



Historic England

First World War Fieldworks in England

Martin Brown

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SUMMARY

The thematic study of First World War fieldworks in England has drawn together evidence of trench systems and other defensive works by drawing on a range of sources. It demonstrates a wide geographical spread of fieldworks that can be divided into three principal forms: those created for, and during, training; those intended for defence against enemy action, and those with specific functions, whether for public information and propaganda, or for developing techniques of camouflage.

The report considers the development of field fortification during the conflict, presents case studies of notable sites and makes recommendations for further works. A supporting gazetteer has been created to document identified examples of First World War fieldworks in England.

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DATE OF RESEARCH

Report was prepared between June 2016 and July 2017.

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INTRODUCTION

“When all is said and done, the war was mainly a matter of holes and ditches.” (Sassoon, 2013: 175)

This thematic study on First World War fieldworks in England has been prepared by Martin Brown, Principal Archaeologist, WYG, on behalf of the Historic England (HE), to facilitate better understanding of the archaeological resource. It is designed to provide a national context for this class of field monuments. The study forms part of Historic England’s contribution to the national Centenary Partnership Programme that seeks to commemorate the centenary of the Great War. It will promote protection through discovery and the identification of the most significant remains. In addition, the report may inform formal designation at the national level, local listing and the protection of previously unrecognised remains through planning and management agreements.

Aims and Objectives

The aims of the project were defined by Historic England in the project brief (Historic England 2015). The project aims are grouped under three broad headings: Understanding, Dissemination and Protection.

Understanding

Aim 1 – To identify the First World War training areas in England and to report on the survival of remains.

Some of the questions to be considered include:

Where were the training areas where training fieldworks were constructed, and when were they constructed?

How do the trench systems we see as field monuments relate to contemporary thinking as presented in official manuals and how is this reflected within the field remains?

Which training fieldworks are associated with other training features, such as, rifle ranges?

Did training fieldworks evolve through lessons learnt on the Western Front, and if so, how?

Is it possible to distinguish between trenches dug to learn trench construction techniques and those dug to practice occupation, night supply and signalling?

Is it possible to identify new experimental trench types in England?

Are there clear, dated, associations with units and training works in England?

Can we identify training works constructed to rehearse for particular battles?

Are any fieldworks clearly identifiable as accurate recreations of German practice?

Can we distinguish between training trenches constructed by individual British and Commonwealth units?

What types of fieldworks were constructed to practice new types of warfare, e.g. gas, tanks, machine gun training and bombing (hand grenade) schools?

Which training works survive and what is the evidence?

Aim 2 – To identify First World War defensive lines in England.

Some of the questions to be considered include:

Where were the prepared defensive lines constructed in England during the First World War?

What form did these lines take and what were their key components?

How do they relate to contemporary field manuals?

Which defensive lines survive and what is the evidence?

Dissemination

Aim 3 – To encourage further research by making information gathered by the project readily accessible.

Protection

Aim 4 – To improve the protection of First World War fieldworks through providing a clear national overview of their locations and significance.

Aim 5 – To understand the value of these features.

Some of the questions to be considered include:

What can we learn from their plan forms or excavation?

What communal values do they hold?

Definitions

The project brief defined two classes of monument for consideration within its scope: defensive lines and training works. These may effectively be defined by drawing on the 1908 *Manual of Field Fortification* (War Office 1908:3)

Provisional Fortifications are described as “works of defence constructed during, or in immediate anticipation of war and used to supplement deficiencies of permanent defences, or to create an extemporized fortress at some point” (Ibid) when its strategic importance has increased. The Manual describes works of this class as “semi-permanent”. This definition has been employed in the definition and assessment of temporary defences for vulnerable coasts and strategic locations and for the defensive lines intended to impede a German advance following an invasion.

Field Fortification is described as “measures taken to strengthen ground which it is intended to only hold for a time and executed “either in face of the enemy, or in expectation of his immediate approach” (Ibid). The definition of field fortification may be regarded as useful in describing many of the training trenches identified as part of this study. Nevertheless, it should be remembered that the fieldworks identified in England reflect a wider class of monuments than simple replication of “measures taken to strengthen ground”, including weapons development, specialist training and even propaganda. This, third, looser class of fieldworks includes trenches created or adapted for other purposes and is less easily defined, though it may include *temporary fieldworks with specific purpose not immediately concerned with the holding of ground or to supplement fixed defences*. This definition can include widespread examples of training works for Infantry but will also cover sites trenches identified at Bovington, used to train tank crews, Winterbourne Gunner, where chemical weapons were developed, and Lytham St Annes, where a set of trenches was open to public view.

METHODOLOGY

Assessment Methodology

In order to assess the value of archaeological assets studied, a set of criteria was developed to consider evidential, historical, aesthetic and communal value. Professional judgement is used in conjunction with these criteria to undertake the assessment of archaeological value and significance.

Sources Consulted

A preliminary list of sites was supplied by Historic England as an appendix to their project brief. This list has been supplemented by further information from Historic England and by the WYG project team. Information gathered during the initial research into historical overview and typology has been used to further supplement the list. They form the core of the final Gazetteer record. The list of sites will differentiate between training works and those sites primarily created as defensive works.

Within the time available for the project it was not feasible to seek data from every Historic Environment Record (HER) in England and not all English HERs include 20th century conflict archaeology within their datasets, or as a separately identified monument type. In order to maximise the return of information available, the following datasets have been interrogated:

Heritage Gateway, using Historic England Thesaurus search terms;

The Defence of Britain database on ADS, although concerned with remains of the Second World War some First World War sites were recorded, either by default, or because of association;

Home Front Legacy records;

Available HER surveys (e.g. Kent, Staffordshire);

Targeted use of National Mapping Project data;

Targeted use of Environment Agency LiDAR data;

Search of grey literature reports using the HE Thesaurus Monument Types

Periodicals and Journals;

Historic England/English Heritage documentation and thematic surveys;
and

Professional engagement with researchers and specialists.

For home defence, strategic locations were considered. England included strategic locations vital in sustaining the war effort, whether in terms of command and control, including the capital city, logistics and supply, including ports and even railway installations serving the Army overseas, and the home stations of the Royal Navy, including Sheerness, Devonport, Portsmouth and Portland Harbour. Defence of such strategic locations came in a variety of both form and scale, from the connecting trenches between pre-existing fixed fortifications to a defended post guarding the entrance to Severn Tunnel, of the defences of Weymouth's waterworks. These locations have been identified from a number of sources including historical sources relating to logistics and troop movements and pre-existing fixed fortifications, such as Palmerston Forts, as well as English Heritage thematic surveys relating to military aviation and coastal defence. In these strategic areas there is particularly high potential for the re-use and adaptation of fieldworks, particularly during the invasion threat of 1940-41 when many of the same locations were retained their significance and their perceived vulnerability. Historic aerial photographs, where available, were used to identify any such sites.

Some areas have also exhibited particular significance due to the range and survival of remains. Kent and Sussex both include a range of sites that includes training areas such as Tolsford Hill or Ashdown Forest, strategic locations such as Sheerness and Newhaven and defended coastlines; both have been the subject of extensive research. Wiltshire was, and remains, the main British Army training ground in England, while Cannock Chase in Staffordshire was heavily used for training during the conflict; both sites are exceptional in the lack of post-1919 development that has led to survival of remains. In this area it has been possible to draw extensively on previous studies. Available surveys used for these areas included those by Victor Smith in Kent (2001; 2016), of Salisbury Plain (McOmish, Field & Brown 2002; Wessex Archaeology: 1998; 2002) and of Cannock Chase (Northamptonshire Archaeology 2006; Brown & Nichol 2014). Where these studies included gazetteers of sites they were confirmed not to have been subject to external threat, such as coastal erosion or development since the creation of the reports, but their conclusions on location, extent and survival of remains were otherwise accepted.

Formal engagement with Defence Infrastructure Organisation Archaeologists and MOD Conservation Group members has sought to identify First World War remains within modern military training areas in England, many of which have their origins in the late 19th or early 20th century. Formal engagement has also been undertaken with the Forestry Commission Archaeologists; this latter contact was of particular importance as these sites may not be readily identifiable from aerial/satellite reconnaissance sources.

The members of the Great War Forum - an online discussion space relating to all aspects of the First World War – were consulted by posting on the online discussion pages. Forum members provided useful comments relating to a number of sites.

Contact with Peter Hart, formerly Principal Oral Historian with the Imperial War Museum, failed to identify any recorded sources from veterans relevant to the study not available elsewhere.

The list of sites was subject to further research to confirm the condition, survival and potential of identified assets. Available data was scrutinised using a range of sources, including:

Modern map research to identify those sites where post-1919 development has encroached on or destroyed fieldworks ;

Online aerial photographic sources, including Google Earth, which has a regression capability, and Bing maps;

LiDAR;

Targeted contact with HER Officers to identify relevant information held by the HER;

Targeted use of National Mapping Programme data and transcriptions; and

Engagement with local information sources and Great War specialists.

Aerial photography was generously supplied by Historic England and included National Mapping Programme data, as well as other information identified during other research.

Site visits to verify conclusions from the desk-based research were excluded from the original proposal. Some visits were undertaken during the course of other survey work on the Defence Training Estate, while personal experience of and previous visits by team members was also employed.

HISTORICAL BACKGROUND

Pre-1914

Entrenchment (the creation of temporary fieldworks for military use) has been a feature of warfare for centuries, including, in the Ancient World, Julius Caesar's circumvallation of Alesia (Keppie 1989: 181-184). By the 17th century, the dominance of gunpowder, with its range and enhanced killing power compared to the weapons of the Ancient and medieval world, changed tactics and fortifications, including in fieldworks, particularly those connected to the siege. Changes in range and power of weapons meant that soldiers dug and moved in trenches, using the power of the earth to absorb projectiles or explosions for protection, in addition to deploying entrenchments as fortifications against enemy attack. While circumvallation remained essential both to thwart attacks by defenders or attempts at relief from outside the siege lines trenches served to minimise visibility from the defenders and to utilise the earth to absorb and deflect incoming fire (Duffy 2006: 90-144). The besiegers would employ trenches to approach the enemy, site batteries and launch assaults; the entrenchments could also include redoubts to act as foci of defence in the event of assault, as at Namur in 1692 (Duffy 2006: 163-167). Significant use of trenches and of tunnelling and explosive mines beneath enemy lines also became a feature of the American Civil War (Brown & Field 2007: 171). The place of field fortification in at least Royal Engineer training is also evident in a variety of sites, including redoubts, batteries and curvilinear trenches, in the home counties that have later 18th and 19th century origins (Brown & Field 2007: 174). The importance of such siege works was demonstrated into the 20th century: The Times reported the following military exercise in 1907 at Fort Luton in Kent:

“The Secretary of State for War visited the siege works on August 2. At Fort Luton the attack had reached the counterscarp wall with two of their four mining galleries, driven from the trench formed by the craters of former explosions. Galleries 3 and 4 had been damaged by the countermines of the defence and had therefore been abandoned. The attack placed five charges each of 200lb. of black powder behind the counterscarp wall. When these were fired they made a very good breach 111ft. broad, the debris filling the ditch and forming a practicable passage. Some men crossed over it into the fort immediately afterwards.” (Kent History Forum 2016)

Discussion of Fort Luton includes reproduction of a number of diagrams, including depictions of “Greek Key” trenches, with a very regular and angular trace that prefigures the style recommended in the wartime manuals (Fig 1 & 2, below) and different to the style of trace shown in the 1908 Manual.

The experience of the British Army in South Africa during the Boer Wars (1899-1902) demonstrated the deficiencies of British field fortification in the face of an enemy armed with modern, high-velocity rifles, artillery and machine guns, as the action on Spion Kop (24th January 1900) demonstrated (Anglo-Boer War Museum 2015). Meanwhile, actions such as Magersfontein and Modder River (11th December 1899 & 28th November 1899 respectively) demonstrated the value of entrenchments,

not only in providing mutual support by supporting and interlocking fire in defence and in the attrition of an advancing enemy, but also in protecting the defenders from incoming fire (Battlefield Anomalies 2015). One British officer commented that:

“The Boer trenches are marvellous...our rotten little, scooped out affairs, a foot or so deep, in one long line, always open to *enfilade*... theirs are *at least* four feet deep, hollowed out in front, below ground, with good head cover, and sandbagged; also each trench... can only hold 3 men, then a traverse of earth comes, a *foot thick*, and the trenches are never in one straight line...” (Courtney, quoted in Brown & Field 2007: 171-172 & fig. 1).

The extensive, open nature of warfare and the necessity of defending strategic locations, including railways and bridges against Boer Commandos (mounted columns of men raiding as part of guerrilla warfare) reinforced the need to develop a suite of temporary fortifications that included new constructions and the preparation for defence of existing structures.

Hard experience in South Africa, coupled with military observations during the Russo-Japanese War, notably relating to the Siege of Port Arthur (1904) and experiences in the Crimean War, meant that the value of fieldworks was recognised in official military circles (Barton, Doyle & Vandewalle 2004: 35-37). Indeed, the Fort Luton exercise of 1907 may have been in response to observations from Manchuria in 1904. Similarly, the Royal Military Academy changed its syllabus in the aftermath of the Boer Wars, including having cadets dig shelter trenches and learn fieldcraft outside the classroom (Newsome *et al* 2009b: 63). The resulting British Army response to the changing battlefield was the War Office manual: *Military Engineering (Part 1) Field Defences* (1908). The 1908 Manual provides a useful definition for fieldworks that informs the definitions used in this study:

“Fortification is usually divided into the following three branches:

- a. Permanent Fortification, which implies defences of the most complete kind. Such works must of necessity be constructed in time of peace, and are employed to protect important centres, or to bar lines of advance.
- b. Provisional Fortification, in which the works of defence are constructed during, or in immediate anticipation of war. It is used to supplement deficiencies of permanent defences, or to create an extemporized fortress at some point of which the strategic importance has increased in consequence of the developments of a campaign. Works of this class are frequently described as “semi-permanent”, but it must be remembered that the question of permanency does not decide the class to which a work belongs. Provisional fortifications may require several weeks for their construction; civil labour and resources will frequently be employed
- c. Field Fortification. Under this heading are included all measures taken to strengthen ground which it is intended to only hold for a time. Works of this kind are executed either in face of the enemy, or in expectation of his immediate approach.” (War Office 1908: 3)

In the terms of this study, the definition of Provisional Fortifications is useful in considering those fieldworks developed for defensive purposes, while Field Fortifications may be said to more appropriately reflect training works.

