STONE CREEK HEAVY ANTI-AIRCRAFT BATTERY, SUNK ISLAND, EAST YORKSHIRE

ARCHAEOLOGICAL SURVEY

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EXECUTIVE SUMMARY

In September 2013, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Peter Gaze Pace Chartered Architects, on behalf of W M Osgerby Ltd (owner), to undertake a programme of archaeological survey prior to and during site conservation works at the Stone Creek Heavy Anti-Aircraft Battery, Sunk Island, East Yorkshire (NGR TA 23814 18853 centred). The work was to provide a pre-intervention survey of the complex, before repairs were carried out to prevent further deterioration of the surviving structures. The site is a Scheduled Monument (SM 32706; National Heritage List for England 1020187), and the survey was primarily funded by Natural England with additional research and reporting by EDAS. The bulk of the archaeological fieldwork was undertaken in September-October 2013, with further site visits in February and December 2015, and February 2017.

The Stone Creek HAA battery, originally designated as Station J, is first recorded in early September 1939 when it had two mobile First World War vintage 3" guns. However, it was probably established in mid 1938, in response to the growing German threat. Probable evidence for this earliest phase of the site, in the form of circular features representing the former sandbagged emplacements for these 3" guns, can be seen on 1947 aerial photographs. By the end of September 1939, permanent gun emplacements were constructed for two 4.5" guns. From August 1941 the battery was known as Station H9, and by June 1942 it had four 3.7" static guns in permanent emplacements supported by a GL Mark II radar. In September 1942 ATS women were introduced to the site as part of the mixed 510/515 Battery. The site was then abandoned in November 1944, when both equipment and personnel were moved to a new gun site at Ringborough on the Holderness coast as part of Operation Diver, to counter the new threat from the V1 flying bomb. The battery was not retained as part of the post-war 'Nucleus Force' developments.

Aerial photographs of September 1946 and April 1947 depict the layout of the site. Some 40 or more huts and other buildings are visible on these photographs, forming the domestic site at the north end of the complex. The operational site comprised four octagonal gun emplacements (one now badly damaged) with a command post in the centre. These emplacements are all of 1938 design - two were probably built for the 4.5" guns in late 1939 while the other two had been built by June 1942 as part of a general expansion of the battery. All the emplacements show evidence of later modifications, including the construction and later extension of duty shelters for the gun detachments, and one of these contains rare, but deteriorating, paintings of British and American aircraft. The operational site also contains a gun store and on-site magazine of early 1938 design, and the former octagonal GL Mark II radar mat lay on the east side of the access road. The command post is also of at least two main phases, with a dedicated plotting room and separate shelter being added to an existing structure between mid/late 1941 and mid 1942. The introduction of women to the site in September 1942 also resulted in alterations to the battery, for example the raising of floor levels on the observation platform and the introduction of heating in the command post, and the doubling in size of the domestic site.

The site formed part of the Humber Gun Defended Area, and the mid/late 1941-mid 1942 expansion of the battery may have been the result of the bombing of Hull, which was particularly heavy in May 1941. It seems that at this time the battery was armed with 3.7" Mark II or Mark IIB guns which were retained until abandonment in November 1944 - there is no evidence for the introduction of the more sophisticated semi-automatic and remote powered 3.7" Mark IIC guns in mid-late 1943, as has been seen on many other HAA sites.

Almost all of the domestic site, apart from the cookhouse, was demolished after abandonment, and one of the gun emplacements has been mostly dismantled. However, the other three emplacements remain, together with the command post, gun stone and on-site magazine, to provide a valuable reminder of the role such sites played in the defence of the area in the Second World War.

1 INTRODUCTION

Reasons and Circumstances for the Project

1.1 In September 2013, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Peter Gaze Pace Chartered Architects, on behalf of W M Osgerby Ltd (landowner), to undertake a programme of archaeological survey prior to and during site conservation works at the Stone Creek Heavy Anti-Aircraft Battery, Sunk Island, East Yorkshire (NGR TA 23814 18853 centred).

1.2 The archaeological recording and conservation work was mostly funded by Natural England, and it formed part of a Higher Level Stewardship Scheme Agreement between Natural England and the landowner; additional research and reporting was funded by EDAS. Other funds for subsidiary non-archaeological work such as scrub clearance, a Condition Survey and an assessment of wall paintings were provided by the LEADER Coast, Wolds, Wetlands and Waterways (CWWW) Monument Management Scheme run by East Riding of Yorkshire Council. The scope of the archaeological survey work, which equates to a Level 3 survey as defined by English Heritage (2007, 23-24), was outlined by a brief prepared by the David Bull (Rural Heritage Officer of LEADER CWWW), which was subsequently augmented by an EDAS Methods Statement (see Appendices 2 and 3).

Site Location and Background Information

1.3 The Heavy Anti-Aircraft (HAA) battery (or gun site, as they are sometimes called) is located at Stone Creek (NGR TA 23814 18853 centred), a small inlet opening directly off the north side of the Humber Estuary, on the west side of Sunk Island, East Yorkshire (see figure 1). The battery is placed on the east side of Stone Creek, and can be reached by vehicular traffic either along Stone Creek road from Sunk Island village or Cherry Cobb Sands Road from Thorngumbald (see figure 2). The battery was used as pasture for a small herd of Dexter cattle at the time of the archaeological survey. There is no public access to the site, although it is clear from internet sources that the battery is visited and photographed on a regular basis.

1.4 Stone Creek HAA battery is one of the better preserved examples in East Yorkshire, with almost a full operational layout of the station complete with well-preserved gun emplacements and other features such as the command post and magazine. The remains of part of the domestic camp, although ruined, are an especially rare survival as at most other sites these buildings have been totally cleared; there is, however, no above-ground evidence for any of the accommodation and service huts. Nearly 1,000 HAA batteries were built during the Second World War, and less than 200 of these have some remains surviving. Only at around 60 sites are these remains thought sufficient to provide an understanding of their original form and function. This includes 30 of the 192 examples which continued in use until 1955. Surviving examples are therefore sufficiently rare to suggest that all 60 well preserved examples are of national importance, and the Stone Creek site is protected as a Scheduled Monument (SM 32706; National Heritage List for England (NHLE) no. 1020187); it was first scheduled on 9th March 2001. The site is also recorded on Historic England's National Monument Record (Site TA21NW8) and their Pastscape database (Site 914137), and by the Humber SMR (Site 4528).

1.5 As far as can be determined, no previous detailed archaeological survey has been undertaken at the site. However, a Condition Survey was undertaken by Peter

Pace in order to draw up proposals for limited repair, conservation and consolidation (Pace 2012), and the surviving wall paintings have been subject to a condition assessment (Hirst Conservation 2013).

Aims and Objectives

1.6 The overall conservation project was designed to support the landowner in the appropriate management of the monument, by preventing (where practicable and necessary) the deterioration of the concrete structures, wall paintings and brick domestic buildings. Scheduled Monument Consent for the various conservation works was approved on 17th September 2013 (English Heritage reference S00067809).

1.7 More specifically, the archaeological survey work was required to produce a pre-intervention record of the various site elements prior to the proposed programme of repair, conservation and consolidation. A certain amount of archaeological recording was also undertaken once repairs were completed.

1.8 The aims of the archaeological survey were:

- to identify and gather sufficient information to establish the extent, nature, character, condition, quality, date, significance and functional relationships of the surviving archaeological and historical features within the survey area;
- to provide a detailed, pre-intervention record of the site complex;
- to provide an accessible version of the report, suitable for publication in an appropriate academic publication.

Survey Methodologies

1.9 The archaeological work was initially defined by a LEADER CWWW brief for a photographic survey only, but this was then augmented to a full topographical and descriptive survey in accordance with an EDAS methods statement (see Appendices 2 and 3); the new survey equates to a detailed Level 3 enhanced and integrated survey as defined by English Heritage (2007, 23-24) and elsewhere (Bowden 1999, 78-80 & 189-193). The whole of the Scheduled Monument area was surveyed, to record the position and form of all features considered to be of archaeological and/or historic interest.

1.10 The majority of the archaeological fieldwork was undertaken between September to October 2013, with a further site visit in February 2015 to photograph the structures just after conservation works had taken place. Additional visits were made in December 2015 and February 2017 to complete the survey work following additional research into the history of the site.

1.11 The survey work comprised several different elements, as follows.

Documentary Research and Collation

1.12 A limited amount of documentary research and collation was undertaken, utilising information held by the Humber Sites and Monuments Record (HSMR), Historic England's National Record of the Historic Environment (NRHE) and the Council for British Archaeology's 'Defence of Britain' project. Relevant secondary sources were also consulted, including previous surveys of similar HAA sites, and Roger

Thomas, Conflict Archaeologist, also provided valuable comments and advise during the survey phases. A full list of primary and secondary sources consulted are given in the Bibliography (Chapter 5) below.

Archaeological Topographic Survey

1.13 A detailed survey of the whole of the Scheduled Monument area was undertaken to record the position and form of all features considered to be of archaeological and/or historic interest. The survey was carried out at a scale of 1:500 using EDM total station equipment. Sufficient information was gathered to allow the survey area to be readily located through the use of surviving structures, fences, walls, water courses, trackways and other topographical features. The survey recorded the position at ground level of all structures, wall remnants and revetments, earthworks, water courses, paths, stone and rubble scatters, ironwork, fences, walls and other boundary features, and any other features considered to be of archaeological or historic interest. The detailed site survey also recorded areas of erosion (both natural, animal and man-made) or other damage.

1.14 The site survey was integrated into the Ordnance Survey national grid by resection to points of known co-ordinates. Heights AOD were obtained by reference to the nearest OS benchmark; given the nature of the site, contours were not plotted across the site. Survey points were taken from fixed survey stations on a closed traverse around and through the site. The locations, descriptions and values of the bench marks and control points are stated in the final survey data. On completion of the total station survey, the field data was plotted and re-checked on site in a separate operation. Any amendments or additions were surveyed by hand measurement, and the results digitised back into the electronic survey data.

1.15 The resulting site survey was produced at a scale of 1:500 and is presented as a wet-ink interpretative hachure plan using conventions analogous to those used by Historic England (English Heritage 1999; 2002, 14; 2007, 14-16 & 31-35). The final survey drawings arising from the site survey comprised hand-drawn wet ink hachure plans. Smaller scale Ordnance Survey map bases have been used to put the survey area into context.

1.16 Individual descriptions have been produced for each identified element within the survey area, for example specific buildings (whether extant or sites), hut bases, earthworks etc. This description includes an account of each element's overall form (e.g. structure, materials, layout, evidence for any attached demolished structures etc), function, date and sequence of development and use, together with the evidence supporting this analysis and interpretation. In addition, general photographs were taken of the survey area to illustrate the landscape context of the site, as well as specific shots of individual elements. The photographs were taken in colour using a digital camera with 10 mega-pixel resolution, and Historic England photographic guidelines were followed (English Heritage 2006, 10-12; 2007, 14) with each photograph normally provided with a scale. All photographs have been clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and have been cross-referenced to digital files etc.

Building Recording

1.17 Specific detailed surveys of all individual standing buildings and structures within the survey area were made. Ground plans were produced at a scale of 1:50 by hand measurement, using the EDM total station footprint survey as a base; two plans at different levels were produced of the command post, in order to depict

different structural information. Sections were produced where this aided interpretation and understanding, but elevations were not drawn, although they were photographed.

1.18 The resulting drawings show all significant detail such as openings (blocked or unblocked), inserted doorways, fittings, sockets etc. All wet-ink drawings were produced according to the guidelines established by Historic England (English Heritage 2006, 8-10 & 19-21), and were keyed into the general topographical survey. Other, more detailed, drawings were produced of particular items of interest or importance, for example the blast doors across the entrances and for the ammunition recesses in some of emplacements, as well as fittings in the top of the walls for securing camouflage netting. These drawings were produced at appropriate scales, such as 1:1 or 1:5, and were cross-referenced to the 1:50 scale plans of the buildings. Once again, the survey drawings conformed to Historic England guidelines (English Heritage 2006,8-10 & 19-21).

1.19 A detailed photographic record was made of all external and internal elevations of the above structures, both parallel to the elevation (within the constraints of the site) as well as from other vantage points to include oblique general views of the structures and showing them in their setting. Photographs were also taken of the overall appearance of individual rooms and circulation areas, and any detail (structural or decorative) which might be relevant to the structure's design, development or use and which did not show adequately on general photographs. Other photographs were taken of any inscriptions, signage or graffiti etc which contributed to an understanding of the structure(s), and any contents or ephemera which had a significant bearing on the structure's history. Close-up photographs were also taken of significant detail, as appropriate (e.g. wall paintings). The photographs were used to show not only the structures' present appearance but also to record the evidence on which the analysis of their historic development was based.

1.20 The colour photographs were taken using a Panasonic Lumix digital camera with 12 mega-pixel resolution, in accordance with Historic England's photographic guidelines (English Heritage 2006, 10-12; 2007, 14) and each photograph was normally provided with a scale where required. All photographs were clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and were cross-referenced to digital files etc.

Survey Products

Archaeological Survey Report

1.21 An EDAS archive survey report for the site was produced, based on the results of the documentary research, the topographical survey and the building recording. This report assembles and summarises the available evidence for the survey area in an ordered form, synthesises the data, comments on the quality and reliability of the evidence, and how it might need to be supplemented by further site work or desk-based research. The survey report also contains various appendices, such as photographic registers and catalogues, and a copy of the EDAS Methods Statement, together with the details of any departures from that design.

1.22 Upon completion, three copies of the final survey report were provided as hard copy format comb bound reports to Historic England, the landowner and the Humber SMR. A CD containing an electronic copy of the report (as a pdf file) and

digital copies of the site photographs was also circulated to interested bodies, including Natural England and the project architect.

Archaeological Survey Archive

1.23 A properly ordered and indexed project archive, comprising paper, magnetic and plastic media, has been prepared according to the standards set by the National Archaeological Record (EDAS site code SIB 13). It was deposited with the East Riding of Yorkshire Museum Service on the completion of the project (accession number ERYMS (BAG) 2017.5).

2 OUTLINE HISTORICAL BACKGROUND

Introduction

2.1 The development of anti-aircraft defences during the First and Second World Wars has a long and complex history (Pile 1949; Routledge 1994; Dobinson 1996; Dobinson 2001). However, for the purposes of this report, only that information most relevant to the Sunk Island HAA battery is described below. The individual structures of the battery, and how they reflect the general development of HAA sites during the Second World War, is discussed more fully in Chapter 3 below.

The Development and Form of HAA Batteries during the Second World War

2.2 Reduced to their most basic functions, HAA batteries contained large guns with the capacity to, and function of, engaging high-flying bombers. As a result, they were located around the south and east coasts of England, and also at 'Point Defence' sites close to large cities and industrial and military targets. All HAA batteries, whatever their date and form, displayed the same basic division between the operational site (i.e. the place for the guns) and the domestic site (i.e. the accommodation area, sometimes known as Air Defence of Great Britain or ADGB camps).

Operational Sites

2.3 There were three main different types of HAA operational sites constructed during the Second World War; those housing 3.7" mobile guns, those housing 3.7" or 4.5" static guns, and those accommodating 5.25" weapons (Dobinson 1996, 156-162). Although they were all distinct in fabric, they could all occupy the same position or site at different dates, or even simultaneously by accretion (Dobinson 1996, 115). At least seven formal designs for 3.7"/4.5" HAA gun emplacements are known to have been issued by the Directorate of Fortifications and Works (DFW) up to 1945. The first design was issued by the War Office in March 1938, and construction started at a number of sites some 18 months before the actual outbreak of war, in response to the 'Munich Crisis'. Once war was declared, in September 1939, these emplacements are believed to have been replaced by a range of improvised emplacements. From mid-1943 onwards, and probably somewhat earlier, designs for two new standard emplacements were introduced, one 'permanent' structure and one 'semi-permanent' fieldwork.

2.4 The aforementioned March 1938 pattern was the first design for an emplacement dedicated to either 3.7" or 4.5" guns. These emplacements were provided for all permanent positions selected in the 1938-39 expansion programme and built prior to the war. The emplacement was octagonal in plan, measuring some 12.20m between opposing external faces, and provided with twin axial entrances closed by double steel gates (Dobinson 2001, 145) (see figure 3A). It was built from shuttered concrete and measured 1.80m high to the top of the encircling parapet. A common holdfast (the arrangement for securely holding down the gun) to fit 3.7" or 4.5" guns was fitted centrally. The standard type of holdfast used with static 3.7" and 4.5" guns appears to have been the AA Mounting No 1 Mark II. This basically comprised a steel box frame embedded in the concrete floor of the emplacement, with ten vertical members protruding slightly above the surface of the pit. The two corner members were designed to accept locating spigots, while the other eight were for the holding down bolts. A cable duct in the emplacement floor linked the gun to the predictor in the command post (Dobinson 1996, 119-120 & 127-128).

2.5 The March 1938 pattern of emplacements were provided with up to six ammunition recesses or lockers, projecting into the emplacement, their steel doors opening at an angle to the gun pit rather than directly into it. These housed a store of ready-to-use ammunition. The length of fuse in each round had to be set to ensure that the shell exploded at the correct height, and so each gunpit was provided with several lockers holding fuses of different preset lengths, so that ammunition could be quickly loaded. Later in the war, a mechanical or machine fuse setter was introduced, which resulted in a significantly increased rate of fire, and emplacements were redesigned to cope with this. The lockers of the 1938 emplacements had timber shelving within them to support the ammunition; examples of this shelving can be seen at some surviving sites, for example at the Chadwell Heath HAA battery in Essex (*http://www.28dayslater.co.uk/forums/showthread.php/55543-Chadwell-Heath-AA-Battery-ZE1-November2010?highlight=heavy+anti+aircraft*) and at the Mersey H18 HAA battery (*http://www.airfieldinformationexchange.org/community/showthread.php?2996-Mersey-H18-HAA-Site*). The lockers were the length of a single round, and ammunition was designed to be stacked in alternate directions so as to maximise the capacity of the recess. One locker was generally kept free for the maintenance of tools and other equipment, or for the use of the Limber Gunner, and this was often supported by a dugout outside the emplacement gates (Ministry of Information 1943, 28; Dobinson 1996, 117 & 119-121).

2.6 From February 1940, the 1938 type of emplacement was subject to modification, primarily in terms of ammunition storage. It was found that the ammunition lockers, not being fully waterproofed, admitted moisture, which caused rounds to misfire and thus affected the operation of the fuses. Timber planking was therefore fitted across the gaps between the lockers, and across one of the double-door openings, which was to be locked and sandbagged shut. Four of the original lockers were to be filled with weatherproof metal containers (Dobinson 1996, 120-121). Once these modifications were made, each emplacement was able to hold a larger volume of ammunition, which could be stored in better conditions allowing for better curation, but the emplacement was left with a single entrance and a smaller working area.

2.7 By at least May 1943, there were two emplacement types which were the only ones authorised for 'permanent' and 'semi-permanent' HAA sites. The 'permanent' type was an octagonal emplacement with lockers placed externally (i.e. recessed into the surrounding earth bank but accessible from the interior), a single entrance and two shelters for the gun detachments set opposite one another (Dobinson 1996, 121-122). Major changes were made again late in 1943 when the trials of guns equipped with automatic fuse setters gave rise to a new design of rectangular emplacement; these had the advantage of being able to store the larger quantity of ammunition needed for the improved quicker-firing automatic 3.7" Mark IIC guns, as well as affording more room for carrying and loading the shells (Hogg, 2002, 123-125; Dobinson 1996, 118-119; Roger Thomas, *pers. comm.*). The addition of these later, rectangular, emplacements (usually two) is a common characteristic of many HAA batteries, and they can also be seen at, for example, Coldra Woods near Newport (Locock 1995) and Blyth in Northumberland, but none are present at the Stone Creek battery.

2.8 Gun emplacements could be camouflaged in a variety of different ways, although by 1943 camouflage was rarely used, it being thought better if the enemy could actually see the strength of the defences (Dobinson 1996, 221-229; Brown *et al* 1995, 50). In addition to the use of bituminous emulsion paints, artillery nets measuring 10.7m by 5.2m were used to obscure the guns (Dobinson 1996, 223-

224). These were usually 'scrimmed' through the addition of a roughly-woven Hessian material, although oily rags and coir could be introduced to add surface variation (Goodden 2007, 96-99). It was also recommended that the concrete floors of permanent gun emplacements were painted either dark green or brown, to prevent being visible from altitude (Dobinson 1996, 224-225).

2.9 HAA batteries relied on complex and automated means of finding and engaging targets, and various systems evolved and improved as war progressed. At most sites, each HAA gun could fire rounds towards a target that might be up to seven miles above them (Dobinson 1996, 161). The data required for target finding was gathered using radar structures (including radar mats or platforms) and a command post which dealt with fire control. The process of converting the range and height information using optical, acoustic and electromagnetic means so as to aim the shell at the point where the aircraft would be (as opposed to where it was recorded) was the job of the 'predictor', a mechanical computer designed to weight up all the variables (see figures 4B and 4C). The relevant data was relayed by cables to the command post's plotting room, where it was logged and transferred into fire control instructions. Details of how this was achieved can be found in a contemporary Ministry of Information film (*http://player.bfi.org.uk/film/watch-ack-ack1941/*). The plotting room was also used by the Gun Position Officer to direct the site, but by 1941, the plotting room had come to focus around the semi-automatic plotter, an instrument indicating target positions gained from radar data (Dobinson 1996, 116-117). Initially, the command post and its instrument rooms were sandbagged enclosures, but significant improvements were quickly made and at least five designs for command posts were issued by the DFW during the course of the war. The command post at Stone Creek most closely resembles DFW 55402, the commonest design of command post used for permanent 3.7" gun sites, particularly mixed batteries, from mid to late 1941 (Dobinson 1996, 129-131) (see figure 3F), although there are some differences (see Chapter 3 below). There would also be other operational structures on the site, such as on-site magazines (OSMs) used for storing reserve ammunition, gun stores (for maintenance) and generating huts (Dobinson 1996, 142-143).

2.10 The gun-laying (GL) radar also developed rapidly, the scant remains that often survive in the field conveying little of their vital importance to the operation of the battery (Dobinson 1996, 132-142). The operational version of the GL Mark I radar entered service in September 1939. By end of the year, 59 sets were in use and these were joined by another 344 in 1940. The production model comprised two trailer-mounted cabins with aerials, the power supply coming from a generator, and the radar was linked to the gun site by cabling (Dobinson 1996, 134). It was found that the Mark I radar worked best when it was provided with an open space, preferably perfectly flat and having uniform electrical properties radiating out by at least 65 yards (59.4m) in all directions. One attempted solution to improve operation was the mechanical skimming and levelling of the ground surface, but in practice it was found that undisturbed ground, dumped soil and infill all had different electrical conductivity, and so in December 1940 orders were issued that this was to cease. Alternative experiments at the time had revolved around the use of a large horizontal wire-mat laid around the radar position, which became known as the GL mat; this was basically an octagonal construction with a raised central platform on which to place the radar receiver. The mats, and platforms where needed, were introduced with Mark I radars from December 1940, although many sites appear not to have received them until after June 1941, by which time the Mark II radar was in service (Dobinson 1996, 135-136).

2.11 The GL Mark I radar was superseded by the Mark II radar in January 1941, and by mid 1942 most HAA sites were equipped with the latter. It comprised a mobile transmitter housed in a rotating cabin driven by a generator, and was usually provided with a GL mat and platform; five people were needed to work the set. The GL mat had three main components. The horizontal wire mat itself was octagonal in plan, 65 yards (59.4m) in radius and raised in height from anywhere between ground level to 2.9m above the ground (see figure 3D). It relied on a system of 645 vertical supporting posts, supposed to be constructed from lengths of angle-iron, although in practice concrete or even timber posts may have been used. The posts were linked by a lattice of galvanised wire passing through the topmost of a series of holes set into the posts themselves (Dobinson 1996, 140-141). Clearances were given to allow the radar to work efficiently without interruption from nearby features, from the radar platform in the centre of the mat - these clearance were 75 yards (68.7m) for guns, 65 yards (59.4m) for the command post, 100 yards (92.0m) for hutting, 120 yards (109.8m) for houses up to 30ft high, 100 yards (93m) for metal fencing, and 80 yards (73.2m) for wooden fencing (Dobinson 1996, 146). Given that the radius of the mat and the clearance for the command post coincided, most command posts lie on the very edge of the mat.

2.12 A good example of an HAA site showing the octagonal GL radar mat in place can be seen on an early post-war aerial photograph of the Mersey H18 HAA battery (*http://www.airfieldinformationexchange.org/community/showthread.php? 2996-Mersey-H18-HAA-Site)*. Two other aerial photographs of the Butt Farm HAA battery (Station H31), near Beverley, East Yorkshire, one taken in December 1945 and the other more recently in January 1992, clearly show the post pits delineating the former octagonal GL mat, which was c.127m diameter and which ran right up to the command post (Dennison & Richardson 2016). The second component, the radar platform, was supported on four brick piers in the centre of the mat, each 0.34m square, the tops of which were to finish c.0.10m below the top of the mat. This supported the wheeled rotating radar receiver which had detachable aerials (see figure 3E). The third component was the ramped access platform, which served as a permanent route between the radar platform and the edge of the mat. This allowed the wheeled receiver to be winched into position - it was usually made from timber decking supported on timber trestles, although brick, stone and concrete examples were also built (Dobinson 1996, 140-142); one such ramp survives at the well-preserved HAA battery at Gloucester Lodge Farm at Blyth in Northumberland (*http://www.28dayslater.co.uk/gloucester-battery-blyth.t16367 #post-229285*). Shelters were also provided for the GL duty detachments; in permanent batteries, the recommended form was between one-half and one-third of a curved asbestos hut, although Nissen huts may have formed an acceptable alternative in practice.

2.13 Improvements and technological advances in radar design meant that regular production and installation of the GL Mark III radar (centimetric operation) began from December 1942 onwards. This required no fixed structures nor a radar mat, but it was, in fact, often used in conjunction with a Mark II set (Dobinson 1996, 137-142). The Mark III unit was housed in a single cabin mounted on a wheeled trailer, which carried a rotating turntable at one end for the aerials. The final development of AA fire-control radar came about in the summer of 1944, with the introduction of the American SCR 584, a centimeteric radar housed in a mobile unit which had a detection range in excess of 64km (Hogg 2002, 130). In both these cases, surviving field evidence for these systems is usually scarce. Indeed, the survival of any elements of the radar facilities at HAA batteries are usually very

modest (Dobinson 1996, 132), and they are frequently omitted or not considered in those few HAA sites which have been surveyed (e.g. RCHME 1994).

Domestic Sites

2.14 The domestic sites associated with HAA gun batteries developed in a number of different phases, merging into a process of gradual improvement in quality and substance, and an increasing standardisation amongst sites of similar status (Dobinson 1996, 177). Domestic sites were equipped with a variety of facilities, including accommodation huts, ablutions blocks, offices, stores and amenities, all drawn from a common pool of approved structures (see figures 3B and 3C). From the summer of 1941, these also had to cater for female operatives, which led to the significant expansion of many camps (Dobinson 1996, 173-220). At many batteries, women often outnumbered the men (Dobinson 1996, 86; Dobinson 2001, 312), and there are numerous contemporary paintings and photographs of ATS women working at HAA batteries (see figure 4). HAA batteries were often also provided with structures for their close defence, such as pillboxes or earthwork emplacements.

Post-War Developments

2.15 It is often forgotten that AA Command had a short post-war life of just ten years. It was a period of very rapid scientific change, with new or improved equipment and ordnance being developed, to deal with both high and low-flying, high-speed jet aircraft. This period was one of constant flux, witnessing a massive loss of manpower due to demobilisation of the conscript wartime army, a reduction and re-organisation of AA Command and its gun sites, the development of ever more sophisticated radar, fire control equipment and artillery, the development of Surface to Air Guided Missiles, and the changes in strategy necessary to deal with aircraft armed with nuclear weapons. Ultimately, all of these changes led to the abandonment of the 'Point Defence' artillery sites on the periphery of towns and cities, to be replaced by RAF Bloodhound missiles sites, located only to protect the nuclear deterrent bases.

2.16 The post-war reduction in size and the re-organisation of AA Command was undertaken in stages, and was first achieved by having a two-tier organisation, with a 'Nucleus Force' of three AA Groups based on 'regular' artillery regiments, supplemented by a small second-tier cadre of regulars if required. Of the almost 1,000 HAA sites built during the war, only 210 were retained for the 'Nucleus Force', distributed amongst the 25 gun defended areas (GDAs); 192 HAA sites in 22 GDAs were located in England (Dobinson 1996, 231). These sites were either Battery Headquarters (BHQ), which were fully equipped, armed and manned (termed 'On'-sites) or those which were maintained on a 'Care and Maintenance' basis with all equipment and guns held in-store at Anti-Aircraft Ordnance Depots ('Off'-sites).

2.17 However, this arrangement only lasted for two years as the Cold War had started in earnest and the AA Command structure was re-organised once more. In 1947 the British government re-activated the Territorial Army for recruitment, as well as peacetime conscription, in the form of National Service. This provided AA Command with a regular flow of manpower and allowed for Territorial back-up in an emergency. AA Command revised their command structure under what became known as the 'Ten Year Plan', forming five AA groups, with the 'On'-sites continuing their BHQ role and providing regular training for the Territorial gunners who on exercise also occupied and trained at the 'Off'-sites. The Territorial AA

regiments were indicated in the numbering system prefixed by 200, 300, etc. up to 600.

2.18 Events overseas in the Far East, particularly the Korean War, raised concerns over manning, capabilities and the need for improved and new equipment, resulting in the Labour government being compelled to increase the defence budget in 1950. AA Command re-organisation in the UK was given the name 'Igloo', which reduced the residue of the 'Nucleus' gun sites from 210 to only 78. The chosen sites were either to be modernised, or even relocated to totally new sites, and were designed to receive the fully automated 3.7" Mark VI No. 5 gun. These resources were grouped into three main defended areas, Forth/Clyde, Mersey/Midlands, and London/South-East (Dobinson 1996, 239). In an emergency, 'Igloo' called for the manning of 54 HAA gun sites within 36 hours. In order to achieve such a rapid deployment, all equipment was to be held on site, frequent manning exercises were to be carried out, and the gun sites were to be protected by security fences and resident caretakers; the remaining 24 gun sites were to continue to be held and manned on the basis of being 'Off'-sites.

2.19 'Igloo' was intended to be integrated into the RAF's new Rotor radar air defence radar system, with the long-range radar data gathered at the Rotor Sector Operations Centres, where targets were allocated to be engaged by the AA gun defences of a given GDA. The radar information was then to be fed to newly-built Gun Operations Rooms (GORs), to allow the Orange Yeoman tactical control radar to pick up the target and to lock the fire-control radar of a particular gun site or sites onto the target, and then to allocate the automated radar-controlled guns to engage. It was intended that the guns could be operated remotely from the GORs or locally from the gun site command post. 'Igloo' placed an ever greater emphasis on technology to allow the guns to engage high-speed jet aircraft and to reduce the necessary manning levels. However, the scope for any modernisation at the gun sites gradually petered out after 1952, due to a change of government that brought the Conservative party into power under Winston Churchill. Although generally in favour of the AA modernisation, and the re-armament programme in general, financial pressures brought sweeping cuts in funding. The budget for building works alone was cut by £15 million, with the result that re-building and/or modernisation work at numerous sites was halted, and sites were then abandoned, followed by the full abolition of AA Command in 1956.

The Humber Gun Defended Area (GDA) and Hull's Second World War Defences

2.20 The area around the Humber, and Hull in particular, was heavily protected during the Second World War due to its location on the east coast and prime strategic importance as a port. Nevertheless, the city was one of the three most bombed-damaged areas in the country, receiving some 82 air raids between 20th June 1940 and 18th March 1945; the raids of May 1941 were particularly heavy. Some 5,300 houses, as well as numerous churches, public buildings, factories and shops, were destroyed and over 152,000 people were made homeless (Ministry of Information 1943, 37-43; Graystone 1991; Geraghty 2002).

2.21 Hull's defences were extensive, and included not only HAA batteries but also Light Anti-Aircraft (LAA) batteries, searchlight batteries, barrage balloons (both land and water-based) and decoy airfields, towns and docks. The Stone Creek HAA battery formed a single element of the Humber Gun Defended Area (GDA), and it was designed to operate as part of a 'landscape' of air war, one extending from ground level to the sky through which the bombers flew (Richardson 2008, 20). The

Humber GDA comprised, at one time, up to 47 different HAA batteries, on both sides of the Humber, although not all were equipped with guns simultaneously (Dobinson 1996, 377-380). At the start of the war, the GDA was manned by two HAA regiments (the 62nd and 91st), controlled by the Gun Operations Room at Wenlock Barracks in Hull (Reckitt 1990, 13-15), and they were equipped with some new 4.5" and 3.7" guns (ceilings of 34,500ft and 32,000ft respectively), and also some old 3" guns which were ineffective against high-flying aircraft. The Stone Creek HAA battery was initially known as Station J and then Station H9 from 1st August 1941 onwards. It included the full extent of the original station complete with four gun emplacements and associated structures, as well as the domestic site. The other north bank HAA batteries closest to Stone Creek were located near Little Humber Farm (Station H8), Paull (H7), Hedon (C1) and Sunk Island (H10) (Dobinson 2001, 569); remains survive at both Little Humber and Sunk Island.

2.22 The HAA batteries would have been supported by numerous Light Anti-Aircraft (LAA) positions which would have worked in tandem with searchlight emplacements. The LAA sites were typically manned with Bofors 40mm guns, and were used for aircraft operating at a height of less than 3,000ft. Radar was sometimes installed at some of the larger LAA sites, but they usually relied on the more traditional methods of finding targets and aiming. The guns were installed in rectangular emplacements, the design depending on whether the gun was static or mobile (Dobinson 1996, 161-165). Local information suggests that one of the LAA sites was located at The Old Hall on Sunk Island.

2.23 Early on in the war, responsibility for manning searchlights was transferred from the Royal Engineers to the Royal Artillery and, together with AA guns, searchlights came under the overall charge of AA Command. Under this system, searchlight troops were organised into 'Searchlight Batteries RA' and in turn into 'Searchlight Regiments', who answered to AA brigades forming part of the AA Command's organisational hierarchy. A searchlight regiment might typically contain four batteries, whilst an AA brigade would be responsible for all the guns and lights in the GDA (Dobinson 2000, 2). Furthermore, the way in which lights were deployed changed during the course of the war, with a great upheaval taking place in the design of searchlight layout in the winter of 1940-41. There had been a suspicion, based on operating experience, that single searchlights located within gun zones did more to light up the target for the enemy than drive them away. Therefore, from approximately the autumn of 1940, lights began to be clustered, with up to half a dozen projectors on a single site (Dobinson 2000, 2). From November 1940, the 'three-light cluster' was employed, with three projectors located on sites situated six miles apart; on each site, the projectors comprised one larger 150cm diameter type and two smaller 120cm or more usually 90cm types, often arranged in a triangle with about 50m between them (Dobinson 2001, 280-284). But by the autumn of 1941, continuing experimenting had led to the decision to decluster the searchlights once more.

2.24 At the same time, sites were grouped into a series of 'belts' on the approaches to major target cities. Conventionally, these were formed by a three-part arrangement; an 'Indicator Belt', 12 miles deep with lights deployed singly at spacings of about 10,000 yards to provide early indications of approaching bombers; a 'Killer Belt', 16 miles deep with single lights at 6,000 yard spacings, equipped with searchlight radars or sound locators, sometimes using 150cm projectors rather than 90cm projectors to aid night fighter aircraft to intercept bombers; and lights in existing GDA's which incorporated positions up to 12,000 yards outside the outer line of existing guns, with single lights at a spacing of 6,000 yards or less, both to illuminate targets for AA guns and to dazzle the airborne

bomb-aimers (Dobinson 2000, 2; Dobinson 2001, 345). Dorman (1990, 32) reports the use of a dazzle barrage by massed searchlights in the Humber GDA, which deterred at least one enemy raid. It is not known where the nearest contemporary searchlight emplacement to Stone Creek was; there were two at the Sunk Island gun battery several miles to the east, but their operational dates are not given (Dorman 1990, 56).

2.25 In addition to the Humber GDA, the aforementioned First World War Sunk Island gun battery (located to the east of the Stone Creek HAA battery), had a concrete XDO (Extended Defence Officer) post constructed during the Second World War, and the battery itself was re-equipped with a pair of 4.7" QF guns taken from Spurn Point; these were present between April 1941 and March 1943. The battery formed part of the Spurn Fire Command area, which itself fell within the larger Humber Fire Command area. In order to help protect shipping in the Humber estuary, a stretch of the river between Stallingborough and Sunk Island became the site of a submarine minefield (Dorman 1990, 30-31 & 56). As already noted, the area around Hull was heavily protected during the Second World War, and numerous remains, sometimes quite discrete, still survive, such as those of a 'ZAA' rocket battery and barrage balloon positions at the site of the former Hull airfield at Preston, to the immediate east of Hull (Bacon 2002; Dennison 2009).

The Stone Creek HAA Battery

2.26 The Stone Creek HAA battery was initially known as Station J (for 'Johnny') and, from 1st August 1941 onwards, as Station H9; it formed part of the Humber GDA, the next nearest battery being Station H8 at Little Humber. As already noted above, the site is likely to have been developed in late 1938 in response to the German threat, and Station J was first recorded on 19th September 1939 when 286 Battery of the 91th HAA Regiment (286/91 Battery) received two mobile First World War vintage 3" guns from Station C, west of Preston (SM description; Dobinson 1996, 377-380; Dobinson 2001, 569). When first established, these guns would have been held in sand-bagged emplacements (see figure 4D), and the command post was probably the first permanent structure on the site; domestic accommodation would initially have been under canvas, later in wooden huts (Roger Thomas, *pers. comm.*).

2.27 By the end of September 1939, control of the site had passed to 172/62 Battery which is thought to have constructed permanent gun emplacements considered necessary for two 4.5" guns; the latter were certainly in place by 9th May 1940, when 286/91 Battery took over. On 25th July 1941, Station J (then called H9 from 1st August) returned to the control of 172/62 Battery until 19th February 1942 when the 113 HAA Regiment took charge. On 22nd June 1942 four 3.7" static guns supported by a GL Mark II radar were reported to be at Station H9 (Dobinson 1996, 379). In September 1942, the site was passed to 510/151 Battery. This was a mixed gender battery which used women from the Auxiliary Territorial Service (ATS) to operate the radar and communications systems, and undertake other support roles, whilst the men operated the guns. That same month the station was credited with shooting down an enemy aircraft, a relatively rare event.

2.28 The site was abandoned in November 1944, when both equipment and personnel were moved to a new gun site at Ringborough on the Holderness coast as part of Operation Diver, which countered the new threat from the V1 flying bomb (SM description; Dobinson 1996, 377-380; Dobinson 2001, 569). The Stone Creek site is not mentioned in November and December 1945 lists of active HAA sites in the Humber GDA (TNA WO166/16631; WO166/16644). The site is not thought to

have been reoccupied as it was not one of those chosen to form part of the post-war Nucleus Force, the spread of 192 HAA gun sites in England selected to be retained after the war, although the nearby batteries at Paull (H7) and Preston (H4) were (Dobinson 1996, 238; Dobinson 2001, 569).

2.29 The interpretation of the existing structures within the battery, especially those of the domestic site which are now virtually all demolished, is greatly helped by two vertical black and white aerial photographs, taken in September 1946 and April 1947 (RAF CPE-UK-1748, frame 4029; RAF CPE-UK-2043, frame 2077). Both these depict the battery once it had been abandoned, but it is surprising how much of the site's infrastructure remained in 1947, in terms of huts and other structures (see figure 5). There is also likely to have been some low-scale reclamation of materials by the locals - for example, on 15th June 1946, a Charles Baker of Stone Creek Cottages (to the east of the battery) was fined £1 for 'stealing concrete slabs from a camp on Sunk Island' (*Hull Daily Mail 15th June 1946*), although this may well have been from another Second World War site in the area rather than from the Stone Creek battery itself.

2.30 The two aerial photographs depict some 40 buildings of various types and forms, located either side of the central access way which runs from the entrance of the battery to the operational site (see figures 5 and 6). Those on the west side have a very regular and uniform appearance, and almost all seem to be curved roofed Nissen huts, mostly of the 16 foot span variety, although there are also two other lower flatter-roofed structures which are probably Ministry of War Production (MOWP) standard huts. It is noticeable that the cookhouse and canteen buildings (which survive in various states of preservation today - Structures A2 and A3; see below) are at a different alignment to the rest of the group. Conversely, the buildings on the east side of the access road are slightly more spread out, and form two distinct groups. To the north, adjacent to the camp entrance, is a large building with a hipped roof, resembling a house; this probably represents the officer's mess, similar to that which still survives at the Little Humber HAA site (Station H8) to the south of Thornbumbald, a single storey wooden bungalow structure with bay windows, a deeply hipped roof and two chimney stacks (see figure 7 top). To the south of this are several larger pitched roof structures including a longer one at right angles which might be a recreation or dining hall, as well as paths which lead to the ablutions (wash house - Structure A4) and probable latrines. To the south again, but on a slightly different alignment, is a group of seven other differently sized structures, with pitched roofs. These form a distinct group, and their different colouring compared to the adjacent 'shiny'-roofed structures, suggest they are wooden buildings of possibly an earlier phase (see below). Examples of similar earlier timber accommodation huts survive at a house named as Eden Roc, on the way to Paull village and possibly at the Barrow Haven HAA site (Station H27) (see figure 7 bottom).

3 DESCRIPTION OF THE SURVEY AREA

Introduction

3.1 The survey area is described below in a logical sequence. Reference should also be made to the survey plans and plates, and the photographic register which appears as Appendix 1; digital photographs are referenced in the following text in italic type and square brackets, the numbers before the stroke representing the film number and the number after indicating the frame e.g. [*5/32*]. Figure 8 provides the overall plan of the site.

