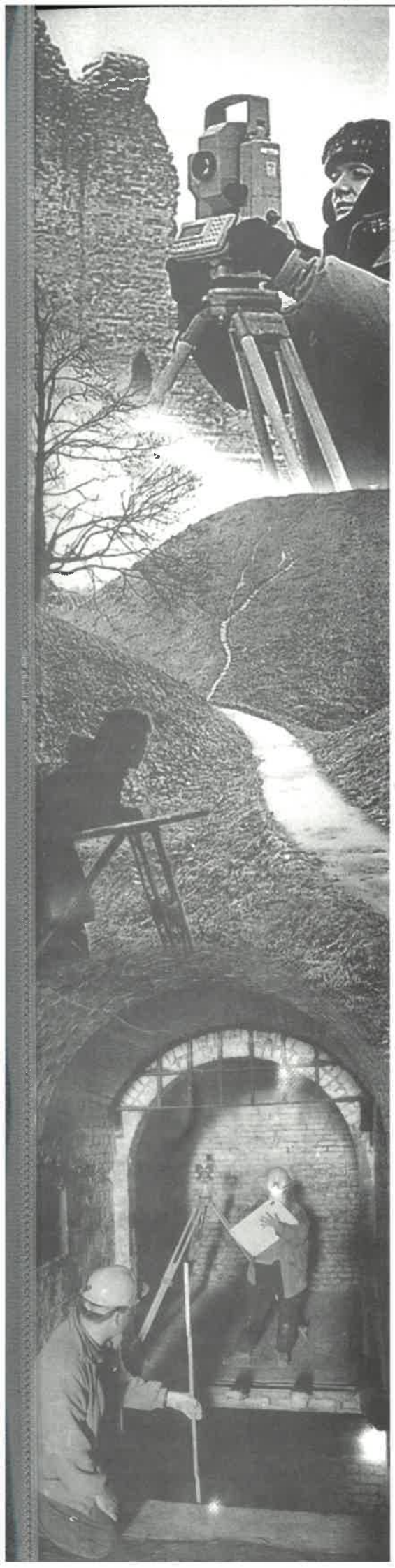

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Landguard Fort report no 3: Right Battery

Felixstowe, Suffolk

Moraig Brown, Nathalie Barrett & Paul Pattison

SURVEY REPORT

ARCHAEOLOGICAL INVESTIGATION SERIES: AI/22/2004

ENGLISH HERITAGE

LANDGUARD FORT

report no 3: RIGHT BATTERY, FELIXSTOWE, SUFFOLK

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Archaeological Investigation Report Series AI/34/2004

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District:	Suffolk Coastal
Parish:	Felixstowe
NGR:	TM 284 318
NMR No:	TM 23 SE 230
SM/ RSM No:	21407
Date of survey:	June-August 2003
Surveyed by:	Louise Barker, Nathalie Barrett, Moraig Brown and Paul Pattison
Report author:	Moraig Brown, Nathalie Barrett and Paul Pattison
Illustrations by:	Moraig Brown and Nathalie Barrett
Photography by:	Steve Cole

Cleaning the barrel of no II gun in 1943. Note the Fire Commander's Position on top of Landguard Fort in the background
(IWM: H3294; reproduced with the kind permission of the Imperial War Museum)

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GLOSSARY

Barbette
A protective breastwork or forward edge of an emplacement, over which the guns fire

Covered way
A continuous walkway, protected from enemy fire by an earthwork parapet

Glaçis
The external slope of a defensive work, carefully profiled and often massively reinforced with earth and other materials to absorb in-coming shell fire

Talus
The rear slope of a rampart

Terreplein
A level surface behind the parapet providing a platform for guns

ABBREVIATIONS USED IN THE TEXT

AA	Anti-aircraft
AR	Ammunition recess
BC(P)	Battery Command (Post)
BL	Breech-loader
BOP	Battery observation post
BPR	Battery plotting room
BRDR	Battery and range dial (equipment) recess
CASL	Coast artillery searchlight
CB BOP	Counter Bombardment battery observation post
CD BOP	Close Defence battery observation post
CR	Cartridge recess
DEL	Defence electric light
DRF	Depression range finding (equipment)
DS	Directing station
ELD (S or P)	Electric light directing (station or post)
FC	Fire command
FR	Fuze recess
GGC	Gun group commander
GS	Group store
HAR	Hydraulic accumulator recess
HV	Howarth ventilator
IH	Issue hatch
LR	Lamp recess
MTB	Motor torpedo boat
PF	Position-finding
PWSS	Port War Signal Station
QF	Quick-firing
RA	Royal Artillery
RML	Rifled muzzle-loader
SR	Shell recess
WD	War Department
WO	War Office

1. INTRODUCTION

1.1 Summary

Between June and July 2003, staff from the Archaeological Investigation department of English Heritage (EH), based in Cambridge, carried out survey and analysis of the earthworks and buildings of Right Battery, at Landguard Fort in Suffolk (NMR no TM 23 SE 2). The survey forms part of a wider study of the historic defences on the Landguard peninsula, carried out during an extensive conservation project on the fabric of the fort and its three associated coast artillery batteries. The survey will also provide detailed information to assist in understanding the extent and significance of the archaeological resource of the peninsula, following an extension of the Scheduled Monument area (no 21407) to include much of the surviving area of the sand and shingle spit extending from Manor House car park to Landguard Point. It is essential to its future conservation and management.

This report is the third in a series of five as follows:

1. Landguard Peninsula report No 1: An outline history of the defences of Harwich Haven 1539-1956
2. Landguard Peninsula report No 2: Landguard Left Battery; a late 19th-century coast artillery battery
3. Landguard Peninsula report No 3: Landguard Right Battery; a 20th-century coast artillery battery
4. Landguard Peninsula report No 4: Darell's Battery; a 20th-century coast artillery battery
5. Landguard Peninsula report No 5: The military landscape

1.2 Description

Landguard Fort is located on a peninsula south-east of Felixstowe in Suffolk, immediately south of the Port of Felixstowe which is separated from the Fort by only a

Figure 1
Location map

narrow road (figures 1 and 2). The peninsula defines the approaches and eastern side of Harwich Haven, a natural harbour at the confluence of the rivers Stour and Orwell. The town of Harwich lies on the western side of the Haven, and fortifications defending the area have long been established both there and on the Felixstowe side.

2. HISTORICAL BACKGROUND

2.1 Protecting the Haven: Landguard Fort

Orwell, or Harwich, Haven is a large sheltered anchorage at the confluence of the rivers Orwell and Stour, one of only a handful of safe ports on the east coast of England. With easy access to the Continent, Harwich has long fulfilled a vital role in naval operations and in international and coastal trade, and was attractive to an enemy as a potential bridgehead port from which to supply a raiding or invasion force. As such it has always been an important place to defend and hold.

Since the 12th century, the principal settlement of the haven has been on the south side at Harwich. On the north side, Landguard Point forms the tip of a long peninsula, where the channel of the River Orwell flows very close to the land. As a result, all but light vessels entering the haven passed very close to the point; hence the strategic value of fortifications built there from the mid 16th century onwards. On the south side of the haven, the estuary is shallower and was commanded over the years from gun batteries positioned on the low promontory of Beacon Hill and along the shore to Harwich town itself. Further defence of the anchorage came from guns emplaced on another peninsula at the confluence of the two rivers at Shotley. In this way, guns could be brought to bear from many points on enemy vessels that were trying to enter or had already gained the haven (figure 2).