1914

The British Expeditionary Force (BEF) mobilised following the German invasion of Belgium on 1st August 1914 and began to deploy to Belgium following the declaration of war three days later, following the German rejection of British demands that Belgian neutrality be respected. Open, mobile warfare followed the British deployment, with actions at Mons and Le Cateau but even here, field fortifications showed their worth: a significant German assault at Nimy was held up by rapidly entrenched men of the 4 Bn Royal Fusiliers (MacDonald 1989: 97, 101). By 20th October 1914 the Germans had launched an offensive intended to drive the BEF from Ypres and ultimately, from Belgium. In anticipation of repeated assaults GHQ BEF issued the following order:

“Action against the enemy will be continued tomorrow on general line now held, which will be strongly entrenched.” (MacDonald 1989: 364).

This instruction was followed 10 days later by orders urging vigorous offensive action to reverse German advances, but instruction from General Sir Douglas Haig, commanding I Corps, reveals a more pragmatic approach as he ordered his troops to entrench as strongly as they could and thereafter to continue to strengthen their positions until the situation became clearer (MacDonald 1989: 377). Meanwhile, reconnaissance forward of trenches should continue (Ibid.). At this early stage of the war, however, not all trenches reflected the traversed fortifications shown in the 1908 manual and this may reflect urgency of the situation; a photograph taken at Messines in October 1914 shows men from the Indian Corps occupying shallow, untraversed trenches without suitable parapets (Turner 2010: 6, Plate 1).

The gradual development of a fixed Front based on field fortifications created by both sides led to a series of intelligence reports and pamphlets detailing developments from the situation as described in the 1908 manual based on the situation in the field, including the *Notes from the Front* series and Dane's 1915 *Trench Warfare* (Bull 2002: 47 & 20, respectively). Captain E.J Solano produced a useful manual *Field Entrenchments*, which first appeared in November 1914, with a January 1915 Second Edition running into numerous reprints (Solano 1916). The information received from the Front also appears to have been disseminated to troops by less formal means than printed instruction, including letters and by officers returning to train recruits, such as Colonel Corry instructing men of 3 Bn Grenadier Guards at Pullingshill Woods (South Bucks Free Press 18/6/1917: 7). The use and influence of the 1908 manual may, nevertheless, be seen in early war trenches: at Pennally (Pembrokeshire, Wales) a trench complex identified as early war by RJC Thomas (1997: 5-6) exhibits High Command redoubts formed within the wider trench system and similar in plan to those shown in the manual.

Captain Solano was clear in his definition of field fortification as a measure “taken for the defence of positions intended to be held only temporarily” and “a means to an end, and not an end in itself... to enable the soldier to use his weapons with the greatest effect” (Solano 1916: 3). He went on to note that in attack the 1914 Infantry Training manual stated that attacking infantry should “not delay the attack or diminish the volume of fire by entrenching” (Solano 1916: 2). However, he did state that “all important tactical points captured in an attack should at once be put in a state of defence, so that attempts on the part of the enemy to recapture them may be defeated, and they may serve as supporting points to the attack” (Solano 1916: 3).

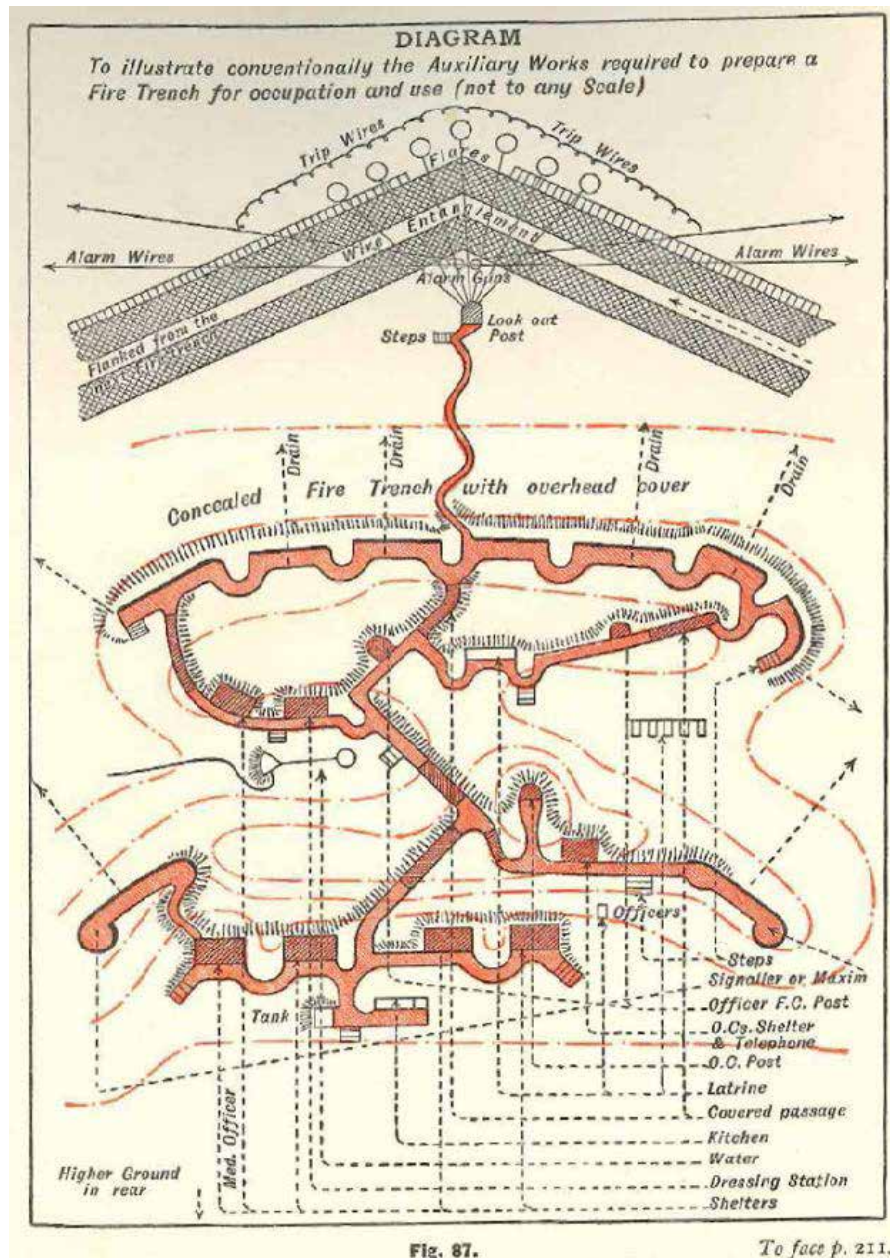


Fig. 1 Illustration of trenches from Solano (1916)

The New Armies (1914-16) & Mass Conscription (1916-18)

Lord Kitchener, installed as Secretary of State for War following the outbreak of hostilities, considered that the conflict would last at least three years and that Britain would not be ready to deploy her full strength until 1917 (Simkins 2007: 38). On 6th August, Kitchener instigated plans to expand the Army, initially by 100,000 men, effectively doubling its size, which he referred to as a “new army” (Simkins 2007: 39-40). The resulting recruitment campaign brought in nearly 2.5 million volunteers by the time of the introduction of conscription in 1916 (Simkins 2007: 326), with 478,893 volunteers between 4th August and 12th September 1914 alone (Simkins 2007: 75). Approximately 2.5 million further men were conscripted between 1916 and the end of the War following a waning of volunteer recruitment and increasing casualties as the war, true to Kitchener’s prediction, continued well beyond Christmas 1914. All recruits required basic training and all those likely to serve at the Front required specialist training in the construction and repair of trenches and in the skills required to function and fight within them.

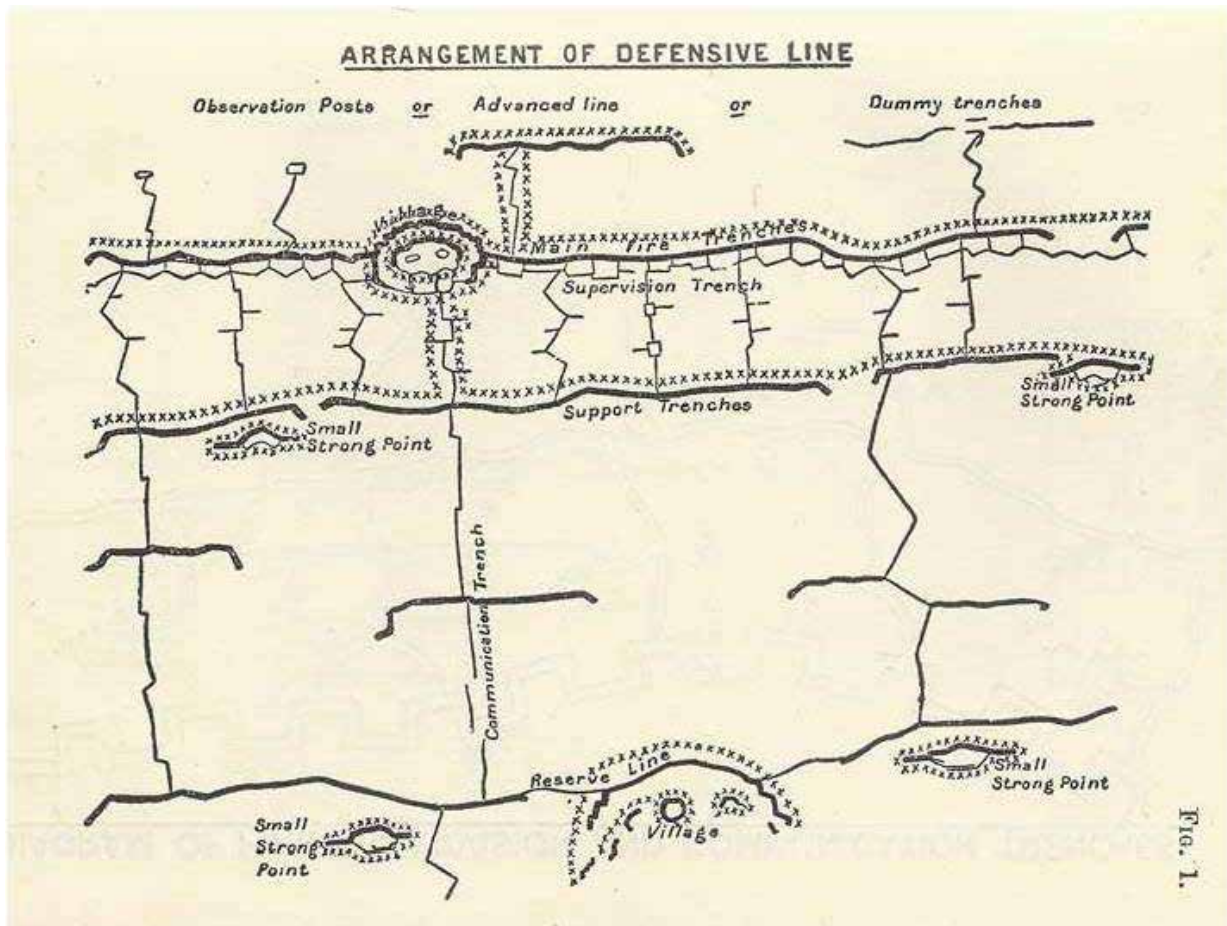


Fig 2. The typical layout of a trench system (from Notes for Infantry Officers, 1916)

The expansion of the Army required an attendant expansion of establishments to train the recruits beyond the existing barracks. Existing barracks were extended, with hutted accommodation built to enhance them, as was seen at Shorncliffe and Aldershot, but elsewhere land already used for summer training camps was

retained for the construction of temporary camps, such as Westdown and Larkhill on Salisbury Plain (James 1987:122-123, 126) or Cannock Chase (Staffordshire County Council 2009a) but elsewhere land was lent to the War Office in response to the national emergency, resulting in camps such as those at Halton House (Rothschild Archive 2016) or Belton House (Time Team 2012). The level of infrastructure required to support training may have surprised some generous owners: roads, railway lines, electricity and water supply, and sewage engineering were all introduced at camps; sewage disposal plans for the Cannock Chase camps, for example, show the extent of camps and the efforts made to provide effective sanitation (Staffordshire County Council 2009b; Staffordshire Record Office: D615/M/6/21). Meanwhile training requirements saw the construction of bayonet targets, assault courses, grenade ranges and rifle ranges. Although some of these facilities are known from film, such as “Britain Prepared” (Gaumont 1915), photographs and postcards, they were ephemeral and will have left only alignments of postholes as evidence, others saw major earthworks to create the butts used in training with small arms, many of which still survive as earthworks, such as Belton House, Cannock Chase, Shorncliffe and Clipstone camps.