3.2 The buildings and structures within the survey area are set on various alignments but, for ease of description, their long axes are considered to be aligned north-south; in each description, the actual orientation and the descriptive orientation (if different) are made clear at the start. Where possible, HAA specific structural or descriptive terms used in the text are as defined by Dobinson (1996; 2001). For the sake of continuity, the same letter identification system has been used for the buildings and structures as was used in the 2012 Condition Survey (Pace 2012), although additional features are also numbered consecutively. Finally, in the following text, 'modern' is taken to mean dating to after c.1945.

Setting and Surroundings

3.3 As has been noted above in Chapter 1 above, the Stone Creek HAA battery is placed on the east side of Stone Creek, a small inlet opening directly off the north side of the Humber Estuary on the western side of Sunk Island (see figure 2). Due to it being reclaimed land, the whole of Sunk Island is not only very low lying but is also extremely flat. This is the case for the field in which the battery was located, and indeed the fields which border it to the north and north-east. The only vehicular access to the battery was either from the centre of Sunk Island along Stone Creek Road or from Thorngumbald along Cherry Cobb Sands Road; there was also a third road, Marsh Road, which originates close to Keyingham, but this follows a rather convoluted and lengthy route to reach the battery, and would not have formed the most direct access. Nevertheless, on the 1946 aerial photograph, it is Marsh Road and Stone Creek road which appear the best maintained. Given the proximity of Stone Creek inlet to the battery, it is not impossible that some supplies may have been brought in by boat.

3.4 The north-eastern boundary of the survey area is formed partly by a modern post and wire fence and partly by a large, steep-sided drain, which is also clearly visible on the 1946 and 1947 photographs. The eastern boundary comprises a similar but substantially smaller drain, again present by 1946; this has a post and wire fence running parallel to its western side which may preserve earlier elements. The two strands of barbed wire are supported in part by a total of 46 angle-iron posts. Each post is c.0.95m in height and 0.04m wide along both outer sides from the angle, each side being 3mm thick [*5/001*]. The posts all have at least six holes cut into one of the sides, placed at 0.06m centres, with corresponding semi-circular 'nicks' at the outer end of that side and of the opposite side. The uppermost hole and associated 'nicks' are slightly larger than those below. These angle-iron posts are of a form used during the Second World War, and their siting alongside a pre-existing boundary reflects contemporary official guidance, as they were then less likely to be visible to enemy aerial reconnaissance (Hunt & Ainsworth 2006, 17); however, they may have been positioned once the battery was abandoned, as those posts along the eastern boundary would have conflicted with the operation of the GL Mark II radar mat, which spans the ditch here (see below). The angle-iron

posts are interspersed at irregular intervals by much more substantial concrete posts [*4/850, 4/851*] (see plate 2). These stand at least 1.15m tall (an unknown portion being buried), and are 0.16m square. They have a number of small holes set at 0.24m centres to one face, but these do not appear to run through the post. Several of the posts have wear around the upper part, as if something has been rubbing against them. They are similar in form to a pile of *ex situ* concrete posts laid alongside one elevation of the command post (see below).

3.5 The contemporary aerial photographs also suggest that the southern tip of the survey area did not form part of the battery, as a fence line runs at an approximate right angle between the eastern and western boundaries of the site (see figure 6); the fence line has been subsequently removed, but significantly the angle-iron posts referred to above do not extend beyond its former position. The southern tip of the survey area presumably remained in agricultural use. The western boundary of the survey area is again formed by a large, steep-sided drain (the Sunk Island Drain), which has an earth dyke running parallel to its west side; both the drain and dyke are visible on the aerial photographs. There is a farm to the immediate north-west of the battery (Stone Creek Farm), on Stone Creek Road, and a row of house to the immediate south-west (now called Coastguard Cottages) (see figure 2). Both of these are at least in part 19th century in date, but it is not known if they were utilised for military purposes during the Second World War; the aerial photograph does appear to show some Nissen huts at the farm.

3.6 As with all HAA batteries, the Stone Creek battery was divided between the operational site (broadly the guns and associated structures) and the domestic site (the accommodation, cooking and washing facilities); together, the two could be referred to as a 'gun park'. A gun park might go through several different phases of development during the course of the war, although Dobinson (1996, 144) suggests that, in terms of layout, new fabric was often added on to, rather than replacing, the earlier fabric, i.e. both may have left evidence in the field. In the draft layouts issued by the War Office in 1937, a four gun gun park covered about two acres (0.8ha), each gun separated by a distance of 15.24m, thus giving a minimum clearance of 31m radius from each gun. It was also stated that no glass window should be within 31m of a gun muzzle. The first firm specification for gun parks was issued in February 1939 and elaborated on the principles laid out in 1937. Linking roadways were included in the plan and a simple command post was included within the gun park. The specification also made provision for domestic accommodation, which was to be sited about 92m away from the guns. Later, the introduction of radar mats (see below) led to prescribed clearances from other structures to allow the radar to work efficiently without interruption (Dobinson 1996, 144-147).

3.7 At Stone Creek, the operational and domestic sites are placed approximately 95m apart (see figure 8), very close to the distance stipulated in the February 1939 specification. The gun emplacements are each separated from one another by c.15m, again very close to the distance given in the 1936 War Office draft layouts. Using the prescribed clearances for radar, and the 65 yard radius (59.4m) of the GL mat (see below), the most likely location for the radar at Stone Creek would have been to the east of the concrete roadway, almost midway between the operational and domestic sites and straddling the drain forming the eastern boundary of the site. However, if this was the case, then there cannot have been any metal or wooden fencing running along the drain in this area as it would have lain too close to the radar (Dobinson 1996, 144-147), and so the surviving angle-iron posts here described above would have to be a post-war introduction.

The Domestic Site

3.8 The sole surviving elements of the extensive group of buildings forming the domestic site and shown on the 1946-47 aerial photographs are a MOWP Standard hut (Structure A3), a Nissen hut (Structure A2) and associated structures (Structures 5 and 6) [*1/534-1/536, 1/693*] (see plate 1). It is noticeable that these buildings are on a different alignment to the rows of Nissen huts shown on the aerial photograph, and are placed parallel to the curving roadway (see figures 5 and 6). These structures are described below, together with other elements of the domestic site.

The Principal Entrance and Roadway

3.9 The principal, and indeed only, access to both the domestic and operational sites at the battery lay at the north end of the survey area. A concrete roadway leaves the south side of Stone Creek Road. In September 1946, there may possibly have been structures with curved roofs present to the south of the road, although it is more likely that these are hay stacks, as harvest was in production at the time, and they had largely gone by April 1947. The short section of concrete roadway running south from Stone Creek road is of Second World War date, but that running on a brick bridge across the Sunk Island Drain is a post-war replacement [*4/711*]. However, the wartime concrete roadway resumes to the south-east of the drain, and enters the north end of the survey area. This roadway has an average width of 3.5m and is of sectional construction; it is presumed that the concrete slabs were cast on site [*1/684*] (see plate 3). The majority of the pre-cast concrete sections have a parallelogram plan-form, with an average length of 6.0m, but there are occasional smaller sub-triangular sections fitted between them [*1/688*]. The roadway retains some patches of a skin of bitumen or tar, which was applied to the surface of the concrete sections in an attempt to camouflage the road from enemy aircraft (Dobinson 1996, 225). It is far less visible in the 1946 aerial photograph than on the 1947 one, presumably as a result of the tarmac either wearing off or not being re-applied.

3.10 There are no traces of any wartime gateway where the road enters the survey area, but a short distance into the site, a concrete base is set at a right angle to the west side of the road. This base is aligned north-east/south-west, measuring 6.50m long by 2.50m wide, and has been previously interpreted as the remains of a guard hut (SM description). On the 1946-47 aerial photographs, a small building, possibly with a curved roof, can be seen in this position; the building is actually slightly smaller than the concrete base, as the latter also forms a surface up to the road. The photographs also show a second, similar, structure close by to the north-west (now actually outside the survey area), and perhaps another third, smaller, structure to the south-east, but these have left no trace as earthworks; any one of these might have been a guard hut.

Former Structures, east side of the Roadway

3.11 On the east side of the concrete roadway, there was a complex of buildings shown on the 1946-47 aerial photographs, few of which have left any surface traces as earthworks. At the north end of this area, there was a larger rectangular building with a hipped roof, resembling a house. The building almost certainly represents the officer's mess, similar to that which still survives at the Little Humber HAA site (Station H8) (see figure 7 top). A shallow, sub-oval depression survives on the north end of this building's position, and there are two concrete drain covers to the east.

3.12 A spread but wide bank runs parallel to the drain marking the eastern border of the survey area - this may have been thrown up during wartime but could equally be upcast from a re-cutting of the drain (see figure 8). There is also a small north-south aligned depression at the north end of this bank, which corresponds a small structure shown on the 1947 aerial photograph. This aerial photograph also shows, to the south of the hipped-roof building, a small hut with a curved roof, and then three further pitched roofed structures all set on the same north-west/south-east alignment. Another building in the south-east corner of this group is shown as an L-shaped building with a flat roof, and had seemingly been built on an area of hardstanding on the earlier 1946 photograph. These buildings may have served some of the male accommodation once women were introduced to the site in September 1942 (see below). To the south of these is a much longer structure with a pitched roof placed at a right angle to the roadway, which probably represents a former dining hall, which became a recreation hall once the other canteen was built on the other side of the road. The position of this and another of the buildings is now crossed by a low bank, and there is a low spread circular platform to the east.

3.13 Beyond and to the south of these buildings, shown on both 1946-47 aerial photographs, there was a group of seven other structures, with pitched roofs (see figures 5 and 6). These form a distinct group, and their different colouring compared to the adjacent 'shiny'-roofed structures, suggest they are wooden buildings. In addition, the 1947 aerial photograph clearly shows a definite circular earthwork (or more likely an infilled circular ditch), c.20m in diameter, just to the south of this group of huts and, with the eye of faith, two or possibly three others of similar sizes immediately adjacent to it, including one bisected by the later access road. It is likely that the wooden buildings and the circular earthworks are associated with the initial phases of the site, with the wooden huts forming domestic accommodation for the 4.5" battery and the circular earthworks marking the various positions of earlier two mobile 3" guns; these latter guns were notoriously heavy and often had to be moved around a site to prevent them sinking into soft ground (Roger Thomas, *pers. comm.*). Unfortunately, none of these features can be seen as earthworks or other surface remains today, but their identification on the 1947 aerial photograph is significant; this is discussed further in Chapter 4 below. As previously noted, examples of these earlier timber accommodation huts survive outside Paull village (see figure 7 bottom). To the east of this group, against the drain forming the east side of the site, is a larger structure which a pitched roof, which has been identified as the ablutions (see Structure A4 below), and two other adjacent smaller structures may have been latrines.

Structure A1: Sub-station Building, east side of the Roadway (see figure 9)

3.14 A small surviving structure adjacent to the east side of the roadway is the former electricity sub-station (Structure A1). This sub-station linked the domestic site to the generators at the south end of the survey area (see Structure E below), as Sunk Island was not connected to the national grid until the 1950s (SM description). The building is aligned north-west/south-east, although for the purposes of description the longer axis is considered to be aligned north-south. It has maximum external dimensions of 4.15m north-south by 2.60m east-west. The building is of a single storey with a roof formed by a single reinforced concrete slab, 0.15m thick and projecting beyond or overhanging all of the external wall faces below by 0.05m [*1/530, 1/691*] (see plates 4 and 5). The roof is not quite flat, there being a very shallow central ridge which runs parallel to the long axis. All walls rise from a slightly projecting plinth, and are built of buff machine-made bricks

(average dimensions 220mm by 105mm by 75mm) set with a cement mortar and laid in English garden wall bond (three stretcher courses to each header course). The external walls have an average thickness of 0.24m. There are traces of black paint to all external elevations, although most has been eroded.

3.15 Starting with the south external elevation, the only feature is a wide central flat-headed window opening, which has lost its frame [*1/526, 1/539*]; it was once quite probably fitted with a louvered frame, similar to that which survives to the north elevation (see below). The east elevation is very plain [*1/527*]. A box-like fitting, c.300mm square, was once bolted to the south end of this elevation at a height of 0.75m above ground level [*1/528*]. To the north of centre of the elevation, there is a small diameter circular hole running through the wall set at a slightly higher level than the fitting, and above this, a rusted metal bracket which evidently once secured a vertical circular-section feature such as a pipe or flue [*1/529*]. The north elevation has a single flat-headed window opening, centrally placed and fitted with a two-light louvered softwood frame with nailed joints [*1/690*]. Most of the frame is set flush with the external face of the wall, with only the sill projecting slightly. The frame is 100mm deep by 70mm wide, and has a quarter-round moulding to the internal face. Each light of the opening contains seven fixed slats, sloping downwards towards the outside of the building. The upper surfaces, facing outward, were once painted black, while the lower surfaces were painted light blue; the frame itself was painted a reddish-brown colour internally [*1/551*].

3.16 The west elevation has a window to the north part and a doorway to the south part, the latter being the only access point to the interior [*1/537*] (see plate 5). The softwood door frame has nailed joints and is set flush with the external face of the wall. The frame is 70mm deep by 50mm wide, and has a quarter-round moulding to the internal face. The door itself is of plank and batten construction and was hung on two short strap hinges to the south side, only the upper of which now survives; the hinge plate is held in place by four screws [*1/538*]. It opened outwards and was probably once lockable using a padlock, as there is a fastener mounted on the north jamb of the door frame. The internal face of the door retains traces of a light blue paint. The flat-headed window opening is fitted with the remains of a two-light louvered softwood frame with nailed joints [*1/546*] (see plate 4). Most of the frame is set flush with the external face of the wall, with only the sill projecting slightly. The frame is in two parts, with a total depth of 110mm and a maximum width of 70mm; both parts have quarter-round mouldings to the internal face. Each light once contained a single leaf, opening outwards and hinged to the outer jamb of the frame; the leaves closed flush with the frame, and each may once have contained two glass panes of equal size, set horizontally [*1/547*]. The remains of the catch for the opener survive to the north light. To either side of the interior of the window, within the brick opening, there is a small vertical timber mounted centrally to the frame, which has a small catch or bracket screwed to it [*1/548, 1/550*].

3.17 As noted above, the only access to the interior was through the doorway in the west elevation; there is a single concrete step leading down into the interior. At the time of the EDAS survey, the interior of the building was full of loose timber and corrugated iron sheeting, at least some of which probably came from the collapsed remains of Structure A2 to the west [*1/541*]; there also appeared to be a bench or table against the west wall. The internal walls are of plain unpainted brickwork [*1/542*]. There are timbers set into the north and south walls above the window openings which have nails projecting from them to hang items from (presumably curtains or similar), and there are also individual nails to the east and west walls [*1/544*]. Along the east and west edges of the concrete ceiling, there appear to be

eight (four to each side) shallow recesses, set at equal centres [*1/545*]. Their function is unknown, but some have a densely layered card-like substance decaying out of them; they may have been for cabling.

3.18 To the immediate east of the sub-station building, there is disused electricity pole which is also likely to date from the Second World War [*1/531*]. The pole is of softwood, and has a large iron hook placed at approximate head height to the side facing away from the sub-station [*1/532*]. At the head of the pole, three ceramic insulators remain in place [*1/533*].

Structure A4: Ablutions, east side of the Roadway (see figure 9)

3.19 This building is shown as a large structure with a pitched roof on the 1946-47 aerial photographs, with a number of walls to the south; it has been identified as the ablutions (SM description); given its proximity to the presumed male accommodation on the east side of the road (see below), it would have been the male ablutions. It had been demolished prior to the scheduling of the site in March 2001, and it survived as demolished remains at the time of the EDAS survey [*1/675, 1/676*]. The building is aligned north-east/south-west, but for the purposes of description it is considered to be aligned north-south.

3.20 The building was set on a concrete base or platform, which had maximum external dimensions of 12.0m north-south by 8.0m east-west, although the building itself was smaller. The surviving part is rectangular in plan, with small projections to each corner, and placed across the north end of the base; it has maximum external measurements of 6.20m east-west by 2.90m north-south [*1/678*]. The walls stand to a maximum height of 0.55m and are built of reddish-brown machine-made bricks (average dimensions 225mm by 105mm by 70mm) set with a sand cement mortar and laid in English bond (one stretcher course to each header course) [*1/679, 1/680*] (see plate 6). The external walls have an average thickness of 0.24m. There was a doorway in the west elevation but this has almost completely collapsed [*1/677*]. The interior of the building is piled high with rubble. Amongst this material are many ceramic tiles which must once have covered the ablutions floor. The machine-made ceramic tiles are just under 200mm square, with a light brown glaze to the upper surface over a pattern of raised alternating ridges, presumably to create a non-slip surface when wet. No examples with a maker's name could be found.

3.21 To the immediate south-east of the ablutions, there is a sub-square scarp, c.6.00m across and 0.75m high, with a similar but longer earthwork to the east. The latter may be related to possible latrines, visible on the 1946-47 aerial photographs. There are further earthworks to the south, close to the drain which forms the eastern boundary of the site. These are mostly sub-square or sub-oval mounds and depressions, varying in size from 1.50m to 10.0m across. One of the smaller earthworks appears to coincide with what may be a small built structure visible in the 1947 aerial photograph (but not in 1946), of uncertain function.

Former Structures, west side of the Roadway

3.22 To the west of the concrete roadway, the 1946-47 aerial photographs show a large group of buildings within the domestic site, including 16 Nissen huts with curved roofs, arranged in three uniform rows with connecting paths between them; the huts are all of the same design and most are of the same length although some of those at the ends of the rows are shorter (see figures 5 and 6). All of these

buildings have all been removed since 1947, and have left virtually nothing in the way of surface traces, although some foundations may survive below ground.

3.23 Dobinson notes that the arrangements and configurations of domestic sites were especially complex and varied, with at least 17 permutations of buildings possible at a typical 3.7" battery (Dobinson 1996, 150). By the outbreak of the war, Nissen huts had been standardised to a series of three spans, 4.9m, 7.3m, and 9.2m. Lengths were modular and based on a bay length of 1.8m; the War Office regarded a six bay structure with a length of 11.0m (36ft) as standard . The main frame of the 4.9m span Nissen hut comprised ribs made from T-section curved steel, each supplied in three sections, the central one fitted with fishplates riveted to it to accept the other two. The gable ends were either made from prefabricated timber components or fashioned locally from brickwork (Dobinson 1996, 197-200) (see figure 3B). From the summer of 1941, the domestic sites also had to cater for female operatives, who were given greater space and privacy in higher standard accommodation, and this led to a significant expansion of many camps (Dobinson 1996, 173-220; Dobinson 2001, 312); as noted above, the Stone Creek site was manned by a mixed gender battery from September 1942 (510/151 Battery), and in many instances the women outnumbered the men.

3.24 The huts would mostly have served as accommodation for the battery. The approved accommodation scales for HAA sites, issued in January 1939, stated that a four gun position, based on 77 men and three officers present, required 2535 square feet of living huts, as well as associated structures including latrine shelters, ablution shelters, cooking shelters and a gun store. Slightly later, in July 1940, the Emergency Scales for ADGB hutting required that, on a typical HAA gun site, Nissen huts should be present on the basis of 12 men per hut. When implemented, this should have meant that a typical HAA site had six or seven Nissen (or comparable) huts. In March 1941, the War Office committed itself to a policy of standardised hutted camps throughout the army, and the subsequent arrival of mixed HAA batteries meant that domestic sites were generally built to a higher standard. Trying to obtain precise numbers of staff at HAA sites is always problematic, but a typical mixed four-gun battery might be expected to have around 150-200 staff in 1943 (Roger Thomas, *pers. comm.*; Dobinson 1996, 187); Stone Creek was not a Battery Headquarters, which would have had an additional number of administrative staff and offices. As with another HAA battery at Butt Farm, near Beverley (East Yorkshire) (Dennison & Richardson 2016, 17), there appears to be a clear distinction between male and female accommodation - if women did outnumber the men, it is possible that the regularly-spaced 15 curved roofed Nissen huts accommodated the women (with their own ablutions, latrines, etc) while the men were housed in the various huts on the east side of the roadway.

Structure A2: Canteen (see figure 10)

3.25 A large curved roof Nissen hut is clearly visible in this position on the 1946-47 aerial photographs, linked to the MOWP Hut (Structure A3) to the west by a linking structure. It has been interpreted as being the canteen hall (SM description). A good idea of what the canteen interior would have looked like whilst in use is given in a sketch made of a similar structure by I K Sydee during 1941 (Coldstream 1943, 6) (see figure 11 top). The structure is believed to have been used for rearing turkeys after the war (Local information, *pers. comm.*).

3.26 At the time the SM description of the Stone Creek site was produced (before March 2001), the Nissen hut was described as being of six-bays and measuring

10.8m by 7.3m. Very little then survived, apart from two fixed 'T' section steel ribs, and one partially fixed, together with some *ex situ* corrugated-iron sheeting on the ground. The brick north gable wall was then still standing, but it has since collapsed. At the time of EDAS's initial survey visit (September 2013), the plan form of the hut was obscured by fallen roofing sheets and timbers, guano and grass [*1/594, 1/595*] (see plate 7). However, after clearance, the form became much clearer [*4/877*].

3.27 The concrete base of the former Nissen hut runs parallel to the adjacent MOWP hut (Structure A3; see below) and is aligned very slightly north-west/south-east, although for the purposes of description it is considered to be aligned north-south. It has maximum external dimensions of c.16.75m north-south by 7.90m east-west, considerably longer than the dimension given by the earlier SM description. The slab comprises three parallel lengths, two of which have further sub-divisions. The gable ends were built of brick, and some evidence for these survives at either end of the hut base. The south gable had a central doorway, leading to what appears to have been a small entrance structure screening the doorway [*4/875, 4/876*], whereas the north gable had an apparently a wider opening, leading to a connecting path or possibly another structure [*4/879*].

3.28 One fixed 'T' section steel rib of the Nissen hut remained in place, and another was partially fixed [*1/584*]. Both are of sectional construction, with riveted fishplate joints [*1/598, 1/601*] (see plate 8). The fixed rib passes from the centre of the concrete roof slab at the east end of the eastern linking structure (see Structure A3 below) [*1/596*] to the north elevation of what is now a free-standing brick structure that was once part of the Nissen hut (see below). The partially fixed rib passes from the north elevation of the east linking structure [*1/604, 1/605*]. There is also evidence for a third rib passing from the south elevation of the east linking structure [*1/597*] to the south elevation of the aforementioned free-standing brick structure. These three ribs are set at c.1.95m centres. Several other *ex situ* examples of ribs were recovered during clearance. In addition, the remains of two metal ceiling light fittings were noted [*4/880, 4/882, 4/883*], painted green on the outside and bearing the name 'Revo'. These were manufactured at the Revo works in Tipton, West Midlands, the firm having risen to prominence during the 1930s and by the 1960s were making a range of electrical products varying from ovens to street lighting. The mark on the Stone Creek fittings is one known to have been used by the firm during the 1930s (*http://www.simoncornwell.com/lighting/manufact/revo/index.htm*) and so they are assumed to date to the wartime use of either the canteen or the adjacent MOWP hut.

3.29 The surviving, now free-standing, structure on the east side of the concrete base was once an integral part of the Nissen hut, and probably formed an entrance lobby or porch for those using the canteen, as opposed to catering staff in the MOWP Hut to the west who used the east linking structure; it is not easy to identify on the 1946-47 aerial photographs. Such entrance porches were used to prevent light from escaping from the main building, thus maintaining a blackout (Roger Thomas, *pers. comm.*). The structure is aligned very slightly north-east/south-west, although for the purposes of description it is considered to be aligned east-west. It has maximum external dimensions of 1.80m north-south by 4.10m east-west (see plate 7). The structure is of a single storey [*1/554*], with a roof formed by a single reinforced concrete slab, 0.15m thick and projecting beyond or overhanging the north and south external wall faces below by 0.15m; a drip channel is present to the soffit of the roof slab (see plate 7). The roof slab angles upwards slightly at the west end where it was formerly met by the curved sheeting

of the Nissen hut roof. All the walls are built of reddish-brown machine-made bricks (average dimensions 220mm by 105mm by 75mm) set with a cement mortar and laid largely in stretcher bond, although some courses have headers interspersed between the stretchers. The external walls have an average thickness of 0.12m.

3.30 The external elevations of this entrance structure are largely very plain. There is a single small flat-headed window opening to the north elevation, fitted with a softwood window frame with nailed joints [*1/695*]. The frame is flush with the external wall face, and is 80mm deep by 60mm wide, and in two parts; the glazing has been removed. To the interior of the frame, a smaller piece of wood with a catch or latch is centrally placed to the east and west sides [*1/570*]. To the immediate west of the window, the pattern of brickwork bonding suggests that the structure may have been built in two different phases. The west elevation, formerly projecting into the Nissen hut, has a tall centrally placed doorway with a concrete lintel [*1/696*] (see plate 9). The south elevation has a similar full height doorway placed towards the west end, although it has a much thinner lintel [*1/557*] (see plate 7). The east elevation [*1/553*] has a single small flat-headed window opening similar to that seen in the north elevation, fitted with a softwood window frame with nailed joints. The frame is flush with the external wall face, it measures 80mm deep by 60mm wide, and is in two parts. The inner part is top hinged and opened outwards; the glazing has been removed although the opener and catch is still in place [*1/555, 1/563*]. There is a ceramic vent above and to the north of the window [*1/556*].

3.31 Internally, this small building was once sub-divided into three cells, two smaller east and central cells and a larger western cell. The cells were once separated by partition walls, with doorways at their south ends, but these have been removed; the only remaining evidence is downstand beams to the ceiling and scarring to the internal walls [*1/559, 1/561, 1/564, 1/567, 1/569, 1/572, 1/576*]. Where the north wall meets the ceiling, softwood timbers have been tacked along the joint [*1/571*]. A single pair of very small pieces of timber are nailed to the east end of the ceiling, presumably for a light fitting [*1/575*]. Clearance of the interior revealed a concrete floor [*4/884*].

Structure A3: MOWP Standard Hut - Cookhouse (see figure 10)

3.32 The general arrangement of the MOWP hut was covered by DFW 10210, issued on the 29th September 1942. The standard frame sizes that were used gave the MOWP hut a clear internal span of 5.60m, a height to the eaves of 2.30m and ceiling height of 2.90m. Like the majority of wartime hutting, the structure was modular and designed to be erected in multiples of 1.80m long bays, but it was often standardised either as a five bay structure (i.e. 9.20m long) or a 10 bay structure (18.40m long). MOWP hut roofs could be wood-framed panels covered with roofing felt, corrugated asbestos cement sheeting, fibrous plaster slabs with roofing felt, or wood wool slabs with roofing felt. The side panels could also be made from a range of materials, with brick or clay block walling recommended for ablutions and cookhouses (Dobinson 1996, 191-192).

3.33 It is presumably the use of brick that has led to the identification of the MOWP Standard Hut at Stone Creek as being the battery's cookhouse (SM description). The building is aligned very slightly north-west/south-east, although for the purposes of description it is considered to be aligned north-south, and it is parallel to the adjacent canteen (Structure A2) to the east. It has maximum external dimensions of 11.70m north-south by 6.60m east-west. The building is of a single

storey, and once had a pitched corrugated asbestos cement sheet roof, although this had largely collapsed at the time of the EDAS survey [*1/578, 1/593*] (see plate 10); it was subsequently replaced and the gables rebuilt as part of the repair works. All original external walls of the hut are built of reddish-brown machine-made bricks (average dimensions 225mm by 105mm by 70mm) set with a cement mortar and laid on edge in stretcher bond; the latter was presumably done to cut down the number of bricks that were used. Where damage has occurred, it can be seen that the upper surface of the bricks are frogged and impressed 'LBC PHORPRES 6'. These were produced by the London Brick Company (LBC), based at Stewartby in Bedfordshire, who operated the largest brick-producing factory in the world at the outbreak of the Second World War. At first, the war severely affected their business but they were subsequently awarded Government contracts for air-raid shelters, airfield buildings and other official structures (Antrobus 2011, 1-3). The trade name of 'Phorpres' relates to the four separate presses that were applied to the powdered clay in the brick moulds - the bricks were dry-fired producing a hard outer surface but a nodular internal mass. The external walls have an average thickness of 0.24m.

Main Structure

3.34 The 6.60m long north gable, like the rest of the external elevations, is essentially of pier and panel construction [*1/701*] (see plate 12). It is three bays in length, the wider central bay being flanked by narrower bays; the bays are separated by projecting square piers (which only rise to just below the eaves course) with concrete caps [*1/608, 1/615*]. The eastern bay is blank, but the west bay contains a single-light flat-headed window opening with a concrete lintel and projecting chamfered concrete sill; the sill is lined with deep red square tiles to the interior [*1/625*]. This opening is fitted with a Crittal-style metal frame, recessed from the face of the wall, holding four panes, arranged vertically [*1/616*]. The frame has a T-section in profile, and the glass panes are held in place using putty; all of the panes were once of toughened glass, containing a grid of wires forming 12mm squares; this is known as Georgian anti-blast glass (Roger Thomas, *pers. comm.*). The upper part of the frame (comprising a single frame) is top-hinged on a pair of small hinges and opens outwards. The opener and catch appear to be zinc-plated. The central bay contains a window opening and frame with the same detailing, although the frame is of a different form [*1/617, 1/618*] (see plate 13). It comprises two leaves, each of four panes. The west leaf is as described above for the west bay. The east leaf is hinged to the west side, and opened outwards.

3.35 There is also a tall doorway with a concrete lintel in this central bay [*1/620*] (see plate 12). The softwood door frame has nailed joints and is recessed from the external wall face. The frame itself is in three parts; the two main parts are in total 0.11m deep by 0.08m wide, but there is also a concave moulding applied to the external face. There is small cut-out just above the centre height of the doorway to this moulding on the east side. Above the doorway opening, there is a rectangular 'fanlight' comprising two panes of toughened glass [*1/623*]. The whole of the frame was once painted a light blue. The door itself had been removed by the time of the EDAS survey, but it was formerly hung on two hinges to the west side; there are letts for the hinge plates at 0.25m and 1.50m above ground level, cut into the frame. Each hinge plate was held in place by four screws. The door opened inwards. Above the central bay, towards the apex of the gable, there is a small opening with a concrete lintel and projecting brick sill, which was once fitted with a louvered frame as described above in Structure A1 above [*1/624*]. To the immediate east of this opening, there are four ceramic insulators with a quantity of cables still attached; one cable rises above to a ceramic fitting with a flared neck

which allows it to pass through the wall. The gable has slightly projecting brick coping, and the ends of the internal roof timbers are also visible externally, cut flush with the external wall face.

3.36 The west elevation is of three wide bays, separated by projecting piers (which rise to just below the eaves course) with concrete caps as to the north gable [*1/706, 1/707*] (see plate 10). Each bay originally contained a pair of window openings, set beneath a single concrete lintel but with separate concrete sills. Each window opening was once fitted with a steel window frame, of the same form as described for the central bay of the north gable. A few frames retain panes of toughened glass, again as described for the north gable [*1/703-1/705*] (see plate 14). The window to the north bay has been largely blocked and replaced with a Crittal-style metal frame, holding four vertically arranged panes, apparently within the working lifetime of the building as a wartime structure [*1/702*]. Above the windows, slightly projecting brick eaves run the length of the elevation, with concrete wall capping over. There are two small concrete bases or pads to the base of the west elevation, one housing a drain.

3.37 The south gable is partly obscured by one of the two link structures which formerly provided access between the MOWP Hut and adjacent Nissen huts (see plate 11); these are described below. The south gable itself, like the north gable, is three bays wide, the wider central bay flanked by narrower bays; as on the north gable, the bays are separated by projecting piers which rise to eaves height with concrete caps. The outer bays have windows of the same form as to the west bay of the north gable [*1/592*]; that to the east bay of the south gable is one of the very few windows in the building to retain a complete set of toughened glass panes [*1/582, 1/586, 1/588*] (see plate 15). Within the central bay (concealed by the link structure), there is a doorway, offset to the west. It was almost certainly once fitted with a door of the same form as that surviving to the north gable, but only the rectangular 'fanlight' comprising two panes of toughened glass now survives [*1/656, 1/663*].

3.38 The east elevation is also partly obscured by a link structure (described below; see plate 11). However, it is of the same overall form as the west elevation, with three bays, again separated by projecting piers which rise to just below the eaves course, with concrete caps [*1/698*]. There is a single window in the south bay to the south of the link structure, of the same form as those to the west elevation; significantly however, the concrete lintel does not extend to the south [*1/579-1/581*]. Within the link structure (and still within the south bay), the wall is blank, with no evidence for a window ever having been present. To the north, still within the link structure but to the central bay, there is doorway with no surviving door fittings [*1/648*]. Beyond the link structure, but still within the central bay, there is a window of the same form as to the south bay [*1/603*]. In the north bay, there are a pair of windows, virtually identical to the paired windows in the west elevation, but with separate lintels rather than a single one [*1/699*]. A drain cover is located at the angle of the east elevation and the north wall of the link structure.

3.39 The main original access to the interior of the cookhouse building was through the doorway in the north gable. This lead into the north cell or room, the smaller of the two cells forming the interior. The floor was initially obscured by fallen debris at the time of the EDAS survey, but after clearance, it was seen to comprise a two-part concrete slab [*4/869*]. All of the internal walls of the north cell are bare brickwork, although there are traces of what may be light coloured paint or whitewash to some of the upper parts. The lower part of the north wall has few features that are not visible externally. There was once a thin pier to the east of the doorway, which

rose as far as the soffit of the window sill but this has largely been cut off [*1/629*]; it may once have crossed the cell to meet a similar feature to the south wall, thus forming an internal partition. Directly above where the north pier terminates, there is a metal switch box set on a wooden mount [*1/639, 1/643*]. Two cables emerge from the top of the box, and one from the base; all three are coated in cloth. One of the upper cables runs horizontally for a short distanced before rising vertically up the wall and into the ceramic fitting noted above to the exterior of the north gable. It passes the four bolts securing the external ceramic insulators. The other upper cable also runs horizontally for a short distance, and then rises vertically up a vertical timber attached to the wall. At the top of the latter, the cable then appears to transfer onto one of the roof timbers [*1/641*].

3.40 At the east end of the north wall of this north cell, there is a sloping timber nailed to the wall [*1/630*]. The timber slopes downwards from east to west, and has a shorter length of timber nailed to its upper surface. Gaps have been left between these shorter lengths, to create recesses into which other cross timbers could fit [*1/640*]. This arrangement is mirrored by a similar sloping timber at the east end of the south wall [*1/636, 1/637; 4/866*] (see plate 17). Although it is possible that five (or possibly six) horizontal timbers ran across the full width of the space, supported on the sloping timbers, to create a large sloping area beneath the windows in the east wall, it is more likely that these wall-mounted sloping timbers supported a slatted shelf along each wall and faint scars in the paint and brickwork on the east wall suggest two Belfast-type sinks were placed under the windows [*1/638*]. This would have created a washing-up area, and Dobinson (1996, 205 & 210) reproduces a MOWP drawing of a wash-up bench of a similar form and slightly larger dimensions.

3.41 With the exception of the sloping timber, the south wall of the north cell is largely blank. There is a vertical timber and a horizontal timber nailed to the wall towards the west end, and a doorway to the west of centre [*1/632*]. This doorway is flanked by narrow projecting piers but again these have largely been cut away [*1/635*] (see plate 16). The doorway has a concrete lintel, but the frame and door have been removed [*1/633*]. In the west wall, there may be vertical stripes or shadows on the brickwork blocking of the window here [*1/627*]. The roof structure of the north room is quite simple, with three plain softwood purlins to each roof slope, running north-south [*1/645-1/647*]. Panels of thick woody cardboard (wood wool?) are nailed over the purlins, and then corrugated-iron sheeting over these. Some of the purlins retain cabling, presumably once linked to light fittings.

3.42 The doorway in the south wall of the north cell or room leads into the larger southern cell. At the time of the initial EDAS survey visit, this was largely filled with fallen roof debris [*1/653, 1/665*], obscuring much of the floor and walls. However, after clearance, it was seen that the floor was formed by a four part concrete slab. Within the slab, there is a small rectangular area at the very south-east corner of the cell which appears to have been associated with scars left by removed partition walls to the adjacent east and south walls. At the north end of the east wall, a small-diameter pipe running through the wall had been cut off flush to the wall face a short distance above floor level. To the east end of the north wall, there are at least two rows of wooden plugs, set at a height that suggests they may once have supported shelving, while to the west end, a horizontal piece of timber is nailed to the wall. Other than these features, there is little surviving evidence for the former internal organisation of the cell [*1/664*]. A single original roof truss survived over the north end of the cell [*1/655*]. It was entirely of nailed softwood construction, and of simple form, with plank tie-beams and principal rafters having raking struts running between them.

3.43 As part of the repair and conservation works, the tops of the walls and gables were rebuilt, new trusses installed and a new corrugated iron roof added [*4/853, 4/857, 4/859*]. Other works included putting slats at the windows to prevent birds entering and external rails to protect the building from stock [*4/854, 4/870-4/874*] (see plates 17 and 18).

East Linking Structure

3.44 The linking building extending east from the MOWP Hut (Structure A3) to link with Structure A2 is somewhat larger than the southern one (see below). It is aligned very slightly north-east/south-west, and so is at right angles to the east wall of the main structure (see plate 11). It has maximum external dimensions of 4.65m east-west by 3.60m north-south [*1/577*]. The building is of a single storey, with a roof formed by a reinforced concrete slab, 0.15m thick and projecting beyond or overhanging all of the external wall faces below by 0.15m; a drip channel is present to the soffit of the roof slab. The roof is not quite flat, there being a very shallow central ridge which runs parallel to the long axis. There are also more prominently raised ridges around all three sides of the roof's eastern end, where it formerly met the Nissen hut to the east (part of Structure A2). All walls are built of reddish-brown machine-made bricks (average dimensions 220mm by 105mm by 75mm) set with a cement mortar and laid in stretcher bond. At the east end of the north and south walls, c.1m may have been rebuilt The external walls have an average thickness of 0.12m, and the external elevations are largely very plain. There is a window opening to the north elevation, with a concrete lintel and sill, although the window frame has gone [*1/697*]. The interior of the link structure is plain [*1/649, 1/651*]; the floor was obscured by guano at the time of the EDAS survey, but nothing apart from the single slab concrete floor was revealed by the clearance works [*4/862, 4/863*] (see plate 19).

South Linking Structure

3.45 The linking structure extended south from the MOWP Hut (Structure A3) to link with an adjacent Nissen hut (Structure 5; see below and plates 10 and 11). This linking structure is aligned very slightly north-west/south-east, and so is at right angles to the south wall of the main structure [*1/583, 1/708*]. It has maximum external dimensions of 2.90m north-south by 2.80m east-west. The building is of a single storey, with a roof formed by a reinforced concrete slab, 0.15m thick and projecting beyond or overhanging the east and west external wall faces below by 0.15m; a drip channel is present to the soffit of the roof slab [*1/590*]. The roof is not quite flat, there being a very shallow central ridge which runs parallel to the long axis. All the walls are built of reddish-brown machine-made bricks (average dimensions 220mm by 105mm by 75mm) set with a cement mortar and laid in stretcher bond. The external walls have an average thickness of 0.12m.

3.46 The external elevations are largely very plain. There is a small window opening to the west elevation, retaining elements of a softwood window frame with similar detailing to that recorded to the west elevation of the sub-station (Structure A1) (see plate 10). The south gable preserves the roof curve of the adjacent former Nissen hut to the south, and a has a wide doorway with a concrete lintel [*1/589*] (see plate 11). The interior of the link structure is also very plain, although there are traces of what may be light coloured paint or whitewash to the lower part of the north wall [*1/657, 1/658*]. A cable with a rubberised coating is secured to a horizontal piece of timber over the window in the west wall using lead clamps held in place by two screws [*1/659, 1/662*]. There is also a small vertical piece of timber

set to the south of the window, and another wooden fixture, probably for a light fitting, fixed to the ceiling [*1/660*]. The link is floored with concrete.

Structure A5: Nissen Hut (see figure 10)

3.47 The south linking structure above led to another Nissen hut to the south (Structure A5). This has been completely removed but its concrete base survives, measuring 5.35m north-south by 4.60m east-west [*1/591*]. It is clearly visible on the 1946-47 aerial photographs.

Structure A6: Store (see figure 10)

3.48 There is a further structure immediately to the north of the MOWP Hut (Structure A3), which has been interpreted as a store (SM description). The building does not appear to be visible on the September 1946 aerial photograph, although it is clearly present by April 1947. The structure is aligned very slightly north-east/south-west, and so is parallel to the large MOWP Hut to the south. It has maximum external dimensions of 1.60m north-south by 5.20m east-west. The three cell building is of a single storey, with a roof formed by a reinforced concrete slab, 0.15m thick and projecting beyond or overhanging the east and west external wall faces below by 0.15m; a drip channel is present to the soffit of the roof slab [*1/609*] (see plate 20). All walls are built of reddish-brown machine-made bricks (average dimensions 220mm by 105mm by 75mm) set with a cement mortar and laid in stretcher bond. The external walls have an average thickness of 0.12m.

3.49 The external elevations are largely very plain [*1/607*]. There is a single small flat-headed window opening to the north elevation, fitted with a two-light softwood window frame with nailed joints [*1/700*]. The frame is recessed slightly from the external wall face, although the window itself has a projecting concrete sill. The frame is 60mm deep by 30mm wide. The lower light has gone, but the upper light remains in place; it is top-hinged, opens outwards and retains its fastener. It is fitted with toughened Georgian glass, strengthened by wire forming a repeating hexagonal pattern; each hexagon is 25mm across. The frame may once have been painted dark green. To the immediate east of the window, the pattern of brickwork bonding suggests that the building may have been built in two different phases. In addition, toothed brickwork at the south end of the west elevation suggests that the building could once have extended further to the west.