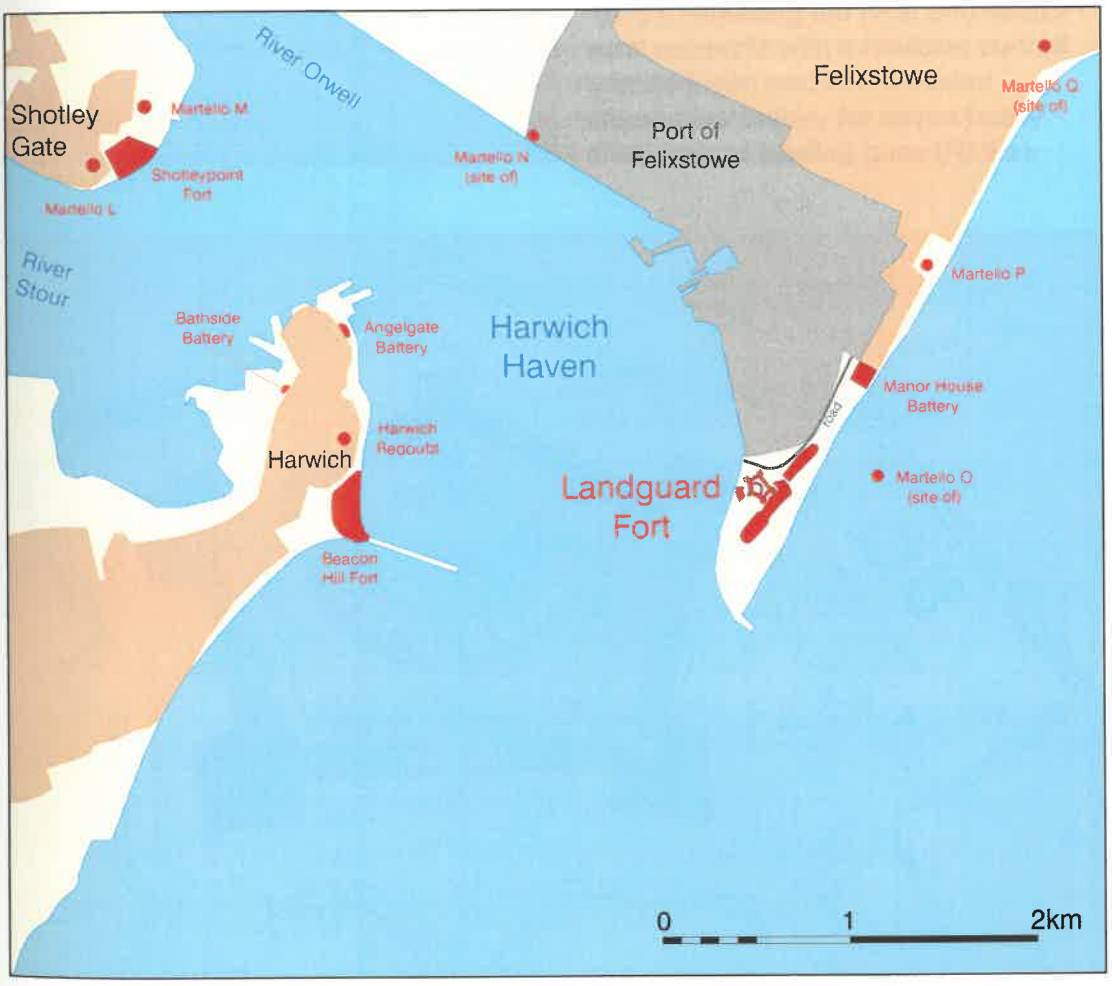


Figure 2 *Harwich Haven, showing the main fortifications defending it*

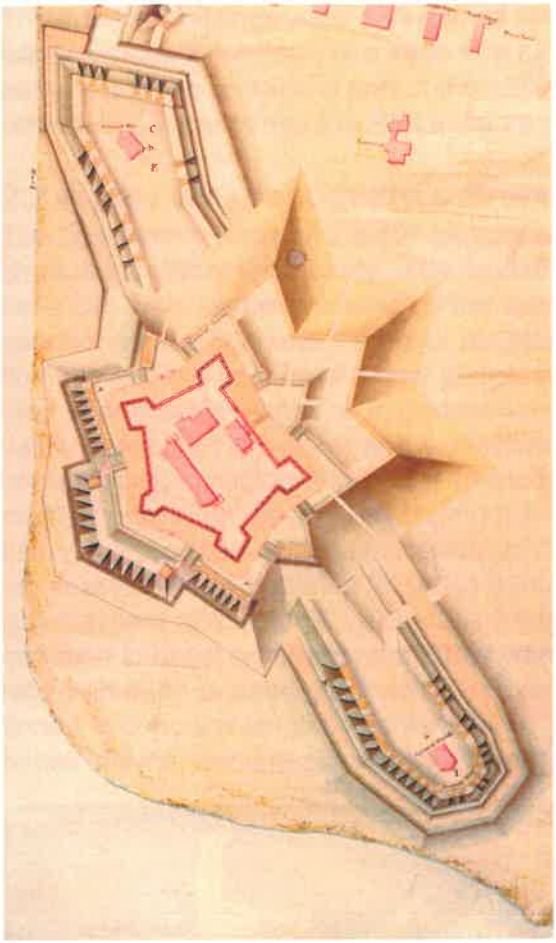


Figure 3
Landguard Fort in 1784. The wing batteries are later work by Thomas Hyde Page, but the central area is the fort as completed by 1750, with Beauclerk's Battery on the seaward (centre left) side. (extract from PRO: MR 1/1201; reproduced with the kind permission of the National Archives)

A fort at Landguard has been a major part of the haven defences since the great national defence policy of Henry VIII. From that time, the haven has been used as a naval base and anchorage in successive conflicts, including the Dutch Wars of the 17th century and in both World Wars of the 20th century. This period witnessed the construction, demolition and modification of several forts to meet and counter new threats, leaving the present hybrid structure which dates partly from 1717-20 but mainly from 1745-50 and 1870-8 (figures 3 and 4). The work of the 1870s almost didn't take place, as a battery at Shotleypoint, built in the 1860s, was considered by some to be capable of defending the entire haven. Those favouring the retention of Landguard won the day and major alterations were made to the old bastioned fort in the 1870s, replacing the west and south-west ramparts with a massive curved granite-faced and iron-shielded casemated battery for seven heavy rifled muzzle loading guns (RMLs).