The widespread and extensive use of trenches obviously reflects the changing nature of the war as the Front stabilised but the digging of trenches can be regarded as having other outcomes beyond the excavation and repair of trenches and the learning of drills. The surge in recruitment left the Army with shortfalls in uniforms and weaponry, meaning that drill, physical training and digging, which were all essential elements of training soldiers, were to the fore in the training of recruits! It may be this ad hoc approach to training that resulted in scattered trench systems appearing across the country in a variety of locations, such as Beverley Westwood (East Yorks.), Heaton Park (Manchester) or in the centre of Bristol (Rowe 2015). In addition, the practice of field fortification had potential for real outcomes in the process of making soldiers. Building the physical strength and resilience of new recruits was vital, whilst some men did hard, physical work many others were employed in other areas and needed to be brought to fighting fitness. At the same time, the Army needed to build the bonds of teamwork, trust and comradeship that made (and make) for effective soldiers (Macdonald 1993: 153-154). Digging trenches became such a staple of training that recruits commented on the miles of trenches dug at home (Ibid.). Although some of the miles of trenches were for home defence, such as 10 Bn East Yorks between Ulrome and Mappleton (Bilton 1999: 33), or as part of the London Defence Scheme (Macdonald 1993: 156), soldiers did remark on the fact that they dug more trenches in training than they ever did in France (Macdonald 1993: 462-463). Meanwhile, The Committee on Ancient Earthworks and the Congress of Archaeological Societies’ joint report for 1915 considered the impact on archaeological heritage and were pleased to note no complaints of damage, despite the “entrenchment, hutting and other work going on all over the country” (The Builder: 260). Typical trenches of this period of optimistic recruitment and the formation of Pals’ Battalions include the Redmires Trenches (SM 1417488) associated with the Sheffield Pals before their move to Brocton Camp in Staffordshire and those of the 17 Bn Manchester Regiment in Heaton Park, which are visible on Pathé newsreel (17manchesters 2014). This period of rapid Army expansion may be regarded as the period during which the majority of practice trenches were created:

although contemporary maps of training trenches are not common, those that do survive, including Perham Down (1915), The Bustard, Salisbury Plain (1916), Larkhill, Salisbury Plain (nd, believed to be 1916) and Bovington, Dorset (1916) all show extensive trench systems in place for exercises. These trench systems are all of such an extent that they indicate extensive trench digging during the period of Army expansion; meanwhile, pre-war forms of entrenchment, like the Pennally redoubts, and associated dating evidence from excavations show that entrenchments were being dug in 1914: 1914 dated live cartridge cases have been identified at Larkhill during 2016 and 2017 excavations and the pressure on munitions during the early months of the war suggests that ammunition of this date was unlikely to have still been available for use into 1915 and 1916. In addition, shallow trenches and sinuous S-curving trenches that reflect the pre-War field fortifications have been identified at Larkhill where they are incorporated into or cut by later trenches that resemble more closely the developed trench systems of the Western Front from 1916 onwards.

The trenches of 1914, originally envisaged as temporary works to hold ground over the winter, were extended and strengthened into a continuous and semi-permanent network of opposed fortifications from the Channel coast to the Swiss border. This meant that in addition to the construction of trenches troops could expect to live in trenches, keeping them in good order, maintaining them and improving fortifications. In addition, what essentially became siege on a grand scale meant that new tactical doctrines needed promulgation and practice. Fighting along and within a continuous line of entrenchments made Solano's words concerning the necessity of preparing captured positions for defence against counter-attack particularly prescient (Solano 1916: 3). The instruction was relevant in attack, whether as part of Army-scale action, at Messines for example, or at a smaller scale, such as during Bite and Hold operations developed in later 1916 and 1917 (Griffiths 1994:32-33), because the German Imperial Army developed their own doctrine of *Eingreif*, or counter-attack, that sought always to retake captured ground (Sheldon 2007: xii).

The realisation that the scale of the war was different to anything previous was not unique to the British. Like their British counterparts, the Germans underwent a learning process regarding the construction of effective field fortifications. Before the outbreak of war German infantry were instructed in the construction of short, relatively shallow trenches with improvised dugouts akin to the British 1908 Manual, with trenches intended as short-term features with a specific tactical purpose (Laudan 2015:46). However, historical sources demonstrate a German learning curve in the construction of fieldworks comparable to that of the Allies. A series of sketches made by Hauptmann der Reserve Karl Gruber of Infanterie Regt. Kaiser Friedrich III (6. Badenisches No. 114) shows the development of trenches. They are artistic depictions, rather than technical drawings, showing soldiers at work, and date from 1914 to 1917. A simple cut and cover dugout and one man foxholes are shown in drawings of mid-August and October 1914 prior to the stabilisation of the line at the end of the year, neither appears to afford much protection (Op. cit: pp 46-47). By the turning of the year a sketch shows development of formalised trenches at La Bassee with traverses and barbed wire, though still with scant shelter for the garrison (p 47). Illustration from Loos in early 1915 show how quickly trenches have developed into regular trench systems with sand bags, traverses and fire

steps (p 49), while drawings from April and May 1915 depict deep dugouts, which Gruber called “rabbit holes” (p 51) and the scramble of troops to the surface at the alarm in anticipation of an enemy assault (p 52). A supporting plan also shows the layout for a redoubt, including positions for dugouts (Ibid.). The author notes that IR114 was heavily involved in the improvement of trenches and the construction of dugouts following their occupation of the line in the Loos sector from December 1914 onwards (op. cit: 50-51), while the same process was repeated in the Auchy sector (op. cit: 52-53). A constant of learning from trial and error continued through the war but by the end of 1915 a blueprint for effective trenches was in place (op. cit: 55). At almost the same time (Spring-Summer 1915) a British soldier was also sketching the trenches he occupied. Henry Buckle of 5th Battalion, The Gloucesters created a series of watercolours of his time in Flanders (Read 2012). Buckle’s illustrations show trenches at Ploegsteert and Gommecourt Wood, with the fortifications at St Yvon in Belgium (June 1915) and Gommecourt in France (July 1915) exhibiting an array of features including dugouts and fire steps as part of trench systems heavily reinforced by sand bags (Read 2012: 43, 81, 102-103). Buckle’s images demonstrate that by Spring 1915 the British had also learned how to make and maintain effective trenches. Meanwhile, the ubiquity of trenches is demonstrated at Kut in 1916 (Mesopotamia, modern Iraq) where British forces fortified the town, which occupied a bend in the river Tigris, and were besieged by Ottoman forces. An officer of the 1st Battalion the Oxfordshire and Buckinghamshire Light Infantry noted that “Of the next few weeks the chief memory that remains is one of digging.” (Crowley 2006: 48), while the regimental history of the 4th Battalion the Hampshire records that “...A Company lived underground in open trenches and dugouts throughout the whole period of the siege... this was the experience of other infantry units (Ibid.).

Training grounds have also been shown to have scale models of trench systems that appear to have been used for instruction. Such models may have a variety of functions from the instruction of recruits in the appearance of trench systems prior to deployment; in the pre-operational briefing of troops about to go into action, or in using past engagements to identify lessons learned and inculcate those lessons amongst the soldiery. The most elaborate of these were the tactical models, including examples used in preparation for the Battle of Messines (June 1917) and the 1918 cement and brick instructional model at the New Zealand Rifle Brigade camp on Cannock Chase (Staffs.), which embodied objectives for training, and in the creation of unit ethos and memory (Brown 2012: 78-80). Other examples, however, include trench systems too small to have a practical value in the construction or repair of trenches, or in the disciplines of life at the Front. Recent examples identified in evaluation at Larkhill (Wilts) exhibit plans consistent with Great War trenches, but no more than 0.40m deep and 0.30m wide, whilst two examples of trenches on Cannock Chase (Staffs) are considered to be of unusual form and, again, appear to be smaller than might be expected and smaller than other nearby examples (Welch 1997; Birmingham University 2007). It is likely that both examples were used as models to demonstrate the component parts of trench systems and both are close to nearby bases for timber huts, which may have been classrooms associated with the models (Birmingham University 2007: Fig 10). This practice may be seen as a continuation of instructional practice such as the late 19th century shed at Woolwich, built adjacent to the Rotunda to facilitate the construction of large scale

sand models of fortifications (Newsome *et al* 2009a: 18). The modern soldier has access to a range of techniques available to depict terrain, using computer technology. Meanwhile, the soldier of 1914 had a multiplicity of maps, photographs, both aerial and panoramic, and sketches to depict the battlefield, the terrain model remained the only effective way of rendering that information on three dimensions.



Fig 3: 1946 RAF aerial photograph showing Salisbury Plain, with two systems of opposed trenches (centre), with further fieldworks (right and bottom left) and associated rifle ranges (left). The trenches are overlying late prehistoric and Romano-British square fields (3G/TUD/UK/157. 19 Apr 1946).

New Weapons and Technology

With the linking of extensive trench lines creating a single front from the Belgian coast to the Swiss border, the situation became, in effect, a siege carried out on a scale incomprehensible to Julius Caesar or the 17th century military engineer Vauban. The problem of breaching an enemy fortification and carrying the force of arms through that breach would have been, nevertheless, a familiar problem. As a

result, there were a range of developments intended to change the battlefield, whether at local, tactical or strategic levels. In some cases, technology and techniques harked back to antiquity, including catapults for grenades (MacDonald 2005: 33) and the exploding of mines beneath enemy positions as part of a wider assault (Barton *et al* 2004: 29-35). Meanwhile hand grenades became one of the principal weapons of trench warfare due to their simplicity to use and effectiveness in the constricted trenches (Doyle 2008: 135). Grenade training was widespread, as Infantry were expected to demonstrate competency with this weapon (for example Jones 1992:12; Fig 4, below). This weapon was to become an important element in the capture and defence of trenches, with specific tactics and training courses for specialist troops including specialised bombing schools. These schools included that at Godstone in Surrey (Brown 2008: 65) and at Herne Bay in Kent (Great War Forum 2014), Aldershot (Great War Forum 2012), Lyndhurst in the New Forest (New Forest Heritage 2015) or Elm Park, Dublin, (Doyle 2014), all of which included fieldworks where men could practice the techniques of bombing. Trenches at Colchester and Larkhill have also produced significant amounts of grenades, indicating training in bomb hand and rifle grenades during infantry training; in both instances, both blank and live grenades were in evidence (Whittaker & Thompson pers. comm.).

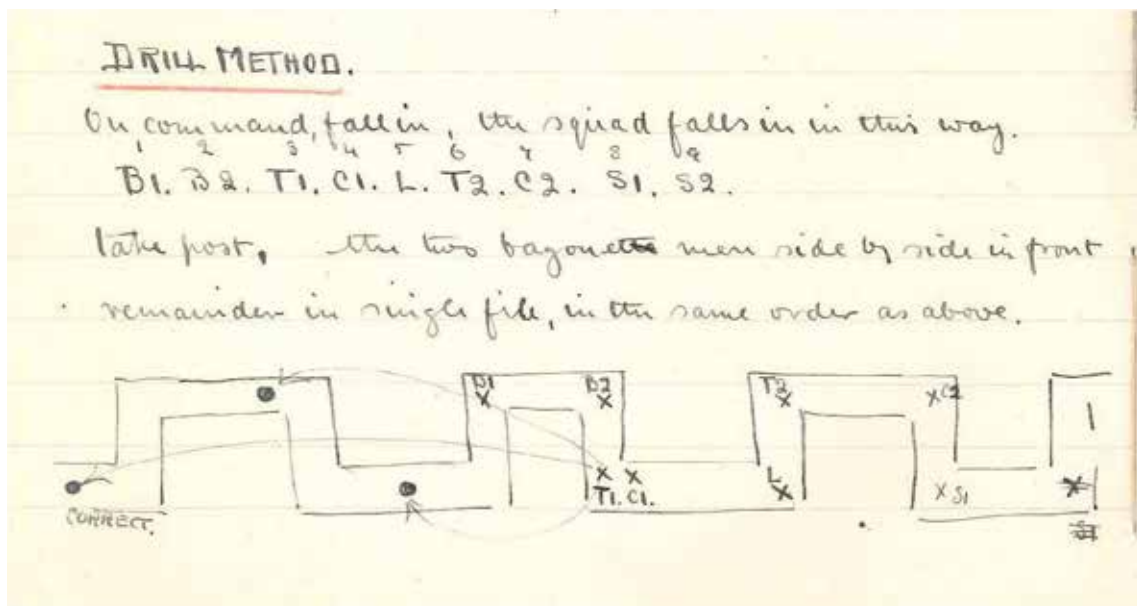


Fig 4: Sketch diagram of the method of clearing an enemy trench using grenades, from the 1916 training notes of Capt. C.W. Bodman (Author's Collection)

Mortars were also developed as a weapon, with the introduction of a series of trench mortars (Stokes 3", 2" 'Toffee Apple' trench howitzer etc) designed to reduce or destroy enemy trenches through relatively short-range high angle artillery fire (Doyle 2008: 126). The British Army lacked such weapons in 1914 and the development of trench warfare was accompanied by efforts to introduce a weapon with the impact of the German *minenwerfer* (Saunders 2012: 50-53). Production of trench mortars necessitated their proofing, which appears to have taken place in trenches identified on Clapham Common (South London) (Aerofilms EPW046680) where they were

part of the Clapham School of Trench Warfare (Saunders 2012: 182). Specialist schools were also established in France and in Britain, including at Lyndhurst (New Forest Heritage 2015). Traditional artillery – field guns and howitzers – retained their importance and became the masters of the battlefield, raining destruction by high explosive, shrapnel and, as the war progressed, gas, onto enemy trenches and into the rear areas where supply and dumps, camps, railheads and airfields were located. Fire was largely indirect (fired to map reference, rather than at a visible target) and could be deployed in preparation for attacks, as in the days before the 1st July 1916, used to harass the enemy's rear areas, or in support of attack or defence (Holmes 2004: 395-417). Trenches have been identified within First World War artillery training areas on Salisbury Plain and close to Redesdale Camp (Otterburn, Northumberland) but only the Otterburn trenches have been subject to investigation but included no evidence of use other than as an artillery target, which was indicated by First World War shell splinters, shrapnel balls and fuses (Brown & Nichol 2006:



14-15, 17). Interestingly, the Otterburn trenches had been constructed to a high standard, with features such as fire steps and dug to the specified depth, in accordance with the manual, rather than creating more simple linear earthworks to act only as targets. This detail of construction strongly suggests that their construction was used as a training exercise in itself (Fig 5.).

Fig 5. Silloans trenches, Otterburn, demonstrating the construction, including fire step, parapet and revetting (Author).

Developments in military technology and *materiel* (military equipment, hardware and supplies) during the conflict included significant elements that, not only changed the nature of the conflict, but which also altered the nature of conventional warfare for the coming century: machine guns, tanks, aircraft and chemical weapons, each of which had their own training requirements. A number of sites were assigned specific training roles, sometimes in more remote locations, probably at least in part for reasons of security, which could be more readily be achieved in areas not easily accessed and where outsiders not in uniform might be identified, such as rural Dorset. The development of tanks, particularly, was kept secret, due to the innovative nature of the weapon.