3.50 Internally, the building is divided into three unequally-sized cells, all accessed from doorway openings in the south elevation [*1/610*], and all floored with concrete (see plate 20). The west cell is open-fronted [*1/613*] and has a bare interior [*1/672*]; a rectangular hole has been cut in the rear (north) wall. The central cell was once sub-divided into two separate spaces internally, but the partition wall separating them has been removed. The west space was entered by a doorway which retains a softwood door frame with nailed joints, set flush with the external face of the wall [*1/612*]. The frame is 70mm deep by 50mm wide. The door itself is of plank and batten construction and was hung on two hinges to the east side. There is a latch plate and handle, and the door opened inwards. The east space was entered by a doorway which also retains a softwood door frame with nailed joints, set flush with the external face of the wall [*1/611, 1/670*]. The frame is 70mm deep by 50mm wide. The door itself is of plank and batten construction and was hung on two short strap-hinges to the east side. The door opened outwards and could be bolted externally; it may once have been painted black externally. The interiors of both spaces were filled with stored material at the time of survey [*1/669, 1/671*]. The doorway to the east cell was once fitted with a door frame and door the same

as that to the east space of the central cell, but only part of the frame survived at the time of the EDAS survey. The door was hung on the east side of the frame and opened outwards. The interior of this cell was empty but contained no features of interest [*1/668*].

The Radar

3.51 As has already been outlined in Chapter 2 above, the operational version of the GL Mark I radar entered service in September 1939, using two trailer-mounted cabins with aerials, the power supply coming from a generator, with the radar linked to the guns by cabling (Dobinson 1996, 134). Improvements led to the use of a large horizontal wire-mat laid around the radar position; this was essentially an octagonal construction with a central raised platform within it on which to place the radar receiver. The mats, and platforms where needed, were introduced with Mark I radars from December 1940, although many sites appear not to have received them until after June 1941, by which time the Mark II radar was in service (Dobinson 1996, 135-136). It is not known if Stone Creek was equipped with a Mark I radar, but it is quite possible. By mid 1942 most HAA sites were equipped with the Mark II radar, and this was also the case at Stone Creek. This system utilised a mobile transmitter housed in a rotatable cabin driven by a generator, placed on a ramped platform in the centre of the octagonal GL mat; as noted in Chapter 2 above, the horizontal wire mat had a 65 yard (59.4m) radius and was raised above ground level using posts (see figure 3D).

3.52 The surviving site components of radar at most HAA batteries are usually very modest (Dobinson 1996, 132) and this is also the case at Stone Creek. Nevertheless, it is possible to suggest where the radar was located, using the prescribed clearances given from the centre of the GL mat to allow the radar to work efficiently without interruption from nearby features (Dobinson 1996, 146). Unfortunately, neither the earthwork survey or the 1946-47 aerial photographs showed any surviving traces of the GL mat. However, it seems most likely that it would have been positioned between the operational and domestic sites, to the east of the concrete roadway, although even here, it is difficult to see how the c.120m diameter for the mat would have been accommodated within the drain marking the eastern boundary of the survey area. However, both 1946-47 aerial photographs do show a curious semi-circular bulge marking a field division on the east side of the site (see figure 5), which almost certainly reflects the position of the GL mat, although the aforementioned drain would have precisely bisected the mat; a bridge across the drain is shown adjacent to the gun store. Extrapolation of this bulge produces a diameter of c.120m, and the central radar platform would coincide with a slight sub-square earthwork seen on the immediate west side of the drain [*5/002*] (see figures 6 and 8). Quite how the presence of an open drain under the mat would have affected radar results is unknown, but this position would be perfectly feasible; the crucial factor is getting the radar mat (and thus the heights of the posts supporting it) precisely level (Roger Thomas, *pers. comm.*). Unfortunately, the bulge in the field division, and the field itself, has been regularly ploughed in recent years, and so no evidence now survives.

3.53 Against the north wall of the command post (Structure B; see below), there is a pile of c.60 reinforced concrete posts [*2/176; 6/708*] (see plate 23). These are all 0.15m square and the most complete examples are 2.50m long, although all are broken off at the bottom, demonstrating that they were originally longer. These have seven small diameter holes to the upper part of one face only, set at 0.24m centres. As has already been noted above, similar posts survive along the drain forming the eastern boundary of the survey area. It has been suggested that the

ex situ posts next to the command post are anti-glider landing poles, that were formerly laid out in a grid pattern across the field to the east of the battery (local information, *pers. comm.*). Such features were certainly once present in the vicinity in very large numbers; it is known that in the fields behind its coastal defences, the East Riding Local Authority erected some 100,000 1.8m tall concrete posts as anti-glider obstructions, to stop glider borne troops outflanking these defences. Some of these posts were subsequently re-used as kerbs in private drives (Ruddy no date), but they were generally over 4.00m long and many were cut in half after the war to be used as fence posts (Roger Thomas, *pers. comm.*). Examples of what are suggested to be reinforced-concrete anti-glider landing poles have also been recorded at the village of Hart, near Hartlepool on Teeside (Daniels 2010, 20-21). At 0.15m square, these are of similar section to the Stone Creek posts, but at 4.27m in length, they are considerably longer. Elsewhere, surviving examples of coastal anti-glider landing poles, such as the well-preserved arrangement at Burntisland and Aberlady Bay, Firth of Forth, Scotland (*http://www.fyca.org.uk/Data/Cruising/CruisingGuide/cruisingp8.htm*) all appear to have been made of timber, rather than concrete. None of the concrete anti-glider landing posts referred to above make clear mention of having regularly spaced holes like the Stone Creek posts, nor is it clear why anti-glider poles would need regularly spaced holes. Is it therefore perhaps more probable that the posts at Stone Creek could once have supported part of the GL mat? As noted above, it is almost certain that the GL mat extended into the field to the immediate east of the battery site, and the posts would have had to have been laid out in a grid pattern - perhaps the local knowledge was incorrect in their interpretation of the posts.

The Operational Site

The Roadway

3.54 After passing through the domestic site, the concrete roadway continues south towards the operational site. The domestic and operational sites are separated by a distance of some 140m (see figure 8). Opposite the northernmost of the four gun emplacements (Structure C), there is a small metal plate set into the surface of the concrete roadway [*1/709*]. It is not certain what purpose this served, as there is no evidence for other associated features such as gates. After passing the Command Post (Structure B), the concrete roadway swings around sharply to the north-east. It passes two of the gun emplacements (Structures F and G), to which there are short connecting branches, and it then turns to the east. At this point it widens to c.6m, and at the east end splits into two further branches. The south-western branch terminates after a short distance, but the north-eastern branch continues to the Gun Store (Structure E) [*2/081, 2/082*] (see plate 21).

Structure B: the Command Post (see figures 12 and 13)

3.55 The command post (Structure B) stands on the north side of the operational site, at the centre of the arc formed by the four gun emplacements to the south and west (see figure 8). As previously noted, at least five designs for command posts were issued by the DFW during the course of the war. The command post at Stone Creek most closely resembles DFW 55402, the commonest design of command post used for permanent 3.7" gun sites, particularly mixed batteries, from mid to late 1941 (Dobinson 1996, 129-131) (see figure 3F), although there are some differences with several phases of alteration evident.

3.56 The building has an irregular and complex plan form, and is aligned north-east/south-west, although for the purposes of description the long axis is

considered to be aligned east-west [*6/738*] (see plate 22). It has maximum external dimensions of 23.20m east-west by 8.00m north-south; the average north-south measurement is 4.90m. The building is of a single storey, with several separate flat roofs; the south side and east end are open to the air, with several changes in level [*2/121, 2/122*]. The different phases of construction are most evident in the building materials used, a mixture of reinforced concrete and concrete blockwork. The external walls have an average thickness of 0.32m. The command post incorporates three separate rooms or cells, 'semi-sunken' in the sense that they are substantially lower than the upper surface of the building but also, in some cases, in relation to the external ground level.

3.57 The north elevation comprises several distinct parts [*6/698*]. At the west end, the structure (Room 3) is of concrete blockwork, and a straight joint and a ridge in the roof line indicates that the western 2.13m (2.00m internally) was a later extension [*6/699*] (see plate 23). There is a large window opening, but it was obscured by the pile of reinforced concrete posts described under the radar section above at the time of the EDAS survey. To the east of these posts, a screen wall provides a protected and roofed access to a wooden doorway. This screen wall is also built of blockwork, and it originally returned towards the main building at its east end, so that only the west end of the access was open; the flat roof is of reinforced concrete [*2/165; 6/692*]. A concrete path, now partly grassed over, ran to this doorway from the central concrete roadway. The doorway retains a softwood door frame with nailed joints and is recessed from the external face of the wall (see plate 25). The frame is 100mm deep by 100mm wide. The door itself is of plank and batten construction and was hung on two short strap hinges to the west side; the hinge plates are held in place by four screws [*2/163*]. It opened outwards and was once lockable. The round metal base plate for the doorknob survives adjacent to the lock but the knob has gone, and so no access to the interior was possible [*2/166, 2/167*]. Both frame and door retain traces of a light to mid greenish-blue paint; this is darker to the interior [*2/174*] (see plate 26).

3.58 East of the doorway and screen wall, the structure of the north elevation changes, with the lower 1.10m being of reinforced concrete and only two courses of concrete blockwork (0.51m high) above; a number of protruding reinforcing bars suggest that a third course of blockwork has been removed. The elevation then steps down to the height of the reinforced concrete and incorporates a gateway or entrance (see plate 24); recesses in the concrete to either side of the stepped entrance suggest that it was once fitted with a heavy gate or gates, possibly similar to the metal blast shutters seen surviving elsewhere at the battery (for example, in Structure E) [*5/006; 6/693*] (see Section G-H on figure 13). Another buried step lies on the north side of the entrance, suggesting that the external ground level here was originally lower than it is now, more like that seen in the screened entrance to the west. The wall immediately to the east of the entrance also has a number of reinforcing bars protruding from the top, which might suggest that the wall was previously made higher with blockwork (as on the west side of the entrance), but which has since been removed. The elevation then steps out to the north by 1.15m to accommodate a central semi-sunken cell (Room 2), and then again by 2.00m for the higher east cell (Room 1). The protruding west and north sides of Room 2 are built entirely of reinforced concrete and are only 0.40m high above the external ground level here, while the north end of Room 1 is built of blockwork topped by a single course of bricks on which the roof is placed (see plate 27). The north end of the room has 1.00m wide windows in the east and west walls while the north elevation is blank [*6/694, 6/696*]. Externally, the roof of Room 1 is c.0.70m higher than that of Room 2 [*6/710*] (see Section A-B on figure 13). After the protruding Room 3, the 1.33m high blank north elevation continues

to the east, with the lower reinforced concrete projecting slightly from the 0.75m high three courses of blockwork above [*6/695*] (see plate 28).

3.59 The east elevation has a central 1.50m wide gateway or opening, approached by a small projecting platform and steps which rise from the south; to the south-east, there are traces of a concrete path leading to the steps [*6/719*]. The northern part of the east elevation retains the higher three courses of blockwork seen on this end of the north elevation, while to the south of the opening the height drops down to the level of the reinforced concrete [*6/717*].

3.60 The wall forming the eastern part of the south elevation is 0.87m high and is entirely of reinforced concrete [*2/132*], and this steps up by 0.52m and west towards a canted projection which forms the spotting telescope platform [*6/716*]; the external height of the wall on the south side of the projection is 1.20m (see Section E-F on figure 13 and plate 29). West of this projection, the elevation continues at the same height in reinforced concrete and then steps up again in two courses of blockwork; the remains of possible reinforcing bars along this part of the wall might suggest that the additional blockwork originally continued along the full extent of the projection (see below). That part of the west end of the south elevation, forming Room 3, is separated from the structures to the east by a straight joint [*6/715*], and is entirely in blockwork (see plate 30). It also contains a large central window opening, 2.00m wide, and there is a further straight joint to the west of the window mirroring that seen on the north elevation [*2/130, 2/131; 6/700*]. The west elevation is blank and a has a blocked drainage channel, formerly open, running along the base. On the 1946-47 aerial photographs, a substantial earth bank is visible to the front of the south elevation, with a semi-circular projection to the centre, but this had been almost entirely removed by the time of the EDAS survey.

3.61 As noted above, much of the upper surface of the command post consists of the observation platforms, open to the air, which would have accommodated the predictor, height finder and spotting telescope; the arrangements are illustrated in a number of contemporary photographs (see figure 4). There were two access points to these platforms - one through the entrance in the central part of the north elevation or up the steps in the east elevation (see plates 24 and 28). From the east end, the steps lead up onto the square height finder platform, measuring 4.20m across, with a low screen wall to the south and a higher, raised, one to the north [*2/133*]; the south wall of the projection is 0.87m high while the north wall is 1.33m high (0.58m of reinforced concrete and 0.75m of blockwork above). In the centre of the platform, there is a base, 1.50m square and raised 0.06m above the surface of the platform. A triangular iron plate is fixed to this base, with a fitting at each corner to accommodate the height finder tripod [*2/136; 4/837*] (see plate 31). Similar triangular bases survive at other command posts, for example at the Gloucester Lodge Farm HAA battery, at Blyth in Northumberland (*http://www.28dayslater.co.uk/gloucester-battery-blyth.t16367#post-229285*). To the north of the base, on the northern edge of the platform, there is a small circular hole containing a ceramic pipe; in the wall above and to the west, there is scarring suggestive of clips for an electric cable which would have taken data from the height finder to the plotting room.

3.62 On the west side of the height finder platform, there is a gateway [*2/146*] with recesses in the concrete on either side suggesting that it was once fitted with a heavy gate or gates, possibly similar to the blast shutters surviving elsewhere at the battery, and similar to the gateway in the north elevation. Two steps lead down to what is thought to be the original floor level (see below), before another crude

set of three angled steps rise up 0.80m onto another open platform which gives access to the most elevated platform in the command post, which forms the spotting telescope and predictor platforms [*2/147*] (see plate 32). As previously mentioned, the spotting telescope platform is set within the canted projection on the south elevation. There is the stub of a concrete post, now only 0.20m high, in the centre of this platform [*2/148*]; although previously interpreted as being the mounting for an anti-aircraft machine gun designed to engage low-flying aircraft trying to attack the battery (SM description), it is in fact the broken support for a spotting telescope. The example at the Butt Farm HAA site was 0.89m high (Dennison & Richardson 2016, 29) and again, contemporary photographs show this piece of equipment in use (see figure 4A). A line of small holes along the north side of the telescope platform probably represents a hand rail to prevent operatives falling down the adjacent 0.80m drop. As also previously noted, the tops of the three sides of the canted projection retain regularly-spaced iron rods projecting slightly from the 0.50m high wall [*2/161*]; they are probably for reinforcement, suggesting that two courses of blockwork have been removed, although some longer ones on the south side probably represent the remains of camouflage fixings as survive to the gun emplacements (see below) [*4/839*]. If there were two additional courses of blockwork on the sides of the projection, the screen wall would have been 1.00m high internally (see Section E-F on figure 13).

3.63 On the north side of the spotting telescope platform, a further flight of four steps lead up from the original floor level to the predictor platform located at the west end of the observation platform (see plate 32); the predictor platform and the spotting telescope platform are broadly at the same height [*5/003*]. The platform has a recessed triangular area 1.00m across at the centre, which would have accommodated the predictor [*2/160*] (see plate 33). An iron pipe emerges from the base of the recess and a narrow slot or duct runs south-west from the recess and then branches into two. One branch runs east across the platform to the steps on the east side, and the other continues south-west on the same line to another sub-rectangular recessed area on the south side of the platform; these slots would have carried the cables transferring the telemetry data to the plotting room. On the west side of the platform, a line of holes probably representing cable clips, run towards a small opening in the east side of the plotting room. On the north side of the predictor platform, steps lead down to the gateway in the north elevation; iron rods also project from the wall top to the west of the gateway. The north and south walls of the predictor platform have been raised by 0.54m using two courses of blockwork, to give a total internal height of 1.00m on the south side.

3.64 At the north-west corner of the height finder platform, two concrete steps lead down to a doorway formerly used to access the easternmost of the three rooms within the command post. This space (Room 1) has been interpreted as being a boiler room for central heating, which was commonly installed at command posts when female staff were introduced (SM description), although it could also be a duty shelter (Roger Thomas, *pers. comm.*). The space does seem rather large for a boiler room when compared to other examples (e.g. Butt Farm HAA site near Beverley), and there appears to be little evidence for the way in which heat from a boiler would have been transferred to other rooms, e.g. via pipes through the walls (again as seen at Butt Farm HAA site). Perhaps it fulfilled a dual function. However, it is definitively a later addition to the command post. The room has maximum internal dimensions of 5.30m north-south by 2.30m east-west, and it is c.2.00m high (see Section C-D on figure 13). It has a flat, reinforced concrete roof 0.15m thick; the roof projects or overhangs the east and north elevations only by 0.10m, and has a drip channel to the soffit. The lower c.1.20m of the south wall, and southern parts of the east and west walls are built of reinforced concrete, while

the upper parts are of blockwork (see plate 34). This clearly shows that the room has been added to the command post, the south and southern ends of the east and west sides being built over the pre-existing reinforced concrete walls of the earlier phase; the upper 0.75m of blockwork is inset slightly above the concrete below [*6/707, 6/718*].

3.65 The 1.00m wide doorway in the east wall which gives access into the room retains elements of a softwood frame, painted a mid greenish-blue; a later pipe has been attached to the rear of the frame [*2/145*]. To either side of the doorway, those parts of the east wall which are built of reinforced concrete project slightly from the wall face above [*2/139*]. There is some pencilled graffiti to the north of the doorway. A short verse reads "Rain or Snow / Wind or blow / We'll always / keep on fighting / 194(?) / IWH" [*3/316, 3/317*] (see plate 35). Adjacent to this, there may be further pencilled marks and drawings, but they are too faint to interpret [*3/318*]. Towards the north end of the east wall, there is a flat-headed window opening, fitted with a softwood window frame with nailed joints. This frame is recessed from the external wall face. The frame is 80mm deep by 60mm wide, and in two parts. The glazing has been removed, but the frame was formerly top-hung and opened outwards [*2/141*]. The internal north wall is blank [*2/140*], but the west wall has a window opening at its north end similar to that in the east wall. A raised concrete platform is set at the base of the west wall containing a curved recess for a drain [*2/142*]; this is of uncertain function - it may have been for holding batteries to power lighting etc (Roger Thomas, *pers. comm.*) but it could also be a secondary feature. Above this, there is a (metal?) vent bearing the raised lettering 'SANATORIUM' [*2/144*]; it has not been possible to identify a maker for this feature but exactly the same sort of named vents were identified at the Butt Farm HAA site near Beverley (Dennison & Richardson 2016, 28). There is a circular vent in the ceiling to the north of centre, which passes through to the roof, presumably for a chimney. Finally, there is a narrow channel along the southern half of the eastern edge of the roof to prevent rainwater running off the roof into the doorway below.

3.66 On the north side of the lowest, central, part of the observation platform (probably representing original floor level), further steps lead down through a doorway into the central room (Room 2). This 1.00m wide doorway was formerly covered by a hatch, hinged to the north side and so opening upwards [*2/149*] (see plate 37). This (Room 2) has been interpreted as an office (SM description), and it might have served as the telephonists' room. This room has maximum internal dimensions of c.3.10m square with a flat, reinforced concrete roof 0.15m thick; the roof projects or overhangs the west, south and north elevations by 0.10m. Unfortunately, the interior of this room was flooded at the time of the EDAS survey, meaning that it could not be inspected closely; the following description is therefore made entirely from photographs. The room is c.1.90m high, which means that it is sunken 0.75m below the original floor level of the operating platform, and the north end is almost wholly buried below the surrounding ground level here (see Section E-F on figure 13). Both the west and south walls, and the ceiling, have battens fixed to them, lined out with fibreboard or asbestos sheets painted a very light green [*2/151; 5/004*] (see plate 36); this material is likely to have been used for heat insulation (Roger Thomas, *pers. comm.*). There is a shelf on the west wall, with a parallel long piece of timber fixed above it, both painted mid-green [*2/157*]. Towards the top of the wall, there are what appear to be two vent openings, although the metal vent is only clearly visible to one. It seems that with both openings, a piece of the lining material used on the internal walls was placed over the vent, and this was held in place by a wooden frame with mitred joints, painted mid-green. The north wall also has two vents, with the same 'SANATORIUM'

lettering as noted in Room 1 [*2/154*]; there are two similar vents in the east wall [*2/153*], one of which must have communicated with Room 1. The south wall of the room could not be clearly viewed. Over the north-west corner of the room, two pieces of wood are fixed across the battens. These appear to lie beneath a vent visible on the roof, which has a flanged metal cover over it [*4/840*]. Almost all of the roof retains a rubberised black coating [*2/159*] (see plate 37). Towards the centre of the roof, there is a wide circular area, 1.10m in diameter, where the coating is absent, as if for an opening; within this circular area, the southern half of the exposed concrete is slightly raised, with a rough surface. There is a second, smaller circular area where the coating is absent to the immediate south-west. A line of concrete blocks have been roughly placed along the northern and western edges of the roof, and a hand rail on the north side presumably gave access to the roof from the high external ground level, although any steps on the north side are hidden by vegetation [*2/158; 6/709*]. A concrete step with indentations for a better grip also lies off the south-west corner of the roof, presumably to give access to the roof from the adjacent platform.

3.67 There is no direct access from the predictor platform into the western and largest room of the command post, although there is a small opening 0.60m wide and 0,.40m high in the room's low east elevation here through which the interior can be viewed [*6/706*]. This space (Room 3) has been interpreted as being the plotting room (SM description), where data from the height finder and predictor were converted into elevation, bearing and fuse timings for the guns. Although this data would have been transferred by cable, the opening in the east wall of the plotting room would have allowed messages to be passed through (see plate 38); this is illustrated in one of the contemporary sketches (see figure 11 bottom). However, the room is clearly a later addition to the command post. It has maximum internal dimensions of c.7.50m east-west by 3.70m north-south, although the western 2.00m was a later extension; it is estimated to be c.2.00m high internally, although the measurement was unable to be checked. It has a flat reinforced concrete roof 0.20m thick, with patches of a black rubberised coating [*2/162*]; the roof projects or overhangs only to the west elevation and the west ends of the north and south elevations by 0.10m. There is a drip channel to the soffit. As previously noted, this room is a later addition to the command post, as is clear from the blockwork construction and the fact that the east side has been built over the earlier concrete wall of the predictor platform; the division between the two different types of construction is also marked with a single course of brick (see Section G-H on figure 13 and plate 38).

3.68 The only access to the interior of the room was through the screened doorway in the north elevation. As previously noted, it was not possible to gain access through this door at the time of the EDAS survey and so the following internal description is made entirely from photographs taken through the opening in the east wall. It appears that all the internal walls, and the ceiling, once had battens fixed to them and were lined out with fibreboard or asbestos, painted a very light green, as seen in Room 2 [*2/168, 2/171, 2/172, 2/175*] (see plate 39). There is also evidence for the former positioning of various wooden and electrical fixtures and fittings.

3.69 There are several features on the plotting room roof which could presumably be related to internal features if the interior were accessible. At the east end, towards the centre, there is a small recess, 120mm square. In line with this, but further west, there is a circular vent and then another circular vent with the remains of a metal cover; to the north of the latter, there is a third circular vent [*3/323*]. Given the lack of visible cable ducts in the floor of the operating platform, it is possible

that some of these vents are access points for overhead cables from the height finder and predictor equipment; an overhead cable from the predictor is shown on a contemporary photograph (see figure 4C). At the north-west corner of this part of the roof, the rusted remains of four bolts with square nuts, forming a rectangular pattern 0.50m long in plan, project from the concrete surface [*3/321*]. Close to the bolts, a raised ridge of concrete, 0.10m high, runs north-south across the roof. It is to the west of this ridge only that the roof overhangs the external wall faces below, and the ridge also coincides with the straight joints in the north and south elevations. There are two features beyond the ridge projecting from the roof, a chimney pot and a ceramic pipe [*3/320*] (see plate 38).

Structures C, D, E and F: the Gun Emplacements

3.70 As noted in Chapter 2 above, at least seven formal designs for 3.7"/4.5" HAA gun emplacements are known to have been issued by the DFW up to 1945. The first design was issued in 1938, and this was the first for an emplacement dedicated to either 3.7" or 4.5" guns. These emplacements were octagonal in plan, c.12.20m in diameter, with twin axial entrances closed by double steel gates (see figure 3A). They had a central holdfast for the gun and up to six ammunition recesses or lockers, placed wholly within the emplacement, their steel doors opening at an angle to the gun pit rather than directly into it. They were built from shuttered concrete and measured 1.80m high to the top of the encircling parapet. From February 1940, the method of ammunition storage was improved, with the use of timber planking and weatherproof metal containers; this resulted in the emplacement being left with a single entrance and a smaller working area. From March 1943 onwards, and probably somewhat earlier, two new standard emplacements were introduced, one 'permanent' concrete structure and one 'semi-permanent' fieldwork; the 'permanent' type was still an octagonal concrete emplacement but the recesses were now placed externally (but obviously still accessible from the interior), with a single entrance and two shelters for the gun detachments and maintenance work set opposite one another. Major changes were made again late in 1943 when the trials of guns equipped with machine fuse setters gave rise to a new design of emplacement which was adapted to a higher rate of fire (Dobinson 1996, 118-122).

3.71 At the Stone Creek site, the four gun emplacements are arranged in an arc, with emplacements F and G to the south-east of the command post [*6/739*], and emplacements C and D to the west (see figure 8).

Emplacement C (see figure 14)

3.72 Emplacement C is the westernmost of the four gun emplacements. Although it lies very close to the main concrete roadway through the operational site, there is no clear evidence that it was ever linked to it. The 1946-47 aerial photographs shows that there were well-made and sharply defined semi-circular banks of earth enclosing the emplacement, most prominent on the east side. These had largely been removed by the time of the EDAS survey, leaving only low spread banks up to 0.50m in height.

3.73 The emplacement is set out to the March 1938 design, with a single shelter for the gun detachment added to the outside north-east angle at a later date. The emplacement has a regular octagonal plan form, with a maximum external dimension (excluding the shelter) of 13.50m; each face of the octagon measures on average 5.70m long externally. The wall defining the emplacement is of concrete blockwork, standing 1.65m high and with an average width of 0.50m (see

plate 40). The shelter (also of concrete blockwork) projects beyond the north-east external face of the emplacement, and measures 6.10m east-west by 2.40m north-south externally. It is noticeable that, like Emplacement D (but not Emplacements F and G), the shelter incorporates one of the external angles of the emplacement. It also stands slightly higher than the emplacement wall, and has a reinforced concrete roof, 0.15m thick, which slopes very gently downwards to the outside of the emplacement [*2/188*]. The east end of the shelter's roof is slightly higher than the rest, due to it being raised on two courses of machine-made orange bricks; it also projects 0.05m beyond the wall face below and retains a covering of black paint. It is clear that the slightly higher section is a later phase of construction (see below).

3.74 Access to the emplacement was through opposed gateways in the north-west and south-east sides [*2/184*]; both gateways are 3.65m wide, but there is no evidence for the former gates or how they were hung, although there is, however, a concrete slab to the centre of the north-west opening that might have been used to secure a bolt to close a pair of gates. The interior of the emplacement is floored with concrete, comprising at least ten separate radial sections, including a central regular octagonal piece containing the gun's holdfast [*2/194*] (see plate 41). The holdfast's position is marked by a sub-circular arrangement of rings, flush with the surface of the concrete, which formerly secured the foundation plate to the concrete. The two larger rings (the locating spigots) are set opposite one another, and have an external diameter of 200mm and an internal diameter of 110mm, together with eight smaller rings; the latter have an external diameter of 180mm but an internal one of only 70mm [*2/193*]. There is a shallow groove running across the south-east part of the gun position. Drains are placed at the base of some of the internal angles of the emplacement - these drains presumably passed through the emplacement wall (as seen on Emplacement D), but one at the east end of the north wall has an odd relationship with the shelter.

3.75 There are four ammunition recesses placed centrally against the inside of the north, east, south and west walls of the emplacement respectively [*2/187, 3/311-3/313*] (see plate 41). They are all of the same form, and are the same or very similar to the Type 1 recesses seen in Emplacements F and G (see below). Each recess measures 2.10m long (parallel to the emplacement wall) by 2.0m wide (projecting from the wall) (see plate 42). They stand 1.70m high and have reinforced concrete roofs, 0.15m thick, which overlap the wall and which slope gently downwards to the outside of the emplacement. Internal patterning shows that the roofs were cast over corrugated-iron sheets [*3/306*]. The outer side of each recess is formed by the emplacement's wall, whereas the inner side is of concrete blockwork, 0.25m thick. There are doorways at either end of each recess. Each doorway was originally fitted with a softwood frame, very slightly recessed from the external wall face, comprising jambs and a lintel [*2/189, 3/303*]; the jambs are formed by two timbers, measuring in total 110mm wide and deep [*3/304*]. It is not certain what type of doors were attached to the frame, as there were no surviving examples in this emplacement at the time of the EDAS survey. However, they appear to have been hinged on the emplacement wall side of each recess, and to have closed, hasp-like, over a loop (that could presumably be secured) mounted on the opposite jamb. The floor of each recess is of concrete, and it is raised 0.04m above the emplacement floor [*6/724*]. The inside of the western recess's interior (i.e. the side formed by the emplacement wall), contains a pattern of damage left by the removal of former fittings; two holes to the base, two holes to the centre (offset from those above and below), and two holes to the top [*2/190, 3/310*]; this were presumably associated with the internal wooden shelving. There is also some damage caused by the removal of a fixture from the

emplacement wall to the east of the north recess [*3/307*], and evidence for another removed fitting just to the west of the shelter door, while to the east external side of the west recess, there are the remnants of a line of wooden fittings that were once nailed to the blockwork.

3.76 There is a fifth open-ended recess-type structure placed against the inside south-west wall of the emplacement, which has a slightly different form (see plate 43). It is narrower and higher than the others, being 1.70m long (parallel to the emplacement wall) by 1.90m wide (projecting from the wall), and standing 1.85m high. It has a reinforced concrete roof, 0.15m thick, which overlaps the emplacement wall, sloping gently down to the outside of the emplacement [*3/308*]. The outer side of the structure is formed by the emplacement's wall, whereas the inner side is a concrete blockwork wall, 0.25m thick. There is no evidence that doors were fitted at either end, but there are three shallow rectangular recesses in each end face of the roof, which would have secured a canvas flap (Roger Thomas, *pers. comm.*) [*3/309; 6/725*]. The floor of the structure is of concrete, and it is raised 0.04m above the emplacement floor. It is probable that this slightly different recess is a shelter for the limber gunner, and is modification to the March 1938 design initiated in February 1940 (Dobinson 1996, 121); the limber gunner was responsible for the day-to-day maintenance of the gun and its fittings.

3.77 The shelter is positioned on the outer north-east side of the emplacement, and has been interpreted as a duty shelter for the gun detachment when not on alert (SM description). As has been noted above, it is a later addition to the emplacement, and is actually of two phases, the smaller eastern cell being a later addition, as evidenced by its relationship with the angle of the emplacement, the raising of the roof using one or two courses of brick, and a change in the external blockwork [*6/697*] (see plate 44). The shelter is entered via a narrow opening 0.55m wide through the emplacement wall, positioned towards the east end of its south wall *[2/197; 6/726*]; there is no evidence for an actual door being fitted here, and the east side of the doorway was rebuilt when the east cell was added. The floor of the shelter is of concrete and is set 0.20m lower than the emplacement's floor, and there is a step on the threshold to prevent water ingress. The interior is divided into two parts, a larger 3.80m long west cell and a smaller 1.60m long east cell; the doorway opens into the east cell *[2/199*]. The internal walls of the smaller east cell appear once to have been painted white, with the joints between the concrete blockwork picked out in green [*3/314*]. This scheme may have been redone at least once, as some of the green joint lines do not correspond exactly with one another, and are of slightly different colours [*3/315*]. There is a small circular ceiling vent over the north-east corner of the east cell. A doorway at the south end of the east cell's west wall leads through to the larger west cell [*2/200*]. This cell is 1.71m high, and a crude chamfer has been cut into the concrete at the top of the connecting doorway to allow for the slight change in height (0.15m) of the ceiling between the two cells; the internal floor level does not change between the two cells. The western cell has a wooden rail running along the eastern half of the north wall, with five nails projecting from it; the blockwork of this cell is not highlighted [*2/202-2/204*] (see plate 45).

3.78 There is also limited surviving evidence around the emplacement for its camouflage fixings. These are located on the upper corners of the recesses, and they all comprise a metal cylinder or pole, 30mm in diameter and up to 0.46m high; it is noticeable that the limber gunner recess against the inside south-west wall of the emplacement does not have these poles. There may be another single example on the emplacement wall to the north of the south-east gateway, although this is not convincing.

Emplacement D (see figure 14)

3.79 Emplacement (D) is the western central of the four gun emplacements [*2/120*]. Although it lies very close to the main concrete roadway through the operational site, there is no clear evidence that it was ever linked to it. The 1946-47 aerial photographs shows that there were well-made semi-circular banks of earth enclosing the emplacement, truncated or finishing rather abruptly to the south-west side where they met the drain forming the western boundary of the site. Even on these early photographs, the emplacement appears very close to the drain, and must have been deliberately positioned here when the drain was already present. Those laying out the emplacements appear to have been adhering to a standard pattern, but placing the structure so close to the drain must surely have created potential problems with subsidence. Spread earth banks, up to 0.50m high, now survive to the north and south of the emplacement.

3.80 This emplacement was in a poor condition at the time of the EDAS survey, with well over half of the structure having been demolished [*2/178*] (see plate 47). However, when first built, it had a rectangular octagonal plan form, with a maximum external dimension (excluding the gun detachments' shelter) of 13.50m; each face of the octagon measures on average 5.70m long externally. Like Emplacement C, it is set out on the March 1938 pattern, with a single shelter for the gun detachment added to the outer south side at a later date. This shelter once projected beyond the south external face of the emplacement, but it has been almost completely demolished, leaving some sections of walling and footings; it measured c.5.70m east-west by 2.20m north-south [*3/301, 3/302*] (see plate 48). It is noticeable, however, like Emplacement C (but not Emplacements F and G), that the shelter incorporated one of the external angles of the emplacement, and that the eastern end had been extended as in Emplacement C [*3/298*]. The wall defining the emplacement is of concrete blockwork, standing 1.55m high and with an average width of 0.50m [*2/183*].

3.81 Access into the emplacement was through a gateway in the east side. There is no surviving evidence for the gates or how they were hung and, given the proximity of the adjacent drain, one wonders if there was actually an opposing gate in the west side, or if there was, whether it could be used; a possible entrance here is visible on the 1946-47 aerial photographs. The remaining visible part of the interior is floored with concrete, comprising at least four separate sections. A drain appears to have been placed close to the base of each internal angle of the emplacement, which passes through the encircling wall.

3.82 There are now only two ammunition recesses surviving, placed against the north-east and south-east walls of the emplacement, but the 1946-47 aerial photographs suggest that there were once four, set out in the same pattern as Emplacement C; there may also have been a limber gunner recess between two of the recesses, as in Emplacement C. Both surviving recesses are of the same form, corresponding to the Type 1 recesses seen in emplacement C [*2/179*]. Each measures 2.15m long (parallel to the emplacement wall) by 1.90m wide (projecting from the wall). They stand 1.75m high and have flat reinforced concrete roofs, 0.15m thick, which overlap the wall [*3/295*] (see plate 46). Internal patterning shows that the roofs were cast over corrugated-iron sheets [*2/181; 3/296*]. The outer side of each recess is formed by the emplacement's wall, whereas the inner sides are of concrete blockwork, 0.22m thick. There are doorways at either end of each recess. Each doorway was fitted with a softwood frame, very slightly recessed from the external wall face, comprising jambs and a lintel. Unfortunately, only the lintels survived at the time of the EDAS survey, and so it is nor certain what type of

doors were attached to the frame [*2/180*]. The floors of the recesses are of concrete, which is raised 0.10m above the emplacement floor. There is a very decayed cable clip attached to the emplacement wall to the south-east end of the north-east recess, and there is also evidence for a line of removed fixtures on the same wall to the north-east of the south-east recess.

3.83 There is also limited surviving evidence around the emplacement for camouflage fixings. These are located on the upper surfaces of the emplacement wall and the recesses, and they are all of the same type. They comprise a metal cylinder or pole, 30mm in diameter, positioned at the inner corners of the recess roofs, and also along the emplacement wall to the north of the gateway.

Emplacement F (see figure 15)

3.84 Emplacement F is the easternmost of the four gun emplacements [*4/701; 6/736*] (see plate 49). It was accessed from the north-west by the main concrete roadway running through the operational site, and from the south-east by one of the narrower concrete roadways from the magazine (Structure H) [*2/076, 2/077*]. The 1946-47 aerial photographs shows that there were well-made sharply defined semi-circular banks of earth enclosing the emplacement, broken only where the roadways approached it. These had been partly removed by the time of the EDAS survey, with the much denuded surviving part to the south-western side being 3.00m wide and 0.90m high, and scarped to the exterior [*2/113*]; there was some stock poaching in the winter months. Like Emplacements C and D, the emplacement is set out on the March 1938 pattern, with a shelter for the gun detachment added to the north external side at a later date, and in two phases.

3.85 The emplacement has a regular octagonal plan form, with a maximum external dimension (excluding the shelter) of 12.75m; each face of the octagon measures on average 5.30m long externally. The gun detachment shelter projects beyond the north external face of the emplacement, and measures 6.20m east-west by 2.25m north-south externally. The wall defining the emplacement is of reinforced concrete, standing 1.60m high and with an average width of 0.38m [*2/111*]. The shelter stands slightly higher, and has a reinforced concrete roof, 0.15m thick, which slopes very gently downwards to the outside of the emplacement. However, the walls of the shelter (apart from the south side which is formed by the emplacement's wall) are of concrete blockwork rather than reinforced concrete, again suggesting a later addition in two separate phases.

3.86 Access to the emplacement was through opposing gateways in the north-west and south-east sides [*2/112*]. Although the concrete roadways approaching the gateways were of widely varying width, the gateways themselves are both 3.60m wide. They were formerly fitted with two gates, each gate hung on a pair of substantial iron pintles mounted to the inside face of the gateway. The gates would have opened inwards, but there were no surviving examples at the time of survey. The interior of the emplacement is floored with concrete, comprising at least three separate radial sections, including a central, slightly irregular octagonal piece for the holdfast [*2/118*] (see plate 50). As with the other emplacements, the holdfast's position is marked by a sub-circular arrangement of rings, flush with the surface of the concrete, which formerly secured the base to the concrete. There are two larger rings (the locating spigots), set opposite one another, with an external diameter of 20mm and an internal diameter of 110mm, together with eight smaller rings; the latter have an external diameter of 180mm but an internal one of only 70mm. There is a shallow east-west aligned groove running across the centre of the gun position, and then a scar in line with this crossing the concrete to the

north-west side of the emplacement. A drain is placed at the base of each internal angle of the emplacement, passing through the wall thickness.

3.87 There are six ammunition recesses placed against the insides of each side of the emplacement (see plate 50). They are of two different forms, referred to for descriptive purposes as Type 1 and Type 2. The four Type 1 recesses are set against the north, east, south and west walls. Each of these recesses is 2.10m long (parallel to the emplacement wall) by 1.90m wide (projecting from the wall); they stand 1.60m high and have flat reinforced concrete roofs, 0.10m thick; some bear traces of a black paint. The outer side of the recess is formed by the emplacement's wall, whereas the inner side is a reinforced concrete wall, 0.18m thick. There is a strip of rubberised material at the base of the concrete wall, forming a seal between the wall and the emplacement's concrete floor. There are doorways at either end of the recess. Each doorway was fitted with a 75mm square angle-iron frame, set flush with the external wall face. The frame once supported a single two-leaf folding metal blast door, each leaf comprising a sheet rived to an internal angle-iron frame, although very few survive complete (see figure 16). The door was hung on three short strap hinges, riveted to the inner leaf, themselves set on pintle blocks riveted to the exterior of the frame's inner side. The outer leaf was joined to the inner leaf using two hinge plates. When closed, the top and bottom of the door overlapped the doorway opening by 30mm; the outer leaf of the door acted like a hasp, closing across a latch on the exterior of the frame's outer side, through which it could be secured. When open, the door opened outwards, folding back on itself. There are vertical sliding bolts mounted to the top and bottom of the internal side of the inner leaf; these could have secured the door both when it was fully closed, or held the inner leaf in place when the outer leaf was folded back. The floor of the recess is of concrete, and is raised 0.04m above the emplacement floor. To the inner side of the interior (i.e. the side formed by the emplacement wall), there is the same pattern of metal bolts projecting from the wall face, or the damage left by their removal. The bolts are organised into two lines; an upper line of three horizontal pairs, and a lower line of two vertical pairs. The lines do not run the full length of the recess' interior, but always commence at the end positioned closest to a gateway; they are assumed to have formerly supported the internal shelving.

3.88 The two Type 2 recesses are positioned against the inside north-east and south-west walls of the emplacement. These are remodelled Type 1 recesses, and have very similar overall dimensions. The main differences are in the form of the doors and the interior. Each doorway was fitted with a 75mm square angle-iron frame, set flush with the external wall face. This frame once supported a two separate doors which opened outwards [*6/723*] (see plate 51). Each door was hung on two short strap hinges, riveted to the leaf, themselves set on pintle blocks riveted to the exterior of the frame. The doors appear to have closed flush with the frame, and had a white rubberised seal around their interior. The floor of the recess is of concrete, but is raised 0.13m above the emplacement floor, significantly higher than in the Type 1 recesses. In addition, the internal walls have been lined with a skin of brickwork, built of machine-made red bricks (average dimensions 220mm by 110mm by 70mm), set with a cement mortar and laid in stretcher bond. A narrow gap was left between the brick lining and the original walls for air circulation, with air bricks placed externally at either end of the gap.