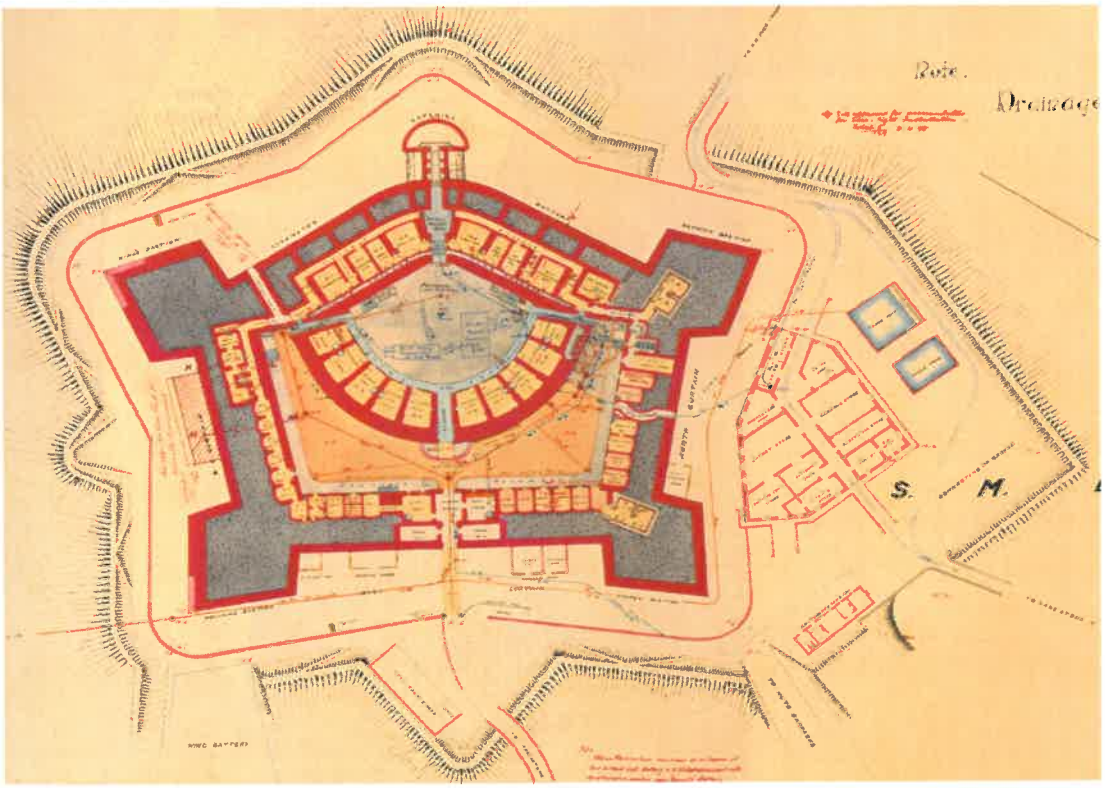


Figure 4
Landguard Fort following the 1870s work. The south-west bastion (shown centre top) was remodelled to form a caponier, but otherwise the main fort remained essentially unchanged. Inside, a new casemated barracks was constructed in the parade ground, while the forward face wasa adapted for heavy casemated guns. (PRO: WO WO78/5147/4; reproduced with the kind permission of the National Archives)

The internal buildings were demolished and replaced by a semi-circular casemated barrack block in the form of a keep that broadly mirrored the shape of the new battery, and the remaining part of the old *terreplein* and the four bastions were remodelled for another nine RMLs (figure 4).

2.2 A new era: Landguard's Breech-loading gun batteries

The final twenty years of the 19th century saw a dramatic increase in the pace of change in military technology. The fundamental principles and design of fixed defences were radically altered by the appearance of new weapons, electricity, telephones and concrete. A major development in the mid 1880s was the introduction into general service of a new generation of fast breech-loading (BL) guns; these fired over greater ranges, with greater accuracy, using cartridges and shells with vastly improved propellants and explosives. Various calibres were made for particular purposes, including 6-inch and 10-inch guns for long-range counter-bombardment of enemy naval vessels, while quick-firing (QF) 3-pdr, 6-pdr, 12-pdr and 4.7-inch guns provided close-in protection of harbour mouths against small fast marauding vessels. New batteries for these guns were designed around the principles of concealment and minimising damage from incoming fire, rather than massive construction to resist bombardment. They were built with a low forward profile incorporating an earth or sand *glaçis* to absorb enemy bombardment, with the guns positioned in concrete emplacements behind. Magazines and storerooms were located below ground, underneath or behind the guns, for maximum protection.

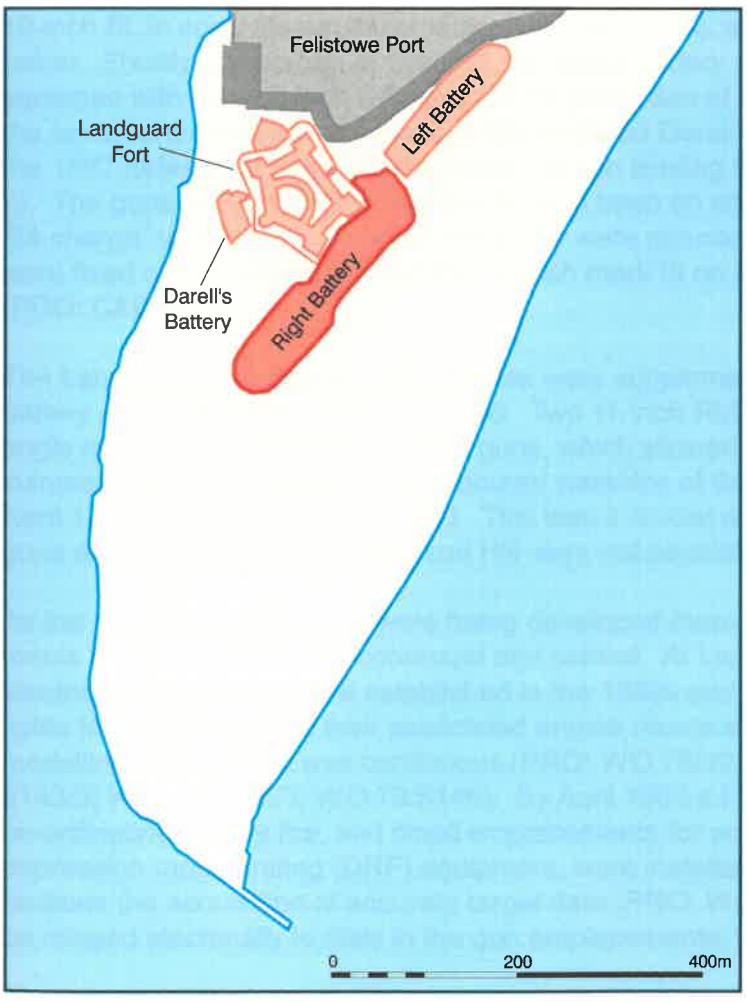


Figure 5 *The Landguard Fort complex, showing the major gun batteries*

In the Harwich defences, the first of the new batteries was built in 1888-9 to the north-east of Landguard Fort (figure 5). Called Wing Battery, but later renamed Left Battery, its initial armament was one 6-inch BL and one 10-inch BL, with a light 3-pdr QF gun on the left flank. A third emplacement for an additional 6-inch BL gun was made in 1898-9, and a machine gun replaced the QF gun (PRO: WO 78/5137). Left Battery was built for guns mounted on disappearing carriages which, after firing over a parapet, recoiled into the safety of deep concrete emplacements for reloading.

The second of the new batteries, designed to cross its fire with Left Battery, was built on the other side of the haven at Beacon Hill in Harwich between 1889 and 1892. It was equipped for one 10-inch BL and two 6-inch BL on disappearing carriages as well as two 4.7-inch QF guns (PRO: WO 78/5141). It was a small fort in its own right, with a perimeter defended by an infantry detachment equipped with magazine rifles (Brown & Pattison 1997).

By the late 1890s, disappearing carriages were considered too complex and carriage design was simplified to enable a more rapid and accurate rate of fire. This was achieved through new mountings which allowed recoil to be absorbed over a very short distance along the axis of the gun barrel, under hydro-pneumatic control. This also allowed the guns to be returned to a fixed carriage, with a central pivot, firing over a parapet without the need for retraction into a gun pit. Right Battery was built to this design, immediately south-east of Landguard Fort, between 1898 and 1901 (PRO: WO 78/5136/11). The initial armament comprised two 6-inch and one 10-inch BL in concrete emplacements, with magazines, stores and shelters provided below. Shortly afterwards, in 1900-01, Minefield Battery was built nearby and equipped with two 4.7-inch QF guns for the protection of the submarine minefield at the haven entrance (it was subsequently renamed Darell's Battery after the hero of the 1667 defence of Landguard against a Dutch landing force) (PRO: WO 78/5139/2). The guns at Right Battery appear to have been on site but *"dismounted and in RA charge"* until 1902/3, at which point they were mounted. The 6-inch mark VIIs were fixed on CP mountings and the 10-inch mark III on a *barbette* IV mounting (PRO: CAB 18/19).