Machine guns were already in use in the British Army of 1914, predominantly the Vickers-Maxim, but the role of machine guns changed. As well as acting as a direct fire weapon, machine guns provided a form of light artillery firing indirectly to grid references, rather than at a visible target, in interdiction roles designed to prevent an enemy bringing up reinforcements or supplies to a section of the line, and in infantry support bombarding enemy trenches with suppressing fire during an attack. Meanwhile, the specialist Machine Gun Corps was formed to better coordinate machine gunnery across Army Divisions and a Corps training camp at Belton House was developed from a Kitchener Army training camp (Time Team 2012; Wessex Archaeology 2013). Belton had an associated gallery range and the earthen butts remain extant within a golf course, while trenches identified at the nearby Harlaxton Manor were used for training in the operational use of the weapon (R. Hirst, pers. comm.).



Fig 6: Overgrown butts from the Belton Park machine gun range (Author).

Testing and evaluation of, and training in use of, tanks initially took place at Lincoln, close to their original factory, but in 1916 tank training was moved to a former infantry training camp on Bovington Heath in Dorset. Initial training had been at

Elvedon (Suffolk) (Glanfield 2001: 139) and on 21st July 1916, as tanks were being demanded for the Battle of the Somme, Col E.D. Swinton staged a demonstration of armoured power at Elvedon, including an advance by 25 tanks across a mock battlefield (Glanfield 2001: 146). A map and photographs of the training area, including the review stand for the King and trenches “crushed in some part by tanks” may be seen on the Great War Forum (Great War Forum 2016a). The map indicates that the simulacrum of the battlefield, including Allied and Enemy trenches and no-man’s-land was centred on TL 8244 7435, these trenches had been in-filled before aerial photographs were taken in 1945 and today the site is under woodland as part of the Thetford Forest. The move to Wool – later Bovington – Camp came in September 1916 due to pressure on available space from the burgeoning armoured formation. Material held in the Bovington Tank Museum clearly show the extent to which the simulacrum of the battlefield was again replicated in Dorset, displaying German defence in depth with multiple trench lines, supported by redoubts, evident on a trench map (Chasseaud 2014: 139). This trench system is the only known example where an attempt to replicate the scale of German defences on the Western Front appears to have been made (Fig 7, below); elsewhere, such as the Larkhill trenches, the pattern of “enemy” trenches mirrors those dug as the “Allied” line and may reflect reuse of trenches previously dug for other training purposes than as an assault objective, while at The Bustard (also Salisbury Plain) the German line indicated on a sketch in the Australian War Memorial is, in fact, a roadside ditch. Much of the Bovington trench system now lies within MOD land used for armoured vehicle driver training and has suffered damage as a result; however, remains of trenches do survive as extant earthworks on land to the east and north of the training area.

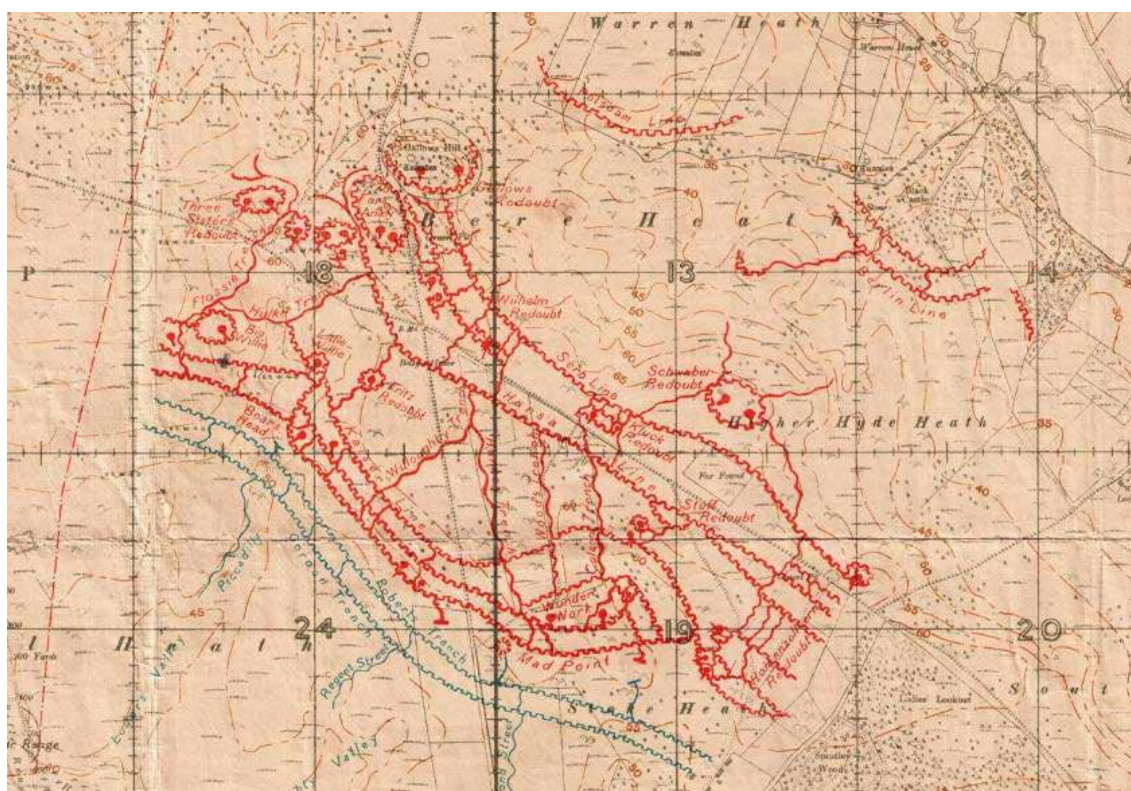


Fig 7: Trench map of Bovington, showing trenches used in tank training (Bovington Tank Museum Library, with permission, also TNA WO 153/978).

The role of aircraft in observation, reconnaissance, aerial photography and eventually ground attack has resulted in the possible association of some training airfields with earthworks but there is, as yet, no definite evidence for the digging of specific trenches for this purpose, though experiments in aerial bombing were conducted at Darland Banks in Kent (Preston 2012: 8).

Training in chemical weapons was undertaken at Winterbourne Gunner (Wiltshire) where specialist training in the use of, and countermeasures against, chemical agents took place. From 1915 onwards, the Royal Engineers undertook testing and training in this area, developing experimental trenches to support their work. A large circular earthwork on Idmiston Down (Wiltshire) resembles a henge, or causewayed enclosure but is, in fact, a circular First World War trench constructed to allow training in delivery of chemical agents from cylinders within trenches, whatever the wind direction; however, as artillery became the dominant method of delivery the trenches became a target and were altered to include gas sampling points and shelters and dugouts where methods of sealing entrances against chemical agents could be tested. This monument has been designated as Scheduled Monument 1014818 in recognition of its unique nature. Elsewhere, training in defence against gas, including familiarising troops with the use of respirators, was undertaken. Identified training sites include Maresfield (East Sussex) (East Sussex 2016) and land east of Seaford (East Sussex) that was used by Canadian troops and which is depicted on a contemporary painting by Fred Varley, held in the Canadian War Museum (CWM 197-10261-0772); however, it is otherwise difficult to identify gas training sites without recourse to archival sources.

The requirement for effective camouflage of trench lines, infrastructure, and even the spoil arising from deep mine galleries, posed a problem as the use of aerial reconnaissance became widespread. Sniping had also been a particular issue in the trenches and a variety of methods were employed to facilitate observation of no-man's-land and the enemy trenches beyond; these included fake trees, portable observation posts and loopholes for observation disguised as sandbags (Rankin 2008: 132; War Office 1918: Plate 26; War Office 1921: Plate 52). The Camouflage School, England was started in 1916 as an exhibition ground to demonstrate methods of concealment and was used by officers on secondment, but expanded and developed an experimental branch. There was extensive information exchange between the School and The Park, the camouflage school in France, with officers from the school touring Corps depots in order to ensure effective training (Royal Engineers 1926: 112-113). The School was located in Kensington Gardens, between Bayswater Road and the Serpentine, and is shown on wartime aerial photographs (Q95936). The establishment included an area of simulated battlefield, complete with trenches and shell-holes. Further experimental work, including demonstrations of prototype tanks, was also undertaken at the Ministry of Munitions Experimental Ground at Dollis Hill (NW London) (Stern 1919: 40). The experimental ground was also the location of trials of the Livens Large Gallery Flame Projector, a flamethrower capable of firing 100 metre jets of burning oil and intended for use on the Somme (Banning 2011; Wils 2012). Although the flame projector was installed near Mametz, in anticipation of the Somme offensive, it was never used (Time Team 2011). Dollis Hill, Clapham Common and Claremont Park all provided locations for experimental

grounds (Saunders 2012: 72) though the extent of trenching at Claremont remains unknown due to heavy vegetation and tree cover, while the Dollis Hill site has been built over in the expansion of London.

A particularly effective method of breaching the enemy line employed by both Allied and Central powers was the use of mines dug from one's own trenches and extended beneath no-man's-land until an explosive charge could be laid. The detonation of such a charge could be used to destroy enemy trenches. Operations of this kind could be employed to secure localised tactical benefit but were also deployed in numbers across the battlefield during major offensives, including the opening days of the Somme offensive in 1916 and, most spectacularly, in June 1917, when 19 mines were exploded beneath the German lines as the opening gambit of the Messines offensive and shattered not only German defences but also the defenders' will to fight (Brown & Osgood 2009: 53-60). Mining had been a standard tactic in siege warfare, with attackers undermining walls to effect a breach since the fall of Jericho (pace The Book of Joshua 6: 1-27) and had been in regular practice by the Royal Engineers in the years before the First World War (Barton *et al* 2004: 43-47) before its adaptation for trench warfare. Evidence of training in mining enemy trenches can be seen at the Bustard trenches on Salisbury Plain and at Darland (Gillingham, Kent) where an extensive trench system is visible on aerial photographs of 1940. The Darland trenches show the effects of mining, with large craters visible; unfortunately, this site has now been redeveloped as an industrial estate. The Bustard trenches include a mine blown during an exercise on 5th November 1916 and used to test troops' proficiency in taking and fortifying the upcast soil that formed the lip of the crater, cutting in shallow trenches and short fire trenches (Brown & Osgood 2009: 40).

Military aviation was in its infancy in 1914, the Army had only started to take a serious interest in aeroplanes in 1910 and the Royal Flying Corps was only founded in 1912 and British preparations lagged behind France and Germany (Barber 2011: 83). The use of aircraft for reconnaissance, including aerial photography, expanded rapidly and was used for reconnaissance and as an information gathering tool for the creation of trench maps. Techniques and cameras improved throughout the war and, for example, experimental flying in assessment of stereo photography was taking place across southern England in 1915 (Barber 2011: 104). Meanwhile, the use of aircraft in ground attack developed throughout the war and trenches appear to have been used as target for training airmen, as demonstrated on aerial photos of Yarnbury hillfort (Wiltshire) where bomb damage is visible (Barber 2011: 109; English Heritage Archive: CCC 11822/130).

Home Defence

The First World War can be described as one of total war, with the mobilisation of the state's resources in support of military aims and objectives. Although the home nations were little touched by enemy action, there remained a perceived threat of attack, whether a naval landing in force, if not actual invasion, and of attacks on strategic communications and infrastructure. In addition to defences on areas of exposed coast deemed to be vulnerable (principally the east coast opposite Germany and occupied Belgium), field fortifications were extended to connect the pre-existing

chain of Mobilisation Centres on the North Downs and outworks were created around large fortifications. Key installations, including ports, railways and even the approaches to the Severn Tunnel were also protected. Although the parachutists and glider troops of the Second World War were unthought-of in 1914, the naval landing party, terrorist group and spy network undertaking sabotage, all posed a plausible threat, while the German support of Irish insurrection through gun-running and the insertion of Irish Nationalist agents, such as Roger Casement, demonstrated the potential for action on behalf of enemy powers (McNally 2007: 13-14; Townshend: 126-128). War Office calculations were that an invasion force of at least 70,000 enemy troops was possible and a "Central Force" was established and this included a strategic reserve, as well as men garrisoning fixed defences and providing local guards (Saunders 1997: 94).

Although Home Defence rested on the cornerstone of the Blue Water doctrine - that the Royal Navy would prevent enemy forces closing on the coast - there had been coherent land-based defence strategy, particularly on the coast of south-east England, since the time of Henry VIII (Saunders 1997: 13-18). The rise of industrial power and industrial warfare had seen a significant reconsideration and reinforcement of defences, including the construction of the Palmerston Forts around Plymouth and Portsmouth in the mid-19th century. In addition to the established batteries, there were 26 defended ports and naval bases where permanent fortification, such as Newhaven Fort (Sussex), Fort Paull (East Yorkshire), Shoeburyness (Essex) and fortifications on Portland (Dorset) defended these locations. Military planning from 1911 recommended the strengthening of landward defences around strategic locations, reviewing the existing defences at Portsmouth, Plymouth and Chatham (Longmate 2001: 426) while in 1912 the Wilson committee on Defence of Coast Fortresses and Coast Batteries against Land Attack recommended the implementation of defence schemes based on blockhouses, walls, barbed wire and even searchlights (Longmate 2001: 427). As actions at Port Arthur had shown, fortifications supported by temporary fieldworks remained eminently defensible (something further demonstrated at Verdun in 1916) and this appears to have led to the creation of such supplementary earthwork fortifications following the outbreak of war, as at Scraesdon Fort (Plymouth) (Wessex Archaeology 2008). Trenches identified north of Browndown Camp (Home Front Legacy site 1) have been described as having a training use but it appears likely that they were at least initiated as a flanking defence for Fort Grange (Gosport), which is approached from the south and the beach at Browndown; the beach is of gently shelving shingle and perfect for landings, as demonstrated by continued 21st century exercises in landing at this location. A Second World War pillbox, constructed within Browndown's trenches, also suggests refortification and reuse in 1940.