3.89 The shelter is located on the north side of the emplacement, and has been interpreted as being a duty shelter for the gun detachment when they were not on alert (SM description). There is some evidence in the north wall to suggest that the eastern third (1.70m of the total 5.50m internal length) was a later addition to the

shelter, which was itself not an original feature of the emplacement [*6/720, 6/721*] although, unlike the extensions to the shelters in Emplacements C and D, the roof line has not been raised. The shelter is entered via a doorway positioned towards the east end of its south wall; there is no evidence for a door being fitted here. The floor of the shelter is of concrete and is set 0.05m to 0.10m lower than the emplacement's floor; a narrow drain runs across the south-east interior of the shelter. The eastern end of the north wall has a wooden rail positioned approximately half way up the wall, which may once have run the full length of the wall. There is a small piece of wood above with a cable clip attached to it. To the east wall, and to the south wall east of the doorway, there is a wooden rail at the top of the wall, with evidence for other former fittings beneath. These walls are painted below, although the paint is in very poor condition. The south wall west of the doorway has a different paint scheme - it is painted light and drab green to 0.80m above floor level, then a narrow band of red and then a pale yellow to ceiling level. There is a circular vent in the ceiling close to the western part of the north wall. The remains of a small structure, represented by two single-skin brick stub walls can be seen running out from the west external wall of the shelter, and there is slight evidence of a now blocked doorway c.1.00m wide in this wall [*6/722*] (see plate 52); this structure may have served as a toilet, and it is interesting to note that a similar structure can be seen in Emplacement G but not in Emplacements C and D.

3.90 All parts of the emplacement preserve evidence for camouflage fixings. These are located on the upper surfaces of the emplacement wall, the shelter and the recesses. They are of two distinct types [*2/114, 2/116*] (see plate 53). The first are square metal housings, which are assumed to have secured retractable camouflage poles. The housings are cast in one piece, and are themselves placed vertically in square sockets in the emplacement wall; each of the sockets has a small inclined drain from the base to the exterior of the same wall. Each housing is c.110mm square and 220mm deep (see figure 16). There is a central square hole in the top, 30mm square, which runs the full length of the housing. The camouflage pole was secured in place by a threaded key with a flat end, which could be screwed through the upper part of the housing against the pole; all surviving keys face towards the inside of the emplacement. The second type of fixing is a non-retractable metal pole, 30mm in diameter, which projects up to 0.46m from the surface of the emplacement wall. The two types of fixing are arranged in a repeating pattern around the top of the emplacement wall (see figure 15). Adjacent to either end of the ammunition recesses, there is a pair of square housings and a single pole, with pairs of housings only to the angles and flanking the gateways. Poles are set at the inner corners of the recess roofs, and also across the south side of the shelter roof. Finally, the external wall of the emplacement has a row of widely-spaced holes bored into the reinforced concrete, aligned horizontally, c.0.75m below the top of the wall, which were presumably also used to secure camouflage netting or other material [*6/705*].

Emplacement G (see figure 17)

3.91 Emplacement G is the western central of the four gun emplacements. It was accessed from the north by the main concrete roadway through the operational site, and retains the vertical concrete edging to either side of the roadway; a narrower curving concrete roadway linked the south side to the magazine. The 1946-47 aerial photographs shows that there were well-made semi-circular banks of earth enclosing the emplacement, broken only where the roadways approached it. These had been partly removed by the time of the EDAS survey, but they generally survived better than those around the other emplacements [*2/123*] (see

plate 54). The banks are a maximum of 3.50m wide and 1.00m high, with flattened tops and a steeply scarped outer edge. Like the other three emplacements, Emplacement G is set out to the March 1938 pattern, with a gun detachments' shelter added to the external north-west angle at a later date and in two phases.

3.92 The emplacement has a regular octagonal plan form, with a maximum external dimension (excluding the shelter) of 12.80m; each face of the octagon measures on average 5.30m long externally [*2/119*] (see plate 54). The gun detachment shelter projects beyond the north-west outer face of the emplacement, and measures 6.20m east-west by 2.25m north-south externally (see plate 55). The wall defining the emplacement is of reinforced concrete, standing 1.60m high and with an average width of 0.38m. The shelter stands slightly higher, and has a reinforced concrete roof, 0.15m thick, which slopes very gently downwards to the outside of the emplacement. However, as with Emplacement F, the walls of the shelter (apart from the south side which is formed by the emplacement's wall), are of concrete blockwork rather than reinforced concrete.

3.93 Access to the emplacement was through gateways in the north and south sides. Although the concrete roadways approaching the gateways were of widely varying width, the gateways themselves are both 3.60m wide. Each was formerly fitted with two gates, each gate hung on a pair of substantial iron pintles mounted to the inside face of the gateway [*4/705; 6/711*] (see plate 55). The gates would have opened inwards, but there were no surviving examples at the time of the EDAS survey. The interior of the emplacement is floored with concrete, comprising at least three separate radial sections, including a central slightly irregular octagonal piece for the holdfast. The holdfast's position is marked by a sub-circular arrangement of rings, flush with the surface of the concrete, which formerly secured the base to the concrete [*2/126*]. There are two larger rings (the locating spigots), set opposite one another, with an external diameter of 200mm and an internal diameter of 110mm, together with eight smaller rings; the latter have an external diameter of 180mm but an internal one of only 70mm. There is a shallow north-east/south-west aligned groove running across the centre of the gun position, with a ring at the north-east end resembling a third locating spigot, and then scars running to the north-west and south-west [*2/248*]. A drain is placed at the base of each internal angle of the emplacement, passing through the wall thickness.

3.94 There are six ammunition recesses placed against the insides of the sides of the emplacement [*2/125, 2/127*] (see plate 55). As with Emplacement F above, they are of two different forms. The four Type 1 recesses are set against the north-east, south-east, south-west and north-west walls. Each of these recesses is 2.10m long (parallel to the emplacement wall) by 1.90m wide (projecting from the wall). They stand 1.60m high and have flat reinforced concrete roofs, 0.10m thick; some bear traces of a black paint. The outer side of the recess is formed by the emplacement's wall, whereas the inner side is a reinforced concrete wall, 0.18m thick. There is a strip of rubberised material at the base of the concrete wall, forming a seal between the wall and the emplacement's concrete floor. There were once doors at either end of the recesses [*2/243*], as described above for Emplacement F, although few now survive. The floor of these recesses is of concrete, and are raised 0.04m above the emplacement floor. To the inner side of the interior (i.e. the side formed by the emplacement wall), there is the same pattern of metal bolts projecting from the wall face, or the damage left by their removal. The bolts are organised into two lines; an upper line of three horizontal pairs, and a lower line of two vertical pairs [*2/244*]. The lines do not run the full length of the recesses' interior, but always commence at that end positioned closest to a gateway. The two Type 2 recesses are positioned against the internal

east and west walls of the emplacement [*4/841, 4/842*]. As noted and described for Emplacement F above, these are remodelled Type 1 recesses, and have very similar overall dimensions; the main differences are in the form of the doors and the interiors [*2/245, 2/247; 6/713*] (see plate 57).

3.95 The shelter is located on the north-west side of the emplacement, and has again been interpreted as a duty shelter for the gun detachment when they were not on alert (SM description) [*2/128*]. It is entered via a doorway positioned towards the west end of its southern wall; there is no evidence for a door being fitted here. The floor of the shelter is concrete and is set 0.05m to 0.10m lower than the emplacement's floor; the step across the threshold (to prevent water ingress) has 'No 3 GUN' inscribed into the concrete [*2/249*] (see plate 56). A narrow drain runs across the interior of the shelter in front of the doorway. As with Emplacement F, the shelter has been extended, this time to the west by 1.50m to create total internal dimensions of 5.50m long by 1.56m wide; the floor level and ceiling height remains the same. The west end of the north wall retains a wooden rail, painted mid green, with the painted white numbers 7 to 11 [*2/253*]. Both this wall, and other internal walls of the shelter, have traces of a pale yellow paint on their upper half and grey to the lower, separated by a red band [*2/251, 2/252*] (see plate 58). The east wall of the shelter also contains a blocked opening, 1.21m wide which presumably led out into a toilet structure, although noting can now been seen externally. Unlike all the other three intact shelters, no evidence for a ceiling vent was visible.

3.96 However, by far the most interesting internal feature in the shelter are six paintings of American and British aircraft surviving to the south wall, east of the doorway. These are painted in black on the pale yellow upper half of the wall. The paintings have been interpreted as representing a US Consolidated Privateer, a B17 Flying Fortress, a Bristol Beaufighter or a Douglas C17 Dakota, a Catalina flying boat, and a Vickers Wellington (Hirst Conservation 2013) [*2/255-2/260, 2/318-2/321*] (see plates 59 and 60). These paintings represent a valuable piece of evidence but are deteriorating fast. The fact that they appear in the gun detachment shelter implies that they were 'doodles', rather than having any aircraft identification function. Such paintings are not unknown from HAA sites, for example there is an excellent image of a German Dornier at the Halsham HAA battery (East Yorkshire) (Cocroft *et al* 2006, 3). In the same area of these paintings at Stone Creek, a metal tool resembling a spanner hangs from a hook on the wall.

3.97 All parts of the emplacement preserve evidence for camouflage fixings, which are located on the upper surfaces of the emplacement wall, the shelter and the recesses. They are essentially the same as seen in Emplacement F, i.e. of two distinct types, the square metal housings for retractable poles and non-retractable metal poles (see above for detailed description) [*2/129*]; these were painted with rust inhibitor as part of the conservation works [*4/704*]. The two types of fixing are arranged in a repeating pattern around the top of the emplacement wall. Adjacent to either end of the ammunition recesses, there are a pair of square housings and a single pole, with pairs of housings only to the angles and flanking the gateways. Pole are also set at the inner corners of the recess roofs, and across the south side of the shelter roof. Finally, the external wall of the emplacement has a row of widely-spaced holes bored into the reinforced concrete, aligned horizontally, c.0.75m below the top of the wall, which were presumably also used to secure camouflage netting or other material; a similar arrangement was noted in Emplacement F.

Structure E: Gun Store and Generator Beds (see figure 18)

3.98 Dobinson (1996, 143) notes that gun stores, used for maintenance of weapons and the stowage of tools and spare parts, were commonly present at HAA batteries. By May 1943, only two types were authorised, and at permanent sites, standard hutting was recommended, usually a Curved Asbestos hut. The gun store at Stone Creek is quite different to this, but numerous similar examples can be found at other former HAA sites (Brown *et al* 1995, 59; RCHME 1994, 10), and so it must be a design pre-dating 1943; it is, in fact, a standard 1938 design (Roger Thomas, *pers. comm.*). The 1946-47 aerial photographs also show two other huts between this building and the boundary drain (see below).

3.99 The gun store stands on the eastern edge of the operational site, adjacent to the drain. It would have been used for gun maintenance and for the storing of tools and spare parts (SM description). It does not have any encircling banks of earth. The building is aligned north-west/south-east, although for the purposes of description it is considered to be aligned north-south. The store has maximum external dimensions of 9.45m north-south by 6.80m east-west, including a small projection off the south-east corner [*2/084*] (see plate 61). It is of a single storey, with a flat reinforced concrete roof 0.20m thick; the roof overhangs all the external elevations by 0.30m, with a drip channel to the soffit. The external walls of all parts of the store are built of reinforced concrete, and have an average thickness of 0.35m. An external concrete drain remains clearly visible around the base of all four sides of the building. This drainage channel has a broadly square cross-section, and measures on average 0.20m wide by 0.20m deep. An iron plate, set flush with the top of the channel's sides, is laid across the drain in line with the doorway located at the west end of the north elevation; there is no corresponding plate at the entrance to the small projection. The external walls bear evidence of a former earth-coloured painted camouflage patterns, now faded so that a pale yellow hue is mostly visible [*5/011, 5/012*].

3.100 The west elevation of the building is completely blank [*2/086*]. The south elevation has a projection at the east end, entered by a doorway in the south side [*2/083*]. This doorway is fitted with a 75mm square angle-iron frame, set flush with the external wall face; the ironwork was painted with a rust inhibitor as part of the conservation works [*4/706*]. The frame once supported a single-leaf blast door, hung on three pintle blocks riveted to the exterior of the frame's west jamb. The door opened outwards, but closed flush with the frame. The projection houses a small cell, completely separate from the interior of the main building. It has a concrete floor, with a wooden shelf, supported on timber brackets, high up on the north wall [*2/228*]. A lead-sheathed cable emerges from the wall above the shelf to run to a ceramic light fitting suspended from the ceiling. There are some painted markings surviving to the internal walls of this cell, all set within a painted green band set mid-way up the east, west and north walls. On the east wall, there is 'M' [*2/229*], to the north wall 'C.70' (see plate 63) and to the west wall 'C. (6?)00 BUFFER OIL' (perhaps with an orange band above) [*2/225, 2/227*]; C70 oil was used for cleaning bright parts of guns and their mountings, and general purpose lubrication, while C600 oil is a general lubricating oil (Roger Thomas, *pers. comm.*). The projection was used to store inflammables or paint.

3.101 The north elevation of the store has a doorway at the west end, forming the only access to the interior [*2/091*]. This doorway is fitted with a 75mm square angle-iron frame, set flush with the external wall face. The frame once supported a pair of blast doors, although only the west door survived at the time of the EDAS survey [*2/087*] (see plate 62). The door is hung on three short strap hinges, riveted to the

leaf, themselves set on pintle blocks riveted to the exterior of the frame [*2/089*]. The door itself comprises a single sheet of metal riveted onto a frame comprising three horizontal iron members with iron braces running diagonally between them. In addition, an extra piece of metal sheet riveted to the east side meant that the west door closed over the east door. They were secured by an external latch or bar which could be turned into a housing riveted to the west leaf [*2/090*]. The doors opened outwards, but closed flush with the external wall face.

3.102 The east elevation contains four window openings, the central pair being twice the width of the narrower outer pair [*2/085; 4/708*] (see plate 64). All windows have projecting concrete sills and lintels (now slightly damaged), and all were originally fitted with external blast shutters although none survived at the time of the EDAS survey [*2/092, 2/093*]. Each window has a 75mm square angle-iron frame, set slightly proud from the external wall face [*2/099*]. In the case of the two wider central windows, the frame once supported a pair of blast shutters, each leaf set on two pintle blocks riveted to the exterior of the frame [*2/094, 2/098*]. The shutters opened outwards, but closed flush with the frame. It is assumed that one shutter overlapped the other but there are no surviving examples. Each of the wider windows is fitted with a same Crittal-style steel two-light window frame, recessed from the external wall face. Both lights are side-hinged and open outwards; opening and closing handles survive to the interior of some [*2/240*]. Each light is divided into four panes of equal size, fitted with thickened glass but lacking the wire reinforcement seen at, for example, the cookhouse in the domestic site [*2/096*]. The narrower outer windows were once fitted with a single blast shutter, hung on pintle blocks to the outer side [*2/095*] - these narrower windows are of the same form as the others, but with a single light of four panes only [*2/097; 4/709*].

3.103 As mentioned above, the only access to the interior of the store was through the doorway in the north wall. The interior is formed by a large single space, floored with concrete. The concrete appears to retain evidence of the store's former use, but was largely obscured by straw and animal manure at the time of the EDAS survey [*2/234*] (see plate 65); a gun store usually contained a large central table for repair work (Roger Thomas, *pers. comm.*). The internal south wall is blank [*2/230*], as is the west wall, although the latter has a metal isolator box with the name 'Prento' mounted on it towards its south end [*2/100, 2/241*]. A thick cable with lead sheathing rises vertically from the box and runs up the west wall, and then continues east across the ceiling above [*2/102*]. It is secured by two-part metal cable-clips held in place by two screws or nails. The cable runs to a ceramic light fitting, with the remains of a pendant light beneath, although it is very decayed [*2/242*]. The cable then continues east across the ceiling, with a short branch off close to a circular vent in the ceiling, to meet the east wall. It descends onto the wall, before meeting a horizontal cable run which traverses the wall above the windows. The latter cable once had three separate branches descending the wall between the windows, although only one now survives. It was linked to a switch with a rotary mechanism or handle [*2/239*]. There are further painted markings and graffiti on the north wall. To the immediate east of the door, there is a pencilled table dated 'NOVEMBER 68' and apparently relating to agricultural usage [*2/235*]. Further to the east, the painted numbers 'C70', 'C600' and 'M800' [*2/236*] are visible, and then 'BUFFER OIL PARAFFIN LINSEED OIL' [*2/237, 2/238*]; M800 is a forced feed lubrication (Roger Thomas, *pers. comm.*). The ceiling over the interior of the store is divided into four bays of equal size by east-west aligned downstand beams [*2/231*]. The northern and southernmost bays have a circular vent to the centre [*2/101*]. There is no evidence on the flat roof for the former presence of any further fixtures or fittings.

3.104 Immediately to the east of the store, adjacent to the boundary drain, there is a concrete engine bed, interpreted as representing the mounting for the on-site electricity generators (SM description) [*2/104*] (see plate 66). On the 1946-47 aerial photographs, the bed is covered by a hut with a curved roof; there is another hut with a pitched roof to the immediate south, but this has left no trace in the field (see figure 5). At a typical HAA battery, the site generating hut was formed from standard hutting, either a MOWP or Nissen type. By May 1943, all static 3.7" gun sites appear to have had the DFW layout issued in April 1942, which called for two 30k VA generators located in a Nissen hut; the beds for these generators would appear to be what survives at Stone Creek. A small battery charging room was also authorised if required in May 1943 (Dobinson 1996, 143). The bed itself is aligned north-west/south-east, although for the purposes of description it is considered to be aligned north-south. It has maximum overall dimensions of 5.70m north-south by 4.95m east-west, and stands on average 0.25m high. A narrow step around the edge of the bed accommodated the curved hut structure, with an inset to the north side perhaps marking the location of a door. Internally, the bed is divided into two equal parts by a central north-south aligned channel; each part is essentially a mirror image of the other. A raised rectangular concrete base to either side of the channel has six regularly spaced square recesses; these are now grass filled, but once accommodated the bolts which secured the generator to the bed [*2/105, 2/106*].

Structure H: On-Site Magazine (see figure 18)

3.105 The on-site magazine (OSM) (Structure H) stands on the south-eastern edge of the operational site [*2/075*]. Dobinson (1996, 142) notes that by May 1943 only two types of OSM were authorised, and that on permanent sites they were constructed from 18 sections of a large trench shelter, forming a building about 11.4m long with brick ends. Again, as with the gun store, the OSM at Stone Creek does not really fit this description but many examples exist at other HAA batteries, and so it was presumably a standard type (Brown *et al* 1995, 52); like the gun store, it is actually a standard 1938 design (Roger Thomas, *pers. comm.*). One example, at the Stratford HAA battery in London, has been excavated (Brown *et al* 2012).

3.106 The building comprises three distinct parts; the magazine itself, and two separate blast walls [*6/728*] (see plate 67). All parts are aligned north-east/south-west, although for the purposes of description they are considered to be aligned east-west. The actual magazine has maximum external dimensions of 11.70m east-west by 4.10m north-south, but the overall maximum dimensions including the blast walls are 21.20m east-west by 7.25m north-south. Both blast walls have a battered profile, as does the rear (south) wall of the magazine. The magazine is of a single storey [*2/072, 2/074*], with a flat reinforced concrete roof 0.20m thick, covered in a 10mm thick black rubberised coating; there appears to have been a small circular fitting, 200mm in diameter, to each corner of the roof, perhaps for camouflage netting, around which the rubberised material was laid. The roof overhangs all the external elevations by 0.40m, with a drip channel to the soffit [*2/209*]. The external walls of all parts of the building are built of reinforced concrete; the boards used for the shuttering were on average 0.17m wide. The blast walls have an average thickness of 0.36m at the base, with the magazine walls being up to 0.31m thick at same point.

3.107 The north blast wall has a straight alignment and plan form; a 3.00m long section at either end slopes upwards from ground level to the full height of the main part of the wall, which is over 2.00m. The south blast wall has U-shaped alignment,

essentially wrapping around the magazine itself and then returning for a short distance to the east and west to end in line with the ends of the north wall; these returns largely comprise sloping sections to mirror those in the north blast wall [*2/073*]. It is possible that both blast walls may once have had an earth bank sloped against them, although as with the gun emplacements, this would have been as much to break up the outline of the structure as to provide additional protection; however, no evidence remains for any embankments, and none are visible on the 1946-47 aerial photographs. Two brick stub walls are visible in plan extending south for 2.50m from the centre of the south blast wall, but there is no evidence on the blast wall itself (such a scarring) to suggest that they ever rose up it [*5/007*]; the function of these walls or structure is unknown.

3.108 Access to the actual magazine was through the passages created by the opposed sloping sections at either end of the blast walls. The area around the magazine is floored with concrete; there is a gap of 1.90m between the magazine and the north blast wall [*2/210*] (see plate 68), whereas the gap between it and the south blast wall is only between 0.60m-1.00m wide [*2/205, 2/208*]. An open concrete drain, 0.15m wide, runs around the concrete area surrounding the magazine, close to the blast walls; it drains into the south-west corner [*6/702*]. There are two cut-outs to the south edge of the north drain run, although it is not clear what function these performed. Just to the north of the north-east and north-west corners of the magazine, there is a circular metal cover over an electrical run. Opposite these covers, at the bottom of the magazine's north elevation, two lead-sheathed cables have been cut off. However, scarring on the elevation indicates that these cables rose vertically up the wall. There is a row of two-part (bakelite?) cable clips, each held in place by two screws, running along the soffit of the roof projection above the north elevation. Furthermore, the remains of a run of similar clips, set at the top of all external elevations just below the level of the projecting roof, are also visible. There are small holes to the north elevation through which the cables held in place by the clips entered the interior of the magazine.

3.109 As might be expected, the east, south and west external elevations of the magazine are blank. The only access into the interior was through the north elevation. The north elevation is five bays in length, with doorway openings to the outer and central bays; the two bays in between have window openings. The doorway openings were all once of the same form. They were fitted with a 75mm square angle-iron frame, set flush with the external wall face [*2/214*]. The frame once supported two blast doors, each door set on three pintle blocks riveted to the exterior of the frame; there is also a pair of rivets to the centre of the exterior of the lintel. The doors opened outwards, but closed flush with the frame; they appear to have been virtually identical to those surviving at the gun store (Structure E); very similar magazines with surviving blast doors are illustrated at the Easton-in-Gordano HAA battery, near Bristol (*https://www.flickr.com/photos/13150208@N05/sets/72157628685773637*) and also at the Chadwell Heath HAA battery in Essex (*http://www.28dayslater.co.uk/forums/showthread.php/55543-Chadwell-Heath-AA-Battery-ZE1-November-2010?highlight=heavy+anti+aircraft*), amongst others. Each of the two window openings is fitted with the same Crittal-style steel two-light window frame, set flush with the external wall face but with a projecting concrete lintel [*2/215*]. Both lights are fixed, and divided into four panes of equal size; the panes are fitted with toughened Georgian glass, strengthened by wire forming a repeating hexagonal pattern - each hexagon is 0.025m across [*2/216, 2/217, 2/222, 2/223*] (see plate 69).

3.110 The five storage bays forming the interior of the magazine are of equal size, each measuring 3.70m north-south by 2.00m east-west, and are floored with concrete [*2/219*] (see plate 70). They are linked internally by openings at the north ends of the dividing walls [*2/220, 2/221*] (see plate 71). There was once painted signs or boards mounted on the north end of the west wall of the southernmost bay and on the ends of the stub walls [*5/009; 6/704*], and it is likely that similar signs were present in each bay; these recorded numbers of shells etc in each bay, and examples can be seen at the Barrow Haven HAA battery. A line of (zinc-coated?) metal cable-clips runs along the centre line of each ceiling, in line with the holes noted previously in the external south elevation. The outer and central bays each have a single circular vent opening to the centre of the ceiling. The vent openings visible externally can be seen projecting through the roof but there are few other features.

3.111 A sectional concrete roadway, 1.50m wide, left the east and west ends of the magazine, and then curved or angled around to meet the two nearest gun emplacements (Structures F and G) [*2/080*]. These roadways would have been used to deliver shells to the emplacements and the on-site magazine. A narrow path between the east end of the magazine and a turning point in the roadway has a low concrete wall running parallel to its south side [*2/079*] (see plate 72) - this is a roller bench along which boxes of ammunition could be pushed (Roger Thomas, *pers. comm.*). Towards its centre, opposite the point where the roadway angles towards the gun emplacement and close to a concrete trough, the wall thickens slightly on the north side [*2/078*]. The wall/roller bench would have allowed shells to be unloaded from lorries at the turning point and pushed to the magazine. There are also a number of spread irregular earthworks to the east and west of the magazine structure. Those to the south form a small sub-circular platform, 0.50m high, which corresponds to a unknown feature on the 1947 aerial photograph.

4 DISCUSSION AND CONCLUSIONS

4.1 By combining the known history of the Stone Creek battery with the information gained through the archaeological survey, it is possible to suggest a more detailed developmental sequence for the battery than has previously been suggested. As at many types of Second World War site, evidence can be found at Stone Creek for several phases of development, alteration and expansion over the relatively short period of time that the battery was in operation, in this case from late 1938 to late 1944.

Summary History of the Site

4.2 As was outlined in Chapter 2 above, the Stone Creek HAA battery was initially known as Station J, and it was first recorded on 19th September 1939 when 286 Battery of the 91st HAA Regiment (286/91 Battery) received two mobile First World War vintage 3" guns from Station C, west of Preston. However, it almost certainly had been developed and occupied before this, perhaps as early as late 1938. By the end of September 1939, control had passed to 172/62 Battery, when permanent gun emplacements were constructed for two 4.5" guns; the latter were certainly in place by 9th May 1940, when the 286/91 Battery took over again. From 1st August 1941 the battery was known as Station H9. By June 1942 the battery had four 3.7" static guns in permanent emplacements, supported by a GL Mark II radar, and in September 1942 women were introduced to the site as part of the mixed gender 510/515 Battery. The site was abandoned in November 1944, when both equipment and personnel were moved to a new gun site at Ringborough on the Holderness coast as part of Operation Diver, to counter the new threat from the V1 flying bomb (SM description; Dobinson 1996, 377-380; Dobinson 2001, 569).

The Pre-War Phase (mid 1938 to late 1939)

4.3 Probable evidence for the earliest phase of occupation and development of the site can be seen in the April 1947 aerial photograph, which clearly shows a circular earthwork (or more likely an infilled circular ditch), c.20m in diameter, just to the south of a group of seven huts on the east side of the central roadway, with three or four possible circles of a similar size immediately adjacent to it, and including one bisected by the later access road (see figures 5 and 6). These circular earthworks are likely to mark the positions of the two mobile 3" guns which were brought to the site in September 1939 although, as noted above, other similar guns may have been present since mid 1938. These 3" guns were notoriously heavy (weighing 20 cwt or one ton each) and they often had to be moved around a site to prevent them sinking into soft ground, which would have been a characteristic of the Stone Creek site (Roger Thomas, *pers. comm.*). The circular features therefore probably represent several phases of abandoned non-permanent gun emplacements, which would originally have been surrounded by sand bags (see figure 4D). Early batteries did not contain purpose-built command posts, but rather protected the identification telescope, height finder, predictor and the necessary staff with either sand-bagged emplacements or simple concrete blast walls with only a limited amount of roofed shelter, perhaps in a large trench (Dobinson 1996, 129-130). No positive evidence for this early command post can be seen on the aerial photograph or in the field, and it is unlikely to have been within the earliest phase of the existing command post structure (Structure B) as it was some distance removed from the guns. However, there is a vaguely rectangular area of ground disturbance visible on the 1947 aerial photograph on the south side of the circular emplacements, which may represent the original command post position; this would have had to be comprehensively demolished as it would have affected

the functioning of the later GL radar mat. No evidence for any tented accommodation associated with this early battery is visible, although this is not unexpected as any such remains would be rather ephemeral.

The War-time Operational Site

The Gun Emplacements

4.4 All four gun emplacements are built according to the DFW March 1938 design, with an octagonal plan and opposed gated entrances, and they are laid out around the command post in a pattern commonly observed at numerous other HAA sites (Brown *et al* 1995, 52). However, it is noticeable that Emplacements F and G appear to be far better integrated into the layout of the operational site than emplacements C and D (see figure 8). The main concrete roadway that runs into the operational site appears to bypass Emplacements C and D, whereas there are branches laid directly to Emplacements F and G. The latter also have smaller roadways connecting them directly to the on-site magazine (Structure H). Furthermore, Emplacements F and G display evidence for alterations to the ammunition recesses, suggesting a longer period of use, and they also appear to have been better built and have more sophisticated arrangements for camouflage, with both retractable and permanent poles used for holding up securing netting or similar material; Emplacements C and D only have poles. Finally, and perhaps most significantly, Emplacements F and G are built of reinforced concrete while Emplacements C and D are of blockwork; evidence from elsewhere on the site, for example at the command post (Structure B; see below), suggests that blockwork elements belong to a later phase. A combination of the evidence therefore suggests that Emplacements F and G were the earliest to be built at the battery, to house the two 4.5" guns recorded at the site between late September 1939 and early May 1940. The fact that the on-site magazine (Structure H) and the gun store (Structure E) are also built of reinforced concrete would imply that they were also built as part of this phase, and they are, in fact, both of an early 1938 design which continued to be used until May 1943. However, all four emplacements must have been present by late June 1942, when Stone Creek was reported to have four 3.7" static guns in permanent emplacements. This would therefore suggest that emplacements C and D were added sometime between May 1940 and June 1942, perhaps in mid-late 1941.

4.5 Emplacements F and G were equipped with six ammunition recesses, in accordance with the 1938 design (see figures 15 and 17). Subsequently, the central two recesses in each emplacement were modified - the changes do appear to be modifications, rather than the wholesale addition of two new recesses. The modifications to the Type 1 recesses involved the raising of the internal floor levels above that of the emplacement in general, encasing the interiors in brick, providing better closing doors, and fixing a rubber seal to the doorways, to create a Type 2 recess. The same changes have been noted at the Bowaters Farm HAA battery at Thurrock in Essex, where they were suggested to relate to the storage of high-altitude shells, which were more susceptible to humidity (RCHME 1994, 5); these changes were introduced after February 1940 (Dobinson 1996, 121). One of the other two, potentially later, emplacements (Emplacement C) has five recesses and, although it is possible that the sixth was demolished when a detachment shelter was added, there is no surviving evidence for this. It may therefore be that this fifth recess, which is a slightly different size to the other four, was added to act as a store for the limber gunner (Dobinson 1996, 121). Unfortunately, insufficient now survives at emplacement D to make a comparison.

4.6 All four emplacements had duty detachment shelters added to one side at a later date, in blockwork, along the lines of those specified on a permanent emplacement design authorised by May 1943; this same pattern was noted at the Red Barns Farm HAA battery, at Wardley, Tyne and Wear (ASUD 2002, 3). Once built, all the Stone Creek shelters were subsequently extended by 1.50m internally, and those at Emplacements F and G have blocked doorways leading to probable an external WC; only the footings for this remains at Emplacement F. The shelters in Emplacements F and G retain evidence for internal painted schemes/graffiti - that in Emplacement G depicts six paintings of American and British aircraft which appear to be 'doodles' rather than having any aircraft identification function. Emplacement G also contains a wooden coat and/or hat rail with the numbers 7 to 11 painted on - the normal detachment for a static Mark II or Mark IIB 3.7" gun was eleven men (Roger Thomas, *pers. comm.*).

4.7 Unlike many HAA batteries, including that at Butt Farm near Beverley (Dennison & Richardson 2016), the Stone Creek site does not contain any sub-rectangular gun emplacements, which were introduced from September 1943 (DFW design 55483). This design was brought about by the need to increase the amount of ammunition storage, and to provide more room for carrying and loading the shells following the introduction of the more sophisticated semi-automatic and remote power operated 3.7" Mark IIC guns in mid-late 1943 (Dobinson 1996, 119 & 126; Roger Thomas, *pers. comm.*). This new quick-firing gun also required more cabling for remote power control and the transference of telemetry data from the command post, and the emplacements where the Mark IIC guns were used display more cable ducting and other modifications that are not present at Stone Creek. By inference, therefore, it is likely that the four 3.7" guns in use at Stone Creek by June 1942 were the relatively simple Mark II or Mark IIB static mounted variety, rather than any of the later models which were, for example, able to fire much more quickly and accurately using, amongst other improvements, fully automatic fuse setters.

The Gun-Laying (GL) Radar

4.8 The operational version of the GL Mark I radar entered service in September 1939, using two trailer-mounted cabins with aerials, the power supply coming from a generator, and the radar linked to the guns by cabling (Dobinson 1996, 134). Improvements led to the use of a large horizontal octagonal-shaped wire mat laid around the radar position, with a central raised platform on which the radar receiver was placed. The mats, and platforms where needed, were introduced with Mark I radars from December 1940, although many sites appear not to have received them until after June 1941, by which time the Mark II radar was in service (Dobinson 1996, 135-136).

4.9 It is not known if the Stone Creek battery was equipped with a Mark I radar, although it is likely, but a Mark II radar was definitely present by June 1942. The octagonal mat for this system had a 120m diameter and was raised above the ground level using posts, and a mobile transmitter housed in a rotatable cabin and driven by a generator which was placed on a ramped platform in the centre of the GL mat. The Stone Creek Mark II radar mat, and presumably any predecessor, must have been placed between the operational and domestic sites, to the east of the concrete roadway. This is confirmed by the presence of a part-octagonal redundant field division shown on the 1946-1947 aerial photographs in the field to the east of the site. Extrapolation of this shape shows that the mat must have been constructed over the open drain which ran along the eastern edge of the site (see figure 6); this seems quite feasible, given that the critical operational attribute

was a level GL wire mat, and any infilling of the drain would have produced variable electrical conductivity. Little now survives of the radar system (as is the case on most HAA sites), although a low mound on the immediate west side of the drain may mark the position of the central radar platform, and it is also possible that the concrete posts stacked against the north side of the command post might have originally been used to support the mat. A bridge adjacent to the gun store, shown on the 1946-47 aerial photographs, gave access across the drain.

Command Post

4.10 The gun emplacements are not the only structures at Stone Creek to display evidence for modification during the operational life of the battery. The command post (Structure B) was clearly built in at least two main phases, Phase 2 being late 1939 to mid-late 1941 and Phase 3 from mid-late 1941 until the abandonment of the site in late 1944 (see figure 19).

4.11 The earliest phase comprised the eastern two-thirds of the existing structure, which was built of reinforced concrete, and largely open to the air to provide the observation platforms for the spotting telescope, height finder and predictor, but also equipped with one other semi-sunken space (Room 2) measuring 3.10m square although a significant part of the space was taken up by the access steps. This room is 1.90m high, but later alterations mean that there is no clear evidence to show whether it was originally roofed, but it is likely to have been, as the access incorporated a hatch which opened upwards. This room presumably served as the original plotting room, in which case the positions of the predictor and height finder might have been different to their later locations. The screen walls to the observation platform on the south and west sides of the command post were between 1.00m and 1.39m high, compared to the original floor level, while those around the eastern platform were slightly lower, at 1.00m high. It is presumed that this phase of the command post dates to when the two 4.5" guns were introduced to the site.

4.12 Once built, the command post was then substantially expanded, with all the additions being made in blockwork. A new room (Room 1) was added on to the east side of Room 2, by building over the existing concrete walls of the east side of Room 2 and the observation platform to the south and east. This new room measures 5.30m north-south by 2.30m east-west internally, and is 2.00m high, although the fact that the roof is 0.70m higher than Room 2 to the west means that it is not dug as deep into the ground (see Section A-B on figure 13). The floor levels of the spotting telescope and predictor platforms were also raised by 0.80m (assuming that the original floor level of the platforms were uniform), although that of the height finder platform to the east was only 0.40m higher; this raising of the floor levels may have been done in one operation or as two separate phases. The screen walls of the predictor platform and the north side of the height finder platform, and also probably the spotting telescope platform, were also raised by between 0.50m and 0.75m, although it is also likely that wall tops were also sandbagged to give extra height and protection. Finally, an entirely new space, measuring c.5.80m by 3.70m internally, was added onto the west end of the command post, to create a plotting room (Room 3), probably to accommodate the arrival of the semi-automatic plotter in 1941; this space also appears to have been expanded to the west by 2.00m internally at a slightly later date. Most of these changes probably date to the introduction of the four 3.7" guns to the site in mid-late 1941, but others, such as the raising of the floor level of the observation platforms and the possible addition of a boiler in Room 1, probably date to September 1942 when ATS women were introduced to the battery. The

installation of heating provided by a (usually) coal-fired boiler to a command post, as well as raising the observation floor levels, is traditionally associated with the use of the post by ATS women, as they were of shorter average height than the men and so had difficulty reaching the telemetry equipment; contemporary examples of raised platforms can be seen in figures 4B and 4C. At the Butt Farm HAA battery near Beverley, the operating platforms were raised using bricks, and there was considerable evidence for the presence of heating pipes etc in the command post (Dennison & Richardson 2016, 29 & 32-33), but there is little evidence for the latter at Stone Creek, although it should be noted that there was no access into two of the three rooms.

Site Defences

4.13 No evidence was recorded by the survey of any ground defences around the battery (usually weapon pits linked by communication trenches and barbed wire), designed to engage fast low-flying aircraft (Dobinson 1996, 228). At the excavated Stratford HAA site in London, a light anti-aircraft (LAA) battery was identified adjacent to the HAA battery (Brown *et al* 2012). However, apart from those within an emplacement with ammunition lockers, LAA sites are characteristically insubstantial and rarely consist of more than a blockwork wall, earthworks or sandbags, behind which machine guns such as Lewis, Bren and Bofors gun were operated (Brown *et al* 1995, 59-61). Many LAA sites were also mobile, and any evidence for shallow earthworks or other ephemeral remains may well have been lost amongst post-war neglect and alteration. Although there is a pill box on the edge of Stone Creek, looking south across the Humber, this is a coastal defence and not related to the battery. No obvious defences are visible on the 1946-47 aerial photographs.

4.14 However, such a lack of defences may not be unusual, and no such features were definitely located at the Butt Farm HAA site near Beverley (Dennison & Richardson 2016), nor at the Bent Rigg Radar Station at Ravenscar (North Yorkshire) (Dennison & Richardson 2014), when some might have been expected. It also needs to be remembered that there would have been other LAA batteries along the Humber estuary which would have afforded some measure of protection, and the nearest to the Stone Creek HAA sites was at The Old Hall on Sunk Island.

The War-time Domestic Site

4.15 The two aerial photographs, dating to September 1946 and April 1947, depict the site in some detail, and in particular provide valuable evidence for the layout of the domestic site which has now largely been removed (see figures 5 and 6). Some 40 buildings of various types and forms are shown, either side of the central access way which runs from the entrance of the battery to the operational site.

4.16 The domestic site would have grown and been modified in the same manner as the operational site during the relatively short period of occupation. There would have been a small domestic site present from late 1938 onwards, although it was almost certainly tented with few permanent structures. By September 1939 some permanent structures would have been present, and it is likely that these are represented by the group of seven wooden huts on the north-east side of the access road. Other buildings in this area include the ablutions building (Structure A4) and perhaps a dining hall, recreational hall or canteen, and they may also have been associated with this phase of activity. However, the domestic site was probably enlarged when the four 3.7" guns were operational, and then significantly expanded again around September 1942 when Stone Creek became a mixed

gender battery. At many mixed sites, the women outnumbered the men, and virtually new camps had to be created for them, with separate washing and toilet facilities. It is therefore possible that all the curved roofed structures on the west side of the road, which number around 20 altogether and which are mostly set out in regular rows, but which also include the later cookhouse and canteen (Structures A3 and A3), are associated with this later expansion; the MOWP hut forming the cookhouse is built to DFW design 10210 which was introduced in September 1942.

4.17 Dobinson (1996, 188-189) provides a detailed list of authorised structures for mixed HAA battery domestic sites, and no doubt many of these would have been present at Stone Creek. The 1946-47 aerial photographs suggest the presence of curved roofed Nissen huts, pitched roof huts and at least one MOWP Standard Hut, and also a hipped roof structure by the entrance which would have formed the officers mess - some 40 structures in all. Although the site was abandoned in November 1944, it is noticeable that the 1946-47 aerial photographs show the domestic site as remaining intact, and it might possibly have been used for another military purpose after 1944. Although it is not known in detail how many people would have been based at the Stone Creek site at its height, estimates of between 150-200 staff for a typical 1943 mixed four-gun battery have been suggested. The 1946-47 aerial photographs also show two other isolated curved roofed huts to the east of the site, within a separate field enclosure, which may or may not be associated with the battery.

4.18 Although it is known that some of the domestic structures on the Stone Creek site were used for rearing turkeys after the war, it is not clear what happened to the rest. It is obvious from the aerial photographs that the buildings were not immediately demolished and, given that two structures appear to have been added between September 1946 and April 1947, it is possible that the domestic site at least was used by military personnel stationed elsewhere, for example at Paull, Sunk Island or even Spurn Point. At some point, probably in the 1950s, the majority of the domestic site was evidently comprehensively dismantled, and a search of surrounding farms in the Sunk Island and Paull area might locate structures that were relocated from Stone Creek. The MOWP Canteen (Structure A3) and the electricity sub-station (Structure A1) remained, probably because they were brick-built, and so could be easily adapted to other post-war uses.

Suggested Phases of Development (see figure 20)

4.19 Based on all the information gathered by this survey, it is possible to propose a number of phases of development for the Stone Creek HAA battery. It should be stressed that this is only a hypothetical scenario, and it may well change as a result of new or further detailed research into the site.

Phase 1: mid 1938 to late 1939

4.20 The site is likely to have been developed in mid 1938, and Station J was first recorded on 19th September 1939 when 286 Battery of the 91th HAA Regiment (286/91 Battery) received two mobile First World War vintage 3" guns (SM description; Dobinson 1996, 377-380; Dobinson 2001, 569). The 1947 aerial photograph shows evidence for possibly four sandbagged c.20m diameter emplacements for these guns, and perhaps a non-permanent command post to their immediate south; only two of these emplacements would have been in use at any one time. No evidence for any of the tented accommodation and any radar system (if present) associated with this phase can now be identified.