The Landguard and Beacon Hill batteries were supplemented by alterations to the battery at Shotleypoint, agreed in 1888. Two 11-inch RMLs were installed on high-angle mountings, replacing six older guns, which allowed plunging fire onto the more vulnerable wooden decks of the armoured warships of the day (Trollope 1983, 8; Kent 1988, 92; PRO: WO 78/4051). This was a crucial decision, as the existing guns at Landguard Fort and Beacon Hill were not capable of high-angle fire.

As the new BL and QF guns were being developed there were associated developments in their co-ordinated command and control. At Landguard and Harwich electric light defences were established in the 1880s and 1890s, comprising searchlights for night firing and their associated engine rooms and directing stations. Remodelling and revision was continuous (PRO: WO 78/4089; WO 78/4227; WO 78/5143/3; WO 78/5145/3; WO 78/5146). By April 1903 a Fire Commander's Post, for co-ordinating battery fire, and small emplacements for position-finding (PF) and depression range finding (DRF) equipment, were installed on the roof of the fort to facilitate the acquisition of accurate target data (PRO: WO 78/5145/2). This could be relayed electrically to dials in the gun emplacements.

Although the result was a formidable system of defence for the haven, changes followed in 1905, with the report of the Committee on the Armaments of the Home Ports (the Owen Committee) (PRO: CAB 16/1) This report rationalised harbour defences by establishing three clearly-defined classes of port with defences allotted proportionately. Harwich was in the lowest grade (C) and thought vulnerable to attack from only lightly armoured warships. As a result, its defensive capability was reduced in the years following, mainly by removing the 10-inch guns and all the disappearing guns from Landguard Left, Landguard Right (1909/10) and Beacon Hill Batteries and by taking away the old RMLs from Shotleypoint and the Circular Redoubt in Harwich. Because of the low classification of the haven the 4.7-inch guns were to have been removed. However, the grading was contested, and in 1912 Harwich Haven was designated a commercial port with special military and naval significance. During this period of negotiation (1905-1912) the 4.7-inch guns were retained but not approved. By 1912 the haven was defended by the submarine minefield, together with the 6-inch and 4.7-inch guns at Landguard Right and Beacon Hill (PRO: CAB 16/1).

Right Battery was provided with position-finding equipment in 1907 and, in the following year, four searchlights (defence electric lights (DELs)) were constructed (PRO: WO192/213).

2.3 The First World War, 1914-8

The growing threat from Germany resulted in nationwide preparations in the ten years before 1914. Consequently, home defences were in a state of readiness when war broke out. At Harwich, however, there was concern about the lack of long-range coast guns for the counter-bombardment role, following the removal of the 10-inch BLs. This situation was remedied in 1915 with the construction of Brackenbury Battery, at the northern end of Felixstowe, for two 9.2-inch BL guns to cover the approaches. This calibre of gun had become the heaviest standard weapon employed by units of coast artillery and was to remain so until the abolition of coast guns in 1956. Both these and the remaining guns at Harwich and Landguard were manned throughout the war, day and night, but none saw action. From 1913, Right Battery was officially renamed *Landguard Battery*, but will continue to be referred to as Right Battery for the purpose of this report (PRO: CAB 11/151).

During the war the haven was a major naval base, used by destroyers and other vessels. The entry and exit of all shipping was controlled from a Port War Signal Station (PWSS), moved in 1913-14 from one of the Martello towers into the Fire Command (FC) Post on the roof of Landguard Fort, from which all of the haven's guns were controlled (PRO: WO 78/5143/2; WO 78/2735). The PWSS was manned by naval personnel, including a signalling crew who used semaphore to challenge vessels entering or leaving the port, from a purpose-built shelter on Right Battery, replacing a pre-war position in the disused 10-inch emplacement. The guns of Right Battery had the 'Examination Role' in close defence of the harbour, covering all shipping until their identity was established. For this purpose, in 1914 a new Battery Command Post (BCP) and Electric Light Direction Station (ELDS) were completed in the disused 10-inch emplacement (PRO: WO 78 5136/14; WO 192/213). The submarine minefield remained in place, with a 'gate' that could be opened by specialised vessels to allow safe passage. As the risk of land invasion became a possibility, the Harwich and Felixstowe area was designated a Class 'A' Fortress with land defences comprising trenches, barbed-wire entanglements, blockhouses (pill

boxes) and earthen redoubts protecting key installations and approaches.

Anti-aircraft (AA) guns, including a 1-pounder QF naval 'pom-pom' gun on Right Battery, countered the new threat from airships and aeroplanes (PRO: WO 78/4423). In 1917 this had been replaced by a heavier 3-inch (20 cwt) QF gun in the AA role (PRO: WO 33/828). In 1913 a seaplane base - Felixstowe Royal Naval Air Station - was established immediately north of Landguard Fort. Four years later, in July 1917, the AA defences failed to prevent two German bomb raids of the seaplane base that resulted in 7 dead and 22 wounded, with substantial damage to slipways and seaplanes (PRO: AIR 1/667/17/122/745; AIR 1/668/17/122/766).

After the Armistice, the defences were scaled down, with the AA guns withdrawn and all of the temporary defences demolished or infilled. Most of the coast artillery was retained and in 1919, Right Battery had two 6-inch BL Mk VIIs, with two 3-pounder sub-calibre guns for practice; there was also a 12-pounder (6cwt) BL gun on a field carriage allocated as the weapon for the examination role (PRO: WO 33/942).

In 1919-20, plans were made to modify the empty emplacements on Left Battery and the 6-inch guns at Right Battery for high-angle mountings to enable an effective counter-bombardment role against enemy armoured warships. This was carried out to an advanced but experimental stage at Left Battery (where no guns were permanently mounted) but only minor works took place on Right Battery (PRO: WO 78/5137/2; WO 78/4254). Essentially, the 6-inch gun mountings on Right Battery remained largely unaltered.

2.4 The Second World War, 1939-45

From the very beginning of the war in 1939, the haven resumed the naval significance it had borne during the Great War. This made it a prime target for the Luftwaffe, especially during 1940-1, and for German naval vessels. At the outbreak of war the Harwich Fixed Defences, covering the haven and immediate area, were commanded from Landguard Fort. The armament comprised the two 9.2-inch BLs at Brackenbury Battery, which could engage enemy naval vessels at long range in counter bombardment, as well as the 6-inch BL, 4.7-inch QF and 6-pdr QF guns for close defence of the haven provided by Right and Darell's Batteries on the Landguard side and Beacon Hill Fort on the Harwich side. Right Battery retained the examination role as well as minefield control and close defence. At this time there were seven searchlights covering the haven (PRO: WO 78/5135/2). Right Battery was manned by detachments of 166 Heavy Battery Suffolk Heavy Regiment Royal Artillery (RA) (PRO: WO 192/213). This unit was renamed 279 Coast Battery RA (part of Suffolk Coast Regiment RA) in 1940, and in March 1941 they incorporated 329 Special Battery (PRO: WO 192/206; WO 192/523).