Fig 8 & 9: Trenches overlooking Wacker Quay and acting as flanking defences for Scraesdon Fort (Cornwall) (Author)



More extensive trench networks joined the pre-existing defences around Chatham and then connecting them to the London Mobilisation Centres along a line from Halling to Knockholt (Smith 2001: 81). The Mobilisation Centres formed the basis of the London Defence Scheme and it had its origins in the 19th century when a prepared defensive line was proposed so that London might be defended in the event that an invader defeated the field army (Victorian Forts 2016). The strategy depended upon a chain of 13 fortified Mobilisation Centres acting as strong points on the North Downs, between Farningham and Guildford, and from Epping to Basildon in Essex (Smith 2001: 74). These fortifications were operational by 1903 when a manual for their use was published (Longmate 2001: 384). By 1915 there were lines of defence north of the Thames, one from north of Chelmsford to Maldon and Danbury Hill, and a second from Ongar to Epping in Essex (Saunders 1989: 213). These preparations appear not to have been in response to paper tigers (illusionary threats) provoking imaginary fears: the years leading up to war had seen a number of war games and exercises that envisaged significant landings by enemy troops and in 1903 Lieutenant-General John French commanded a force of 12,000 men that was landed near Clacton (Essex). French's force advanced on the capital but met stiff resistance from home forces led by General Arthur Wynne, who utilised hedges and ditches in lieu of temporary fieldworks (Longmate 2001: 412-414). The defence of London remained an important element in military planning during the war, with defences being constructed, maintained and improved (WO/78/4420). In addition to works supporting existing fortifications, vulnerable areas of coast were also prepared for defence. The creation of temporary fieldworks was often undertaken by recruits as part of their training, including the United Arts Volunteer Rifles who are depicted working on defences at Woldingham (Surrey) under Royal Engineer supervision, in a series of photographs held by the Imperial War Museum (Q23546 – Q23549); nevertheless, there remained the possibility that these trenches might one day become the front line and the IWM photographs give an indication of the strength and depth of the works.

Naval exercises in 1912 included the timetable for a landing at Filey (North Yorkshire), and in 1913 at Blythe (Northumberland), Sunderland and on the Humber Estuary (Longmate 2001: 423) and were designed to test Royal Navy reaction times, while Allied operations at Gallipoli demonstrated the feasibility of landings in force, in the face of the enemy, even if the subsequent operations were not successful. The result of the possibility of raids in strength, if not invasion, was taken seriously and vulnerable coastline and strategic locations saw a massive expansion of defence works (Foot 2006: 2). Many of these defence works were of a temporary nature and they survive today, like training trenches, as archaeological features (Smith 2016: 66). Following initial fears that, as would happen in 1940, the French Channel ports would be lost, the focus for German landings was considered to be more likely to be the east coast but real threats to the English Channel ports, the Thames and the Capital remained (Smith 2016: 65-66). The proximity of the eastern seaboard to the German fleet bases in Germany and on the captured coast of Belgium posed new threats. The strategic importance of the Humber, with its proximity to the German/North Sea and potential vulnerability, as demonstrated by the German raids on the north-east coast in late 1914, was recognised by the construction of permanent batteries at Spurn and Kilnsea (East Yorks) with supporting temporary fieldworks

(Saunders 1989: 211). The 10th Bn East Yorkshire Regiment were sent to guard the coast of Holderness between Ulrome and Mappleton and set to digging trenches and practicing “standing to” (preparing for attack), but the battalion history reports that trenches were dug too close to the cliff edge and, due to the unstable cliffs of boulder clay, they constantly fell into the sea and had to be replaced (Bilton 1999: 33). Later in the war (1917) JRR Tolkien was stationed at Thirtle Bridge, near Withernsea, on the East Yorkshire coast with training detachments of 3rd Bn Lancashire Fusiliers forming part of the coastal defence forces (Garth 2003: 234-236). Meanwhile, the Town Clerk of Southwold recorded defensive measures on the Suffolk coast, which saw the barbed wire laid along the cliff top and firing positions and trench systems behind (Longmate 2001: 443). Harwich also saw significant defence works, some of which survive amongst the Second World War fortifications (WO/78/4423), but it was not only eastern harbours that were defended – Liverpool also had its temporary defences (WO/78/4422).

In some locations, concrete pillboxes, more usually associated with the anti-invasion defences of 1940, were constructed and, like their Second World War successors, were supported by trench lines and barbed wire entanglements. In some places, such as Holderness or north Norfolk, the defences were constructed to create a coastal crust that presented a front edge defence along the coastline to prevent enemy landings and to impede the establishment of a beach head, but this formed the first line of a strategy of defence in depth reliant on temporary fieldworks, including trenches and redoubts, and concrete pillboxes intended to delay the enemy and wear them down until sufficiently large forces could be deployed to destroy the invader. Stop Lines, again prefiguring the defences against Hitler’s forces, were also constructed to impede an enemy advance into the interior and in strategic locations and the careful positioning of pillboxes in the north Norfolk First World War defences was such that pillboxes were surveyed for re-use in the creation of anti-invasion defences in 1940 (Foot 2006: 2). One such example of a site used in 1940 that had been defended in 1914 is Little London (Norfolk) where a pillbox and associated entrenchments (Home Front Legacy 8149 & 8150) form part of a stop line utilising a canal as a physical obstacle. Such First World War defensive lines included the Medway-Swale Line (Saunders 1997: 94; plate 65) and the London Defence Ring in Essex, Kent and Surrey (Smith 2016: 85). The latter included a 70 mile long shielding arc of field defences to the south and east of London, with a further 25 miles from Medway southwards, where LiDAR survey has demonstrated the extent of survival (Ibid.). Survey in Kent has identified surviving elements of trenches associated the Swale-Maidstone line associated with pillboxes east of Newington (Kent), with other possible trenches at Box Hill (Surrey), militarising a popular pre-war beauty spot. (Smith 2001: 81). Fieldworks on Spurn, the peninsula extending from the plain of Holderness into the Humber estuary, and in East Anglia and Kent were also supported by concrete pillboxes. This German innovation on the Western Front was rapidly adopted by the Royal Engineers as a stronger, permanent version of the blockhouses and defensible posts used during the South African wars (Military Times, 2011: 18) and in Burma, and evident in the 1908 Manual (War Office 1908: Plates XLVIII, XLIX and LI). These blockhouses were set within a polygonal defensive perimeter and aerial photographic evidence of one such may be evident on NMP mapping of Salisbury Plain at NGR SU 084 463. This feature

appears to be defending the junction of the road between Rollestone and Tilshead and a north-south byway from Tilshead to Blackball Firs. It appears also to have been overlain by a later crenelated fire trench with communication trench entering from the east. Another example of South African style defence of strategic defence is at the eastern, English end of the Great Western Railway's tunnel beneath the Severn at Avonmouth. Annotated plans show a blockhouse within wire entanglement overlooking the eastern end of the tunnel. Annotations commenting on the state of the blockhouse indicate that the works were carried out. Such blockhouses, with supporting fire trenches, have also been identified as part of the extensive defence network around Weymouth and Portland, such as on Spring Bottom Hill, near Osmington (WO/78/4418).

Display Trenches

A series of trenches, called the Loos Trenches, were constructed at Poulton-le-Fylde (Lancashire) in 1915 and have been identified on aerial photograph (NMR SD 3133/001). They are associated with Battalions of the Loyal North Lancashire Regiment and were initially dug as part of their training (Loyal North Lancs. 2016). The trenches were then adopted by wounded servicemen and appear to have been maintained by them as part of rehabilitation; they were, however, open to the public following the Battle of Loos, from which they took their name. These trenches were intended to give visitors a sense of the actuality of the trenches of the Western Front, albeit a heavily sanitised version (Doyle 2008: 168)! The trenches appear to have retained this function and were renamed Arras Trenches in 1917, following the spring offensive in Artois. They were subject to limited archaeological excavation in July 2014 (Home Front Legacy 2014). The excavations identified significant remains of the trenches and excavators were able to identify some excavated features as named trenches, including Laventie, Chemin-de-Luxe and Rotten Row, that appear in contemporary sources relating to the trenches in their display phase (Whittall 2014: 33-34). A similar example is also known from Heaton Park, Manchester where training trenches dug and used by the Manchester Pals (16th - 19th and 20th – 23rd Bns Manchester Regiment) were converted into a public attraction following the transfer of troops to Belton Park. These trenches are advertised in July 1916 as “Made by convalescent soldiers” and showing “the actual conditions of Trench Warfare under which your Boys are fighting” (Lancashire at War 2016). Admission was sixpence, with proceeds going to local charity to aid servicemen blinded in the war. The official plan, which was available for One Shilling, shows trenches with a range of dug outs, stores, observation posts, wire entanglements and shell holes, while a display of “war relics”, including uniforms, shells and ammunition is also promised (Ibid). These trenches are now beneath the pitch and putt course.

Other identified display trenches include Kensington Gardens, where the trenches of the School of Camouflage appear to have been open to the public, and a set created for an exhibition in Knightsbridge (see 7.4 below). Documentary reference to a trench open to visitors in the inter-war period at St Martin's Plain at Shorncliffe, Kent, appears in an archaeological desk-based assessment (Seddon 2016: 4.5). It is assumed that this attraction utilised existing First World War trenches but its location is unclear and its post-1919 date places it outside the scope of this study.



Fig 10: First World War Training Trenches at RAF Halton (Author).



Fig 11: Modern reconstructions of trenches built by RAF trainees using original techniques and by re-excavation of First World War earthworks and used for instruction and public display (Author).

CASE STUDIES

Salisbury Plain Training Area

Salisbury Plain has been a military training area since 1899 when the areas approximating to those now known as SPTA East (Perham Down to the Avon valley) and Centre (the Avon to the A360) were acquired (James 1987: 19). Wartime expediency saw the area between the Warminster and the modern A360 (modern Area West) taken over for training, but returned to civilian use in the inter-war period before requisition during the Second World War. Numerous practice trench systems have been identified across all three land blocks (Brown & Field 2007; McOmish, Field & Brown 2003: 138-142).

Larkhill Service Family Accommodation

Archaeological excavations managed by WYG and undertaken by Wessex Archaeology took place between May 2015 and April 2017 ahead of the proposed development of Service Family Accommodation (SFA) at Larkhill, Wiltshire. The presence of trenches had been indicated by the NMP in 2002. As part of the evaluation process the site was subject to geophysical survey and a network of linear anomalies was identified (Wessex Archaeology 2014). Archaeological evaluation confirmed these anomalies to be the training trenches shown on NMP mapping and they were considered to be of First World War origin (Wessex Archaeology 2015). Seven open areas were stripped to characterise and better understand the remains and to support development of a methodology for the archaeological mitigation works across the wider SFA area. Whilst the form of the trenches indicated a First World War date, secure dating, in the form of stratified 1914 dated blank cartridges, provided confirmation. Data gathered as part of this project also provided dating in the form of a trench map that shows Blue (Allied) and Red (Enemy) trenches, with the Red fortifications given names that echo nomenclature used on British trench maps (Fig 10, above). Although not dated, the names are strongly indicative of a First World War date, referencing The Kaiser (Willie), senior Germans (Hindenburg, Tirpitz) and the Leipsic (*sic*) Redoubt, which was a German fortification on the Somme battlefield, indicating a date for the map of 1916 onwards when the British occupied this sector of the Front. The redoubt and a section of Blue Line to the immediate north of Martinbushes Road appear to be aligned toward the north-east, unlike the main systems and no-man's-land separating them, which are aligned roughly north-south. The different alignment suggests that these are earlier training works that were incorporated into the later, larger system. There are a number of features consistent with support and defence within the trenches. Positions created by the use of short saps on communication trenches have been interpreted as weapons pits or bombing pits (from which grenades would be thrown to repel enemy troops), while most are for a single man, at least one is big enough to have been a position for a Vickers-Maxim machine gun. One weapons pit included remains of "sortie steps" shown in "Trench Warfare" (1916) (Bull 2002: 52). These footholds were dug into the trench wall to allow quick deployment over the parapet. They are considered unlikely to have been adopted in trenches amidst the realities of the Front, and none have been recorded archaeologically to date on the Western Front;

trench ladders were more effective. At least one T-head sap has also been identified within the plate 2 Blue trenches, giving observation and fire over trenches around it and down-slope toward the Red line.



Fig 12: Sortie Steps in a bombing pit, Larkhill SFA development (Author).

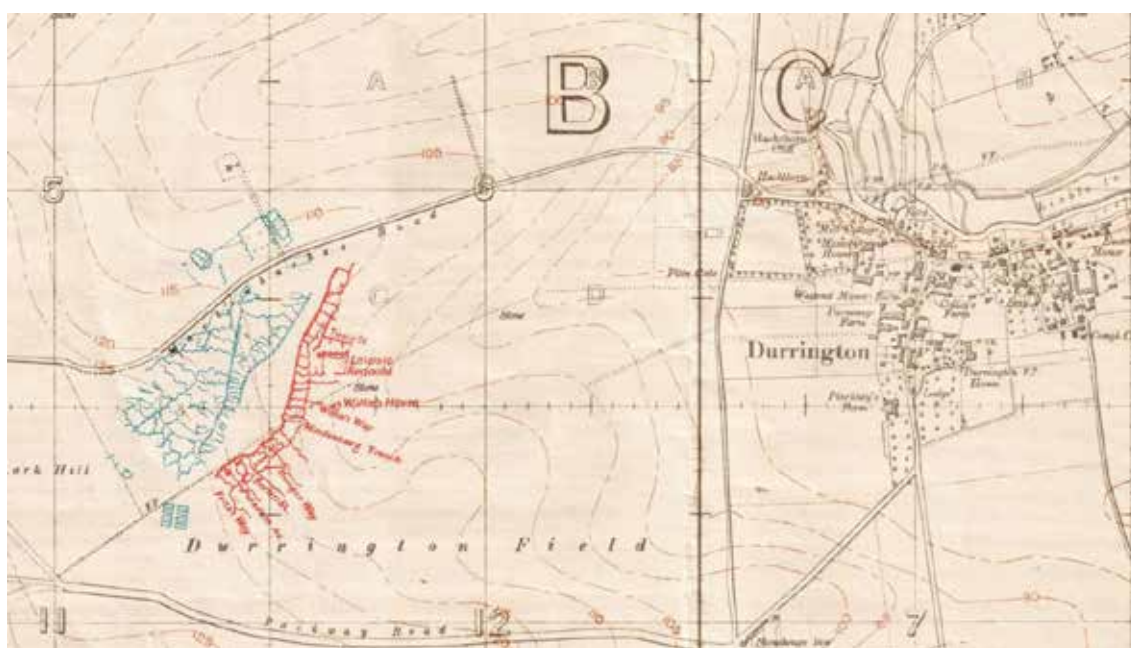


Fig 13: Artillery Training Map showing training trenches on Salisbury Plain at Larkhill (Private collection).