Phase 2: late 1939 to mid-late 1941?

4.21 Two 4.5" guns are recorded at the battery in late September 1939 and May 1940. It is proposed that most of the reinforced concrete structures of the operational site belong to this phase, namely two of the gun emplacements (Structures F and G), the eastern two-thirds of the command post (Structure B), and the on-site magazine and gun store (Structures H and E). In terms of the domestic site, the limited number of staff would have been male, and they may well have been accommodated in the seven wooden huts on the north-east side of the access road.

Phase 3a: mid-late 1941? to late 1942

4.22 From 1st August 1941 the battery was known as Station H9, and by June 1942 it had four 3.7" static guns in permanent emplacements, supported by a GL Mark II radar - it is clear that the site had been significantly expanded by this date. Two new gun emplacements (C and D) had been constructed, and improvements were made to the other two already existing (F and G), including modifications to some of the ammunition recesses and perhaps to the camouflage system. As an afterthought, duty shelters for the 11 man gun detachment were added to all the emplacements. At the command post, two new rooms (Rooms 1 and 3) were added, the latter to create a dedicated plotting room. It may be that the raising of the screen walls around the observation platforms and the raising of their floor levels (either wholly or in part), and the creation of the eastern entrance, also took place in this phase. A typical four gun battery at this time held 150-200 staff, and so it is likely that the domestic site was also expanded at this time, to include most, if not all, of the buildings shown on the east side of the access road, including the wooden huts of the earlier phase.

4.23 This major expansion of the site in mid-late 1941 may well have been a reaction to the bombing of Hull which had begun as early as June 1940 and which was particularly heavy in May 1941 (Geraghty 2002, 109). It is also interesting to note that the Butt Farm HAA battery (Station H9), and also perhaps the adjacent Riplingham HAA battery (Station H30), were built at this time (Dennison & Richardson 2016, 11-12).

Phase 3b: late 1942 to late 1944

4.24 Women from the ATS were introduced to the site in September 1942, as part of the mixed 510/515 Battery, and this often led to a number of improvements at the command post, where they were generally employed. It is possible that some of the alterations at the command post such as raising the floor levels of the operating platforms and increasing the heights of the screen walls took place at this time, or perhaps the floors were raised again, to enable the women to reach the equipment. The new plotting room (Room 3) may also have been extended to the west at this time, and Room 1 may have been altered to accommodate a boiler to heat the whole of the command post. Although not directly related to the introduction of the women, it is also possible that the gun emplacement shelters were extended in this phase. The influx of women to the battery would, however, have had a significant impact on the domestic site, and it is suggested their accommodation and related infrastructure is represented by the rows of Nissen huts on the west side of the access road, together with construction of a new cookhouse and canteen.

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21st September 1946	RAF black and white vertical aerial photograph of Stone Creek (NMR CPE-UK-1748, frame 4029)
29th April 1947	RAF black and white vertical aerial photograph of Stone Creek (NMR CPE-UK-2043, frame 2077)
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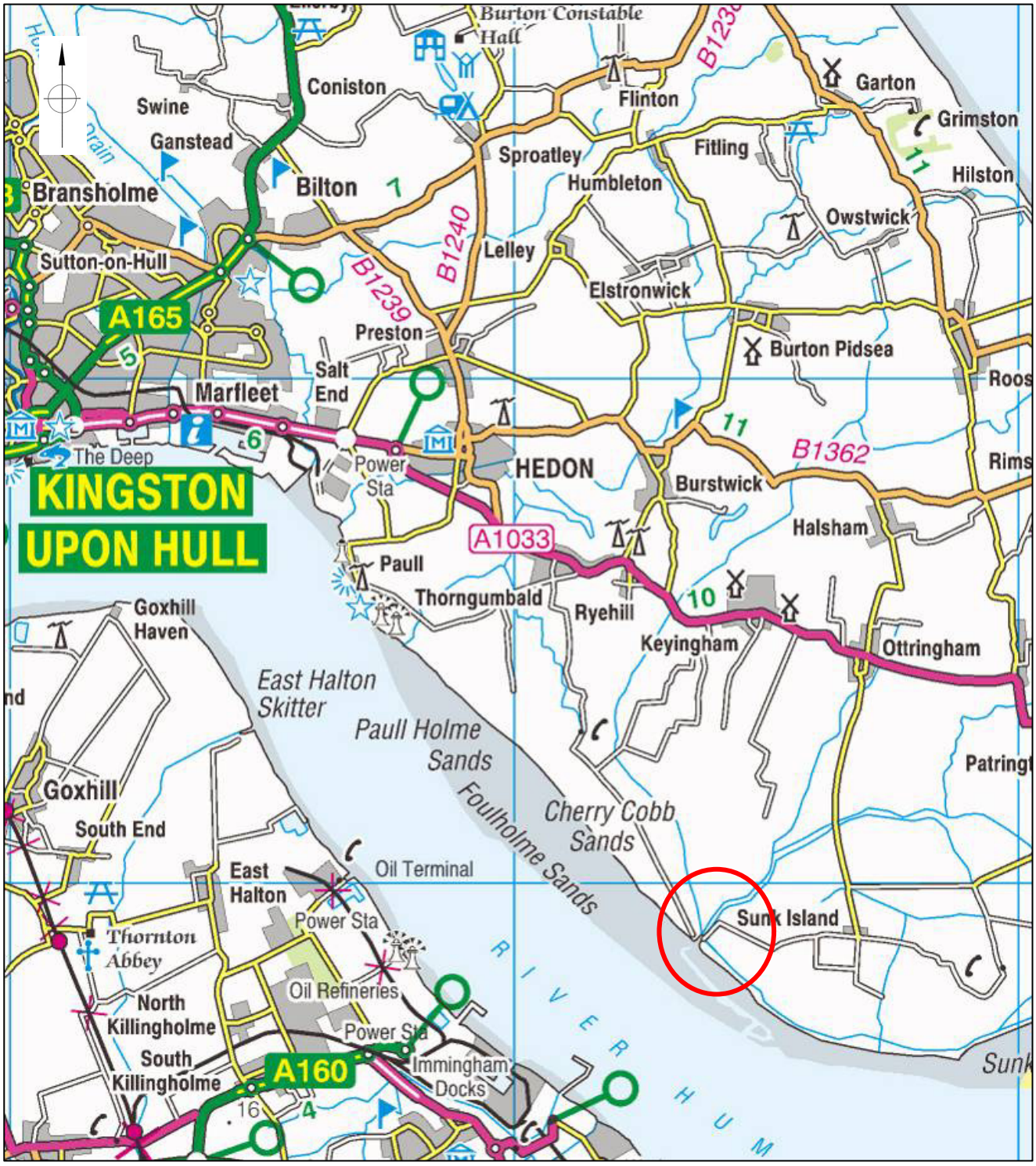
6.2 The archaeological survey was undertaken by Shaun Richardson and Benchmark Land Surveys of Leeds, with assistance from Richard Lamb. The subsequent hand enhancement of the EDM survey was by Shaun Richardson who also took the site photographs, with assistance from Ed Dennison. Comments on a draft survey report were kindly provided by Roger Thomas, and he also helped with site interpretation during the recording phase. The final report was produced by Ed Dennison, with whom the responsibility for any errors remains.



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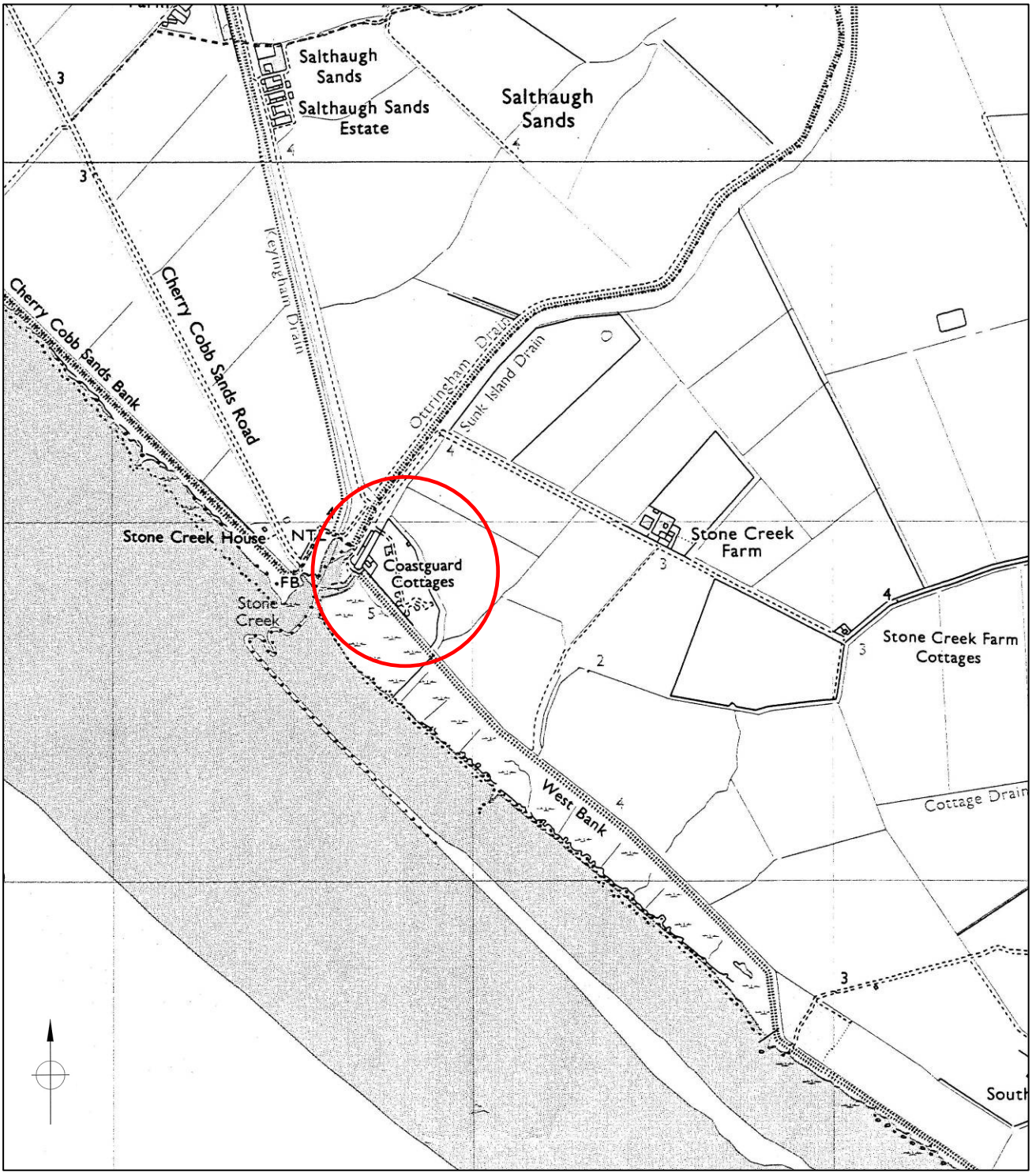

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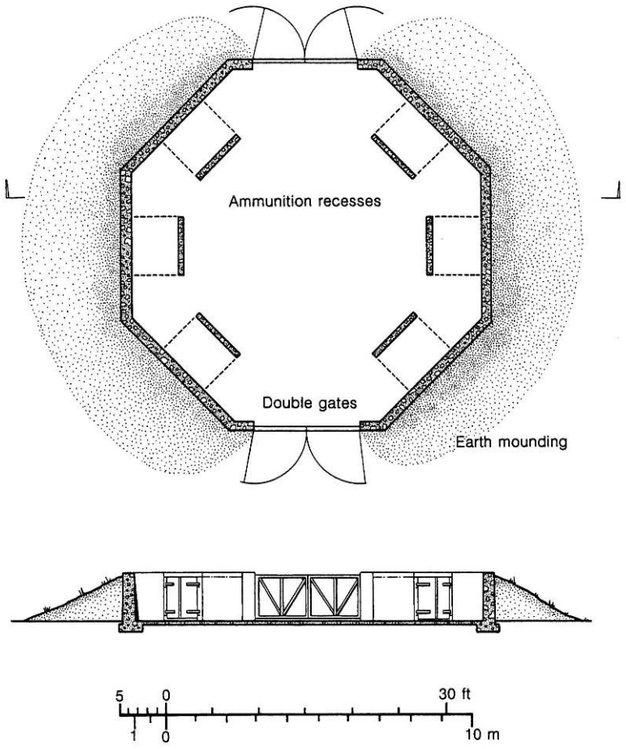
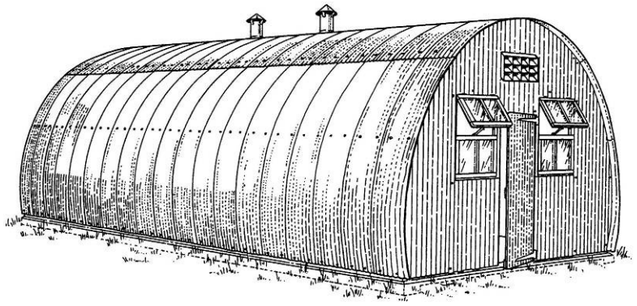
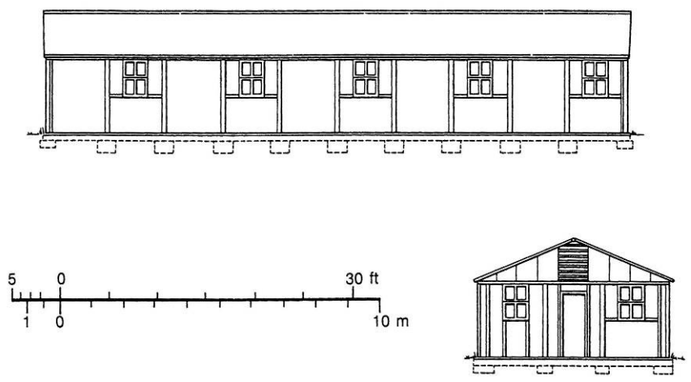


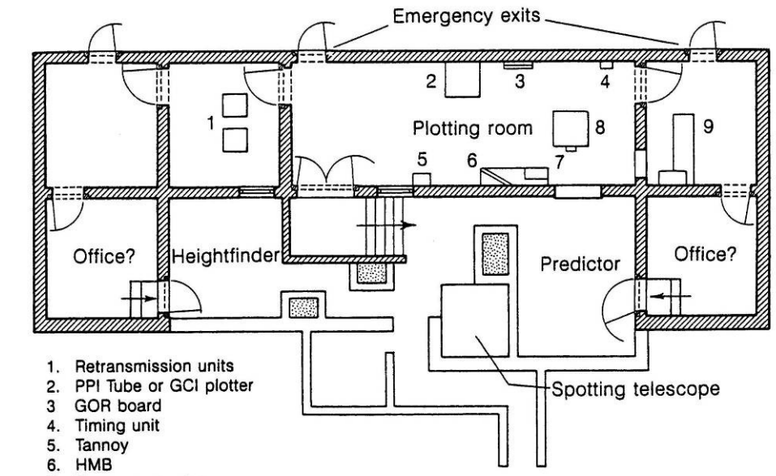
A) HAA emplacement design (March 1938 pattern).

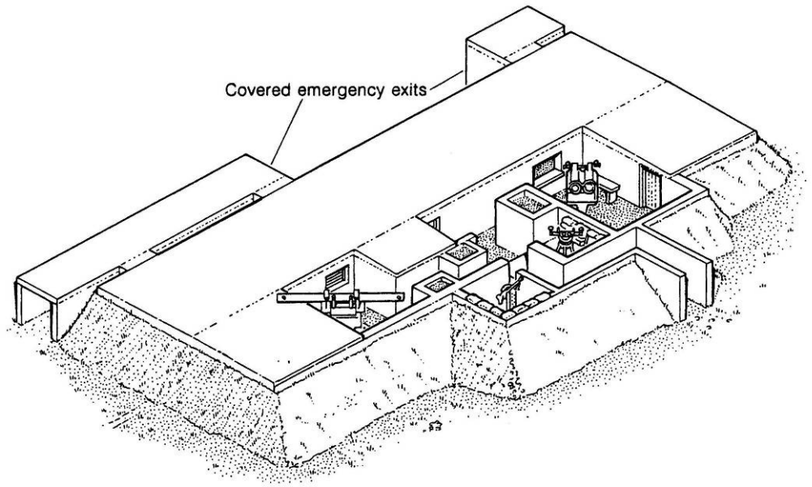


B) Typical 16-foot Nissen hut.

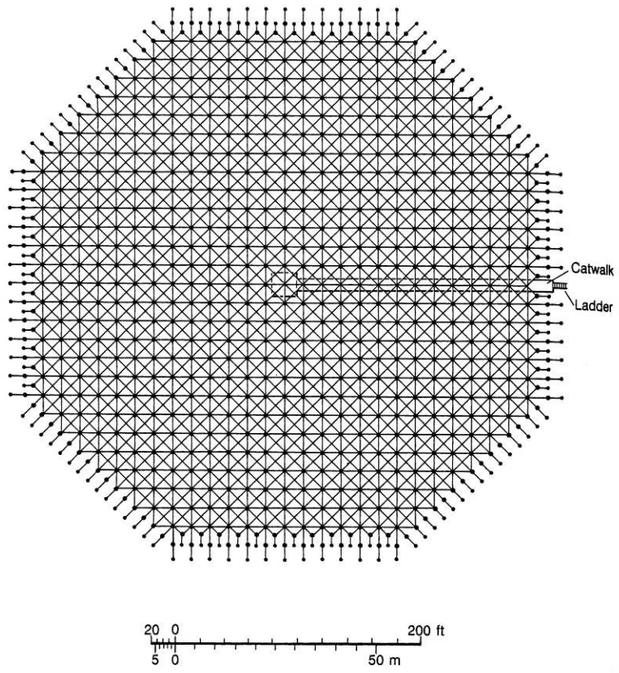


C) Ministry of War Production (MOWP) standard hut.

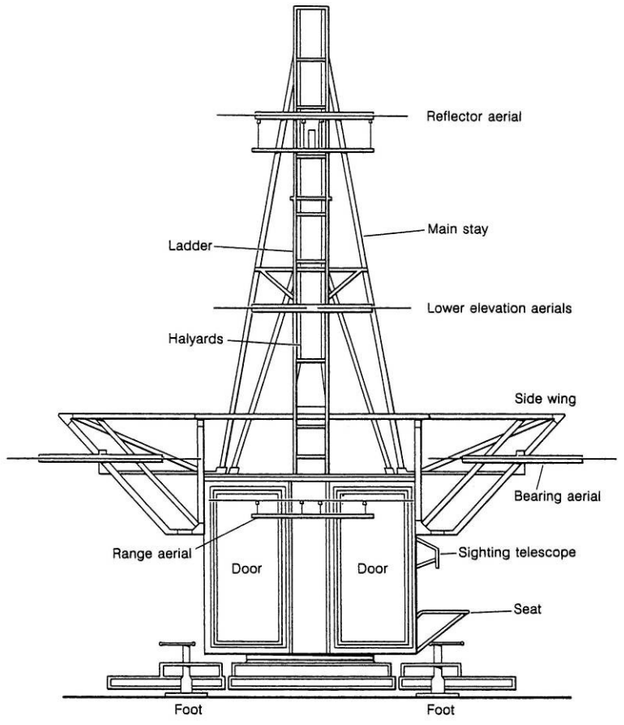




F) HAA command post (DFW 554402 - 1941 pattern).



D) Gun-laying (GL) radar mat.



E) Gun-laying (GL) Mark II radar receiver.

Source: Dobinson, C 2001 *AA Command: Britain's Anti-Aircraft Defences of the Second World War*.

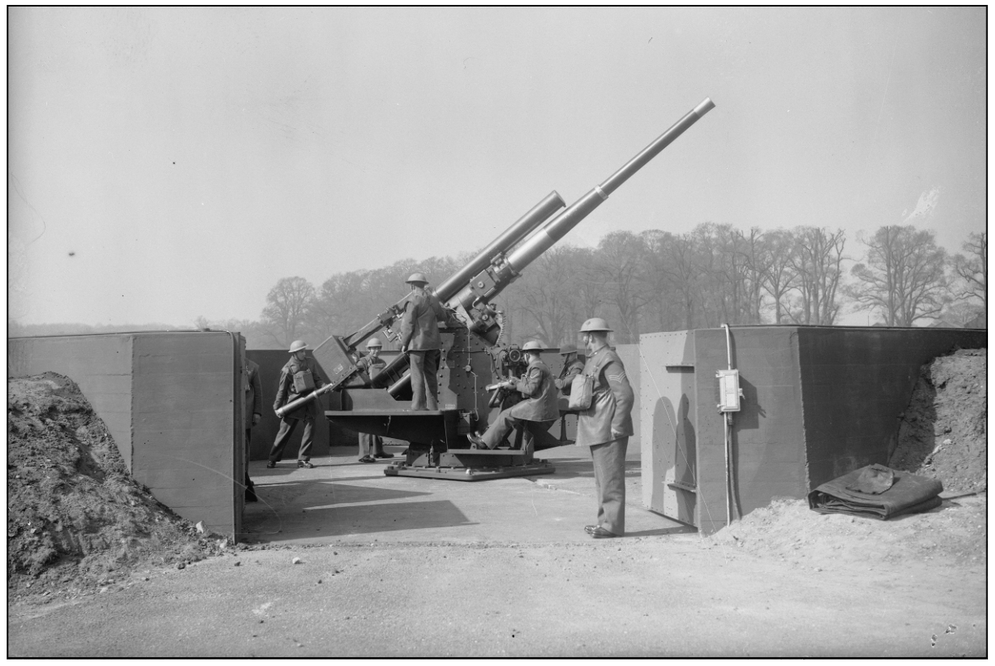
PROJECT: STONE CREEK HAA BATTERY	
TITLE: TYPICAL SITE STRUCTURES	
SCALE: AS SHOWN/NTS	DATE: APR 2017
EDAS	FIGURE: 3

A) ATS women of 500th (Mixed) HAA Battery near Middlesborough run to their stations at the command post, 12th May 1942. Spotting telescope being manned and a 3.7" gun in its emplacement can be seen in the background (Imperial War Museum H 19600).

B) ATS women run to their posts at an anti-aircraft site, somewhere in Britain, 1942. Predictor in the foreground, spotting telescope behind (Imperial War Museum D 8292).

C) ATS women operate predictors, height-finders and range-finders at a 3.7" HAA battery, 27th August 1943 (Imperial War Museum H 32337).

D) 3" gun crew of 303rd Battery, 99th AA Regiment RA in sand-bagged emplacement, Hayes Common in Kent, May 1940 (Source: IWM H 1388).



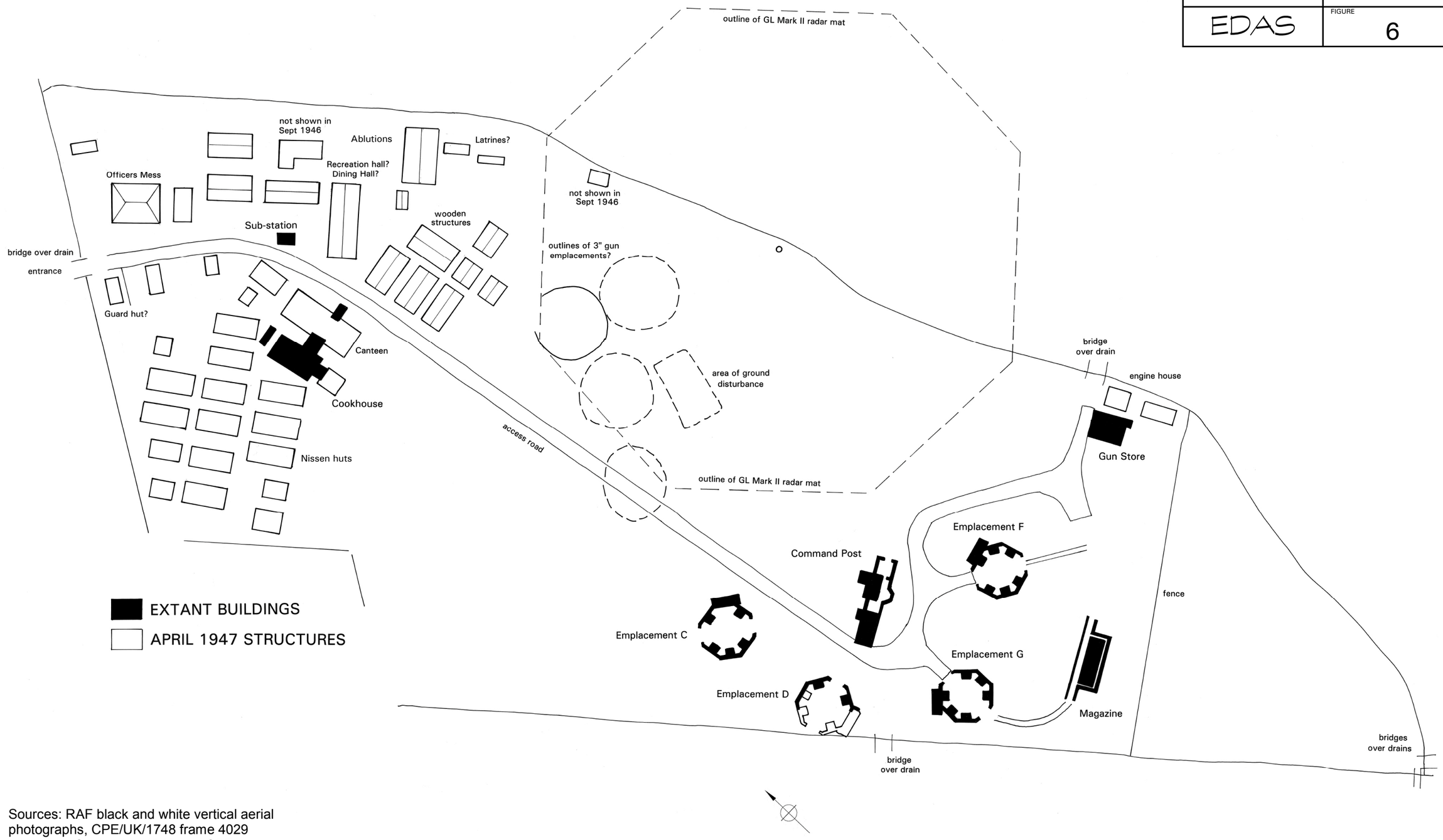
E) 3.7" anti-aircraft gun emplacement in Richmond Park, London, 1940 (Imperial War Museum H 1257).

PROJECT: STONE CREEK HAA BATTERY	
TITLE: CONTEMPORARY PHOTOGRAPHS	
SCALE: NTS	DATE: APR 2017
EDAS	FIGURE: 4

RAF black and white vertical aerial photograph (CPE/UK/2043 frame 2077) taken 29th April 1947 (English Heritage Archives).

PROJECT: STONE CREEK HAA BATTERY	
TITLE: 1947 AERIAL PHOTOGRAPH	
SCALE: NTS	DATE: APR 2017
EDAS	FIGURE: 5

PROJECT	STONE CREEK HAA BATTERY
TITLE	INTERPRETATION OF 1946-47 AERIAL PHOTOGRAPHS
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 6



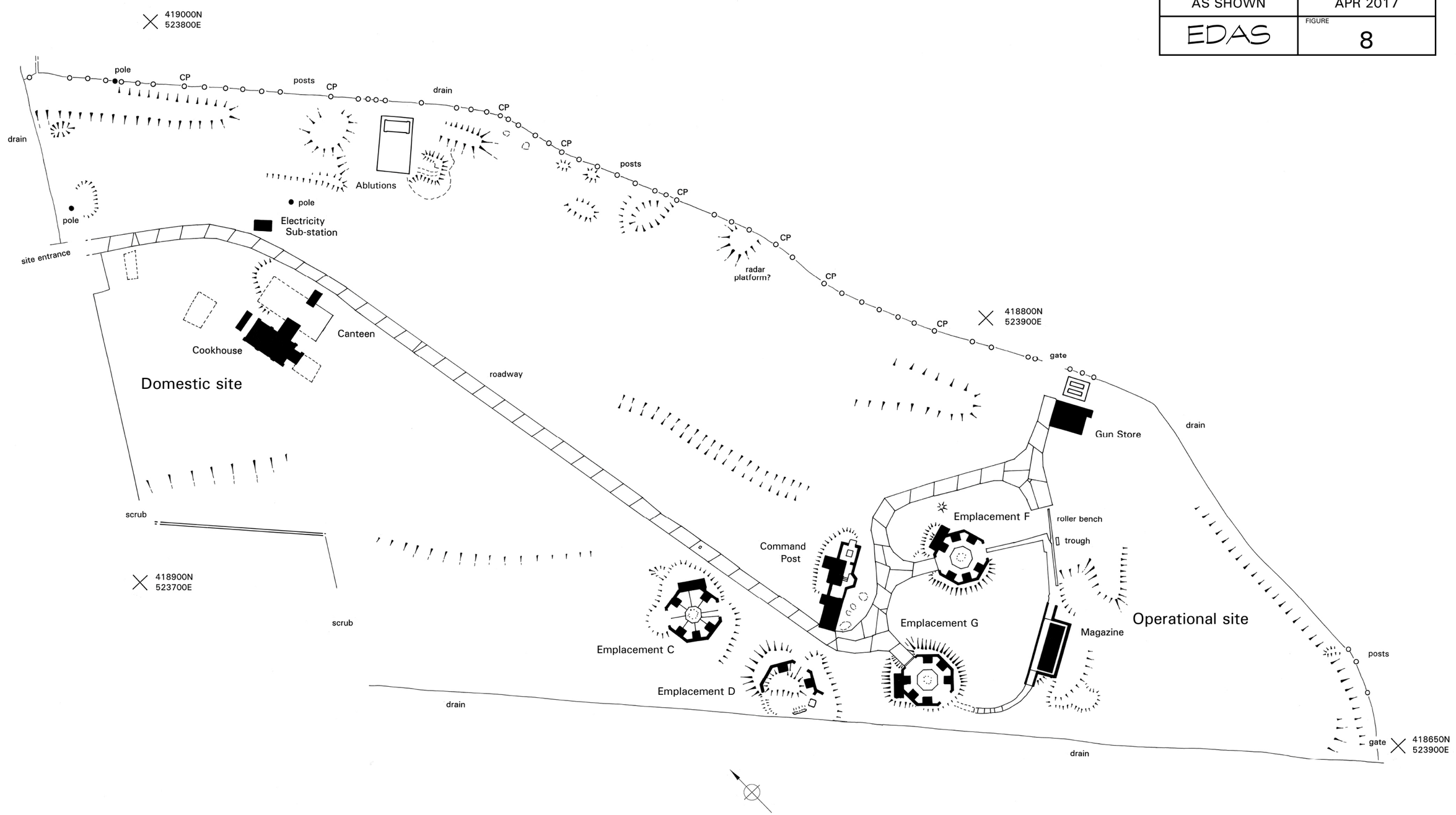
Sources: RAF black and white vertical aerial photographs, CPE/UK/1748 frame 4029 taken 21st September 1946 and CPE/UK/2043 frame 2077 taken 29th April 1947 (English Heritage Archives).

Top: Former officers mess bungalow, Little Humber HAA site (Station H8), south of Thorngumbald, East Yorkshire.

Bottom: Former wooden accommodation huts at Eden Roc, north-east of Paull, East Yorkshire.

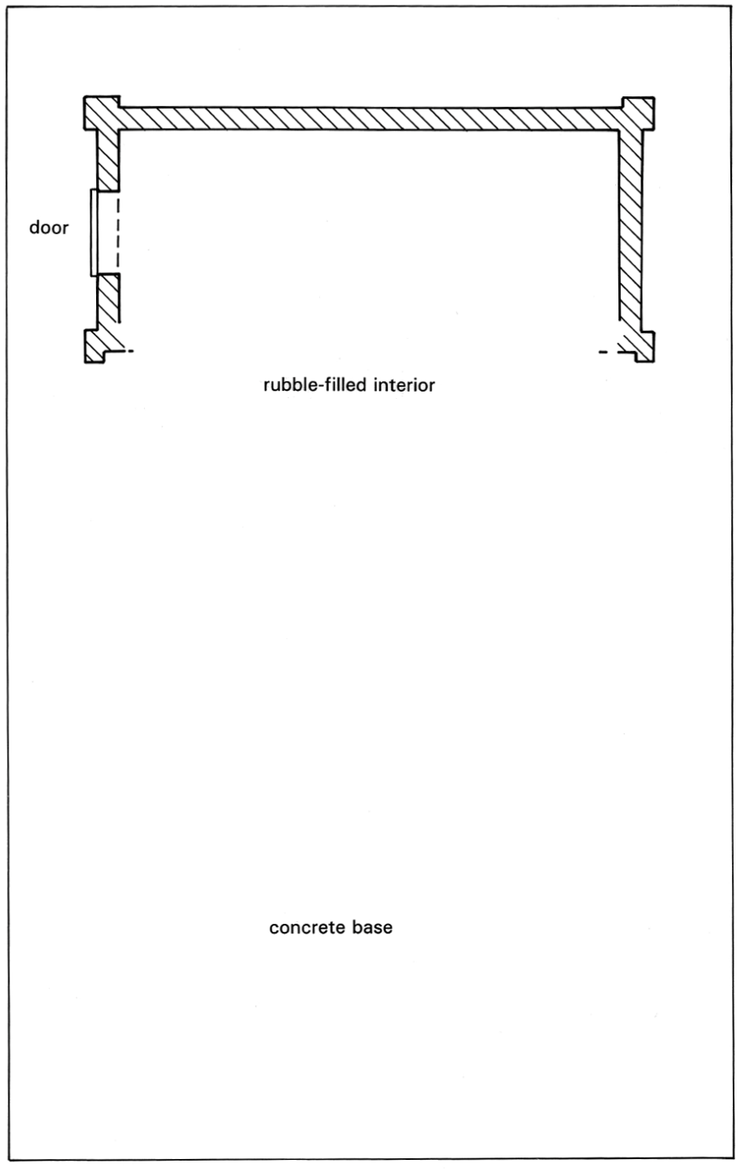
PROJECT	
STONE CREEK HAA BATTERY	
TITLE	
COMPARABLE STRUCTURES	
SCALE	DATE
NTS	APR 2017
EDAS	FIGURE 7

PROJECT	
STONE CREEK HAA BATTERY	
TITLE	
OVERALL SITE PLAN	
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 8

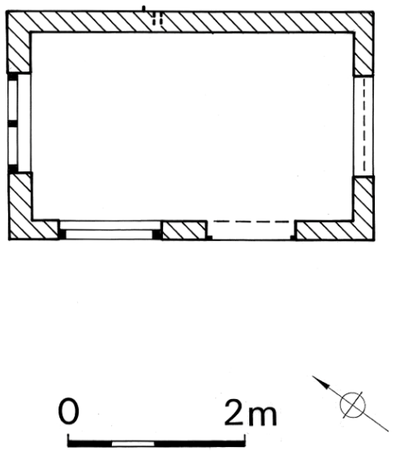


CP - Concrete post

0 100m



Structure A4: Ablutions



Structure A1: Sub-station Building

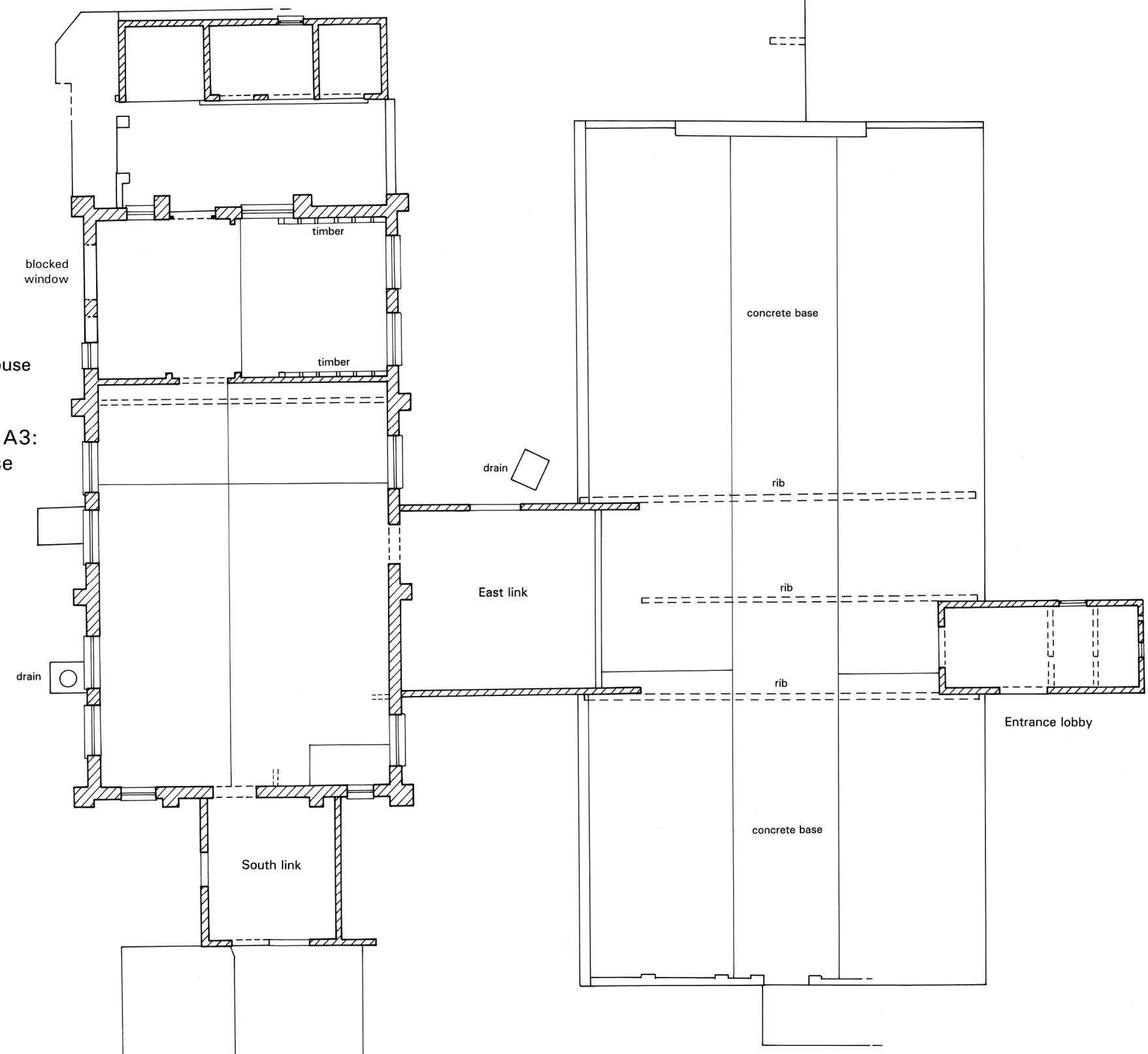
PROJECT: STONE CREEK HAA BATTERY	
TITLE: STRUCTURES A1 AND A4: PLANS	
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 9

PROJECT	
STONE CREEK HAA BATTERY	
TITLE	
STRUCTURES A2, A3, A5 AND A6	
SCALE	DATE
AS SHOWN	APR 2017
EDAS	FIGURE 10

Structure A6: Store

Cookhouse

Structure A3: Cookhouse



Structure A5: Nissen hut

Structure A2: Canteen

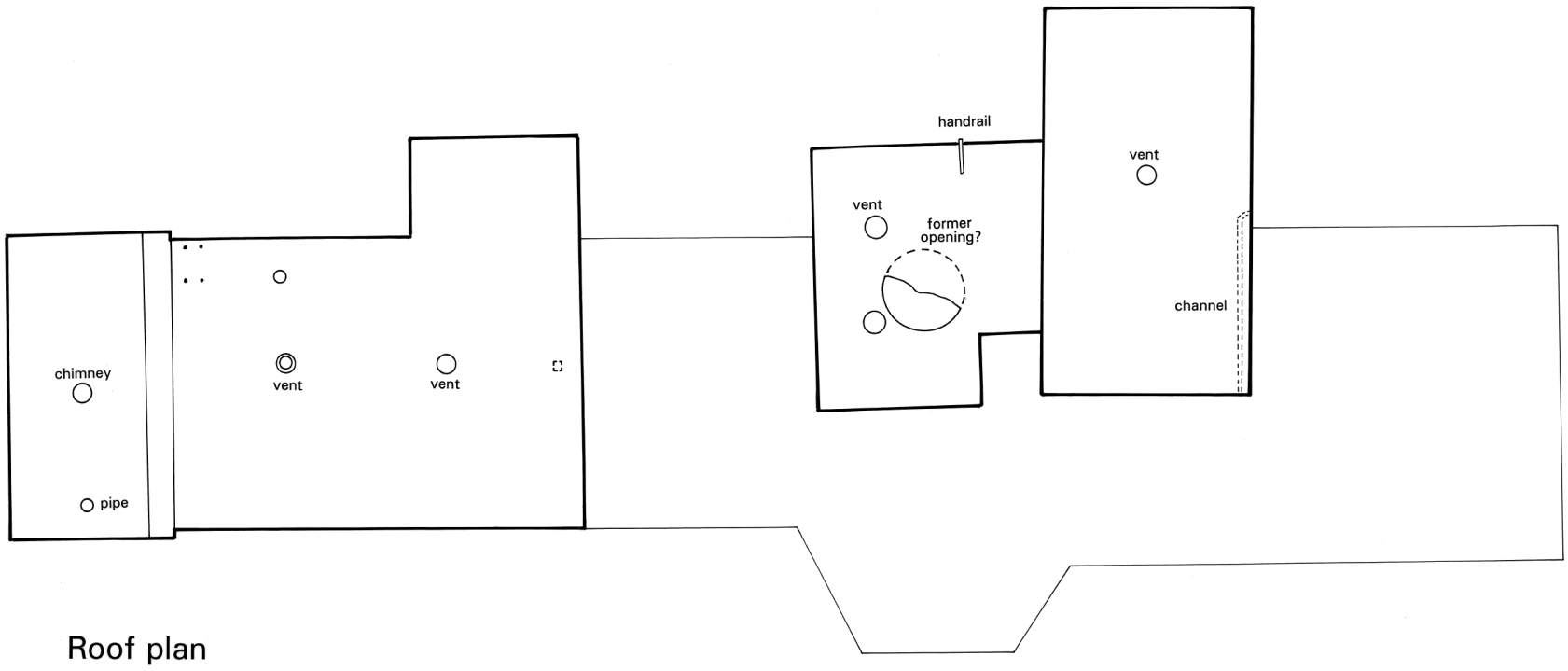
0 10m

Top: Painting of the interior of a canteen, by I K Sydee, 1941 (source: Coldstream, W 1943 *Soldiers: War Pictures by British Artists - Second Series,* p6).