These defences were considered inadequate and in 1940 work began on the construction of three emplacements for twin 6-pounder guns, one at Beacon Hill (called Cornwallis Battery) and two at Darell's Battery. These weapons, to replace the 4.7-inch QF and 6pdr QF in the anti-motor-torpedo boat (MTB) role, were capable of extremely rapid and accurate fire to cover the harbour approaches, the minefield, and the beaches at Landguard and Dovercourt. Additional measures were taken at Right Battery and Beacon Hill against bombardment and strafing, with the provision of concrete casemates for the 6-inch guns by August 1940. The BCP and ELDS in the old 10-inch emplacement at Right Battery were extended and redesigned by

October of the same year (PRO: WO 192/213). An emergency battery of two more 6-inch Mk VII guns, in new concrete gun houses, was established a little to the north of Landguard Fort. Initially styled X Battery it was soon renamed as Manor House Battery (PRO: WO 192/213).

The threat from the air meant that additional defences were needed, and from 1939 heavy AA batteries of 3.7-inch guns were established on Landguard Common as well as elsewhere around the haven. Bofors, light AA Lewis and Bren guns were in use and a balloon barrage was established across the entire haven, with some balloons anchored on barges in the estuary and others on land (Foynes 1994, 127). Extensive land defences were also installed, in the form of pillboxes, infantry trenches and barbed-wire entanglements, while the beaches and sea fronts were lined with tank traps and steel scaffolding barriers.

In 1942, one of the 6-inch BL emplacements at Beacon Hill was rebuilt to a new design, comprising a gun house with overhead "plastic armour" to provide protection against aerial strafing, and a battery observation post (BOP) was built over one of the old 4.7-inch QF emplacements. A brick tower was constructed north of the battery for early developments in naval radar. As part of the same programme, in May 1942, work began to convert Right Battery for three guns: this involved the construction of two new 6-inch emplacements - to the same design as Beacon Hill - for 6-inch BL Mk 24 guns, replacing the old 6-inch BL Mk VIIs. This required a major extension of the battery north-eastwards for two new emplacements, while the old no II emplacement was to be modified. During construction, the battery was placed on a reduced state of readiness with only the old no I gun manned. By January 1943 the two new 6-inch BL Mk 24 guns were operational (designated nos 2 and 3 guns) but the planned installation of the third gun in the old no II emplacement failed through lack of funds, as did the updating of the BCP and ELDS into a Close Defence Battery Observation Post (CD BOP) – although new range-finding equipment was installed (PRO: WO 192/213; WO 199/523; WO 199/1173). Removal of the two old guns began in January 1943 and in April permission was granted for the construction of the CD BOP. At the same time, because the new guns could fire at high angles up to 45°, the battery was also given a counter-bombardment role, for which a Battery Plotting Room (BPR) was established in the old 10-inch magazine and a Counter Bombardment Battery Observation Post (CB BOP) begun on the old Left Battery. Although the latter was still not complete by the end of 1944, early in the same year the guns were working in conjunction with a coast artillery radar set, also established on the old Left Battery (PRO: WO 199/1173; WO 192/206; WO 192/213; WO 78/5136/2).

2.5 Decline and decommissioning, 1945-56

At the end of the war, the defences were rapidly reduced, although the army had plans to co-ordinate the area's fixed artillery defences from Landguard Fort. An order of 27th January 1945 placed Right Battery's two 6-inch Mk 24 guns onto a care and maintenance regime, and disbanded the Fire Command HQ of 515 Coast Regiment in Landguard Fort (PRO: WO 199/930). However, in February completely new 6-inch BL Mk 24s were installed in both emplacements (PRO: WO 192/213). The twin 6-pounders of Cornwallis and Darell's Batteries remained in service, the latter modified to provide a secondary AA role from 1948, being capable of high-

angle fire by 1950 (PRO: WO 192/209). In 1956, however, all coast artillery was disbanded and the 450-year story of the Landguard and Harwich defences came to an end (figure 6).

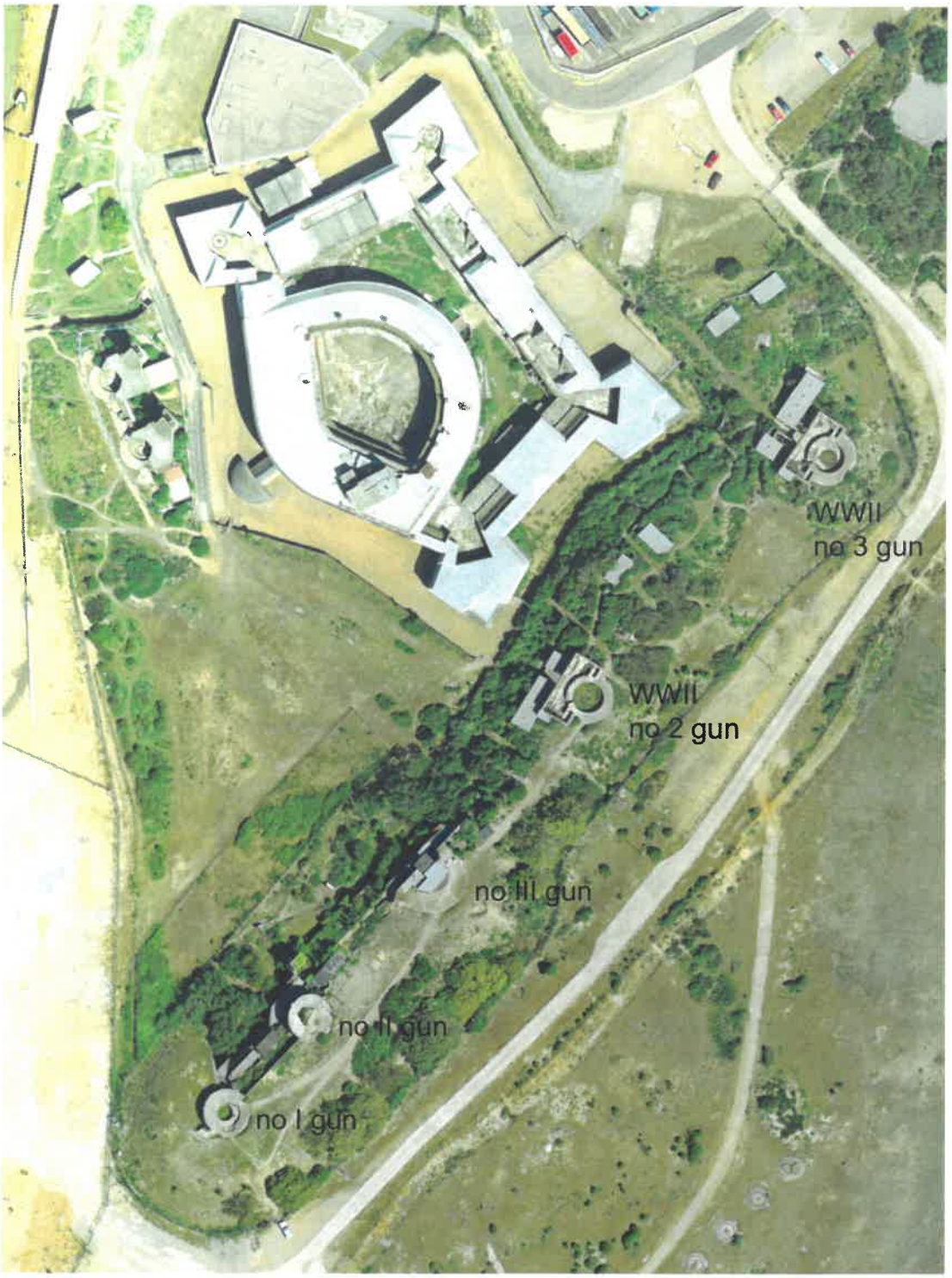


Figure 6
Aerial photograph of Landguard Fort and Right Battery (north at top) (LAF99Q01)

3. RIGHT BATTERY: DESCRIPTION AND INTERPRETATION

Words and letters shown in bold in the text may be found on the figure given at the beginning of that particular section. Other figure references occur in the body text. The battery is referred to throughout by its original name of Right Battery.