In addition to the fully developed systems shown in Fig 13 (above), excavation has revealed the remains of tunnel systems beneath no-man's-land, extending from both Red and Blue lines, as well as further fieldworks, including a series of zig-zag communication trenches with squared island traverses (Fig 11, above). These trenches connect a pair of straight, linear features that do not reflect military practice, suggesting that they may have a simple function, such as forming men up before passing or fighting through the communication trenches. Elsewhere, the extensive stripping of the site for archaeological recording has shown the map to reflect a moment in time and that it is clear that there are different phases of construction (Fig 12). Over one hundred Mills Bombs and rifle grenades, both live and detonated, that were recovered from trench fills under specialist Unexploded Ordnance supervision, demonstrate the use of live ammunition in training for clearance of enemy trenches.



Fig 14: UAV imagery showing communication trenches with squared island traverses, Larkhill (WYG/Wessex Archaeology).



Fig 15: UAV imagery of First World War trenches at Larkhill (WYG/Wessex Archaeology).

The Larkhill practice trenches are associated as a monument class with further extensive remains across Salisbury Plain (Brown & Field 2007: 170-177), but have specific geographic association with the remains of camps along the Packway (Wessex Archaeology 1998: 20-21), for which they appear to have provided “back door training” whereby soldiers could easily access the trenches from their nearby camps. One such camp was home in 1916 to Australian 3rd Division, who are known to have undertaken extensive and realistic training in preparation for deployment to Belgium and participation in the June 1917 Battle of Messines (Molkentin 2006: 48-50). Photographs held in the Australian War Memorial show men from this formation in training at Larkhill, including one image showing them in trenches (AWM H00447). Comparison with the Larkhill SFA site suggests that the image may well have been taken toward the southern end of the Blue Line, and looking northwards. Further evidence of units and, more specifically, individual soldiers has come from pencil graffiti at the entrance to the identified tunnel and visible in the exposed galleries revealed by a collapse: Identified individuals include Pte White, who is thought to have served with the East Surrey Regiment and the Wiltshire Regiment and who survived the war, while Pte Fleming of 37Bn Australian 3rd Division also survived the war by the expedient of going absent without leave (AWM Papers).



Fig 16: Soldiers' graffiti in the entrance to one of the tunnels (WYG).

It is notable that there is no discernible difference in construction within the trenches that could indicate a specific style of work by Australian troops; the trenches exhibit the same range of features and form as other examples that do not have identified Dominion troops involved in their construction or adaptation. This is probably because all British Imperial forces were using the same manuals. Artefacts, such as an Australian toffee tin and graffiti are indicators of Anzac presence, but trench architecture is not considered indicative.



Fig 17: Australian troops training on Salisbury Plain, probably at Larkhill (AWM H00447).

There is evidence of tunnelling beneath both sets of trenches, where remains have been identified that have included a collapsed junction of four tunnels, as well as a tunnel entrance from a sap leading to an incline believed to access dugouts. This is believed to be the first example of extensive subterranean warfare training identified outside the Royal Engineers training grounds in Kent and their satellite camps at Kelham Hall (Notts) and Deganwy (Wales). Investigations ahead of development have revealed galleries accessed from the front line leading to a series of listening posts, replicating methods of identifying enemy counter-mining. In addition, one countermine extending from the blue trenches (see Fig 13 above) was identified heading toward the galleries dug from the red line and one of the listening posts included evidence of auguring that may reflect training in setting a charge to catch enemy miners (S. Jones pers. comm.).



Fig 18: A sap leading to a tunnel entrance within the Larkhill trench system (WYG).

Although a significant part of the trenches at Larkhill fall within the area proposed for development of new Army housing, the northern end of the large trench system and the redoubt and associated trenches between the new development and Martinbushes Road will be retained in open space, currently under grass and scrub, presenting opportunities for further fieldwork and for interpretation.

The trenches were the focus of Battle of the Somme centenary commemorations for 14 Regt Royal Regiment of Artillery, who are situated in the garrison immediately to the west.

The extensive investigation of this complex has shown how trenches were dug, re-excavated, adapted and extended, allowing stratigraphic relationships and phasing to be revealed. In addition, the discovery not only of tunnels but also of associated graffiti, as demonstrated both the complexity of the training environment but also the names and stories of men training within them. The excavations have demonstrated the potential of such a site to show the development of trench warfare

and the changing nature of training, as well as its potential to help reveal the individuals involved with the site over the course of the war.



Fig 19: Dugout and tunnel entrances exposed at Larkhill (WYG).

The Bustard Trenches

Trenches north of Larkhill between Half Moon Copse and Down Barn Wood were used in a major exercise that included the explosion of a mine, whose crater remains visible (Molkentin 2006: 50). These trenches are clearly visible, as is the crater and its defensive saps, on an aerial photograph in the Historic England Archive that was taken in the 1920s (SU0847/5 (CCC4378)). This system was depicted on a trench map (AWM25 473-1-4) that, while not as formal as that shown in Plate 1, gives a clear understanding of the system and their names. Although the majority of the trenches have been backfilled, some shallow earthworks and a small crater in front of the Allied line remains a visible feature on the ground. The large crater and its outworks are not shown on the trench map but they do appear in a series of papers in the Australian War Memorial describing a training exercise as specified in Detachment Orders No. 1 (Monash Papers: AWM RCDIG0000616).

The Bustard trenches are also notable for their association with a series of arborglyphs (carvings into trees) identified within Half Moon Copse that include the names of individuals from the Australian forces (Brown & Osgood 2009: 45-47). Although outside the scope of this study, they demonstrate, like graffiti at Larkhill, the potential for information of this kind to survive in close association with, if not in, fieldworks.

There have been limited archaeological geophysical survey and excavations on the Bustard trenches by Defence Estates intended to better characterise the remains and assess condition and significance (Brown & Osgood 2009: 40-45). Archaeological evaluation trenches have shown that the Bustard trenches have been deliberately infilled and this process has helped to protect them from later disturbance by training troops and military vehicles.

Bulford Down

Bulford Down includes a series of practice trenches on Beacon Hill which extend for approximately 350m and cover some 7 hectares. They include a firing line overlooking Bulford Ranges to the west, with support line and connecting communication trenches; the reserve line utilises a Bronze Age linear earthwork (Brown & Field 2007: 172-3). The trenches may also include a machine gun position (Ibid.) The system is also notable for a series of positions created by use of short saps from the communication trenches between firing and support lines, which have been interpreted as weapons/bombing pits for internal defence within the system, like those identified at Larkhill (Brown & Field 2007: 173, Fig. 2). They are also interesting for an area toward the western end of the system that includes heavily pitted ground consistent with an attempt to replicate the effects of shelling, a phenomenon also seen at Larkhill, Bodelwyddan Castle (Wales) (Spencer, Silvester & Watson 2016: 26) and Duitse Puit (West Flanders, Belgium) (Dewilde 2016: 10-15).



Fig 20: Excavation of German training trenches at Duitse Puit, West Flanders, Belgium (Author).

The same western chalk ridge of Bulford Down ridge also includes another extensive trench system at Halters Hole, overlooking Bulford Ranges to the west and Shipton Bellinger to the east. The trenches occupy a narrow ridge that also includes a large Bronze Age barrow.

Unlike trenches at Larkhill, Bustard and Perham Down, there is currently no identified link with particular units or individuals.

Perham Down

Excavation of elements of the Perham Down trench systems was undertaken in July 2016. An extensive and well-documented network of trenches is located at the eastern edge of the Salisbury Plain Training Area and extends beyond the modern boundary into private land. Documents in the National Archives, including the 100th Inf Bde War Diary (WO95-2428) include a trench map showing a range of fortifications and attendant features, including trenches and redoubts, latrines, kitchens and a variety of posts, including command and aid posts. This map accompanies a Brigade Operation Order, dated 13th October 1915 detailing a major exercise in assaulting the trenches. The Order includes reference to Battalions of the Kings Royal Rifle Corps and the Essex and Middlesex Regiments operating with Royal Engineers and machine gun and trench mortar support. The Order also discusses artillery barrages but this appears to be part of a scenario, rather than evidence of participation as no evidence of shelling was found. The documentary evidence allows the formal association of this monument with individuals, something that the excavators, many of whom were ex-servicemen, were pleased to do and, as 2016 excavations fell within the anniversary of the Battle of the Somme, commemorations were observed and memorial deposits left in some of the excavated trenches, including poppy petals and artefacts.



Fig 21: Perham Down, trench junction with revetment and a fire step (Author).



Fig 22: Perham Down, medical post with raised area for stretchers; also present are modern memorial deposits made by volunteers (Author).

There is evidence that some elements of the trenches remained open after the war and into the post-Second World War period. They appear to be at least partly still in use as a training resource on an aerial photograph in the Keiller collection held by Historic England (CCC 11753/9185; Barber 2011: 91). In addition, evidence of later training use and backfilling post-1945 was identified in the course of archaeological works. The trenches are now, for the most part, backfilled, but appear clearly on online aerial photography (Google Earth) and on aerial photography in the Historic England Archive (CCC 11753/9185) while there are some areas of extant earthworks in woodland plantations.

Cannock Chase, Staffordshire

Two extensive Divisional Training Camps capable of housing up to 40,000 troops were established on Cannock Chase following the outbreak of war. The two camps, Brocton and Rugeley existed for infantry training and were associated with extensive infrastructure, including roads, sewerage, railways, electric power and a hospital, all of which were built in conjunction with the camps, following the outbreak of war. In addition, training infrastructure developed, including rifle ranges and networks of trenches, and bombing ranges (Whitehouse & Whitehouse 1996: 7-10, 18-19). Brocton Camp also housed German Prisoners of War from 1916 (Whitehouse & Whitehouse 1996: 10-11) and was home from 1917 onwards to the 5th Bn New Zealand Rifle Brigade, who trained on the Chase (Brown & Nichol 2014: 5-6).

The Chase was used for military training during the Second World War and is now an extensive open area of heathland an Area of Outstanding Natural Beauty (AONB) and is designated for its ecological value. Unlike some other sites, Cannock Chase has not been subject to intensive modern agriculture or the pressure of post-war development. As a result of its relatively undisturbed state and because of the widespread survival of earthwork remains, Cannock Chase has been subject to an extensive landscape survey by Northamptonshire Archaeology intended to identify and document earthworks and to test the accuracy of mapping of the camps held in the Staffordshire County Record Office (Northamptonshire Archaeology 2006). Meanwhile, recent LiDAR survey, undertaken as part of the Heritage Lottery Fund supported Cannock Chase Through Time project has further revealed the extent of earthwork remains by penetration through the dense vegetation obscuring them. This work has underlined the significance of the Chase as a First World War training landscape that includes camps, infrastructure, ranges and training trenches (Staffordshire Newsletter 2016) .

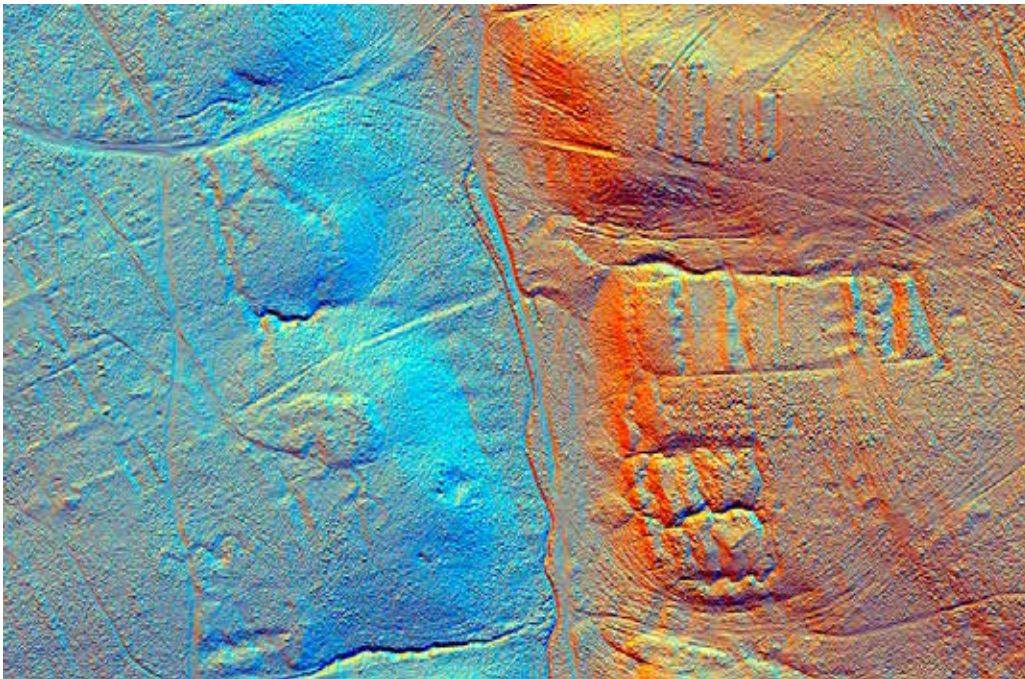


Fig 23: Extract from The Chase Through Time LiDAR survey showing networks of trenches on either side of a valley, with bases of huts on the left hand side of the image (Historic England/Staffordshire County Council).

The Chase is notable for its unique terrain model, which depicts Messines and its defences at the outset of the assault on the town by New Zealand Rifle Brigade in June 1917 (Fig 24, below). The model has been subject to extensive investigation and recording prior to reburial (Brown & Nichol 2014: 11-22). It was created in 1918 and was used for troop training, but also clearly embodies a series of wider and, in some cases continuing, meanings (Brown 2012: 78-80). The model is constructed of cement, brick ends and pebbles and was intended to be, at least, semi-permanent and is believed to be unique as a wartime training aid that was designed to be durable and used repeatedly for instruction.



Fig 24: Detail from the Cannock Chase Tactical Model, showing roadway in pebbles and concrete trench lines.