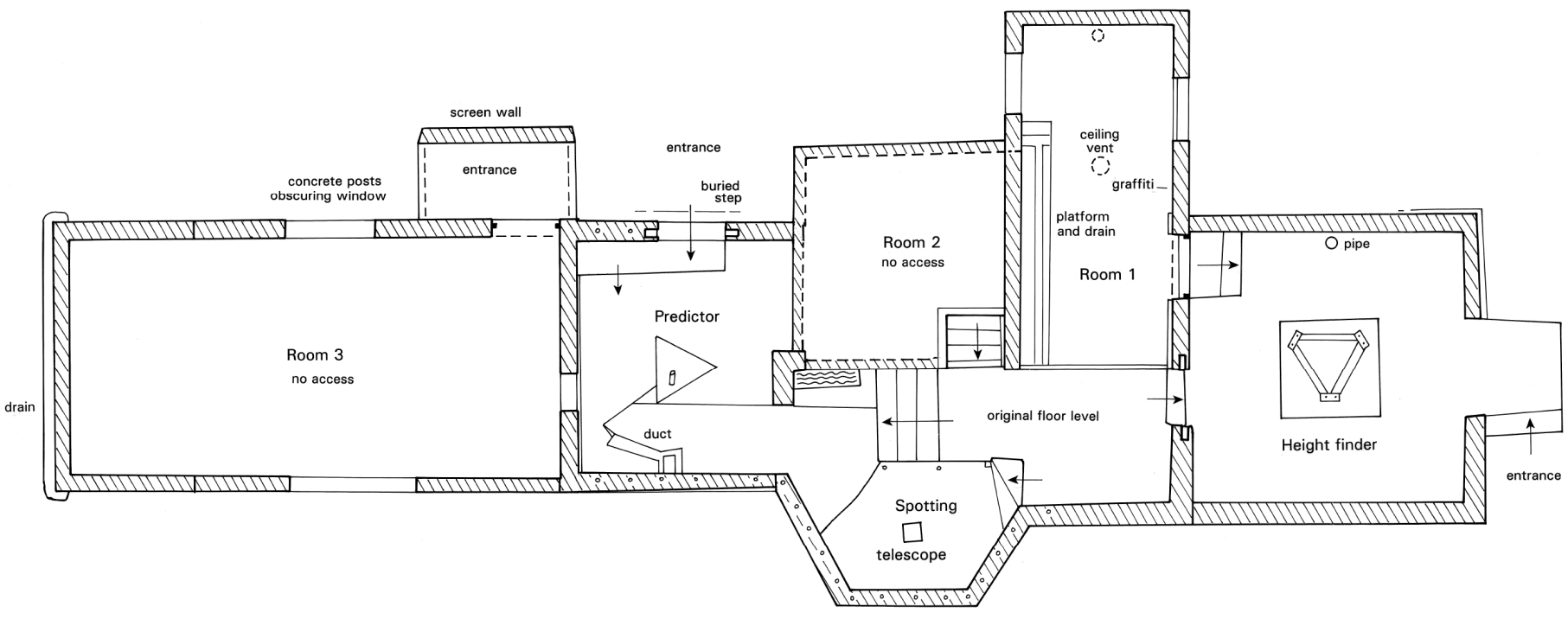
Bottom: Painting of anti-aircraft command post in action, by Edward Ardizzone, 1941 (source: Coote, C 1942 *Army: War Pictures by British Artists,* p23).

PROJECT	
STONE CREEK HAA BATTERY	
TITLE	
CONTEMPORARY PAINTINGS	
SCALE	DATE
NTS	APR 2017
EDAS	FIGURE 11

PROJECT	STONE CREEK HAA BATTERY
TITLE	STRUCTURE B: PLANS
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 12



Roof plan

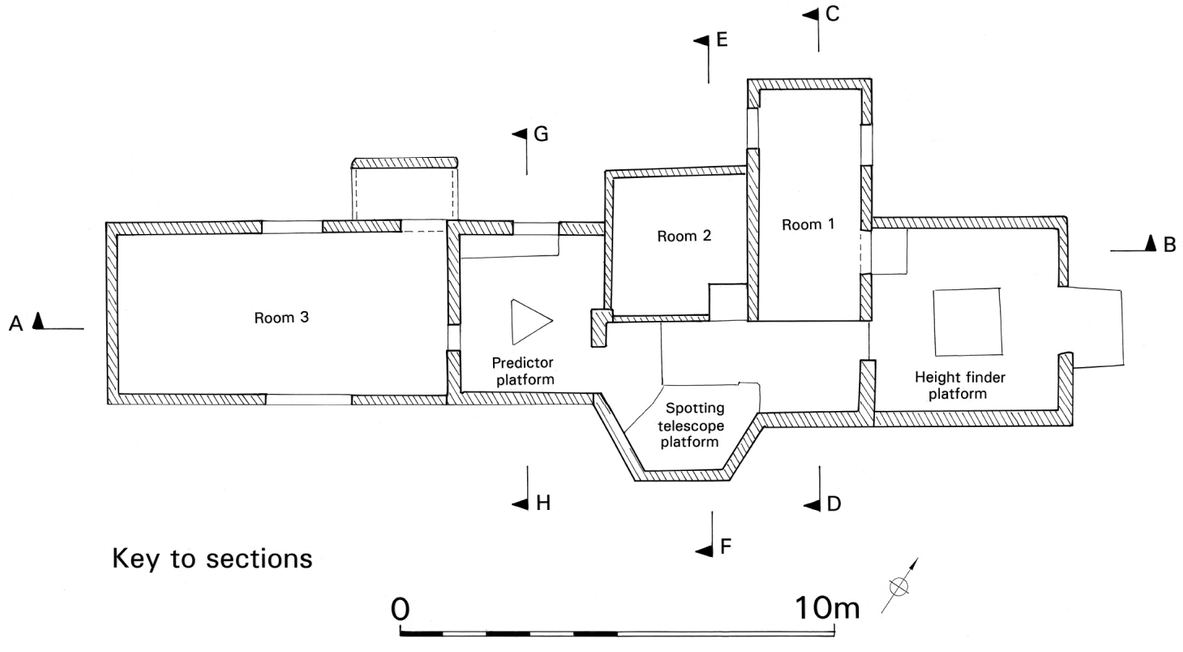


Ground plan

Structure B: Command Post

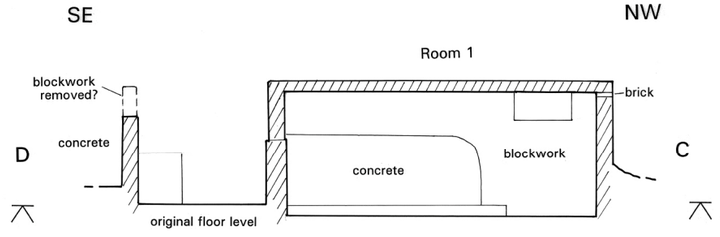
0 10m

PROJECT	STONE CREEK HAA BATTERY
TITLE	STRUCTURE B: SECTIONS
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 13

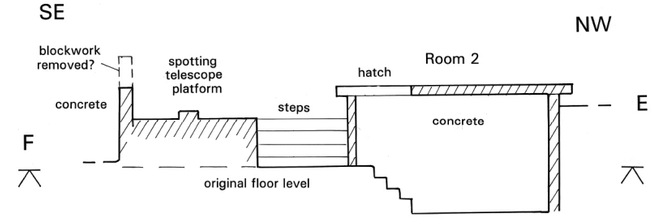


Key to sections

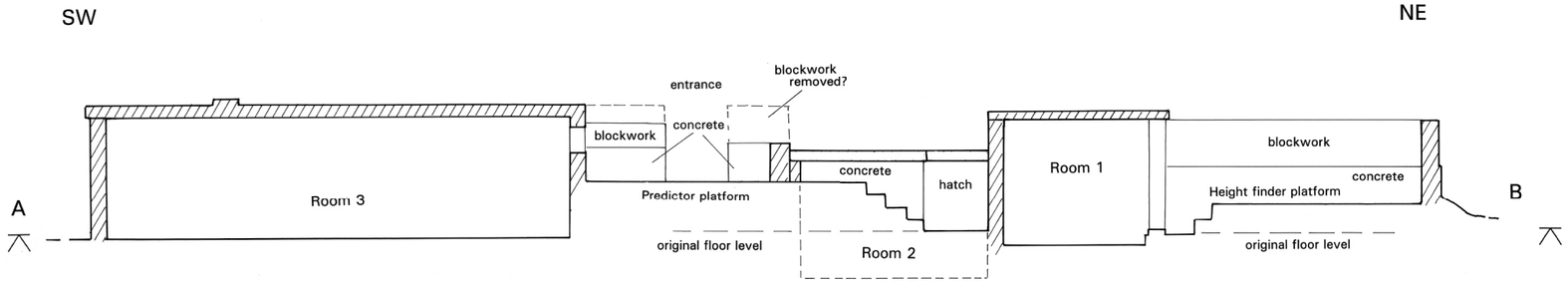
0 10m



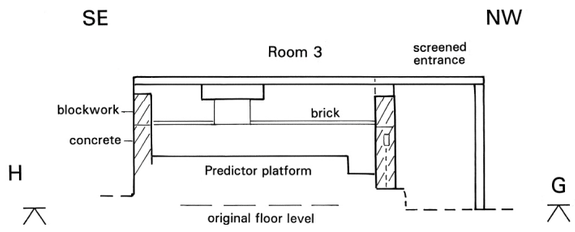
Section C-D



Section E-F



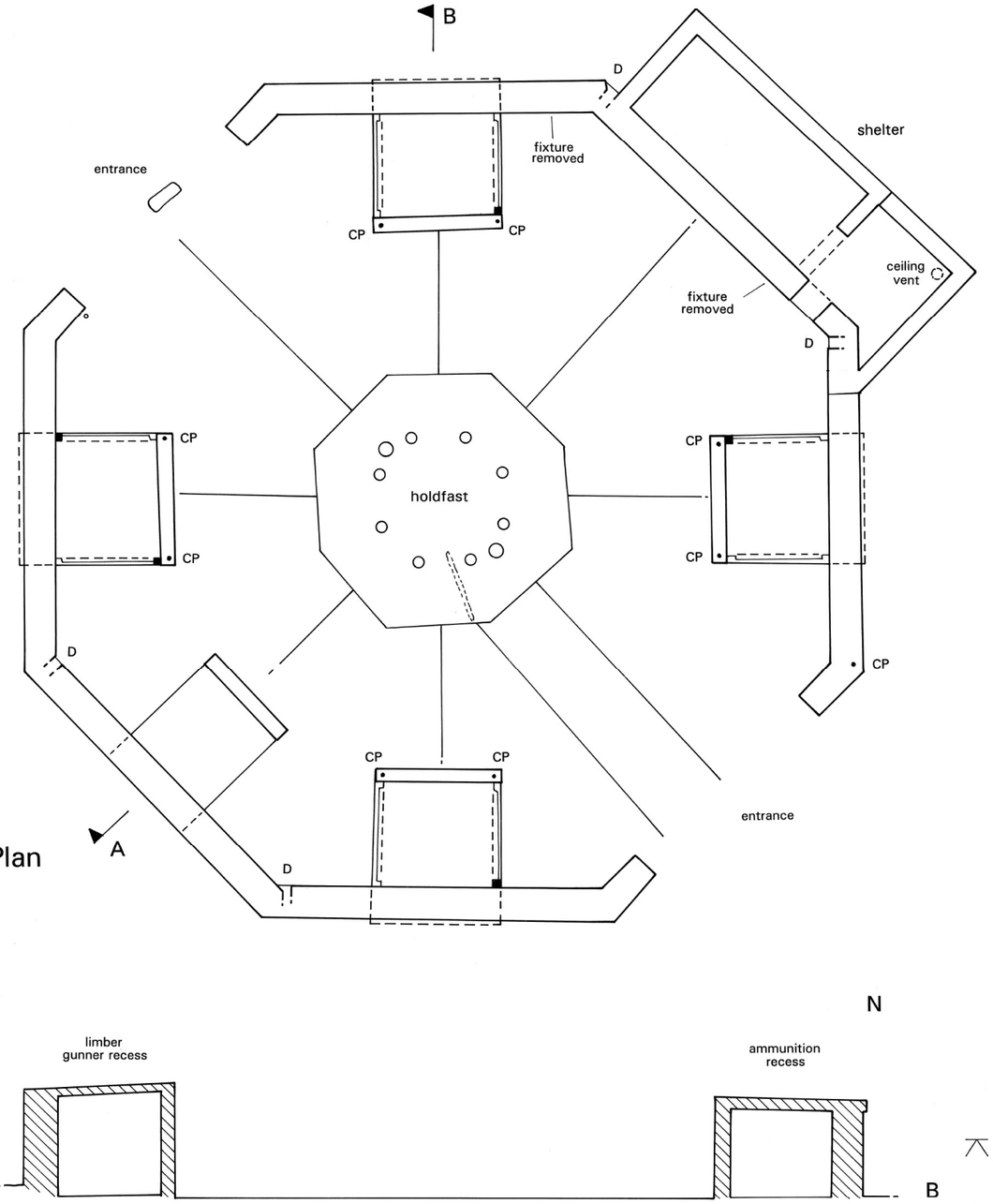
Section A-B



Section G-H

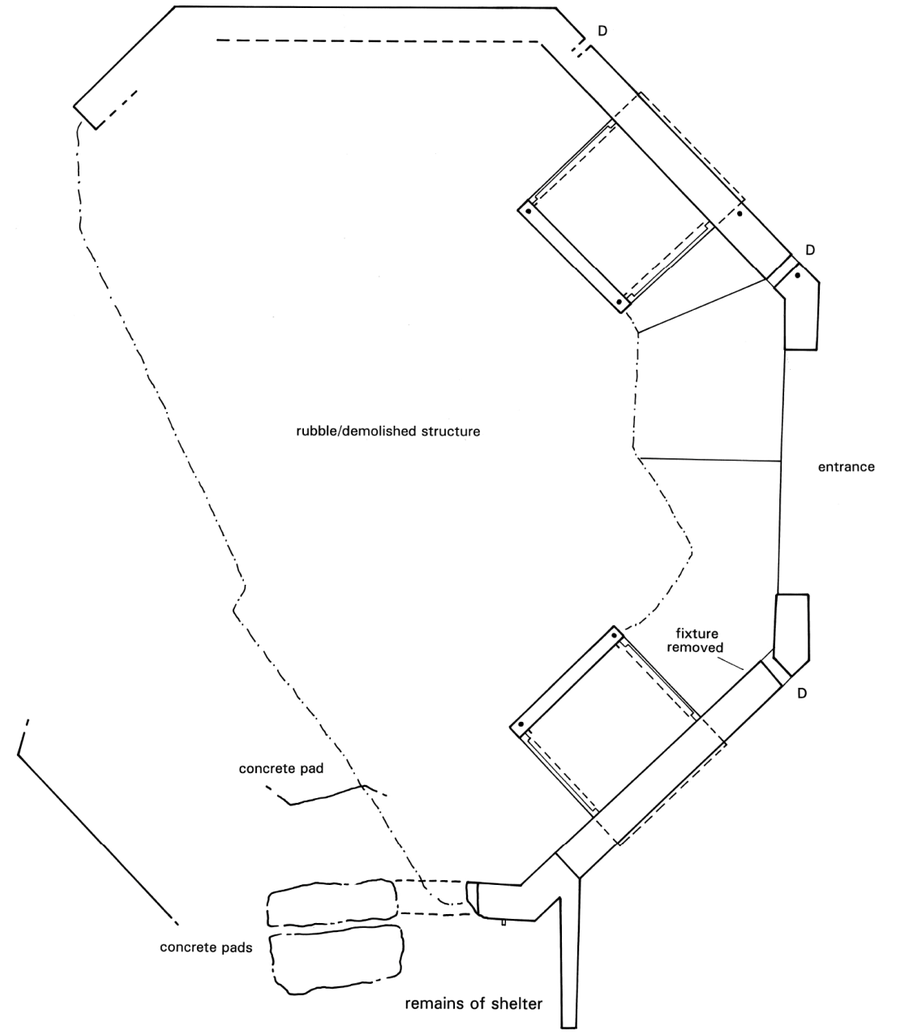
Structure B: Command Post

0 10m



Section A-B

Emplacement C Plan and Section



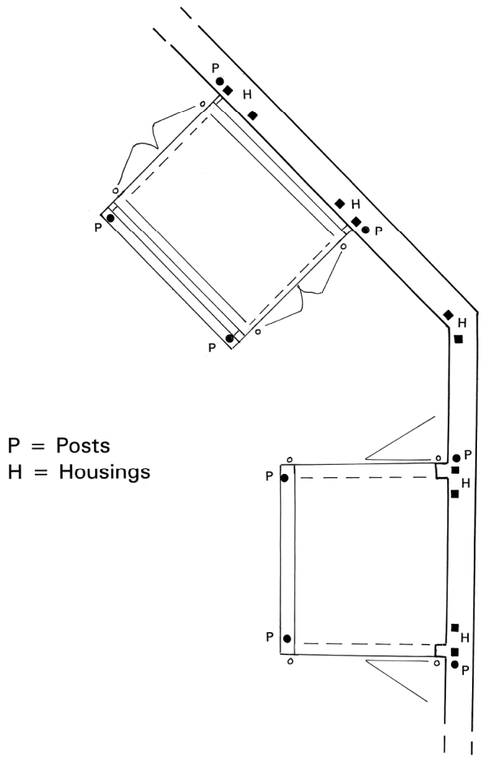
Emplacement D Plan

D DRAIN

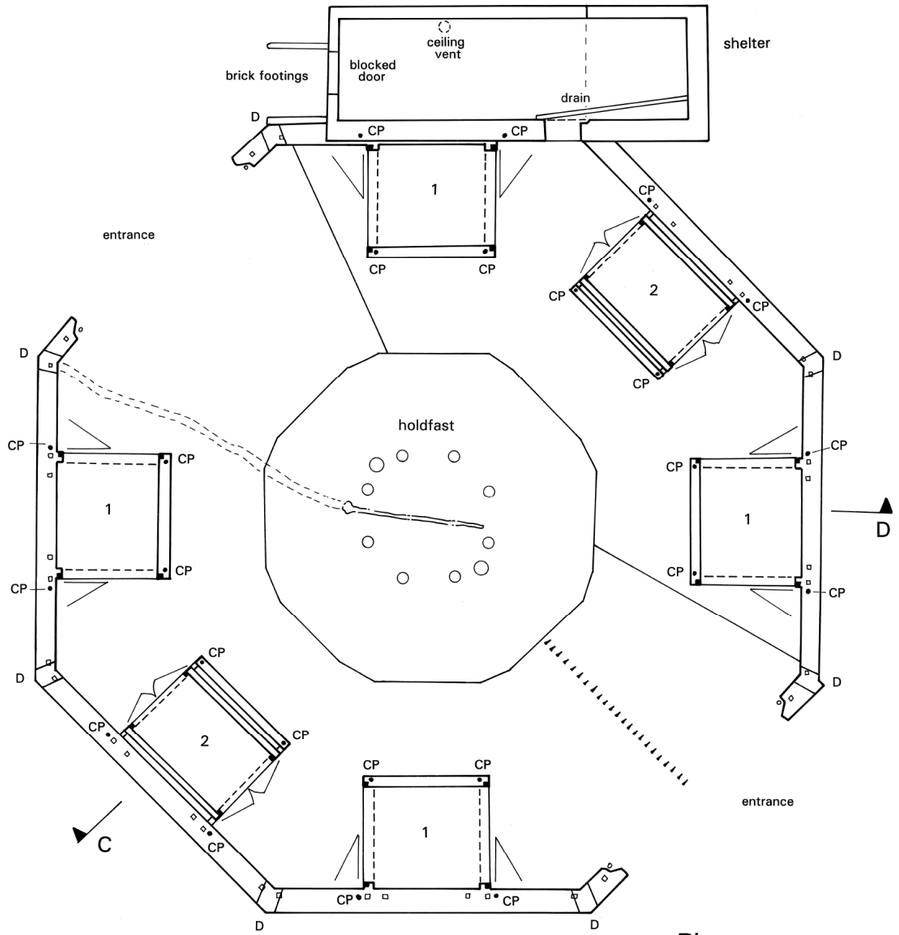
CP CAMOUFLAGE POLES

PROJECT: STONE CREEK HAA BATTERY	
TITLE: EMPLACEMENTS C AND D	
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 14

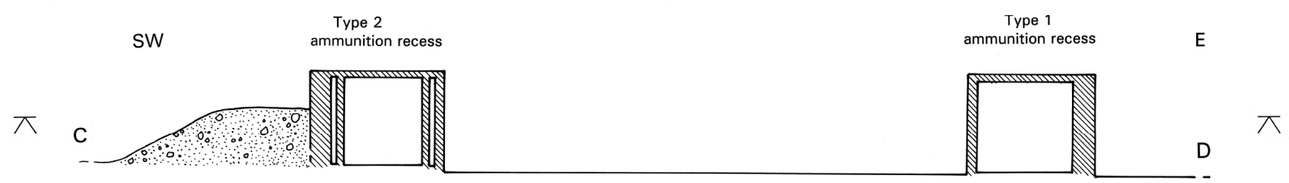
Emplacement F Plan and Section



Detail of Camouflage Fixings



Plan



Section C-D

0 2m

0 10m

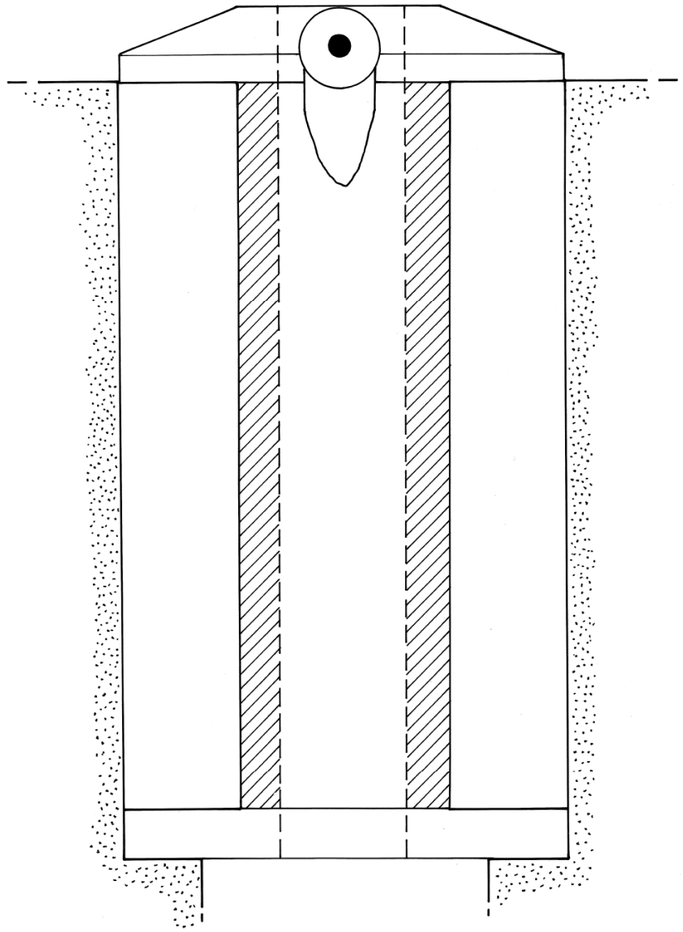
D DRAIN

2 TYPE OF AMMUNITION RECESS

CP CAMOUFLAGE POLES

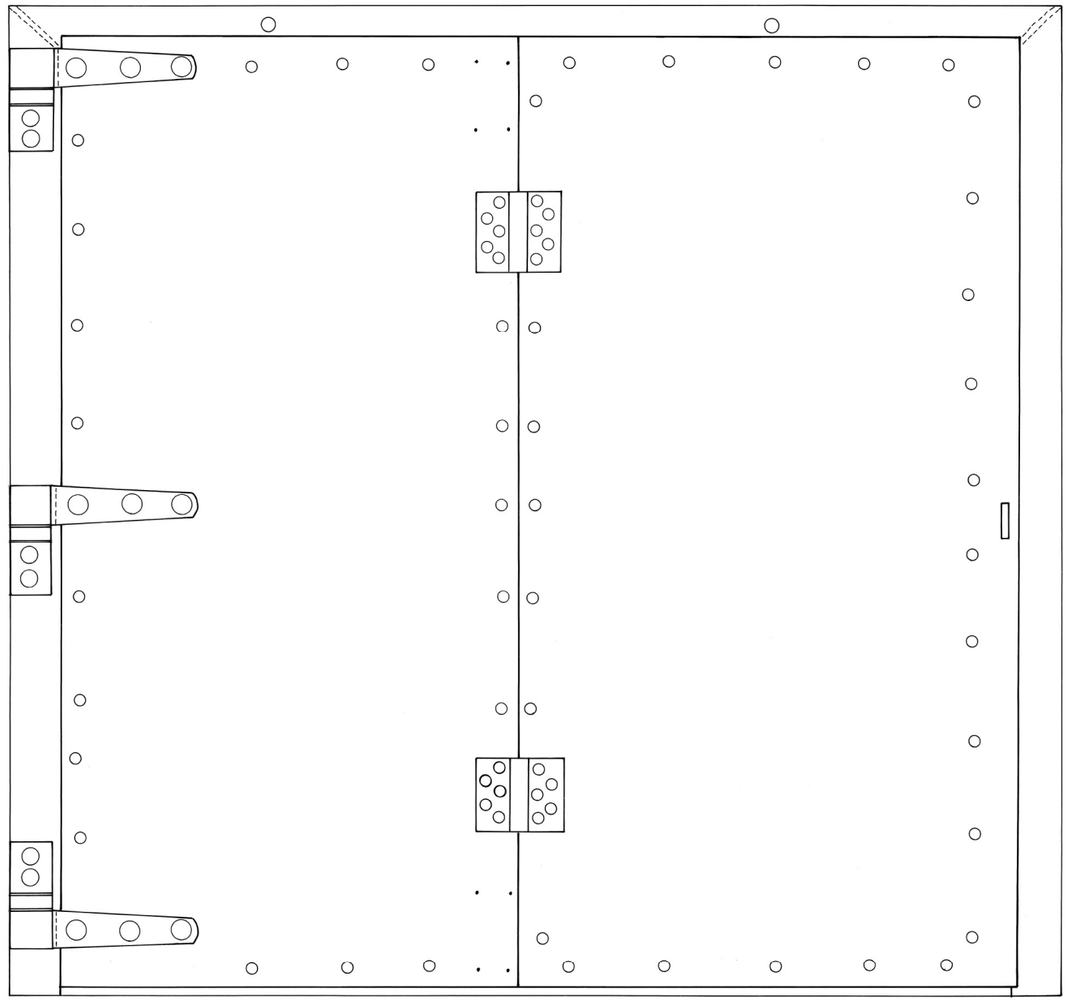
CAMOUFLAGE HOUSINGS

PROJECT: STONE CREEK HAA BATTERY	
TITLE: EMPLACEMENT F	
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 15



0 100mm

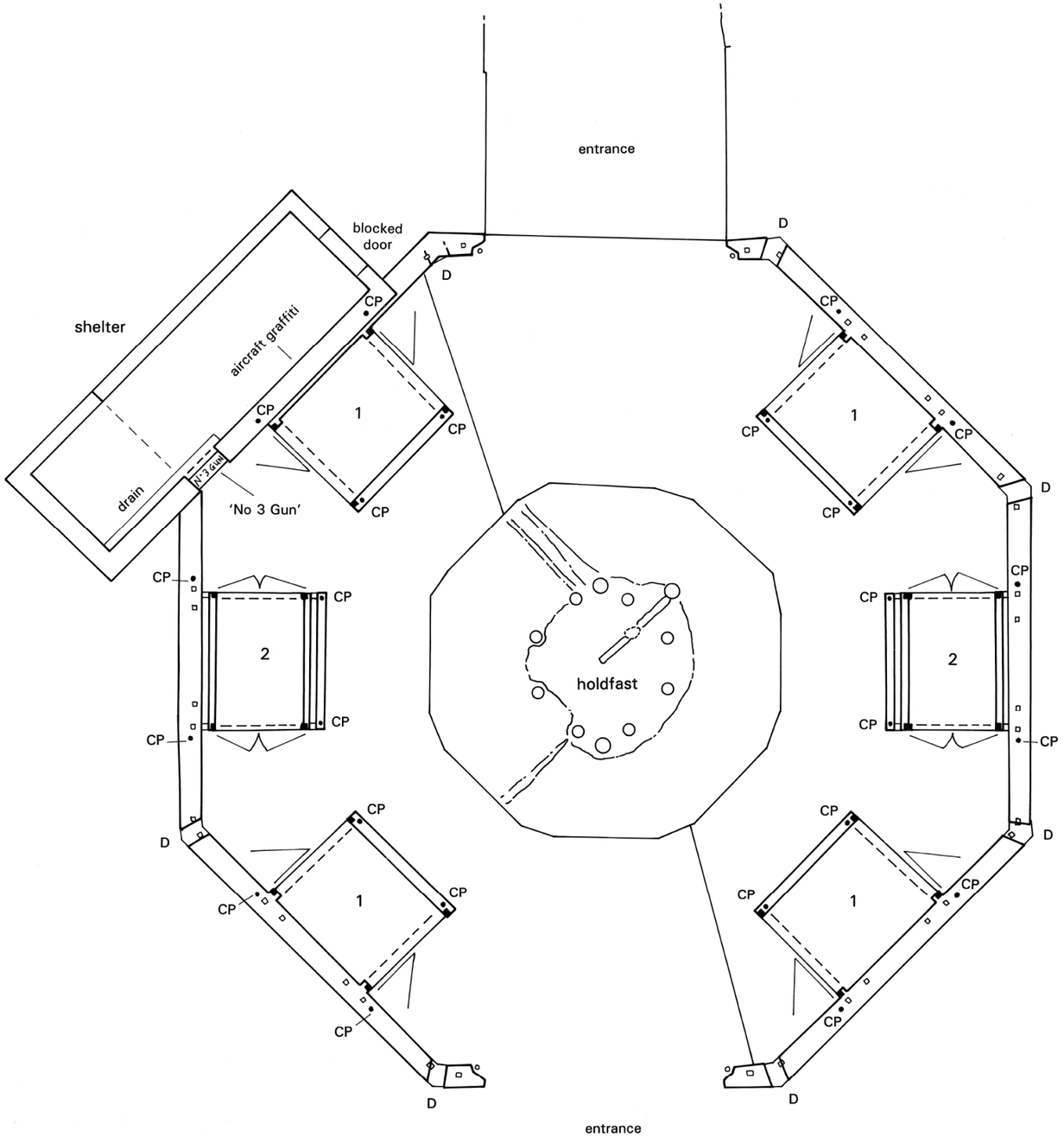
Section through Camouflage Housing, Emplacement F



0 1m

Doors to Type 1 Ammunition Recess, Emplacement F

PROJECT: STONE CREEK HAA BATTERY	
TITLE: EMPLACEMENT F: DETAILS	
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 16



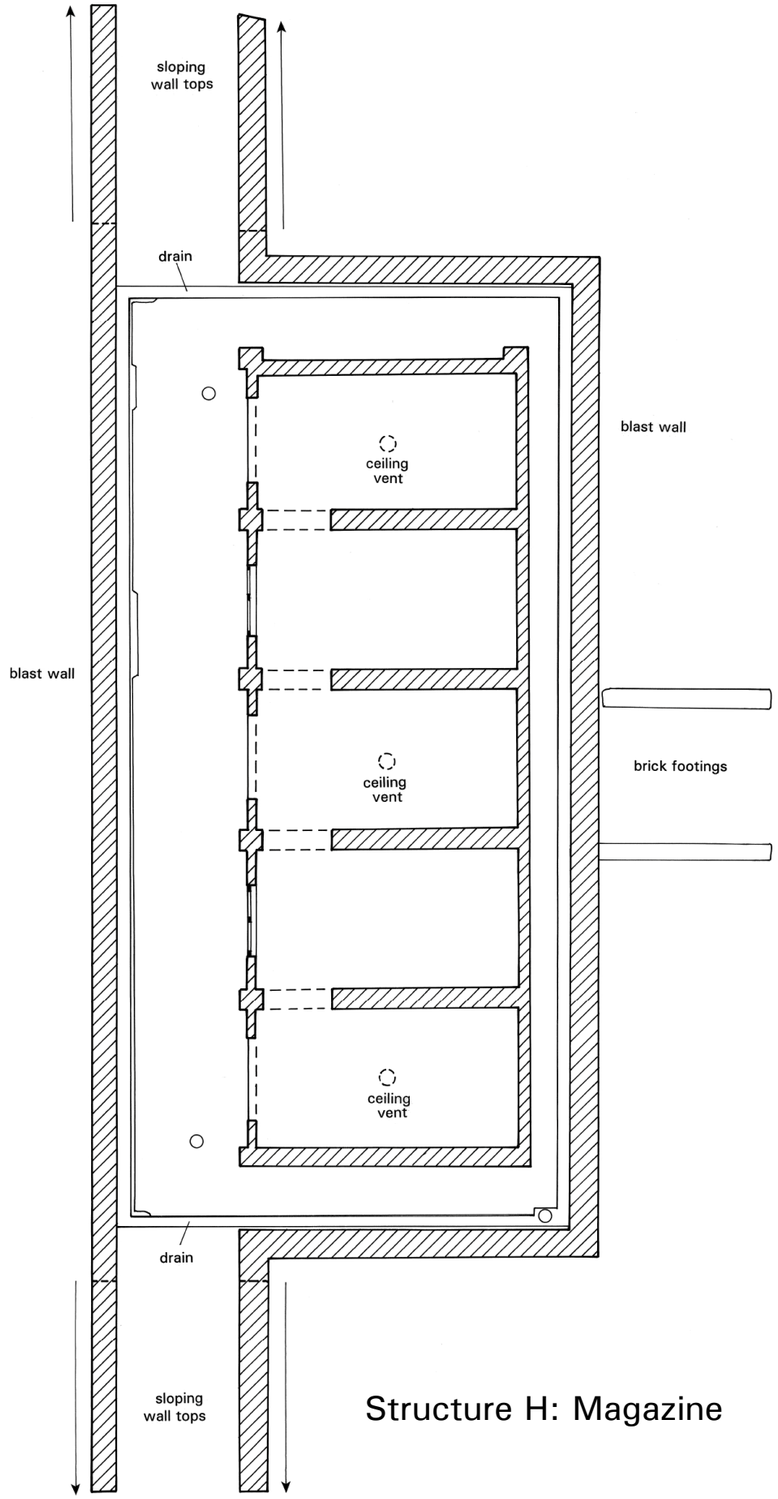
Emplacement G Plan

D	DRAIN
1	TYPE OF AMMUNITION RECESS
CP	CAMOUFLAGE POLES
	CAMOUFLAGE HOUSINGS

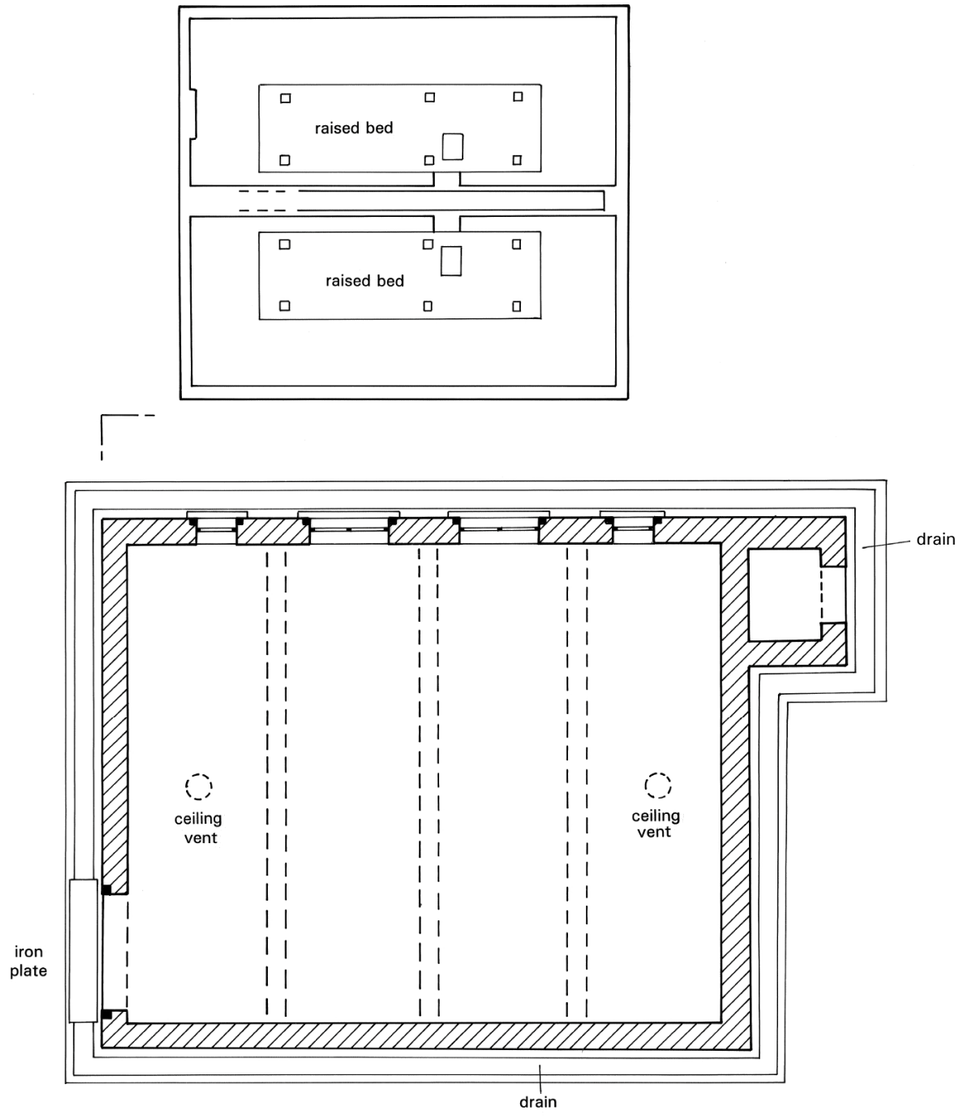
0 10m

PROJECT: STONE CREEK HAA BATTERY	
TITLE: EMPLACEMENT G	
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 17

PROJECT	STONE CREEK HAA BATTERY
TITLE	STRUCTURES E AND H: PLANS
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 18



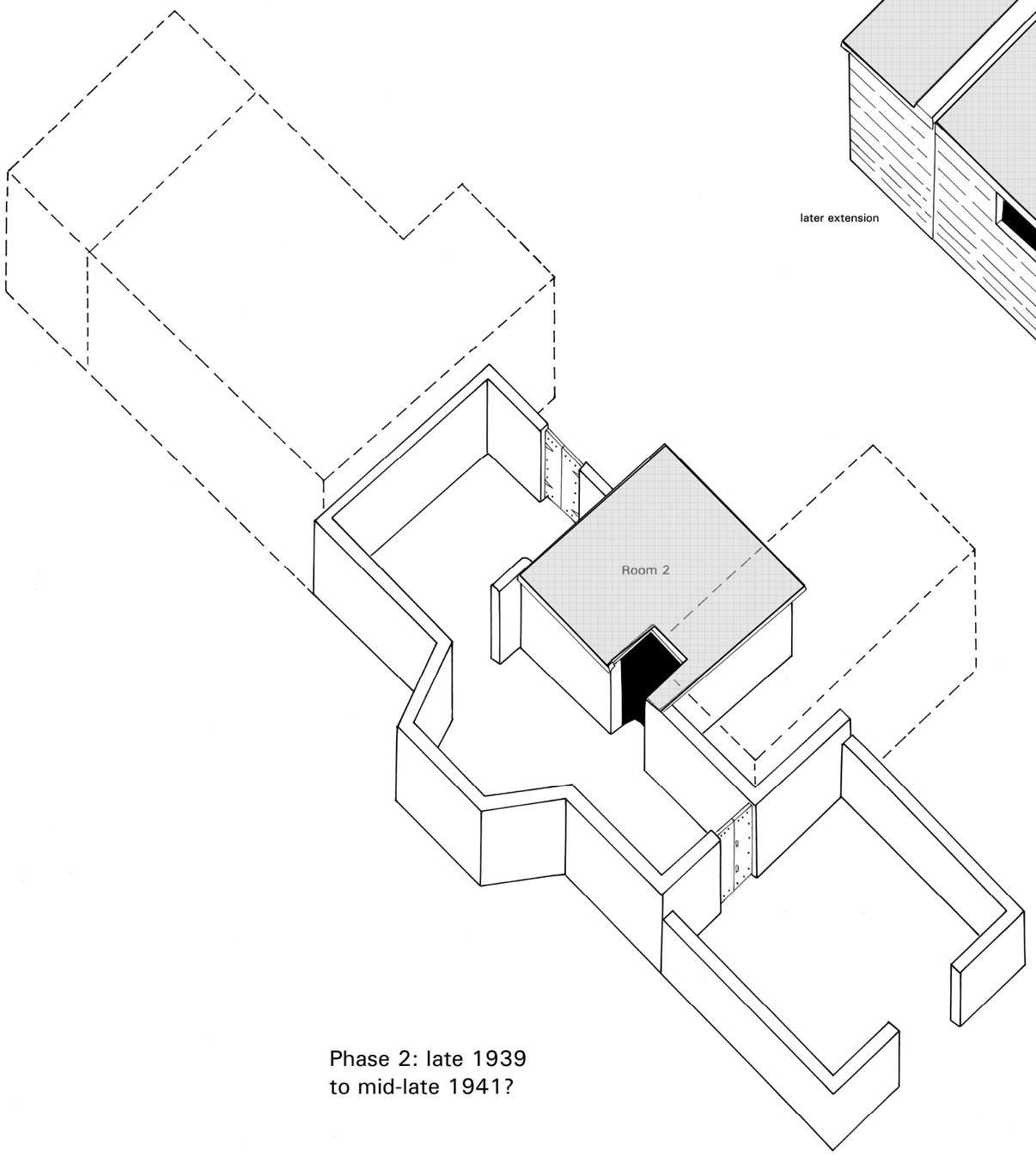
Structure H: Magazine



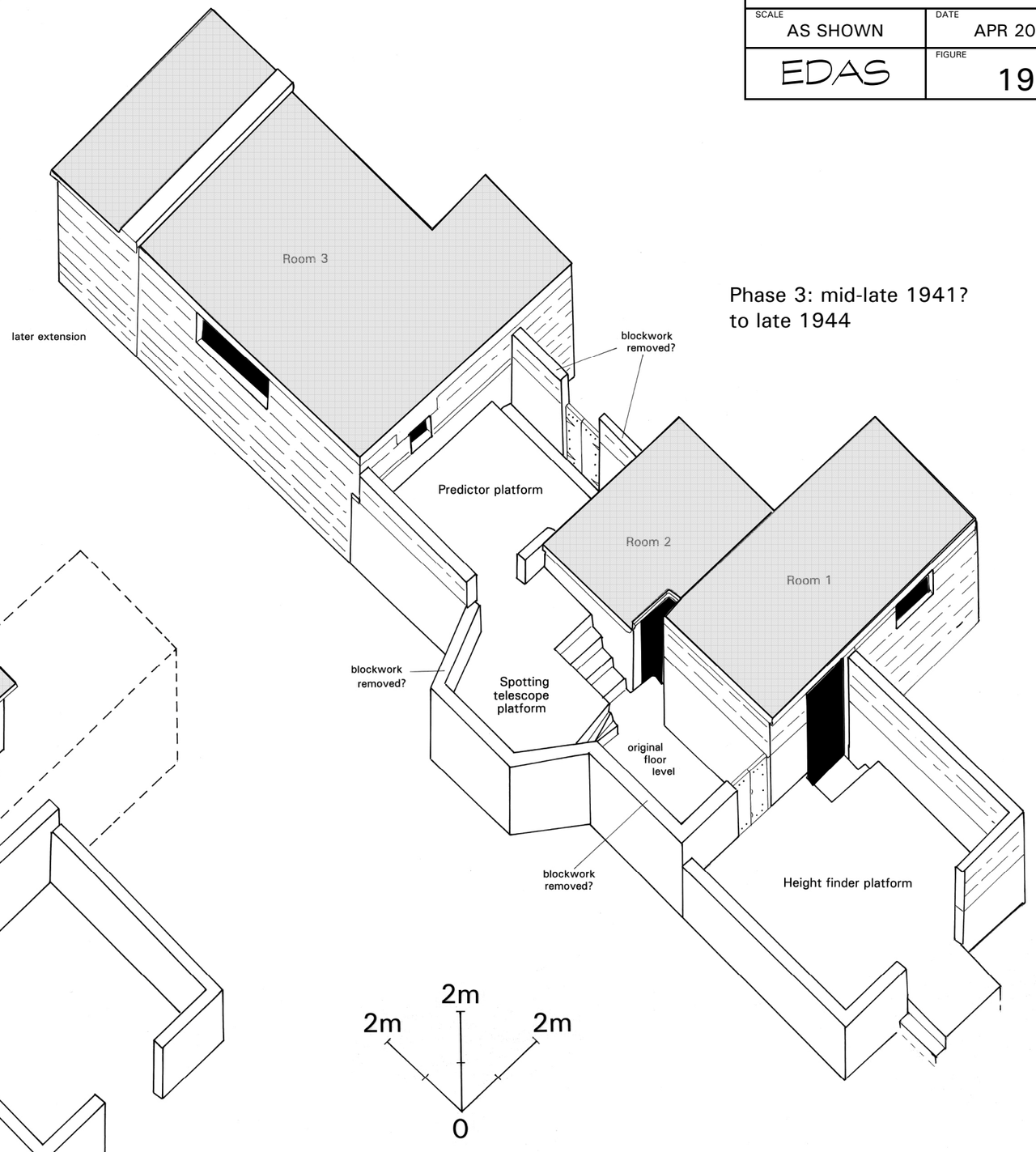
Structure E: Gun Store and Generator Beds