Figure 7 is the overall plan of the battery, showing the major features
Figure 9 is a detailed plan of the three gun emplacements of the original battery of 1898-1901
Figure 41 is a detailed plan of the magazines associated with the original battery of 1898-1901
Figures 77 and 87 are detailed plans of the gun houses and ancillary structures built in 1942-3

3.1 Summary

Right Battery lies immediately south of Landguard Fort (figure 7). The concrete and brick structures of the battery are built into the body of a carefully profiled linear mound, formed from shingle and sand, which extends as an earthwork for some 270m, with a maximum width of 58m and a maximum height of over 8m at its south-western end. At the north-east end another, detached mound of identical material supports one of two Second World War gun houses, blocking the seaward aspect of an earlier practice battery. The greater part of the battery is covered in scrub and there are several flights of timber-and-earth steps cut into the *glaçis* and *talus*. These allow access to long clearings where there are permanent nets established for bird ringing by the Landguard Bird Observatory based in Right Battery.

The shingle mound has two elements on very slightly different alignments. The south-western part is intact and supports the original gun emplacements and magazines of 1898-1901: it is 126m long by 41.2m wide by 8.6m high, with a broad gently-sloping top surface, 14.3m wide, and a steep *glaçis* to the front. The rear is formed into a high vertical concrete revetment wall containing multiple entrances to the magazines and shelters; behind it is a low bank, 84.5m long by 7.6m wide by 0.6m high, providing some protection for those structures against attack from the rear.

The north-eastern part of the mound has been significantly altered but it was originally shaped to provide a long and narrow *terreplein* with a parapet, the length of which suggests a use for infantry defence as well as for battery observation (figure 8) (PRO: WO 78/5136/11). It was modified in 1942 for new gun emplacements and ancillary buildings, resulting in loss of the original profile. Today, it is 105.4m long by 34.3m wide, the top surface varying in width between 4m and 12m. There is a steep *glaçis* and an equally steep *talus* which ends against the counterscarp wall of Landguard Fort.

The battery completed in 1901 had two 6-inch BL Mk 7 guns (nos I and II) and one 10-inch Mk 3 BL gun (no III). The three emplacements survive in variously altered states. The rear revetment wall incorporates entrances and windows to the magazines, artillery stores, lamp rooms and war shelters located on two levels. Flights of steel steps built against the revetment provided access to the various levels and to the *terreplein*, where a covered way gave protection for the crews moving between

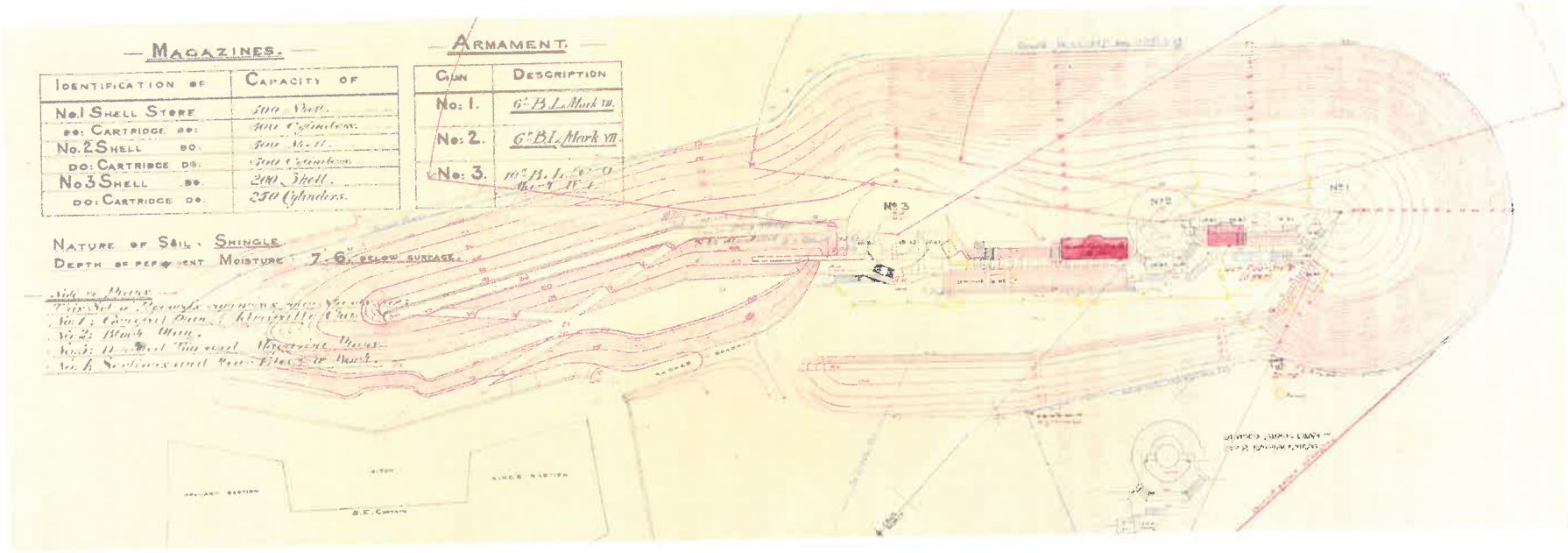
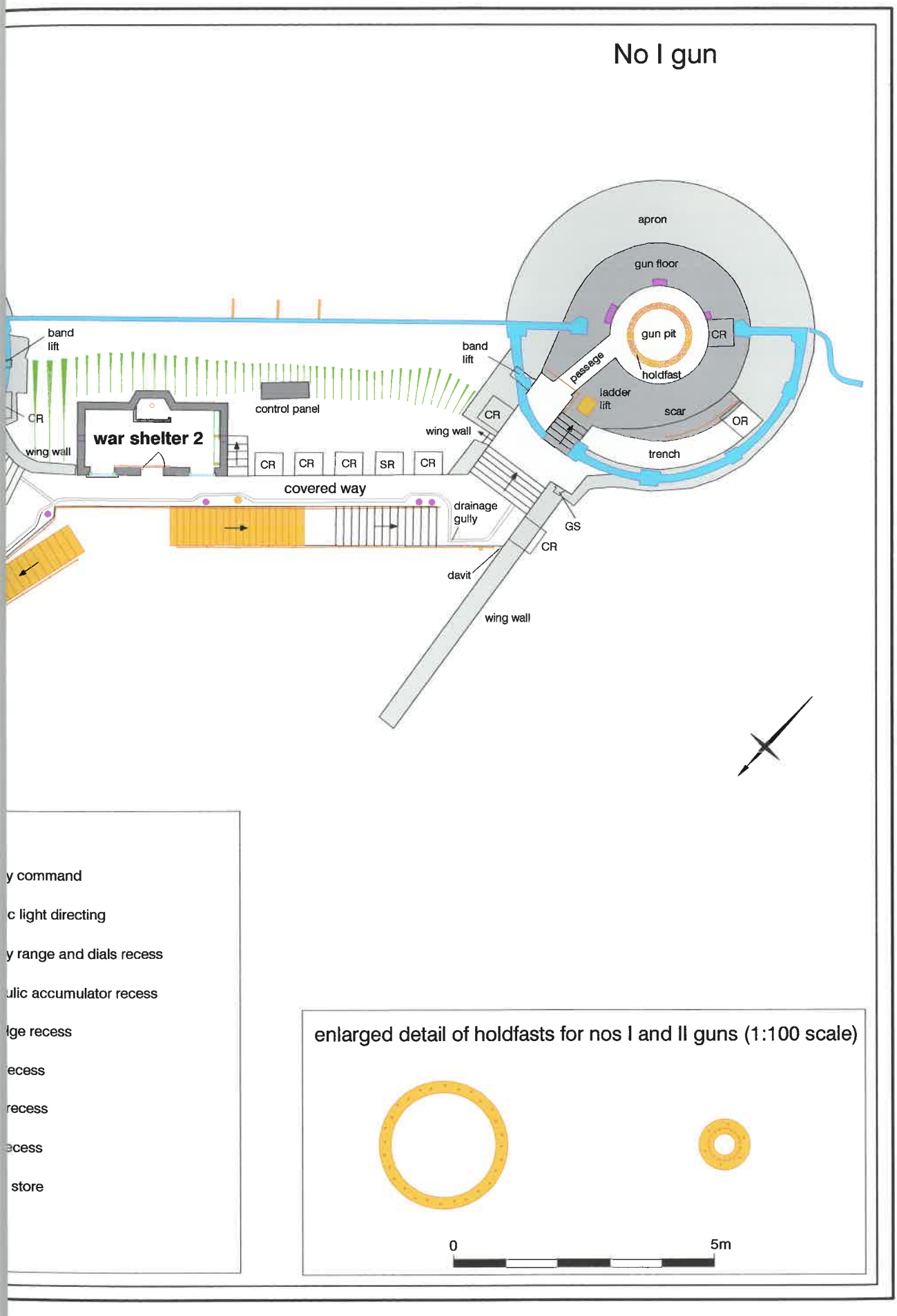