The Chase in the World Wars has been the subject of historical and archaeological research since the publication of the first edition of “A Town for Four Winters” in 1987 (2nd edition 1996), which has led to formal archaeological surveys and excavations by Northamptonshire Archaeology (2006), Birmingham Archaeology (2007) and the No Man’s Land archaeological group (Brown & Nichol 2013), as well as extensive interest in and promotion of the Chase during the Great War by Staffordshire County Council (2016). These surveys and the Chase Through Time project’s LiDAR surveys have confirmed the extent and survival of First World War remains.

There is also known to be significant local interest in this aspect of the Chase’s heritage. This level of interest and study has included the identification of the association of the site with JRR Tolkien, who trained on the Chase whilst with the Lancashire Fusiliers, as well as positively identifying regiments whose battalions trained on the Chase, including the Barnsley and Sheffield Pals and the New Zealanders (Whitehouse 1996: 38-40). Historical research has also shown that facilities not included in the scant official records that survive, such as the Empress Theatre and a Canteen-Stores (Whitehouse & Whitehouse 1996: Plates, facing page 17), were present, although the location of these and other support services are currently unknown.

Watson Road, Blackpool

Practice trenches were created in land now incorporated within Watson Road Park, Lytham St Annes, between September 1915 and May 1916 by men training with the 55th (West Lancashire) Division. The trenches are depicted in sketch maps by Captain Rae of the Loyal North Lancashire Regiment, but appear to have been developed further beyond his plans. The trenches were taken over by men convalescing in the King's Lancashire Convalescent Hospital at Clifton Racecourse (modern Blackpool Airport) who acted as guides around the trenches which had been named the Loos Trenches, following the 1915 battle. The trenches appear to have become a tourist attraction with a refreshment stall, band concerts and advertisements and proceeds from entrance fees going to the hospital. The trenches were rebranded as the Arras Trenches in June 1917, after the battle fought that April, and they were described as including trenches, a redoubt, dugouts with a variety of functions and machine gun emplacements. The trenches have been the subject of a comprehensive desk-based assessment by Neil Archaeological Services (Neil 2013) and subject to archaeological evaluation by The University of Salford, which has demonstrated survival of the trenches, but limited structural evidence or stratified artefacts (Whittall 2014).

The complex is historically well-documented, with identified units and individuals involved in the trenches both as training asset and tourist attraction. These trenches are noteworthy in their shifting meaning within the militarised landscape at Watson Road that sees them evolve from training asset into, not only tourist attraction, but also hospital fundraiser and an aid to convalescence and physical rehabilitation for wounded soldiers. (Neil 2013). These trenches form part of a small group of trenches open to public view, including Heaton Park and the School of Camouflage trenches in Kensington Gardens.

Kensington Gardens

A network of trenches has been identified on aerial photographs from July 1918 held in the Imperial War Museum (Q 95936). They include both Fire and Communication trenches, as well as a No Man's Land rendered with extensive shell holes. This simulacrum of the battlefield is more developed than many examples, reflecting the use of the Royal Park by the British Army School of Camouflage (AKA School of Special Works) which was operational from 1916 to the end of the war (TNA MUN 4/3353; Rankin 2008: 133-135).

The School was developed by artist Solomon J. Solomon and run by Royal Engineers under Lt Col. J.P. Rhodes (Rankin 2008: 133). Works included concealment of elements of field fortification, including trenches and emplacements (IWM Q95944; Q95949) fake trees hiding observation posts, and machine gun positions, as well as trialling ideas such as fake casualties intended to act as lures to enemy soldiers who might then be captured and interrogated (Rankin 2008: plates 1 & 2). Assessment of effectiveness appears to have included observation from across No Man's Land, with supporting photography (IWM Q95963). The School also experimented with painting schemes for materiel, including heavy artillery and tanks (IWM Q95943).

The site appears levelled on 21st century online imagery available through Google Earth. The 1945 aerial photography uploaded onto the site includes features that may be soil marks associated with the shell holes. Unfortunately the definition of the scanned imagery is not sufficiently high to clearly show any remains. The current levelled state of the trenches suggests careful backfilling at the end of the war, probably as a result of the location and Royal ownership of the Park and, as a result, buried remains may be expected to survive in good condition. The unique nature of these trenches and their relationship to the development of camouflage, decoys and deception gives them an unusual significance.

Newhaven, East Sussex

The port of Newhaven provided a rail served link from the south coast of Sussex to Dieppe, having been developed by the London Brighton & South Coast Railways (LBSCR). Its 19th century importance had been recognised when an artillery fort was constructed on the cliffs immediately west of the Ouse estuary from 1862. The rail-served docks, with links to a French port close to the Front proved invaluable. Newhaven was primarily used for movement of supplies (Chasseaud 2014: 167). At the height of the war Newhaven was handling up to 10,000 tons of supplies daily and as many as 37 transports might be in the harbour at any time (Chasseaud 2014: 178).

In light of its strategic importance a defence scheme was prepared for the port and town in 1914 (TNA WO 78/4412) that included earthwork defences to reinforce Newhaven Fort and Castle Hill, overlooking the harbour. A continuous belt of barbed wire entanglements was proposed to enclose the town on both sides of the river, with detached fire trenches, blockhouses and field fortification networks behind it; the plan also indicates buildings to be prepared for defence. In addition, further trenches are shown providing protective screening to Newhaven by defending the higher ground of the South Downs to east and west of the town (Chasseaud 2014: Fig 8). It remains unclear how much of this scheme was ever implemented, but online imagery does indicate the presence of networks of trenches close to Newhaven Fort, some of which may be traced on the ground, though these may date to the Second World War.

There has been significant suburban expansion and industrial development around Newhaven since 1919, as well as the development of static caravan parks to the west, between Newhaven and the post-Great War speculative development of Peacehaven. Later 20th century development at Bishopstone may also have affected the site of some of the proposed remote defences on Rookery Hill. In addition, Castle Hill was fortified during the Second World War, when a 6" Battery was constructed. The construction of the battery is likely to have significantly impacted remains of the earlier defences for the fort. Meanwhile, the battery is also likely to have included fire trenches for close defence and it may be these, rather than the remains of any earlier fieldworks that are visible on some satellite imagery of Castle Hill. It is possible, however, that in the elements of the scheme that were implemented, the First World War trenches were reused during the Second World War, because the positioning of trenches in 1914 is likely to have been carefully considered. In addition, any trenches dug in 1914 may still have been visible as earthworks in 1940 and would have

been easier to re-excavate them, rather than to dig new trenches in the chalk hill. The trench system therefore has the potential to afford time depth and phasing to remains.

Spurn Head

Spurn Head includes a narrow sand spit some 5km long that extends into the Humber Estuary from the coast of Holderness (East Yorkshire). The southernmost tip is called Spurn Point and is the location of a permanently manned lifeboat station, associated houses and two lighthouses. The spit is formed primarily by a mobile sand bar that is shifted by wave action. During the 19th and 20th centuries formal sea defences were erected to stabilise the spit, but these are no longer being maintained.

The strategic position of the Head, extending into the Humber Estuary, ensured its inclusion in defence schemes for the river and its ports at Hull, Grimsby and Goole (Saunders 1997: 209, 211). The erection of batteries and pillboxes in the Great War added a line of defences intended to, not only protect the Estuary, but also to deny the Head, with its smooth, sandy foreshore to enemy landings. The defences were served by a military railway that ran from Kilnsea to the north, to a jetty at the Point. The railway was served by a number of engines, as well as at least one sail-powered bogey. The close defence of the beach and batteries was provided by rectangular pillboxes and temporary fieldworks. Although elements of the defences do survive, trenches may have been affected by later works during the refortification of the spit in 1939-40 and by subsequent action of wave and weather, which have also affected the concrete works.

The Hoo Peninsula

Historic England has undertaken extensive survey across the Hoo Peninsula, which is located between the Thames estuary to the north and Chatham and the river Medway to the south (Historic England 2015a). The peninsula includes a range of Great War defences, reflecting its strategic location with a major battery at Allhallows, a number of airfields and anti-aircraft gun sites, including the Scheduled pre-War Lodge Hill Battery (Smith 2016: 69; 73; 81). There were also significant ammunition depots within the peninsula at Chattenden and Lodge Hill, which had one-man pillboxes of a style unique to Kent, as well as Dacoit fencing, wire entanglements and trenches as part of their defences (Smith 2016: 81). Lodge Hill is also the location of significant training remains associated with the Royal Engineers, which appear to have included mining, in some cases with the laying and detonation of charges both before and during the conflict (Barton 2004: 44). This area was also used for experimentation in entrenchment in response to the changing situation at the Front (Smith 2016: 81). Lodge Hill remains part of the Defence Training Estate and training in entrenching continued after the 1918 Armistice, meaning that not all remains on the site will be of First World War date. Although the form of the trenches will, in many cases, indicate their date, this cannot always be assumed as the entrenchments familiar from 1914-18 still formed an element of training in the inter-war years, as the Bustard aerial photograph demonstrates.

Medway to Swale Defence Line, Kent

Isle of Sheppey, Kent

The Isle of Sheppey is tactically significant as a result of its northern face overlooking the Thames estuary. The town and Naval base of Sheerness occupies the northerly point of the island and controls the entrance to the Medway. Pre-existing defences along the coast of Sheppey were extended and improved following the outbreak of war, with new works being added, which served both training and defensive purposes. Eventually an extensive frontage was developed with wire entanglements, redoubts and trenches that defended the coast from Sheerness, in the north-west, to Shellness, on the south-east corner of the island (Smith 2016: fig 8). The fortifications were also supported by gun batteries both on the island and as part of the Stockbury Valley defences (Smith 2014). The trenches mirrored those seen elsewhere with defence in depth, provided by multiple lines of trenches and they also integrated and improved localised defences to strategic installations, including the Eastchurch airfield and Kingsferry Bridge (Anstee & Smith 2014: Sheppey, fig 2). The frontage was also strengthened by the construction of clusters of concrete pillboxes. The defence works also extended beyond the coastal crust, with arms reaching back inland, as well as detached positions along higher ground overlooking the marshes and intended to create killing zones into which the enemy were funnelled (Smith 2016: 79). The use of terrain and detached, fortified positions not only prefigures defensive strategy in the Second World War in Kent and Sussex, but also the use of detached fortification set out in the 1908 Manual; however, the extensive nature of the fortifications resembles the trenches of the Western Front, with trenches and fire connecting redoubts, strong points and pillboxes. They expressed defence in depth intended to delay enemy advance until counter attacks could be initiated (Smith 2014a).

Stockbury Valley

The defences of Sheppey were not restricted to the defences of the barbed wire island alone. A defence system was set out to the south-west of the River Swale, running along and behind the London Road (now the A2). The defences were intended to impede an enemy advance, deny them use of the London Road and to protect road and rail. These defences, which ran south from Sheppey and then south-west to Detling, have been extensively investigated as part of the Defence of Swale project (Smith 2014). Like the Sheppey defences these works were of a complexity comparable to the Western Front, including a series of pill boxes and, where the geology allowed, submerged machine gun emplacements, notably at Tunnel hill, above Chestnut Street but evident elsewhere in the defences too (Smith 2014). The Defence of Swale project has seen significant elements of the defence scheme recorded, allowing the level and complexity of fieldworks, supporting barbed wire entanglements and pillboxes to be readily understood (Anstee & Smith 2014: fig 2; fig 14) and contemporary photographs and original plans held in the Royal Engineers Museum Library have supported efforts to identify extant remains (Anstee & Smith 2014: fig 11 and fig 16). These works should be seen as part of an integrated scheme with those on Sheppey itself, not only were the fieldworks

mutually supporting, the heavy guns in fixed batteries on Sheppey and in prepared emplacements such as Church Battery above the Stockbury Valley were sited to provide mutual support (Anstee & Smith 2014: fig 26), while 37 positions for mobile artillery were also prepared (Smith, Anstee & Mason 2014).

North Norfolk Coast

The Norfolk coast, with its sandy beaches and ready access from the North Sea, was considered vulnerable. The CBA Home Front Legacy site includes records of a series of coastal defence installations including a coastal crust and stop lines.

The coast between Trimingham House, near Gimingham (HFL 8164) and Hempstead, close to Eccles by Sea (HFL 8259) includes 16 Stokes Mortar positions identified on a 1918 map in private hands, but reproduced on the HFL website. The mortar batteries appear to be supported from a little way inland by artillery positions, including one at Walcott Green (HFL 8156). Although there appears to be no direct evidence from the map for supporting infantry trenches around these positions, it may be assumed that they were present because unsupported short-range artillery of this sort would not be a sensible tactical use of the weapon. The north-western end of the line of fortifications comes as Cromer cliffs rise to the west, reducing the need for immediate defences of potential invasion beaches. There are, however, further pillboxes recorded along the north Norfolk Coast between Sherringham and Stiffkey, where the recorded pillboxes cease. This absence of records may reflect the fact that the marshy coast of Blakeney, Holkham and Holme, east of Hunstanton, was considered less vulnerable but it could, but may reflect a lack of research.

There is also a line of concrete pillboxes recorded approximately 5 km inland from the line of mortar positions and running between Hanworth (HFL 8079) and Wayford Bridge, (HFL 8141). These pillboxes form part of the River Ant stop line, following the river and the North Walsham and Dilham Canal. Once again, it may be anticipated that these concrete fortifications are associated with and supported by temporary fieldworks. However, their redigging, reuse and alteration during the Second World War may be anticipated, as appears to have been the case with some of the pillboxes, including 8011 at West Runton. In areas searched using online imagery, however, no trace of trenches was identified, partly as a result of vegetation, agriculture and development but further research using a wider range of aerial photographs might result in further information emerging.

Portland Harbour, Dorset

The Isle of Portland is a limestone island immediately south of the mainland of Dorset and extending into the English Channel. It is connected to the mainland by a natural causeway formed, in part, by the southern end of Chesil Beach. The port of Weymouth lies immediately to the north of Portland and by the outbreak of the conflict had become a major naval base, following the construction of large breakwaters to form a man-made harbour. The strategic importance of the harbour, even before the construction of the breakwaters, was demonstrated by

the construction of Portland Castle, a Henrican Device Fort, in the 16th century. Defences were extended to encompass Weymouth in the 19th century when works including the large 19th century Nothe Battery replaced earlier works.