Structure B: Command Post

PROJECT	STONE CREEK HAA BATTERY
TITLE	STRUCTURE B: PHASED ISOMETRIC
SCALE: AS SHOWN	DATE: APR 2017
EDAS	FIGURE: 19

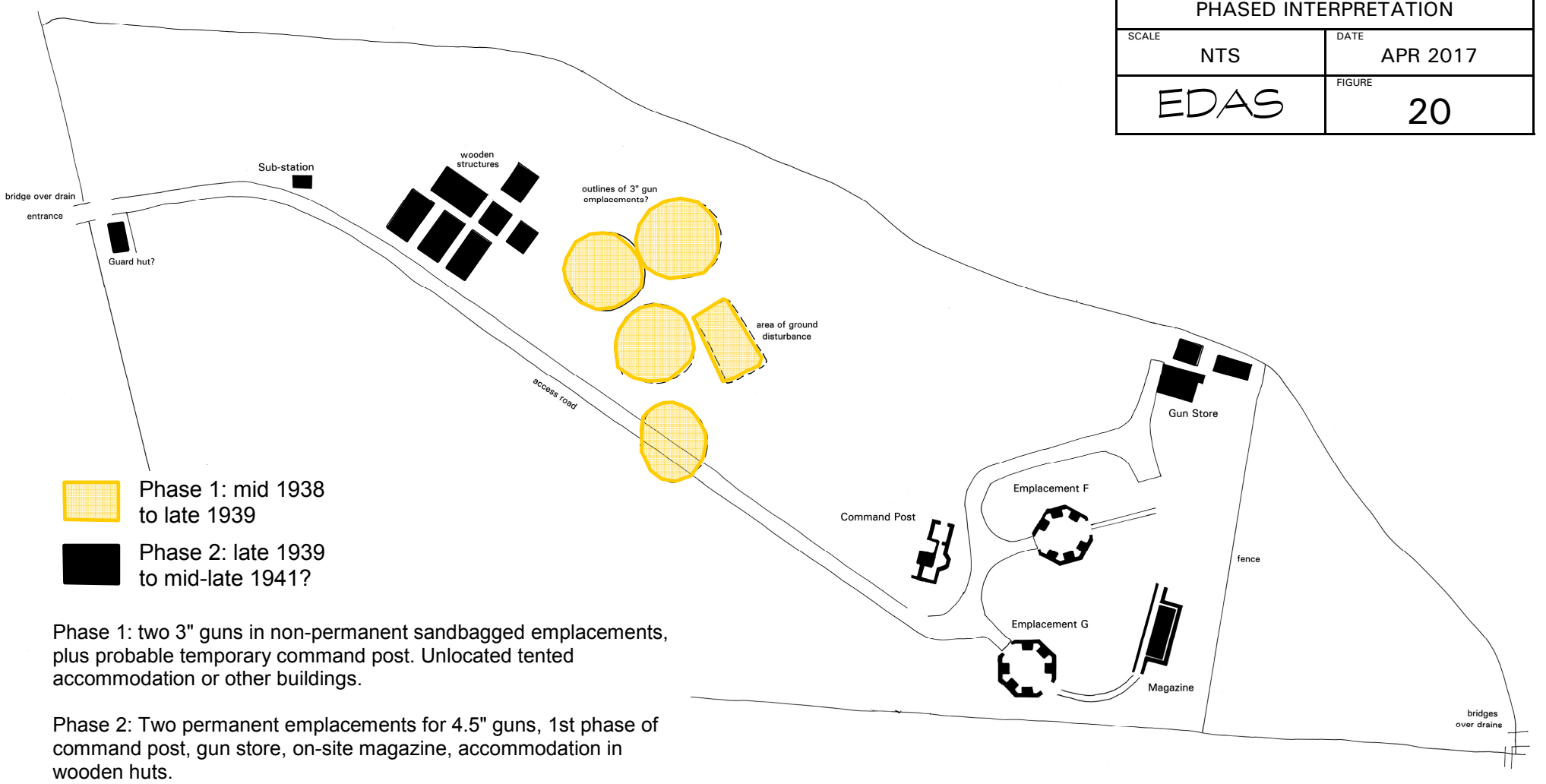


Phase 2: late 1939
to mid-late 1941?



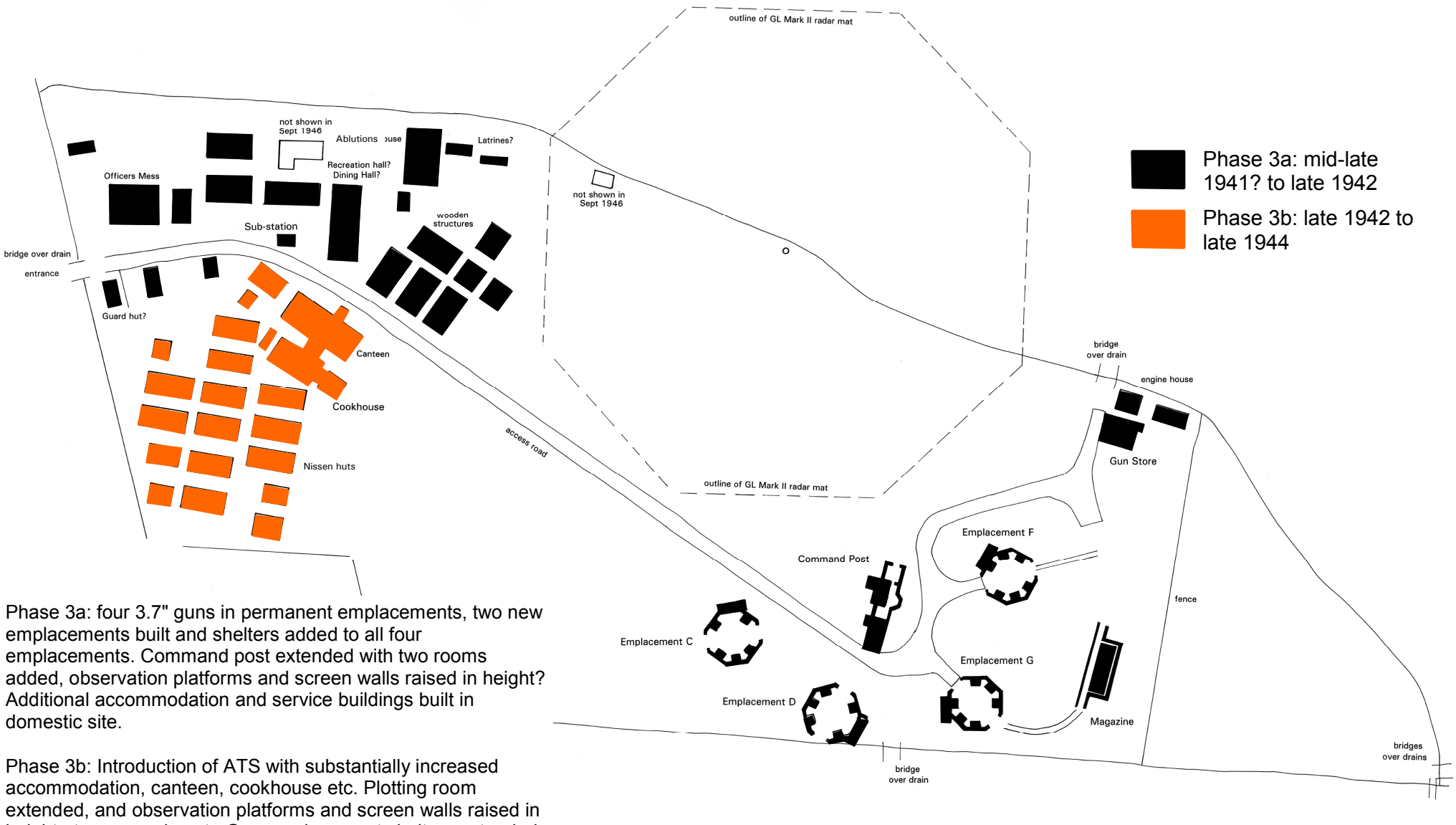
Phase 3: mid-late 1941?
to late 1944

PROJECT	STONE CREEK HAA BATTERY
TITLE	PHASED INTERPRETATION
SCALE: NTS	DATE: APR 2017
EDAS	FIGURE: 20



Phase 1: two 3" guns in non-permanent sandbagged emplacements, plus probable temporary command post. Unlocated tented accommodation or other buildings.

Phase 2: Two permanent emplacements for 4.5" guns, 1st phase of command post, gun store, on-site magazine, accommodation in wooden huts.



Phase 3a: four 3.7" guns in permanent emplacements, two new emplacements built and shelters added to all four emplacements. Command post extended with two rooms added, observation platforms and screen walls raised in height? Additional accommodation and service buildings built in domestic site.

Phase 3b: Introduction of ATS with substantially increased accommodation, canteen, cookhouse etc. Plotting room extended, and observation platforms and screen walls raised in height at command post. Gun emplacement shelters extended, two ammunition recess in older emplacements upgraded.

Plate 1: General view of domestic site, looking SW (photo 1/536).

Plate 2: Typical concrete post to east boundary, looking E (photo 4/850).

Plate 3: Typical section of concrete roadway, looking NW (photo 1/684).

Plate 4: Structure A1 (sub-station), looking S (photo 1/691).

Plate 5: Structure A1 (sub-station), W elevation, looking NE (photo 1/537).

Plate 6: Structure A4 (ablutions), looking W (photo 1/680).

Plate 7: Structure A2 (canteen) showing ribs of collapsed Nissen hut and east entrance structure, looking N (photo 1/584).

Plate 8: Structure A2 (canteen), rib detail, looking SW (photo 1/598).

Plate 9: Structure A2 (canteen), west elevation of east entrance, looking E (photo 1/696).

Plate 10: Structure A3 (cookhouse), west elevation with south linking structure, looking NE (photo 1/706).

Plate 11: Structure A3 (cookhouse), showing south and east linking structures, looking NW (photo 1/578).

Plate 12: Structure A3 (cookhouse), central bay of north gable, looking SE (photo 1/616).

Plate 13: Structure A3 (cookhouse), north gable, central window detail, looking S (photo 1/617).

Plate 14: Structure A3 (cookhouse), window detail in central part of west elevation, looking E (photo 1/704).

Plate 15: Structure A3 (cookhouse), window detail at east end of south gable, looking N (photo 1/586).

Plate 16: Structure A3 (cookhouse), internal south wall of north cell, looking S (photo 1/635).

Plate 17: Structure A3 (cookhouse), interior of north cell after clearance and repairs, showing sloping timbers, looking E (photo 4/866).

Plate 18: Structure A3 (cookhouse), interior of S cell after clearance and repairs, looking SW (photo 4/854).

Plate 19: Structure A3 (cookhouse), central part of east elevation (within east link structure) after clearance, looking W (photo 4/863).

Plate 20: Structure A6 (store), general view, looking NW (photo 1/609).

Plate 21: Concrete roadway with bitumen coating, west of Structure E, looking NE (photo 2/082).

Plate 22: Structure B (command post), general view, looking NE (photo 6/738).

Plate 23: Structure B (command post), west end of north elevation, showing blocked doorway and extension to Room 3, looking SE (photo 6/699).

Plate 24: Structure B (command post), entrance in north elevation, looking SE (photo 6/693).

Plate 25: Structure B (command post), north elevation, Room 3 door, looking SW (photo 2/163).

Plate 26: Structure B (command post), Room 3 interior, door in north wall, looking NW (photo 2/174).

Plate 27: Structure B (command post), north elevation, east side of Room 1, looking SW (photo 6/696).

Plate 28: Structure B (command post), east end of north elevation, looking SW (photo 6/695).

Plate 29: Structure B (command post), east end of south elevation, looking NW (photo 2/132).

Plate 30: Structure B (command post), south elevation, junction of south wall and Room 3, looking NW (photo 6/715).

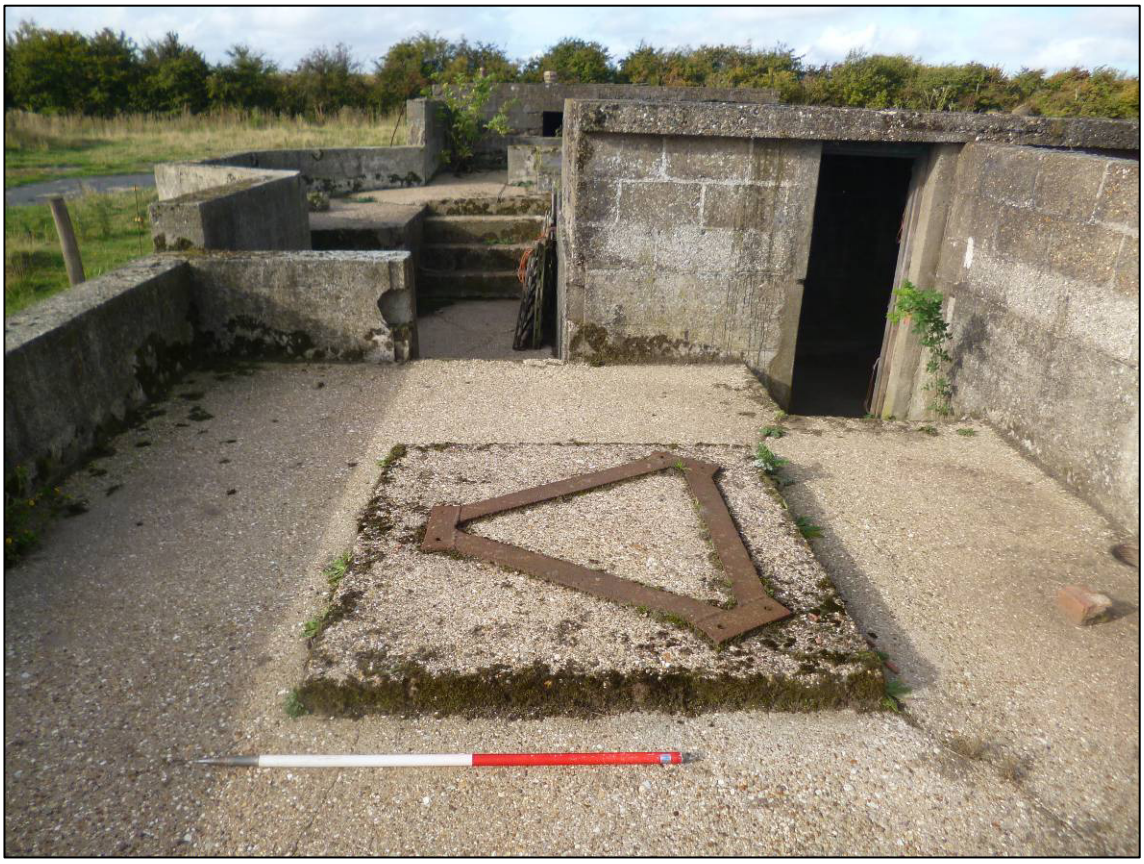


Plate 31: Structure B (command post), height finder platform, looking SW (photo 2/136).

Plate 32: Structure B (command post), spotting telescope platform to left, predictor platform to rear, looking SW (photo 2/147).

Plate 33: Structure B (command post), recess in predictor platform, looking NW (photo 2/160).

Plate 34: Structure B (command post), Room 1 interior, showing different builds, looking SE (photo 2/139).

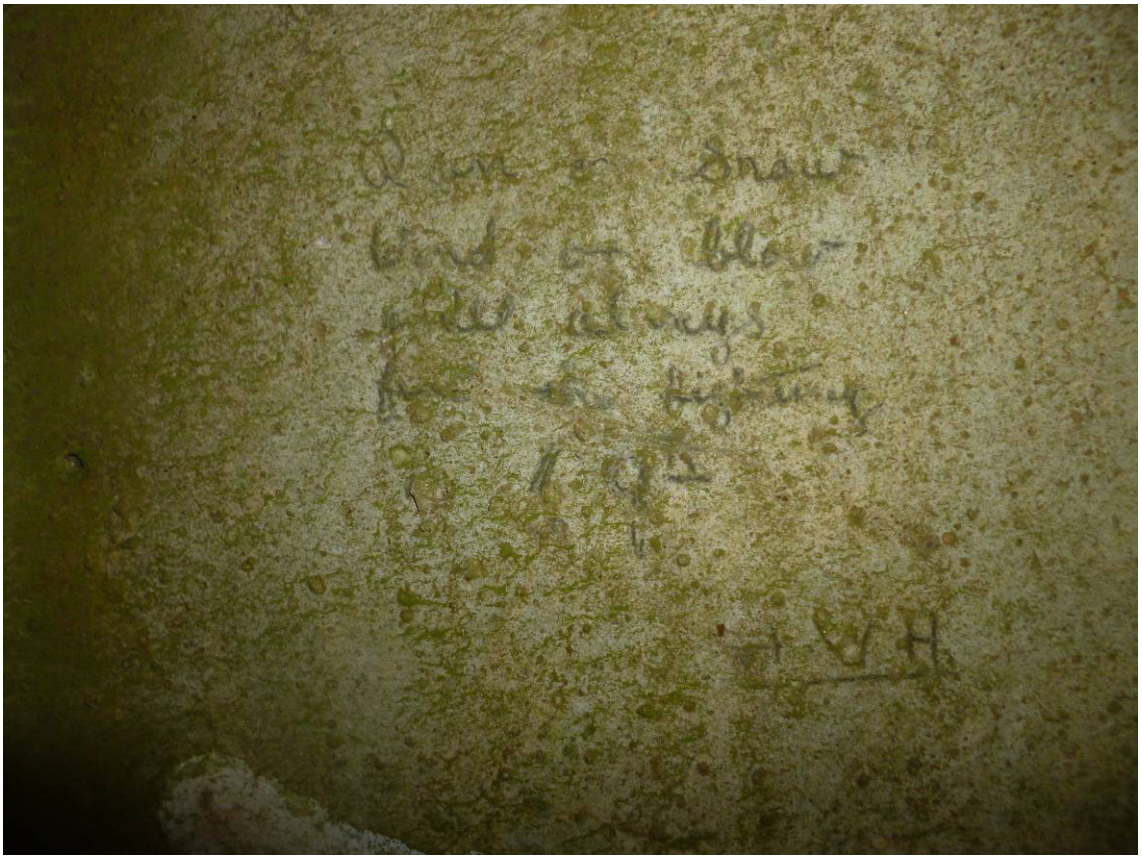


Plate 35: Structure B (command post), pencilled graffiti to east wall in Room 1 (photo 3/316).

Plate 36: Structure B (command post), internal west wall of Room 2, looking NW (photo 5/004).

Plate 37: Structure B (command post), Room 2 roof, looking NE (photo 2/159).

Plate 38: Structure B (command post), east end and roof of Room 3, looking SW (photo 2/162).

Plate 39: Structure B (command post), interior of Room 3, looking SW (photo 2/168).

Plate 40: Structure C (gun emplacement), east side, looking W (photo 2/188).

Plate 41: Structure C (gun emplacement), holdfast and ammunition recesses, looking W (photo 2/194).

Plate 42: Structure C (gun emplacement), Type 1 ammunition recess, looking N (photo 3/303).

Plate 43: Structure C (gun emplacement), limber gunner recess, looking W (photo 6/725).

Plate 44: Structure C (gun emplacement), extension to shelter, looking SW (photo 6/697).

Plate 45: Structure C (gun emplacement), interior of west cell of shelter, looking SE (photo 2/203).

Plate 46: Structure D (gun emplacement), Type 1 ammunition recess on north-east side, looking NW (photo 3/295).

Plate 47: Structure D (gun emplacement), south side, looking NW (photo 2/178).

Plate 48: Structure D (gun emplacement), remains of shelter on south side, looking N (photo 3/298).

Plate 49: Structure F (gun emplacement), looking E (photo 4/701).

Plate 50: Structure F (gun emplacement), holdfast and ammunition recesses, with shelter to the rear, looking NE (photo 2/118).

Plate 51: Structure F (gun emplacement), Type 2 ammunition recess, looking NW (photo 6/723).

Plate 52: Structure F (gun emplacement), brick stub walls off end of shelter with blocked opening, looking E (photo 6/722).

Plate 53: Structure F (gun emplacement), camouflage fittings on south-east side, looking NW (photo 2/116).

Plate 54: Structure G (gun emplacement), looking SW (photo 2/119).

Plate 55: Structure G (gun emplacement), ammunition recesses and shelter on north-west side, looking NW (photo 2/127).

Plate 56: Structure G (gun emplacement), identifier to shelter step, looking NW (photo 2/249).

Plate 57: Structure G (gun emplacement), Type 2 ammunition recess on west side, looking N (photo 2/245).

Plate 58: Structure G (gun emplacement), interior of shelter, looking SW (photo 2/252).

Plate 59: Structure G (gun emplacement), wall paintings to internal south wall of shelter: US Consolidated Privateer (left), B17 Flying Fortress (centre) and Bristol Beaufighter or Douglass C47 Dakota (right) (photo 2/258).

Plate 60: Structure G (gun emplacement), wall paintings to internal south wall of shelter: Consolidated Catalina (US flying boat) (top) and Vickers Wellington bomber (bottom) (photo 2/260).

Plate 61: Structure E (gun store), looking W (photo 2/085).

Plate 62: Structure E (gun store), north elevation, blast door, looking SE (photo 2/087).

Plate 63: Structure E (gun store), painted sign to north wall of south cell, looking NW (photo 2/228).

Plate 64: Structure E (gun store), east elevation windows during conservation, looking SW (photo 4/708).

Plate 65: Structure E (gun store), internal view, looking E (photo 2/231).

Plate 66: Structure E (gun store), concrete bases to east, looking N (photo 2/104).

Plate 67: Structure H (magazine), general view, looking E (photo 6/728).

Plate 68: Structure H (magazine), passage inside north blast wall, looking SW (photo 2/210).

Plate 69: Structure H (magazine), internal window, looking NW (photo 2/222).

Plate 70: Structure H (magazine), east internal bay, looking SE (photo 2/219).

Plate 71: Structure H (magazine), openings between internal bays, looking SW (photo 2/221).

Plate 72: Trough and roller bench, north-east of Structure H (magazine), looking NE (photo 2/079).

APPENDIX 1: CATALOGUE OF PHOTOGRAPHS

Sunk Island Photographic Catalogue

Film 1: Colour digital photographs taken 18th September 2013
Film 2: Colour digital photographs taken 26th September 2013
Film 3: Colour digital photographs taken 23rd October 2013
Film 4: Colour digital photographs taken 20th February 2015
Film 5: Colour digital photographs taken 4th December 2015
Film 6: Colour digital photographs taken 4th February 2017

Film	*Frame*	*Subject*	*Scale*
1	526	Structure A1 (sub-station), S elevation, looking NW	1m
1	527	Structure A1 (sub-station), E elevation, looking SW	1m
1	528	Structure A1 (sub-station), E elevation, fittings to S end, looking SW	1m
1	529	Structure A1 (sub-station), E elevation, fittings to N end, looking SW	-
1	530	Structure A1 (sub-station), looking W	1m
1	531	Structure A1 (sub-station) & adjacent electricity pole, looking W	1m
1	532	Fitting to electricity pole adjacent to Structure A1, looking NW	-
1	533	Fittings to electricity pole adjacent to Structure A1, looking NW	-
1	534	General view of domestic site, looking W	-
1	535	General view of domestic site, looking N	-
1	536	General view of domestic site, looking SW	-
1	537	Structure A1 (sub-station), W elevation, looking NE	1m
1	538	Structure A1 (sub-station), doorway to W elevation, looking NE	1m
1	539	Structure A1 (sub-station), window to S elevation, looking N	0.50m
1	541	Structure A1 (sub-station), interior, looking NW	-
1	542	Structure A1 (sub-station), interior, looking N	-
1	544	Structure A1 (sub-station), interior, looking NW	-
1	545	Structure A1 (sub-station), interior, cable recess?, looking E	-
1	546	Structure A1 (sub-station), window to W elevation, looking NE	0.50m
1	547	Structure A1 (sub-station), window to W elevation, looking N	0.50m
1	548	Structure A1 (sub-station), window to W elevation, looking N	0.50m
1	550	Structure A1 (sub-station), window to W elevation, looking N	0.50m
1	551	Structure A1 (sub-station), interior, slated window, looking N	-
1	553	Structure A2 (canteen), E elevation, looking W	1m
1	554	Structure A2 (canteen), looking NW	1m
1	555	Structure A2 (canteen), window to E elevation, looking W	0.50m
1	556	Structure A2 (canteen), vent to E elevation, looking W	-
1	557	Structure A2 (canteen), S elevation, looking N	1m
1	559	Structure A2 (canteen), interior, looking E	1m
1	561	Structure A2 (canteen), interior, looking E	1m
1	563	Structure A2 (canteen), interior, window to E wall, looking E	0.50m
1	564	Structure A2 (canteen), interior, looking NE	1m
1	567	Structure A2 (canteen), interior, looking NW	1m
1	569	Structure A2 (canteen), interior, looking W	1m
1	570	Structure A2 (canteen), interior, window to N wall, looking N	0.50m
1	571	Structure A2 (canteen), interior, ceiling, looking NE	-
1	572	Structure A2 (canteen), interior, ceiling, looking E	-
1	575	Structure A2 (canteen), interior, ceiling, looking W	-
1	576	Structure A2 (canteen), interior, ceiling, looking W	-
1	577	Structure A3 (cookhouse), E link structure, looking NW	1m
1	578	Structure A3 (cookhouse), looking NW	1m
1	579	Structure A3 (cookhouse), S end of E elevation, looking W	1m
1	580	Structure A3 (cookhouse), S end of E elevation, window detail, looking W	0.50m
1	581	Structure A3 (cookhouse), S end of E elevation, window detail, looking NW	0.50m
1	582	Structure A3 (cookhouse), E end of S elevation, looking NW	1m
1	583	Structure A3 (cookhouse), S link structure, looking NW	1m
1	584	Structure A2 (canteen) and ribs of collapsed Nissen hut, looking N	-
1	586	Structure A3 (cookhouse), E end of S gable, window detail, looking N	0.50m
1	588	Structure A3 (cookhouse), E end of S gable, toughened glass to window, looking N	0.50m
1	589	Structure A3 (cookhouse), S link structure, S elevation, looking N	1m

1	590	Structure A3 (cookhouse), S link structure, detail of drip channel to flat roof, looking NW	-
1	591	Structure A5 (Nissen hut), concrete base, looking N	1m
1	592	Structure A3 (cookhouse), W end of S gable, looking N	1m
1	593	Structure A3 (cookhouse), looking NE	1m
1	594	Structure A2 (canteen), ribs of collapsed Nissen hut, looking N	1m
1	595	Structure A2 (canteen), ribs of collapsed Nissen hut, looking NE	1m
1	596	Structure A2 (canteen), W end of ribs of collapsed Nissen hut, looking NW	-
1	597	Structure A2 (canteen), rib detail of collapsed Nissen hut, looking NE	0.50m
1	598	Structure A2 (canteen), rib detail of collapsed Nissen hut, looking SW	-
1	601	Structure A2 (canteen), joint detail of fallen rib	0.50m
1	603	Structure A3 (cookhouse), N end of E elevation, looking W	1m
1	604	Structure A2 (canteen), rib detail of collapsed Nissen hut, looking S	1m
1	605	Structure A2 (canteen), rib detail of collapsed Nissen hut, looking S	-
1	607	Structure A6 (store), E elevation, looking W	1m
1	608	Structure A3 (cookhouse), N gable, looking W	1m
1	609	Structure A6 (store), general view, looking NW	1m
1	610	Structure A6 (store), S elevation, door details, looking NW	1m
1	611	Structure A6 (store), S elevation, door detail, looking N	1m
1	612	Structure A6 (store), S elevation, door detail, looking N	-
1	613	Structure A6 (store), W cell, looking NE	-
1	615	Structure A3 (cookhouse), N gable, looking SE	1m
1	616	Structure A3 (cookhouse), central bay of N gable, looking SE	1m
1	617	Structure A3 (cookhouse), N gable, central window detail, looking S	0.50m
1	618	Structure A3 (cookhouse), N gable, central window detail, looking SW	0.50m
1	620	Structure A3 (cookhouse), N gable, central doorway detail, looking S	1m
1	623	Structure A3 (cookhouse), N gable, central doorway detail, looking W	-
1	624	Structure A3 (cookhouse), upper part of N gable, looking S	-
1	625	Structure A3 (cookhouse), N cell, N wall, internal window detail, looking NE	0.50m
1	627	Structure A3 (cookhouse), N cell, internal W wall, looking W	1m
1	629	Structure A3 (cookhouse), N cell, internal N wall, looking NW	1m
1	630	Structure A3 (cookhouse), N cell, internal N wall, looking NW	1m
1	632	Structure A3 (cookhouse), N cell, internal S wall, looking S	1m
1	633	Structure A3 (cookhouse), N cell, internal S wall, looking SW	1m
1	635	Structure A3 (cookhouse), N cell, internal S wall, looking S	1m
1	636	Structure A3 (cookhouse), N cell, internal S wall, rail detail, looking SE	1m
1	637	Structure A3 (cookhouse), N cell, internal E wall, looking SE	1m
1	638	Structure A3 (cookhouse), N cell, internal E wall, looking E	1m
1	639	Structure A3 (cookhouse), N cell, internal N wall, looking NE	1m
1	640	Structure A3 (cookhouse), N cell, internal N wall, rail detail, looking NE	1m
1	641	Structure A3 (cookhouse), N cell, upper internal N wall, looking N	-
1	643	Structure A3 (cookhouse), N cell, internal N wall, fitting to upper part, looking NE	-
1	645	Structure A3 (cookhouse), roof over N cell	-
1	646	Structure A3 (cookhouse), roof over N cell, looking E	-
1	647	Structure A3 (cookhouse), roof over N cell, looking W	-
1	648	Structure A3 (cookhouse), central part of E elevation (within E link structure), looking W	1m
1	649	Structure A3 (cookhouse), E link structure, interior, looking SW	1m
1	651	Structure A3 (cookhouse), E link structure, interior, looking NW	1m
1	653	Structure A3 (cookhouse), interior of S cell, looking W	-
1	655	Structure A3 (cookhouse), interior of S cell, truss, looking N	-
1	656	Structure A3 (cookhouse), S elevation, central doorway, looking N	1m
1	657	Structure A3 (cookhouse), S link structure, internal N wall, looking N	1m
1	658	Structure A3 (cookhouse), S link structure, internal view, looking NE	1m
1	659	Structure A3 (cookhouse), S link structure, internal W wall, looking W	1m
1	660	Structure A3 (cookhouse), S link structure, fitting to ceiling	-
1	662	Structure A3 (cookhouse), S link structure, internal W wall, cable & clips, looking W	-
1	663	Structure A3 (cookhouse), S elevation, central doorway detail, looking N	-
1	664	Structure A3 (cookhouse), S cell, internal E wall, looking NE	-
1	665	Structure A3 (cookhouse), interior of S cell, looking N	-
1	668	Structure A6 (store), interior of E cell, looking NE	1m
1	669	Structure A6 (store), interior of W central cell, looking N	-

1	670	Structure A6 (store), S elevation, internal door detail, looking N	-
1	671	Structure A6 (store), interior of central cell, looking W	-
1	672	Structure A6 (store), interior of W cell, looking N	1m
1	675	Structure A4 (wash house), looking E	1m
1	676	Structure A4 (wash house), looking N	1m
1	677	Structure A4 (wash house), looking E	1m
1	678	Structure A4 (wash house), looking S	1m
1	679	Structure A4 (wash house), looking W	1m
1	680	Structure A4 (wash house), looking W	1m
1	684	Typical section of concrete roadway, looking NW	1m
1	688	Typical section of concrete roadway, looking S	1m
1	690	Structure A1 (sub-station), N elevation, looking SE	1m
1	691	Structure A1 (sub-station), looking S	1m
1	693	General view of domestic site, looking SW	-
1	695	Structure A2 (canteen), N elevation, looking S	1m
1	696	Structure A2 (canteen), W elevation, looking E	1m
1	697	Structure A3 (cookhouse), E link structure, N wall, looking S	1m
1	698	Structure A3 (cookhouse), E elevation, looking SW	1m
1	699	Structure A3 (cookhouse), N end of E elevation, looking W	1m
1	700	Structure A6 (store), N elevation, looking S	1m
1	701	Structures A3 & A6 (cookhouse & store), looking SE	-
1	702	Structure A3 (cookhouse), N end of W elevation, looking E	1m
1	703	Structure A3 (cookhouse), central part of W elevation, looking E	1m
1	704	Structure A3 (cookhouse), central part of W elevation, window detail, looking E	-
1	705	Structure A3 (cookhouse), S end of W elevation, looking E	1m
1	706	Structure A3 (cookhouse), W elevation, looking NE	1m
1	707	Structure A3 (cookhouse), W elevation, looking N	1m
1	708	Structure A3 (cookhouse) & S link structure, looking NE	-
1	709	Possible gate fitting position and bitumen coating to concrete, looking N	1m
2	072	Structure H (magazine), looking W	1m
2	073	Structure H (magazine), E elevation, looking W	1m
2	074	Structure H (magazine), looking N	1m
2	075	Structure H (magazine), general view, looking N	1m
2	076	Structure F (gun emplacement), general view, looking NW	1m
2	077	Structure F (gun emplacement), general view, looking NW	1m
2	078	Trough and roller bench, NE of Structure H (magazine), looking E	1m
2	079	Trough and roller bench, NE of Structure H (magazine), looking NE	1m
2	080	Structure H (magazine), general view, looking SW	1m
2	081	Concrete roadway with bitumen coating, W of Structure E, looking N	1m
2	082	Concrete roadway with bitumen coating, W of Structure E, looking NE	1m
2	083	Structure E (gun store), looking W	1m
2	084	Structure E (gun store) & adjacent concrete bases, looking W	1m
2	085	Structure E (gun store), E elevation, looking W	1m
2	086	Structure E (gun store), W elevation, looking NE	1m
2	087	Structure E (gun store), N elevation, blast door, looking SE	1m
2	089	Structure E (gun store), N elevation, blast door, looking SE	1m
2	090	Structure E (gun store), N elevation, blast door, looking SE	1m
2	091	Structure E (gun store), N elevation, looking SE	1m
2	092	Structure E (gun store), E elevation, S end, looking SW	1m
2	093	Structure E (gun store), E elevation, N end, looking SW	1m
2	094	Structure E (gun store), E elevation, central window, looking SW	0.50m
2	095	Structure E (gun store), E elevation, outer window, looking SW	0.50m
2	096	Structure E (gun store), E elevation, central window, looking SW	-
2	097	Structure E (gun store), E elevation, outer window, looking SW	-
2	098	Structure E (gun store), E elevation, windows, looking NW	-
2	099	Structure E (gun store), E elevation, window, looking SE	-
2	100	Structure E (gun store), internal W wall, looking SW	-
2	101	Structure E (gun store), internal S wall, looking SE	-
2	102	Structure E (gun store), W ceiling area, looking SE	-
2	104	Structure E (gun store), concrete bases to E, looking N	1m
2	105	Structure E (gun store), concrete bases to E, looking N	0.50m
2	106	Structure E (gun store), concrete bases to E, looking N	0.50m