Figure 8 *Record plan of Right Battery in 1901* (PRO: WO 78/5136/11; reproduced with the kind permission of the National Archives)

the guns. In the early 20th century, additional gun floor shelters were built just behind the emplacements at *terreplein* level (PRO: WO 78/5136/14). Finally, a free-standing Battery Command Post (BCP) stood behind no II emplacement and served all three guns.

In 1909/10 the 10-inch gun was removed and in 1913 the empty emplacement was adapted to form a new BCP for the 6-inch guns, and an Electric Light Directing Station (ELDS) for co-ordinating the lights on the Landguard peninsula used during night fighting. The flat-roofed concrete BCP and ELDS are intact but subsumed within the larger BCP/ELDS built in 1940 and modified as a Close Defence Battery Observation Post (CD BOP) in 1943.

During the early part of the Second World War, the 6-inch guns were given concrete casemates to protect the gunners from aerial attack. Both of these are intact, though slightly damaged following removal of their guns in 1942. The guns were superseded by two 6-inch BL Mk 24 guns emplaced in new concrete gun houses. These, along with their ancillary buildings, are in excellent condition on and beyond the northern end of the original mound.


No I gun
apron
gun floor
gun pit
CR
holdfast
passage
ladder lift
scar
OR
trench
band lift
band lift
control panel
CR
wing wall
war shelter 2
wing wall
CR
CR
CR
SR
CR
covered way
drainage gully
GS
CR
davit
wing wall
y command
c light directing
y range and dials recess
ulic accumulator recess
lge recess
ecess
recess
ecess
store
enlarged detail of holdfasts for nos I and II guns (1:100 scale)
0
5m

3.2 THE 6-INCH GUNS OF 1901-43

NO I GUN EMPLACEMENT (figures 9 and 10)
There are four phases evident in this structure:

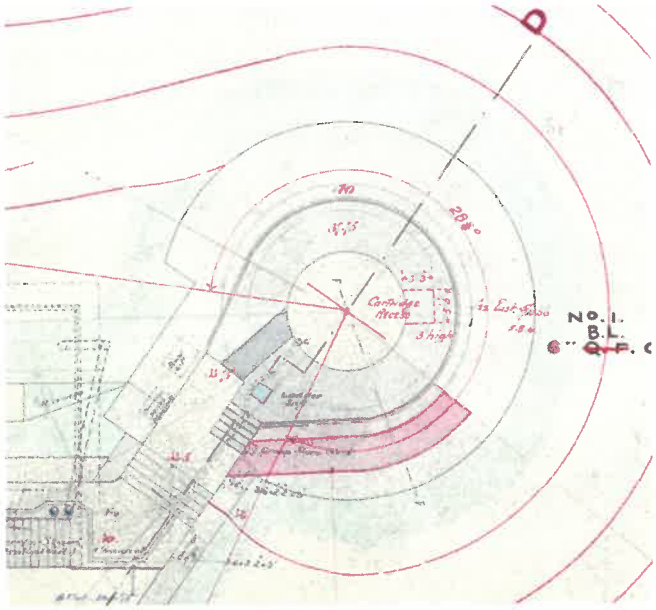


Figure 11
No I gun: emplacement as built between 1898 and 1901 (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

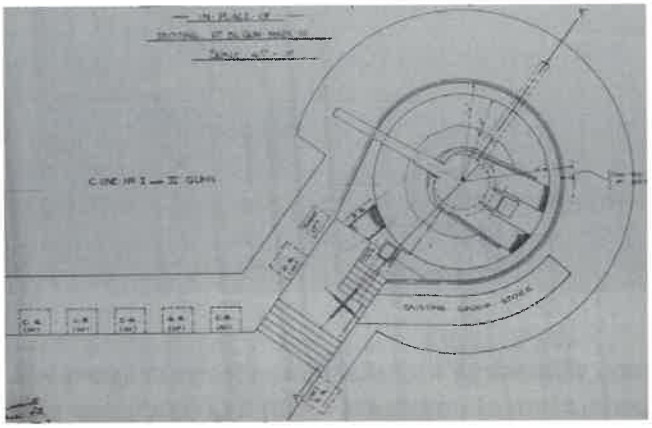


Figure 12
No I gun: proposal plans for conversion of no I gun in 1919 (PRO: WO 78/4254; reproduced with the kind permission of the National Archives)

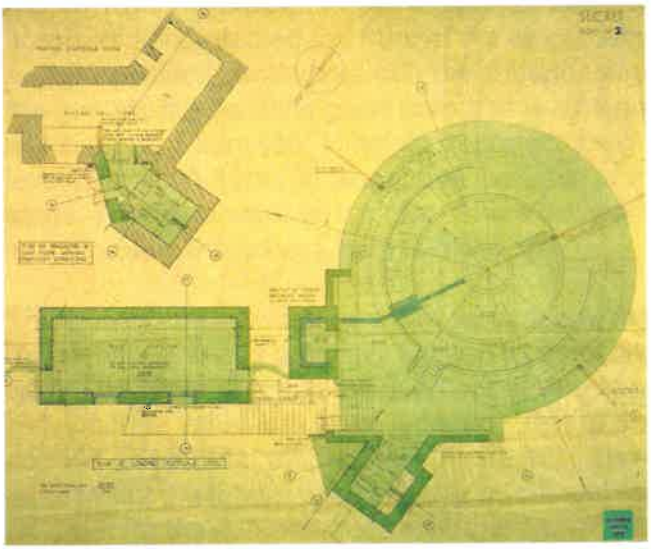


Figure 13
No I gun: proposal plans for the conversion of no I gun and magazine in 1942 (PRO: WO 78/5136/1A; reproduced with the kind permission of the National Archives)

Phase one: the original emplacement of 1901 was for a 6-inch BL Mk VII gun with a 288° arc of fire. It comprised a circular gun pit, with a raised gun floor surrounding the pit and a sloping apron beyond. There were three ready-use ammunition recesses, two ammunition lifts, and a recess for group stores (figure 11).