There had been large-scale fortifications constructed on Portland Bill designed to defend the harbour since the 19th century, focussed on the Verne Citadel, built between 1857 and 1881, and its associated batteries and breakwater forts. In common with other sites, including Spurn and the Isle of Sheppey, the permanent fortifications were supplemented and strengthened by temporary fieldworks. In common with other sites, such as Newhaven and Sheerness, a series of detached works were created to increase the defensive capability and to protect strategic infrastructure and these are detailed in annotated maps held in the National Archives (WO78/4418 1910-1917; WO78/5087 1915). Works were not confined to Portland, with wire entanglements and positions around Nothe Battery and Upton Battery. Some of these positions reflected the defensible posts and redoubts described in the 1908 manual but also included significant frontages of entrenchments, notably trench systems with supporting wire entanglements, machine guns and artillery positions protecting Westham and Wyke Regis and access to Weymouth and Portland Harbour. Defensible posts and redoubts also offered flanking defences to the harbour, including at Osmington, where they appear to survive as earthworks. Meanwhile, the Weymouth Water Works, a strategic resource for the town, had plans prepared for sandbag barricades and wiring, but it is unclear whether this was ever enacted. A series of significant defences apparently deploying wire, trenches, batteries and blockhouses, was also employed to protect the northern end of the Portland Bridge. These works also encompassed a Royal Navy torpedo works within their circuit. Oil fuel tanks on Chesil Beach were also subject to temporary fortification. Vulnerable coastline, such as Lulworth Cove, was also furnished with defensible posts to alert against, if not resist, an enemy landing. Further militarisation of the landscape is also evident in rifle ranges at Wyke Regis.

RECOMMENDATIONS FOR FURTHER WORKS

This report highlights the extent of fieldworks created during the First World War. Some areas have been well-documented and extensively studied, such as Cannock Chase, Sussex or Salisbury Plain for training, and Kent for defence against enemy landings, as well as Royal Engineer training. It is clear, however, that there are many more sites across England than previously thought and that they range from the extensive works on Salisbury Plain to individual training events, like those in Pullingshill Woods; there are even sites identified in urban contexts such as trenches on Clapham Common, London, and in Heaton Park, Manchester. It has become increasingly clear, however, that there are significant gaps in knowledge that should be addressed and these relate in particular to home defence, both on the coast and in the interior, including anti-invasion defences and fieldworks protecting strategic locations.

Survey of sites would present an excellent opportunity for community engagement. In many cases confirmatory fieldwork need not be invasive, but would involve visual inspection perhaps leading to earthwork survey of the sort seen in Pullingshill Woods; other sites would be ideally suited to geophysical survey, such as Clapham Common or Beverley Westwood. Excavation also remains an option for assessment, but safety concerns must be borne in mind because some trench systems used for training may include unexploded ordnance. Excavation in more prominent locations, such as public open space, would make excellent community projects that would present excellent interpretation opportunities as well as gathering useful data about the monuments, as the excavation of the tactical model on Cannock Chase showed. Community archaeological projects intended to investigate First World War Home Front remains

In some cases further recording may be seen as a step toward designation, but this should not be seen as the primary focus of research. Surveys and excavation should be regarded as exercises intended to assess condition, survival and significance. Results should be submitted to the relevant Historic Environment Record and the CBA Home Front Legacy website. Survey work should also include documentary research.

Such community engagement need not focus solely on fieldwork and excavation. There is, for example, considerable value in documentary research on War Office papers in the National Archives. These War Office plans will be invaluable in new research and should inspire efforts to investigate the sites described in the records, including use of online aerial photography, such as Google Earth, and leading to efforts to confirm their presence and survival through walkover survey. This potential has clearly been demonstrated by the work of the Defence of Swale project, where use of documentary sources and recording of extant remains has greatly enhanced understanding of the defence scheme

The following table presents National Archives references to War Office documents relating to field defences in England (WO 78 -). These sites afford excellent opportunities for new documentary research and field investigation; the research

may also reveal further sites and will indicate the typical positions of defences that could inspire research around other locations.

WO 78/- Reference	Location	Date
4420	London Defences	1915
4424	Dover land defences	17.03.15
4401	Portsmouth field defences	23.01.15
4406	Chatham field defences	10.12.14
4404	Tyne field defences.	23.07.14
4418	Weymouth land defences	1910-17
5087	Weymouth and Portland defences	1915
4433	I.O.W. field defences	23.03.16
4422	Mersey plans of trenches	12.12.15
4402	Darlington, Co Durham (8 sheets and one for Dover)	1915-16
4403	Chingford, Essex field defences and one plan for Eastchurch, Sheppey searchlight plan.	14.02.16
4423	Harwich, Essex defences	14.02.16
4412	Newhaven	1915

The defence of ports was clearly an important issue during the war but there is scope for significant further research in this area. Meanwhile insufficient research has yet been undertaken on monuments associated with the defence of strategic installations other than ports. Strategic rail installations, vital to the movement of men and materiel, are known to have been defended, as the Severn Tunnel shows and some airfields are thought likely to have had close defence. Further research is recommended, but it is recognised that until recently this was a little-known aspect of temporary fieldworks and remains may have been misinterpreted because they do not always conform to the commonly held idea of First World War monuments, reflecting the use of defended posts rather than networks of trenches. There may also be a misconception that defences are of Second World War date because home defence is more firmly fixed in popular consciousness for this conflict. Once again, interrogation of War Office records will be of value but searches of aerial photographs around airfields, strategic rail junctions and bridges in search of strongpoints, Boer War style blockhouses and crenelated, Greek Key pattern trenches will have value. Examination of aerial photography can also be used in the interpretation, dating and assessment of the condition of identified trenches, as works at Seaford Camp have demonstrated.

Research in local archives and regimental museums are also likely to have value in the identification of sites but also in providing associations for sites with units, individuals, actions and events. The canon of First World War memoirs includes little on training, memoirs deal, for the most part, with the combat phase, perhaps because authors assumed readers wouldn't be interested, while regimental histories predominantly relate to operations. As the work on Pullingshull Wood has shown, examination of local newspapers can greatly inform understanding of earthwork remains; research here provided dates, units and even named individuals associated with the trenches. Once such identifications have been made the archaeological sites are likely to acquire further significance and develop wider meaning, as the Redmires trenches have shown. A trench system that can be linked to particular individuals provide a physical link to the biographies of men and units, taking them from enlistment, through training or deployment in home defence, to the battlefield where there may be direct connections to major events but where reading of the relevant War Diary (held in the National Archives) will illustrate the day-to-day existence of deployed soldiers. Thereafter it will be possible to take on the biography either to commemoration and memorialisation or to a life after the Armistice. As such, it is entirely possible that any trench system has the potential to become the focus of memorialisation and ritual connected to remembrance.



Fig 25: The Cannock Chase Tactical Model with the Poppy wreath laid by the New Zealand Defence Attaché in recognition of his countrymen's training on the Chase and construction of the Model (Author).

Recent experience connected to the Somme Centenary has shown trenches can readily become memorial spaces, as informal remembrance at Perham Down and formal regimental commemoration at Larkhill have shown. Trenches can provoke emotional responses to the history they embody, recognising and reacting to the wider meaning of remains. Meanwhile, the Cannock Chase Tactical Model is regarded as sufficiently important by the New Zealand High Commission for the Defence Attaché to rise early and drive to Staffordshire in order to lay a wreath on the remains, choosing the representation of Fanny's Farm, where the New Zealanders achieved their final objective of the morning on 7th June 1917, as the place to lay his wreath. Memorialisation was not only restricted to the military because, following excavation, a small cairn appeared on the site, having been built by visitors, and this became a focus for deposition of Royal British Legion poppies (S. Dean, pers. comm.).



Fig 26: Troops from XIV Regt Royal Artillery parading on the Larkhill trenches at 07:00 on 1st July 2016 in advance of their Battle of the Somme Centenary commemorative parade (Meeke/Drumbeat).

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APPENDICES

Appendix A – Currently Designated First World War Fieldworks in England

Monument Name	List Entry Number	County	NGR	Description	References	Designation
Martin Down style enclosure, bowl barrow, Iron Age hillfort, Romano-British village and associated field system on Thundersbarrow Hill	1015124	West Sussex	TQ 2290 0840	Group of slit trenches associated with a training area. Associated with Shoreham Camp	NMR Unique Identifier 398683	Scheduled within an area of prehistoric monuments
Medieval deerpark and other archaeological remains in Sutton Park	1020420	West Midlands	SP095967	Park used for training by the Birmingham City Battalion of the Royal Warwickshire Regiment.	<i>Birmingham: The Hidden History</i> by M. Hodder + Photos of Birmingham Pals digging trenches available on the Birmingham History Forum REF https://birminghamhistory.co.uk/forum/index.php?threads/the-birmingham-pals-in-the-great-war.45663/	Scheduled as part of wider historic landscape
World War I practice trenches 740m north west of Short Fell	1021025	Northumberland	NT 8349 0248	Remains of part of World War One practice trenches.	NMR Unique Identifier 1387292 MOD Booklet on Silloans, Otterburn by Brown & Nichol (2006) All Quiet on the Western Front?, Defence Estates	Scheduled
Bell barrow, three bowl barrows and gas testing trenches on Idmiston Down	1014818	Wiltshire	SU 22210 36635	Gas warfare experimental trench.	HEA recce photographs.	Scheduled
World War I instruction model of a trench system, and associated earthwork and building remains 850m north west of Fairoak Cottages, Cannock Chase	1021326	Staffordshire	SK 00283 16817	Scale model of trenches used in instruction	Welch, C, (1997) An investigation of a trench model at the WWI camp at Rugeley, Environmental Planning Unit Research Report Number 2, Staffs CC	Scheduled
Old Oswestry hillfort, and two adjacent sections of Wat's Dyke	1014899	Shropshire	SJ 2955 3104	Perpendicular practice trenches	Reid & Marriot (2010) Old Oswestry Hillfort CMP, for English Heritage. EH Research Report 82-2010 Aerial Survey report AER/1/2004	Scheduled as part of Old Oswestry Hillfort
Redmires First World War Training Area	1417488	Sheffield Metropolitan Authority	SK 255859	Series of practice trenches and emplacements across 20 hectares of moorland	http://www.pals.org.uk/sheffield/redmires.pdf	

Appendix B - Abbreviations & Glossary

Anzac – Australian & New Zealand Army Corps

Bde – Brigade: an Army formation including a number of Battalions plus supporting elements, such as medical services, artillery and engineers.

Bn – Battalion: an Army formation of, typically 800-1000 men

Corps – Either a specialist Army formation, such as Royal Army Medical Corps, Army Service Corps or Royal Flying Corps, or a unit of management for large numbers of Divisions, as in Anzac.

Div – Division: An Army formation typically including infantry battalions and supporting elements; similar to but smaller than a Brigade.

HER – Historic Environment Record

Inf – Infantry

Materiel – Military equipment, technology, hardware and supplies

NHLE – National Heritage List for England

NMP – National Mapping Project

NMR – National Monument Record, now the Historic England Archive

RE – Royal Engineers

Regt – Regiment

Trace – The line of fortifications when seen in plan.

Appendix C - Report Conditions

First World War Fieldworks in England - Thematic Study

This report is produced solely for the benefit of Historic England and no liability is accepted for any reliance placed on it by any other party unless specifically agreed by us in writing.

This report is prepared for the proposed uses stated in the report and should not be relied upon for other purposes unless specifically agreed by us in writing. In time technological advances, improved practices, fresh information or amended legislation may necessitate a re-assessment. Opinions and information provided in this report are on the basis of WYG using reasonable skill and care in the preparation of the report.

This report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

This report is limited to those aspects reported on, within the scope and limits agreed with the client under our appointment. It is necessarily restricted and no liability is accepted for any other aspect. It is based on the information sources indicated in the report. Some of the opinions are based on unconfirmed data and information and are presented accordingly within the scope for this report.

Reliance has been placed on the documents and information supplied to WYG by others, no independent verification of these has been made by WYG and no warranty is given on them. No liability is accepted or warranty given in relation to the performance, reliability, standing etc of any products, services, organisations or companies referred to in this report.

Whilst reasonable skill and care have been used, no investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal, budget and weather related conditions.

Although care is taken to select monitoring and survey periods that are typical of the environmental conditions being measured, within the overall reporting programme constraints, measured conditions may not be fully representative of the actual conditions. Any predictive or modelling work, undertaken as part of the commission will be subject to limitations including the representativeness of data used by the model and the assumptions inherent within the approach used. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions.

The potential influence of our assessment and report on other aspects of any development or future planning requires evaluation by other involved parties.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. WYG accept no liability for issues with performance arising from such factors.

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WYG Environment Planning Transport Ltd



Historic England Research and the Historic Environment

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A good understanding of the historic environment is fundamental to ensuring people appreciate and enjoy their heritage and provides the essential first step towards its effective protection.

Historic England works to improve care, understanding and public enjoyment of the historic environment. We undertake and sponsor authoritative research. We develop new approaches to interpreting and protecting heritage and provide high quality expert advice and training.

We make the results of our work available through the Historic England Research Report Series, and through journal publications and monographs. Our online magazine Historic England Research which appears twice a year, aims to keep our partners within and outside Historic England up-to-date with our projects and activities.

A full list of Research Reports, with abstracts and information on how to obtain copies, may be found on www.HistoricEngland.org.uk/researchreports

Some of these reports are interim reports, making the results of specialist investigations available in advance of full publication. They are not usually subject to external refereeing, and their conclusions may sometimes have to be modified in the light of information not available at the time of the investigation.

Where no final project report is available, you should consult the author before citing these reports in any publication. Opinions expressed in these reports are those of the author(s) and are not necessarily those of Historic England.

The Research Report Series incorporates reports by the expert teams within the Investigation & Analysis Division of the Heritage Protection Department of Historic England, alongside contributions from other parts of the organisation. It replaces the former Centre for Archaeology Reports Series, the Archaeological Investigation Report Series, the Architectural Investigation Report Series, and the Research Department Report Series