2	111	Structure F (gun emplacement), gateway to SE side, looking W	1m
2	112	Structure F (gun emplacement), SW side, recesses, looking W	1m
2	113	Structure F (gun emplacement), W side, looking N	1m
2	114	Structure F (gun emplacement), SE side, camouflage fittings, looking NW	0.50m
2	116	Structure F (gun emplacement), SE side, camouflage fittings, looking NW	0.50m
2	118	Structure F (gun emplacement), holdfast and recesses, looking NE	-
2	119	Structure G (gun emplacement), general view, looking SW	-
2	120	Structure D (gun emplacement), general view, looking NW	-
2	121	Structure B (command post), general view, looking NW	-
2	122	Structure B (command post), general view, looking NW	-
2	123	Structure G (gun emplacement), general view, looking W	1m
2	125	Structure G (gun emplacement), W side, recesses, looking S	1m
2	126	Structure G (gun emplacement), holdfast and recesses, looking SW	-
2	127	Structure G (gun emplacement), NW side, recesses & shelter, looking NW	-
2	128	Structure G (gun emplacement), NW side, recesses & shelter, looking NW	-
2	129	Structure G (gun emplacement), W side, camouflage fittings	0.50m
2	130	Structure B (command post), S elevation, W end, looking E	1m
2	131	Structure B (command post), S elevation, W end, looking NW	1m
2	132	Structure B (command post), S elevation, E end, looking NW	-
2	133	Structure B (command post), height finder platform, looking SW	1m
2	136	Structure B (command post), height finder platform, looking SW	1m
2	139	Structure B (command post), Room 1 interior, looking SE	1m
2	140	Structure B (command post), Room 1 interior, looking NW	1m
2	141	Structure B (command post), Room 1, internal window detail, looking NE	0.50m
2	142	Structure B (command post), Room 1, internal drain, looking SE	0.50m
2	144	Structure B (command post), Room 1, internal vent detail in W wall, looking W	-
2	145	Structure B (command post), Room 1, internal doorframe detail, looking SE	-
2	146	Structure B (command post), height finder platform, gateway on W side, looking W	1m
2	147	Structure B (command post), steps to telescope platform, looking SW	1m
2	148	Structure B (command post), telescope platform, looking NE	1m
2	149	Structure B (command post), general view of central area, looking NE	1m
2	151	Structure B (command post), Room 2, internal W wall, looking NW	-
2	153	Structure B (command post), Room 2, internal E wall, looking N	-
2	154	Structure B (command post), Room 2, internal N wall, looking NW	-
2	157	Structure B (command post), Room 2, internal W wall, looking SW	-
2	158	Structure B (command post), Room 2 roof, looking NE	0.50m
2	159	Structure B (command post), Room 2 roof, looking NE	0.50m
2	160	Structure B (command post), predictor platform, recess, looking NW	0.50m
2	161	Structure B (command post), telescope platform, reinforcements on S wall, looking SE	0.50m
2	162	Structure B (command post), Room 3 roof, looking SW	0.50m
2	163	Structure B (command post), N elevation, Room 3 door, looking SW	1m
2	165	Structure B (command post), N elevation, Room 3 door, looking NE	-
2	166	Structure B (command post), N elevation, Room 3 door detail, looking SE	-
2	167	Structure B (command post), N elevation, Room 3 door detail, looking SE	1m
2	168	Structure B (command post), Room 3 interior, W wall, looking SW	-
2	171	Structure B (command post), Room 3 interior, S wall, looking S	-
2	172	Structure B (command post), Room 3 interior, N wall, looking NW	-
2	174	Structure B (command post), Room 3 interior, door in N wall, looking NW	-
2	175	Structure B (command post), Room 3 interior, W wall, looking SW	-
2	176	Structure B (command post), N elevation, anti-glider posts or GL grid supports, looking E	1m
2	178	Structure D (gun emplacement), S side, looking NW	1m
2	179	Structure D (gun emplacement), NE side, recess, looking NW	1m
2	180	Structure D (gun emplacement), NE side, recess, looking NW	0.50m
2	181	Structure D (gun emplacement), NE side, roof detail of recess, looking NW	-
2	183	Structure D (gun emplacement), E side, looking W	1m
2	184	Structure C (gun emplacement), SE side, looking NW	1m
2	187	Structure C (gun emplacement), SE side, looking NW	1m
2	188	Structure C (gun emplacement), E side, looking W	1m
2	189	Structure C (gun emplacement), recess, looking NW	0.50m
2	190	Structure C (gun emplacement), recess, internal features, looking NW	0.50m

2	193	Structure C (gun emplacement), holdfast fixings	0.50m
2	194	Structure C (gun emplacement), holdfast & recesses, looking W	1m
2	197	Structure C (gun emplacement), shelter doorway, looking NE	1m
2	199	Structure C (gun emplacement), shelter, interior of E cell, looking SE	1m
2	200	Structure C (gun emplacement), shelter, interior, looking NW	1m
2	202	Structure C (gun emplacement), shelter, interior of W cell, looking NW	1m
2	203	Structure C (gun emplacement), shelter, interior of W cell, looking SE	1m
2	204	Structure C (gun emplacement), shelter, interior of W cell, looking SE	1m
2	205	Structure H, passage between magazine & E blast wall, looking SE	1m
2	208	Structure H, passage between magazine & S blast wall, looking SW	1m
2	209	Structure H (magazine), detail of roof covering & drip channel, looking SW	-
2	210	Structure H (magazine), passage inside N blast wall, looking SW	1m
2	214	Structure H (magazine), N wall, doorway detail, looking E	1m
2	215	Structure H (magazine), N wall, window detail, looking SE	1m
2	216	Structure H (magazine), N wall, window detail, looking SE	-
2	217	Structure H (magazine), N wall, window detail, looking SE	-
2	219	Structure H (magazine), E internal bay, looking SE	1m
2	220	Structure H (magazine), openings between internal bays, looking SW	1m
2	221	Structure H (magazine), openings between internal bays, looking SW	1m
2	222	Structure H (magazine), internal window, looking NW	0.50m
2	223	Structure H (magazine), internal window, looking W	0.50m
2	225	Structure E (gun store), painted sign to W wall of S cell, looking N	-
2	227	Structure E (gun store), painted sign to W wall of S cell, looking N	-
2	228	Structure E (gun store), painted sign to N wall of S cell, looking NW	-
2	229	Structure E (gun store), painted sign to E wall of S cell, looking NE	-
2	230	Structure E (gun store), internal S wall, looking S	1m
2	231	Structure E (gun store), internal view, looking E	1m
2	234	Structure E (gun store), internal view, looking N	1m
2	235	Structure E (gun store), internal N wall, graffiti, looking N	-
2	236	Structure E (gun store), internal N wall, painted sign, looking N	-
2	237	Structure E (gun store), internal N wall, painted sign, looking N	-
2	238	Structure E (gun store), internal N wall, painted sign, looking N	-
2	239	Structure E (gun store), internal E wall, switch, looking E	-
2	240	Structure E (gun store), internal E wall, window catches, looking E	-
2	241	Structure E (gun store), internal W wall, isolator box, looking W	-
2	242	Structure E (gun store), internal ceiling light	-
2	243	Structure G (gun emplacement), SW side, Type 1 recess, looking NW	1m
2	244	Structure G (gun emplacement), SW side, interior of Type 1 recess, looking S	1m
2	245	Structure G (gun emplacement), W side, Type 2 recess, looking N	1m
2	247	Structure G (gun emplacement), W side, interior of Type 2 recess, looking NW	1m
2	248	Structure G (gun emplacement), holdfast, looking W	1m
2	249	Structure G (gun emplacement), identifier to shelter step, looking NW	1m
2	251	Structure G (gun emplacement), interior of shelter, looking NE	1m
2	252	Structure G (gun emplacement), interior of shelter, looking SW	1m
2	253	Structure G (gun emplacement), shelter, pegs to internal N wall, looking NW	-
2	255	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
2	256	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
2	257	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
2	258	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
2	259	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
2	260	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
2	318	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
2	319	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-

2	320	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
2	321	Structure G (gun emplacement), shelter, wall paintings to internal S wall, looking SE	-
3	295	Structure D (gun emplacement), NE side, recess, looking NW	1m
3	296	Structure D (gun emplacement), NE side, interior of recess, looking W	1m
3	298	Structure D (gun emplacement), S side, remains of shelter, looking N	1m
3	301	Structure D (gun emplacement), S side, remains of shelter, looking NE	1m
3	302	Structure D (gun emplacement), S side, remains of shelter, looking NE	1m
3	303	Structure C (gun emplacement), recess, looking N	1m
3	304	Structure C (gun emplacement), recess detail, looking W	1m
3	306	Structure C (gun emplacement), recess, internal roof detail, looking W	-
3	307	Structure C (gun emplacement), fitting detail, looking N	1m
3	308	Structure C (gun emplacement), limber gunner recess, looking W	1m
3	309	Structure C (gun emplacement), limber gunner recess, looking S	1m
3	310	Structure C (gun emplacement), recess, internal features, looking SW	1m
3	311	Structure C (gun emplacement), recesses & holdfast, looking NW	1m
3	312	Structure C (gun emplacement), recesses & holdfast, looking W	1m
3	313	Structure C (gun emplacement), recesses & holdfast, looking E	1m
3	314	Structure C (gun emplacement), shelter, painted lines to interior of E cell, looking E	-
3	315	Structure C (gun emplacement), shelter, painted lines to interior of E cell, looking E	-
3	316	Structure B (command post), Room 1, pencilled graffiti to E wall, looking NE	-
3	317	Structure B (command post), Room 1, pencilled graffiti to E wall, looking NE	-
3	318	Structure B (command post), Room 1, pencilled graffiti to E wall, looking NE	-
3	320	Structure B (command post), Room 3 roof, looking SW	-
3	321	Structure B (command post), Room 3 roof, bolts, looking SW	-
3	323	Structure B (command post), Room 3 roof, looking NE	-
4	701	Structure F (gun emplacement), looking E	-
4	704	Structure G (gun emplacement), E side, camouflage fittings during conservation, looking N	-
4	705	Structure G (gun emplacement), gate fittings during conservation, looking E	-
4	706	Structure E (gun store), S elevation, doorway during conservation, looking N	-
4	708	Structure E (gun store), E elevation, windows during conservation, looking SW	-
4	709	Structure E (gun store), E elevation, window during conservation, looking SW	-
4	711	Bridge over drain at entrance to site, looking S	-
4	837	Structure B (command post), height finder fitting during conservation, looking NW	0.50m
4	839	Structure B (command post), possible camouflage fitting in wall of telescope platform during conservation, looking SW	0.50m
4	840	Structure B (command post), vent fitting to Room 2 roof during conservation, looking N	0.50m
4	841	Structure G (gun emplacement), W side, Type 2 recess with camouflage fittings during conservation, looking SW	1m
4	842	Structure G (gun emplacement) W side, Type 2 recess with camouflage fittings during conservation, looking W	1m
4	850	Typical concrete post to E boundary, looking E	1m
4	851	Typical concrete post to E boundary, looking SE	1m
4	853	Structure A3 (cookhouse), interior of S cell after repairs, looking N	1m
4	854	Structure A3 (cookhouse), interior of S cell after repairs, looking SW	1m
4	856	Structure A3 (cookhouse), interior of S cell after repairs, looking S	1m
4	857	Structure A3 (cookhouse), interior of S cell after repairs, looking S	1m
4	859	Structure A3 (cookhouse), interior of S cell after repairs, looking E	1m
4	862	Structure A3 (cookhouse), E link structure, interior after clearance, looking NW	1m
4	863	Structure A3 (cookhouse), central part of E elevation (within E link structure) after clearance, looking W	1m
4	866	Structure A3 (cookhouse), interior of N cell after clearance, looking E	1m

4	869	Structure A3 (cookhouse), interior of N cell after clearance, looking W	1m
4	870	Structure A3 (cookhouse), W elevation after repairs, looking NE	1m
4	871	Structure A3 (cookhouse), S gable after repairs, looking N	1m
4	872	Structure A3 (cookhouse), after repairs, looking NW	1m
4	873	Structure A3 (cookhouse), E elevation and E link structure after repairs, looking W	1m
4	874	Structure A3 (cookhouse), E elevation after repairs, looking W	-
4	875	Structure A2 (canteen), S end of Nissen hut after clearance, looking S	1m
4	876	Structure A2 (canteen), S end of Nissen hut after clearance, looking S	1m
4	877	Structure A2 (canteen), Nissen hut base after clearance, looking N	-
4	879	Structure A2 (canteen), N end of Nissen hut after clearance, looking N	1m
4	880	Structure A2 (canteen), WW2 light fitting recovered during clearance	0.50m
4	882	Structure A2 (canteen), WW2 light fitting recovered during clearance	0.50m
4	883	Structure A2 (canteen), WW2 light fitting recovered during clearance	0.50m
4	884	Structure A2 (canteen), interior after clearance, looking E	0.50m
5	001	Typical angle iron post along NE boundary of site, looking N	1m
5	002	Probable GL radar platform on W side of drain, looking E	1m
5	003	Structure B (command post), view to predictor platform, looking W	1m
5	004	Structure B (command post), Room 2, internal W wall, looking NW	-
5	006	Structure B (command post),, N entrance and predictor platform, looking W	-
5	007	Brick stub walls on S wall of Structure H (magazine), looking N	1m
5	009	Structure H (magazine), former sign on end wall of bay, looking W	-
5	011	Structure E (gun store), camouflage paint on W wall, looking NE	-
5	012	Structure E (gun store), camouflage paint on walls, looking E	-
6	692	Structure B (command post), N elevation, Room 3 and screened access, looking SE	1m
6	693	Structure B (command post), N elevation, entrance, looking SE	-
6	694	Structure B (command post), N elevation, N side of Room 3, looking SE	1m
6	695	Structure B (command post), E end of N elevation, looking SW	1m
6	696	Structure B (command post), N elevation, E side of Room 1, looking SW	1m
6	697	Structure C (gun emplacement), extension to shelter, looking SW	1m
6	698	Structure C (gun emplacement), W end of N elevation, looking SE	-
6	699	Structure B (command post), N elevation, W extension to Room 3, looking SE	-
6	700	Structure B (command post), S elevation, W extension to Room 3, looking NW	1m
6	702	Structure H (magazine), gap between front of building and N screen wall, looking SW	-
6	704	Structure H (magazine), former sign on wall of bay, looking SW	-
6	705	Structure F (gun emplacement), general view, looking NE	-
6	706	Structure B (command post), E end and roof of Room 3, looking SW	-
6	707	Structure B (command post), S side of Room 3, looking NW	-
6	708	Structure B (command post), N elevation, anti-glider posts or GL grid supports, looking SW	-
6	709	Structure C (gun emplacement), N elevation, roof of Room 2, looking E	-
6	710	Structure B (command post), N elevation, roof of Room 2, looking NE	-
6	711	Structure G (gun emplacement), pintels in N gateway, looking N	-
6	713	Structure G (gun emplacement), Type 2 recess, looking N	-
6	715	Structure B (command post), S elevation, junction of S wall and Room 3, looking NW	-
6	716	Structure B (command post), S elevation, spotting telescope platform, looking NE	-
6	717	Structure B (command post), S elevation, height finder platform, looking NW	1m
6	718	Structure B (command post), view towards Room 2, looking NW	-
6	719	Structure B (command post), E elevation, height finder platform and E entrance, looking NW	1m
6	720	Structure F (gun emplacement), extension to shelter, looking S	1m
6	721	Structure F (gun emplacement), junction of shelter and wall of emplacement, looking W	1m
6	722	Structure F (gun emplacement), brick stub walls off W end of shelter, looking E	1m

6	723	Structure F (gun emplacement), Type 2 ammunition recess, looking NW	-
6	724	Structure C (gun emplacement), Type 1 recess and limber gunner recess, looking W	1m
6	725	Structure C (gun emplacement), limber gunner recess, looking W	1m
6	726	Structure C (gun emplacement), entrance to shelter, looking NE	1m
6	728	Structure H (magazine), general view, looking E	-
6	736	Structure F (gun emplacement), general view, looking NE	-
6	738	Structure B (command post), general view, looking NE	-
6	739	General view of operational site, looking NE	-

APPENDIX 2: LEADER CWWW PHOTOGRAPHIC SURVEY BRIEF

APPENDIX 2: LEADER CWWW PHOTOGRAPHIC SURVEY BRIEF

Brief for the photographic survey of the buildings, structures and WWII wall painting associated with the scheduled monument, Stone Creek Heavy Anti-aircraft Gunsite, Sunk Island (SM32706)

Introduction

English Heritage has indicated that they require a photographic record of the buildings, structures and WWII wall painting associated with the scheduled monument, Stone Creek Heavy Anti-aircraft Gunsite, Sunk Island (SM32706) prior to a programme of conservation works as described in the enclosed Conservation Survey and Scheme of Works.

Site information

Location map, site plan, description, condition assessment, working photographs and drawings are provided in the survey report and should form the bases for the photographic record.

Survey Level

The survey should be undertaken accordance with current best practice as described in the English Heritage guidance – *Understanding Historic Buildings – A guide to good recording practice (2006)*, with special reference to sections 4.4 and 5.5 dealing with photographic survey.

The survey should reflect the nature of the structures and buildings, with a range of photographs including all internal and external elevations, photographs recording surviving features, fixtures and fittings. For the wall painting the photographic record should include a montage or similar of the wall painting as a whole, with detailed photographs highlighting the individual elements of the painting. Please note, due the current condition of the wall painting it is accepted that it may not be possible to attach/include an appropriate scale in each photograph.

Specific points

- Photographs should be taken using black and white and colour film, and/or digital images. The medium used for photography and photographic prints should be of archive quality and the consultant should provide details of the selected format and materials in their response to this brief.

- All detail photographs must contain a graduated photographic metric scale of appropriate dimensions (measuring tapes and surveying staffs are not considered to be acceptable scales in this context). A 2-metre ranging-rod, discretely positioned, should be included in a selection of general shots, sufficient to independently establish the scale of all elements of the structure.

- Photographs must be accompanied by a simple plan(s) showing the position from which the photographs were taken and the approximate axis of each shot, and a list of photographs taken.

- Prints should be at least 6” x 4” and should be labelled on the reverse either in HB pencil (taking care not to damage the print) or using printed self-adhesive labels and digital pictures with a minimum definition of 10 MB. Labelling must include the site name and national grid reference, date recorded, photographer’s name.

- Prints and negatives should be presented in archivally stable envelopes and negative sleeves, such as Kenro display pockets. The use of PVC holders should be avoided. Negatives should be presented in strips, and in no circumstances should be cut into individual frames. The prints and negatives should be accompanied by the plan referred to above, with sufficient documentation to leave no doubt as to the subject of each photograph; photographic prints

should be labelled and cross-referenced to the negative. Digital photography should be supplied in an appropriate format with a minimum definition of 10 MB on a CD or data stick.

- A copy of the photographic archive (prints/negatives/digital images) will be sent to English Heritage, the regional Historic Environment Record and the commissioning body. The archive will become publicly accessible once deposited, unless confidentiality is explicitly requested, in which case it will become publicly accessible six months after deposition.

- If the consultant would prefer to use digital photography as standard, the digital photographs will need to be submitted to the Archaeological Data Service (ADS) for long-term archive storage. ADS will need to be approached upon commissioning and the digital archiving details included in that final report.

- Copyright - Please note the author of the material gives permission for the material presented to be used by the commissioning body and its agents including English Heritage and the HER, in perpetuity, although the author of the material retains the right to be identified as the author of all project documentation and reports as specified in the *Copyright, Designs and Patents Act* 1988 (chapter IV, section 79). The permission will allow the commissioning body and its agents including English Heritage and the HER to reproduce material, including for non-commercial use by third parties, with the copyright owner suitably acknowledged.

APPENDIX 3: EDAS METHODS STATEMENT

APPENDIX 3: EDAS METHODS STATEMENT

PRE-INTERVENTION ARCHAEOLOGICAL SURVEY, STONE CREEK HEAVY ANTI-AIRCRAFT BATTERY, SUNK ISLAND, EAST YORKSHIRE

Introduction

This project will be undertaken by Ed Dennison Archaeological Services Ltd (EDAS). EDAS have worked on several similar projects in the past, and visited the site on 13th November 2012.

Background Information

The Heavy Anti-aircraft (HAA) battery at Stone Creek (NGR TA 23814 18853 centred) is the best preserved example in East Yorkshire, with nearly a full layout of the station complete with well-preserved gun emplacements and other features such as the command post and magazine. The remains of the domestic camp, although ruined, are an especially rare survival as at most other sites these buildings have been totally cleared.

Nearly 1,000 HAA batteries were built during World War II, and less than 200 of these have some remains surviving. However, at only around 60 sites are these remains thought sufficient to provide an understanding of their original form and function, This includes 30 of the 192 examples which continued in use until 1955. Surviving examples are therefore sufficiently rare to suggest that all 60 well preserved examples are of national importance, and the Stone Creek site is Scheduled as an Ancient Monument (SM 32706; National Heritage List for England no. 1020187).

The HAA sites contained big guns with the function of engaging high flying strategic bombers, hence their location around the south and east coasts, and close to large cities and industrial and military targets. Of all the gunsites, these were the most substantially built. There were three main types: those for static guns (mostly 4.5 and 3.7 inch); those for 3.7 inch mobile guns; and sites accommodating 5.25 inch weapons. These were all distinct in fabric, though they could all occupy the same position at different dates, or simultaneously by accretion. As well as the four or eight gun emplacements, with their holdfast mountings for the guns, sites will generally include operational buildings such as a command post, radar structures including the radar platform, on-site magazines for storing reserve ammunition, gun stores and generating huts, usually one of the standard Nissen hut designs. Domestic sites were also a feature of HAA gunsites, with huts, ablutions blocks, offices, stores and amenities drawn from a common pool of approved structures. Sites were often also provided with structures for their close defence, such as pillboxes or earthwork emplacements were also present. The layout of HAA gunsites was distinctive, but changed over time, for example to accommodate the introduction of radar from December 1940, women soldiers from summer 1941, and eight gun layouts from late 1942.

The Stone Creek site was initially known as Station J and then Station H9 from 1 August 1941 onwards. It includes the full extent of the original station complete with four gun emplacements and associated structures, as well as the remains of the domestic site. Station J is first recorded on 19 September 1939 when 286 Battery of 91 HAA Regiment (286/91 Bty) received two mobile World War I vintage 3in guns from Station C, west of Preston. By the end of September 1939, control passed to 172/62 Bty which is thought to have constructed permanent gun emplacements considered necessary for the two 4.5in guns. These were certainly in place by 9th May 1940, when 286/91 Bty took over. On 25 July 1941 Station J, called H9 from 1 August, returned to the control of 172/62 Bty until 19 February 1942 when 113 HAA Regiment took charge. On 22 June 1942 four 3.7in static guns supported by a GL MkII radar were reported to be at Station H9. In September 1942, the gunsite was passed to 510/151 Bty. This was a mixed sex battery which used women from the Auxiliary Territorial Service (ATS) to operate radar, communications systems and other support roles whilst the men operated the guns. That same month the station was credited with shooting down an enemy aircraft, a relatively rare event. The gunsite was abandoned in November 1944 when both equipment and personnel were moved to a new gunsite at Ringborough on the coast for Operation Diver which countered the new threat from the V1 flying bomb. The gunsite is not thought to have been reoccupied as it was not one of those chosen to form part of the post-war Nucleus Force, the spread of 192 HAA gunsites in England selected to be retained after the war (information from SM description).

Site Description

The functional core of the site are the four gun emplacements and the command post located towards the south eastern end of the monument. The command post ('B' on attached figure) is a complex concrete structure about 20m by up to 7m, facing south with its long axis orientated east-west. The shell of this building is very well-preserved, retaining some additional fittings such as metal ventilators. It is thought to be an early design and does not follow the pattern typically used from 1941 onwards. Most of the structure is open to the sky, outlined by low walls and formed platforms for the identification telescope, height finder and predictor; three pieces of optical equipment for spotting and tracking enemy aircraft. At the centre of the command post there is also a concrete post which was the mounting for an anti-aircraft machine gun designed to engage low-flying aircraft trying to attack the gunsite. The command post also includes three semi-sunken rooms, the largest is at the west end with two smaller rooms on the north side towards the middle of the command post. The largest room is interpreted as the plotting room where data from the height finder and predictor were converted into elevation, bearing and fuse timings for the guns. Of the two smaller rooms, one would have acted as an office whilst the other, which shows evidence of later alteration, would have been a boiler room for central heating. This had to be installed on gun batteries with female staff.

Arranged in an arc around the south western side of the command post there are the four gun emplacements ('C', 'D', 'G' and 'F' on attached figure). These are all of a general design first issued in 1938 and are constructed in concrete. Each emplacement is c.12m across and octagonal in plan which is defined by a blast wall. Set centrally into the concrete floor there is a ring of holding down bolts for the gun mounting and extending inwards from six sides of the blast wall there are six 2 sq m ammunition lockers. The remaining two sides of the blast wall form wide entrances set on opposite sides of the emplacement. Each emplacement also has a small concrete shelter immediately on the outside of the blast wall. This is identified as a relaxed duty shelter for the crew when not on alert. The four emplacements appear to have been built in at least two stages. The southern pair of emplacements ('G' and 'F') retain metalwork, including hinges for blast doors across the entrances and for the ammunition lockers, as well as fittings in the top of the blast walls for securing camouflage netting. In addition some of the ammunition lockers retain their original iron doors. The northern pair of emplacements ('C' and 'D') show no evidence that they had either hinges for doors or fixings for camouflage. Also two of the ammunition lockers, the central one on each side, are latter additions to the emplacements. Overall, the emplacements are generally very well-preserved, some even retaining some timber work, however the southern emplacement of the northern pair ('D') has been partly demolished and both 'C' and 'D' have suffered from some infill/storage of surplus concrete and hardcore from earlier demolitions. Emplacement 'G' contains wall paintings of British and American planes.

Opposite the command post and 15m to the south of the southernmost pair of emplacements, there is a five bay ammunition magazine surrounded by a substantial blast wall ('H' on attached figure). The magazine itself is flat- roofed, c.10m by 3.5m, complete with three doors and two windows regularly spaced down its north side. It follows a standard design produced by the Air Ministry in February 1939. To the east of the gun emplacements there is another well-preserved small flat-roofed building complete with its doors and windows ('E'). This follows another standard design and was a gun store, used for gun maintenance and for storing tools and spare parts. Immediately to the north-east there is a concrete engine bed which is interpreted as the mounting for the on-site electricity generator. The gun store is at the end of a concrete roadway which ran past the gun emplacements, connecting them to the road to the north west. This is also an integral part of the monument and retains some patches of a tarmac skim applied during the war to make the road less obvious to enemy aircraft.

At the north end of this roadway there are the remains of the domestic site. On the east side of the road there is a 3m by 4m brick building with a flat concrete roof ('A1' on attached figure). This is identified as an electricity substation, linking the domestic part of the gun battery to the generators at the western end of the site, as Sunk Island was not connected to the national grid until the 1950s. On the west side of the road, there is a complex of brick buildings, two main structures with corrugated iron roofs, with additional smaller linking buildings, porches and outbuildings with flat concrete roofs. The two main buildings are of different designs. The one nearest the road is a six bay 24ft span Nissen which measures 10.8m by 7.3m ('A2'). Very little of this survives, apart from two fixed 'T' section iron ribs, and one partially fixed; a few of the corrugated iron sheets survive on the ground. Its north gable brick wall is leaning outwards and the southern wall has collapsed. This is believed to

have been the canteen hall. The other main building is a six bay Ministry of War Production (MOWP) Standard Hut, built in brick with concrete lintels and metal framed windows ('A3'). Overall it measures approximately 6m by 11m; this building is identified as the battery's cookhouse. The southern half of its roof has collapsed with part of the southern gable. The various smaller concrete roofed buildings are much better preserved than the two with iron roofs and are believed to have been small stores and entrance lobbies. The demolished remains of another brick building lies 50m to the east. This was the wash house for the site. All these buildings formed part of the domestic camp for the battery's staff with sleeping accommodation provided in at least 15 adjacent temporary huts that were removed some time after 1947. Just inside the gate to the field, on the south west side of the road, there is a 3m by 6m concrete hardstanding which is interpreted as the foundation for a guard hut.

As far as can be determined, no detailed archaeological survey has been undertaken at the site. However, a Condition Survey was undertaken by Peter Pace as part of proposals for limited repair, conservation and consolidation (Pace 2012), and the wall paintings in emplacement 'G' have been subject to a condition assessment (Hirst Conservation 2013).

Aims of the Project

The overall project is designed to support the landowner in the appropriate management of the monument, by preventing where practicable and necessary the deterioration of the concrete structures, wall paintings and brick domestic buildings.

More specifically, the archaeological survey work is required to produce a pre-intervention record of the various site elements prior to the proposed programme of repair, conservation and consolidation.

The aims of the archaeological survey are:

- to identify and gather sufficient information to establish the extent, nature, character, condition, quality, date, significance and functional relationships of the surviving archaeological and historical features within the survey area;

- to provide a detailed, pre-intervention record of the complex;

- to provide an accessible version of the report, suitable for publication in an appropriate academic publication.

Survey Methodologies

Documentary Research and Collation

A limited amount of documentary research and collation will be undertaken, utilising information held by the Humber Sites and Monuments Record, English Heritage's National Monuments Record and the Council for British Archaeology's 'Defence of Britain' project. It is assumed that these organisations will not charge for any data supply.

Archaeological Topographic Survey

1) Site survey work

A detailed Level 3 survey of the whole of the Scheduled Monument area (as defined on the attached plan) will be carried out to record the position and form of all features considered to be of archaeological and/or historic interest.

The survey will be carried out at a scale of 1:500 using EDM total station equipment. Sufficient information will be gathered to allow the survey area to be readily located through the use of surviving structures, fences, walls, water courses, trackways and other topographical features. The survey will record the position at ground level of all structures, wall remnants and revetments, earthworks, water courses, paths, stone and rubble scatters, ironwork, fences, walls and other boundary features, and any other features considered to be of archaeological or historic interest. The detailed site survey will pay particular attention to those structures required to be recorded as part of the building survey (see

Building Recording below), and will also record areas of erosion (both natural, animal and man-made) or other damage.

The site survey will be integrated into the Ordnance Survey national grid by resection to points of known co-ordinates. Heights AOD will be obtained by reference to the nearest OS benchmark; given the nature of the remains, contours will not be plotted across the site. A temporary bench mark could be established and left on site using an approved ground marker if required. Survey points would be taken from fixed survey stations on a closed traverse around and through the site. The locations, descriptions and values of the Bench Marks and control points would be stated in the final survey data.

On completion of the total station survey, the field data will be plotted and re-checked on site in a separate operation. Any amendments or additions will be surveyed by hand measurement, and the results digitised back into the electronic survey data.

The resulting site survey will be produced at a scale of 1:500 and presented as an interpretative hachure plan(s) using conventions analogous to those used by English Heritage (1999; 2002, 14; 2007, 31-35). It is envisaged that the final survey drawings will comprise an A1 size sheet. It should be noted that the final product arising from the site survey will be a hand-drawn wet ink hachure plan, rather than AutoCad (or equivalent) electronic data. Larger scale Ordnance Survey map bases will be used to put the survey area into context.

2) Written accounts

Individual descriptions will be produced for each identified element within the site complex, for example specific buildings (whether extant or sites), hut bases, earthworks etc. This description will include an account of each elements' overall form (e.g. structure, materials, layout, evidence for any attached demolished structures etc), function, date and sequence of development and use, together with the evidence supporting this analysis and interpretation.

3) Photographs

General photographs will be taken of the survey area to illustrate the landscape context of the site and of specific elements.

The colour photographs will be taken using a digital camera with 10 megapixel resolution. English Heritage photographic guidelines will be followed (English Heritage 2006, 10-12; 2007, 14) and each photograph will normally be provided with a scale. All photographs will be clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and will be cross-referenced to digital files etc.

Building Recording

Specific detailed surveys of the individual buildings and other structural elements on the site, namely the domestic camp buildings ('A1', 'A2' and 'A3'), the command post ('B'), the gun emplacements ('C', 'D', 'F' and 'G'), the gun store ('E') and the magazine ('H'), will be undertaken.

1) Ground plans

Ground plans of the above structures will be produced at a scale of 1:50 by hand measurement, using the EDM total station footprint survey as a base. A lower level plan of the command post ('B') will also be produced, subject to access, and sections will also be produced where this will aid interpretation and understanding. Elevations will not be drawn, but will be photographed (see below).

The resulting drawings will show all significant detail such as openings (blocked or unblocked), inserted doorways, fittings, sockets etc. All drawings will be produced according to the guidelines established by English Heritage (2006, 8-10 & 19-21), and will be keyed into the general topographical survey.

Other, more detailed, drawings may be produced of particular items of interest or importance, for example the blast doors across the entrances and for the ammunition lockers in some of emplacements, as well as fittings in the top of the blast walls for securing camouflage netting. These surveys will be undertaken an scales of 1:5 or 1:2 as appropriate. Any such surveys would be cross referenced to the 1:50 scale plans of the buildings. Once again, the survey drawings would conform to English Heritage guidelines (English Heritage 2006,8-10 & 19-21).

2) Photographs

A detailed photographic record will be made of all external and internal elevations of the above structures, both parallel to the elevation (within the constraints of the site) as well as from other vantage points to include oblique general views of the structures and showing them in their setting. Photographs will also be taken of the overall appearance of individual rooms and circulation areas, and any detail (structural or decorative) which might be relevant to the building's design, development or use and which does not show adequately on general photographs. Other photographs will be taken of any inscriptions, signage or graffiti etc which contribute to an understanding of the building(s), and any contents or ephemera which have a significant bearing on the building's history. Close-up photographs will also be taken of significant detail, as appropriate (e.g. wall paintings). The photographs will be used to show not only the structures' present appearance but also to record the evidence on which the analysis of their historic development is based.

The colour photographs will be taken using a digital camera with 10 megapixel resolution. English Heritage photographic guidelines will be followed (English Heritage 2006, 10-12; 2007, 14) and each photograph will normally be provided with a scale and an identifier where required. All photographs will be clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and will be cross-referenced to digital files etc. The general site plan and building floor plans will also be used to indicate location and direction of photographs.

Survey Products

Archaeological Survey Report

An EDAS archive survey report for the site will be produced, based on the results of the documentary research, the topographical survey and the building recording. The report will be a standard A4 typed and bound document, which will assemble and summarise the available evidence for the survey area in an ordered form, synthesise the data, comment on the quality and reliability of the evidence, and how it might need to be supplemented by further site work or desk-based research.

It is expected that the report will include (as appropriate):

- a contents list;
- acknowledgements;
- a non-technical executive summary;
- site code/project number;
- dates of fieldwork visits;
- national grid reference and address;
- overall site plan;
- statutory designations;
- a brief account of the project plan, research objectives, survey methodology, procedures and equipment used;
- details of the historical and archaeological background to the site;
- an account of the overall form and development of the site and of the evidence supporting any interpretation;
- preliminary conclusions, including an assessment of the importance of the findings in relation to the other remains on the site and in the region as a whole;
- preliminary recommendations for improved public interpretation;
- a bibliography and list of sources consulted;
- selected colour digital images, reproduced at no less than 6" by 4";
- selected figures e.g. historic maps and plans, reduced to A4 or A3 size;

- final survey drawings, reduced to A4 or A3 size, comprising hachured earthwork surveys, detailed drawn plans and sections (as appropriate).

The survey report will also contain various appendices, such as photographic registers and catalogues, and a copy of this Methods Statement, together with the details of any departures from that design.

One draft copy of the report will be made available for discussion with interested bodies prior to completion. Three copies of the final approved survey report will then be provided in hard copy format (comb bound reports) to English Heritage, the landowner and the Humber SMR, no later than eight weeks after the end of the on-site work unless otherwise agreed. A CD containing an electronic copy of the report (as pdf files) and digital copies of the photographs will also be provided - this can be supplied to other interested parties (e.g. Natural England) as necessary.

Archaeological Survey Archive

A properly ordered and indexed project archive (paper, magnetic and plastic media) will be deposited with the East Riding of Yorkshire Museum Service at the end of the project. It is expected that the archive will contain the following:

- copies of relevant documentary material, bibliographic, cartographic and pictorial sources, arranged in date sequence;
- survey control information, including a diagram showing traverses and control networks, coordinates of control points and survey stations, and digital survey data;
- field and final ink drawings (any drawn records will be presented as wet ink plots on standard "A" size matt surface stable polyester film sheets);
- written accounts and pro forma gazetteers;
- structured catalogues and indices;
- hard copies of digital photographs on archival-stable photographic paper;
- electronic copies of all reports, as pdf files.

OASIS Compliance

EDAS subscribe to English Heritage's OASIS (Online Access to Index of Archaeological Investigations) project, and all EDAS projects are fully OASIS compliant. Prior to the start of any fieldwork, an OASIS online record will be initiated and key fields completed on Details, Location and Creators forms. All parts of the OASIS online form will be subsequently completed, and this will include an uploaded pdf version of the archaeological survey report.

Copyright

Copyright of all survey material and the survey report would pass to English Heritage at the end of the project, although the originators retain the right to be identified as the authors of all project documentation and reports as specified in the Copyright, Design and Patents Act 1988 (chapter IV, section 79). Any of the survey data and/or information contained in the survey report subsequently used by other interested parties should acknowledge the originators and authors.

Health and Safety, and Insurance

EDAS would comply with the Health and Safety at Work Act of 1974 while undertaking the project. A full copy of their Health and Safety Policy is available on request. Appropriate provision of first aid, telephone and safety clothing as required by IFA and SCAUM is provided. Ed Dennison will be nominated as the project safety officer.

Necessary precautions will be taken regarding overhead lines and other services. Especial care will be taken when working in close proximity to water bodies and steep slopes. A risk assessment would be produced prior to any site work. Health and Safety issues will take precedence over archaeological matters.

The site is privately owned, and EDAS would indemnify the landowner in respect of their legal liability for physical injury to persons or damage to property arising on site in connection with the survey, to the extent of EDAS's Public Liability Insurance Cover (£5,000,000).

Staffing and Experience

The project would be undertaken by EDAS, who are registered as an Archaeological Organisation with the Institute for Archaeologists.

The project would be undertaken by Ed Dennison and Shaun Richardson of EDAS. Both have some 20 years experience in non-intrusive earthwork and topographical survey, and they have undertaken numerous walkover and detailed surveys of specific monuments and of areas of historic landscape throughout Yorkshire. These surveys have included land uses of all types, and in addition to identifying a wide range of archaeological remains, detailed management strategies and recommendations have been proposed. Some of these surveys have included 2WW sites, for example an anti-aircraft searchlight battery at Cracoe, North Yorkshire (Richardson & Dennison 2011), various slit trenches and training facilities in Cawthorn Woods, North Yorkshire (Dennison 2005), the identification of hut bases, shelters, a searchlight battery and a balloon tethering station at Preston, East Yorkshire (Dennison 2009), a coastal radar station at Bent Riggs near Ravenscar, North Yorkshire (Dennison & Richardson 2012), and 2WW civilian air raid in Hamburg, north Germany (Richardson 2008). Further details of EDAS's activity can be found on their website *www.edarchserv.co.uk*.

The topographical survey will be undertaken in conjunction with Benchmark Land Surveys of Leeds, who have worked with EDAS on numerous similar survey projects in the past.

Curriculum vitaes can be provided on request.

Modifications

The programme of recording work may be modified in accordance with the professional judgement of the staff undertaking the work, insofar as the overall provisions and objectives of this project design would not be changed. Any variations in the project would be discussed and agreed with the project monitors prior to implementation.

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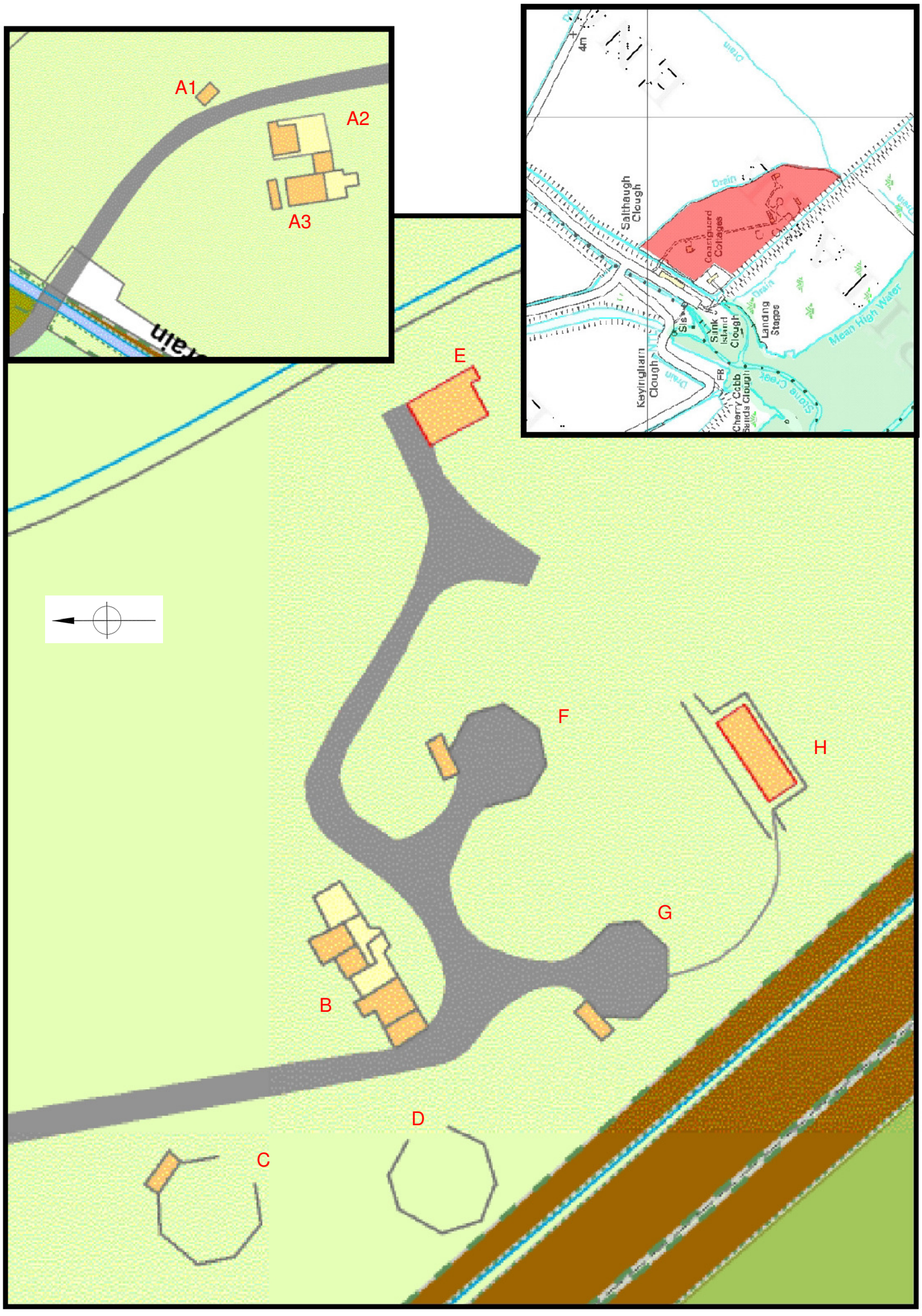
Ed Dennison
Ed Dennison Archaeological Services Ltd
September 2013


A1
A2
A3
Salthaugh Clough
Coastguard Cottages
Drain
Sink Island Clough
Landing Stages
Mean High Water
Keyingham Clough
Cherry Cobb Sands Clough
Stone Creek
E
F
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