Phase two: in June 1913, approval was given to alter the north-western half of the emplacement to create a narrow trench in the gun floor, necessitating the re-arrangement of one of the cartridge stores and the group store (in pink on figure 11). The work was completed in 1914. Whatever its purpose, it was subsequently used as a fire trench for infantry defending the battery (PRO: WO 78/5136/14; WO 78/5137/4).

Phase three: in December 1919 plans were made to convert the emplacement to accommodate a 6-inch gun on a high angle mounting, capable of firing at elevations up to 45° (as opposed to 15°) (figure 12). This would have resulted in a gun placed deeper in a broader gun pit. It is possible that this work was begun but not completed, to judge by five additional ready-use ammunition recesses shown on the proposal and visible today. However, it is more likely that the extra recesses were actually constructed during the First World War.

Phase four: in July/August 1940 a concrete casemate was constructed over the emplacement to protect it from aerial strafing (PRO: WO 192/213 p 37). In 1942 it was again proposed to modify the emplacement for a 45° gun mounting (PRO: WO 78/5136/1A) (figure 13). This would have included alterations to the shell store and lamp room in the magazine below, for new rapid shell and cartridge lifts, but the plans were abandoned, having been superseded by the decision to build two new gun houses for the 45° guns further north-east. In 1943 the old 6-inch BL Mk VII gun was removed, resulting in the destruction of some parts of the emplacement (figure 14).

Figure 14
No I gun: the 10-ton shield being removed in 1943; note the painted camouflage on the gun barrel and casemates (IWM: H28714; reproduced with the permission of the Imperial War Museum)

The mass concrete emplacement essentially comprises a circular gun pit with a gun floor surrounding it and a low *barbette* and sloping semi-circular apron to the front (figure 15). The *barbette* rises 0.69m (2ft 2in) above the gun floor to the lip of the apron, which protected the front of the emplacement. The **apron** slopes outward to a slight gradient continuous with the superior slope of the *glaçis*. On the flanks of the gun pit, the *barbette* gives onto and is continuous with the emplacement walls, which reach 1.83m (6ft) in height to protect the gun floor. The gun floor forms a level platform 1.19m (3ft 9in) above the base of the gun pit, reached by a flight of steps. The entrance is at the rear, where the emplacement walls turn into wing walls which protect the access from flanking fire.

The **gun floor** is divided by a narrow passage that allowed access to the gun pit for maintenance: it was originally capped by steel chequer plate, for which only the rebate is visible. Set into the gun floor at three points on the perimeter are panels of red concrete inlaid with white lettering. Two of these read "Light house" and "Beacon Hill & Redoubt" respectively (figure 16). The third was damaged by alterations in 1914 but the letters were partially re-set and read "...C. Post 4" 7" (possibly the BC Post for the 4.7-inch guns on either Darell's Battery or Beacon Hill Battery in

Harwich). These are the bearing markers used to check the orientation of the gun so that range and bearing information relayed from the Battery Command Post would result in accurate laying of the gun onto its target. The rear of the gun floor also contains a hinged metal hatch covering a ladder lift for shells, under which the mechanism is *in situ*. The metal stanchions for a handrail around the rear of the gun floor also survive, although most of the rails have been removed.

Figure 16 *No I gun: concrete bearing markers on the perimeter of the gun floor* (NMR: AA051377/ AA051378)

A difference in the type of concrete in the western part of the gun floor marks the original edge of the gun pit. The flat-bottomed trench formed in 1914 lies beyond. At the end of the trench is an open recess with a concrete lintel, probably for ready ammunition, above which a painted sign reads "A1" (the original gun designation). The poor finish of the trench and recess is consistent with a hurried or *ad hoc* construction immediately prior to war.

The maintenance passage enters the gun pit with a step down of 0.27m (10in). There is a continuous recess around the wall of the gun pit for shell storage, above which are the remains of a galvanized hood, covering a metal rail for curtains to protect the shells from the elements (see figure 15). The **gun pit** is 3.78m (12ft 4in) in diameter, and contains an annular steel holdfast plate which secured the gun mounting of central pivot type. The plate is a maximum of 2.48m (8ft 1in) in diameter and is 0.23m (9in) wide, with two concentric rings of bolts, each 0.04m (1½in) in diameter by 0.15m (5in) high, slightly offset from one another (see figure 9, detail of holdfast). There is a small square drain in the floor on the north side. A ready-use cartridge recess was inserted under the south-western part of the gun floor as part of the 1914 alterations (PRO: WO/78/5136/14).

Figure 17 *No I gun: the opening at gun floor level for the band lift which transported cartridges from the magazine* (NMR: AA051380)

Set into the eastern **wing wall**, 0.49m (1ft 6in) above the floor, is the opening of a band lift for cartridges, which measures 0.57m wide by 0.94m deep by 0.50m high (1ft 8in by 3ft by 1ft 6in) (figure 17). The opening retains only a steel frame for a door, which was hinged to the side, while much of the wooden framework of the lifting mechanism inside is intact. Above it, the most recent of a series of signs reads "Ammunition Lift". This wing wall also contains a cartridge recess, measuring 1.06m

wide by 0.99m deep by 0.91m high (3ft 4in by 3ft 2in by 2ft 10in), missing its doors and frame, and only a trace of the galvanized rain hood has survived re-rendering. Several superimposed painted signs above the recess are too fragmentary to read.

The alterations of 1914 destroyed a ready-use shell recess and a group store recess in the western **wing wall**. A replacement group store was constructed nearby in the wall (PRO: WO 78/5136/14). It is a small recess, measuring 0.31m wide by 0.23m deep by 0.51m high (1ft by 9in by 1ft 8in), situated 0.51m (1ft 8in) above floor level. Only the rebate for its wooden doorframe, 0.05m (2in) wide, survives. Adjacent is another original cartridge recess of standard pattern, with a multi-phase sign above it; the most recent of which records a change of use: "SHELL RECESS...$^{H}/_{1}$" but most of its area is obscured by later electric light fittings. Next to the recess a barely visible sign reads "H...1", the gun designation during the Second World War (PRO: WO 192/213; WO 78/5136/6).

By August 1940, a reinforced concrete **casemate** had been built to protect the emplacement from aerial strafing (IWM: H3294). Its roof, 0.32m (1ft) thick, is supported 2.56m (8ft 4in) above the gun floor on nine piers; it had asbestos sheeting as an internal lining and asphalt as an external weatherproofing. With the exception of those to the front, the walls are of corrugated concrete pierced by small inwardly-splayed openings into which thick circular glass panes were fixed to provide illumination for the gun floor; it is not clear when the electric lighting present in the casemate was installed. There is a single doorway to the rear, 2.02m high (6ft 7in), that retains its metal frame but not the outward-opening door. Attached to each side of the casemate are flanking walls of corrugated concrete: the north-east wall, 2.30m (7ft 6in) high, links to no II gun emplacement; the south-west wall describes a wavy pattern in an attempt to camouflage the battery. Three metal brackets, each 0.70m (2ft 3in) long and set 0.94m (3ft 1in) above present ground level, project seaward from the wall; what they supported is unknown. The roof and sides of the casemate were damaged in 1943 to enable the removal of the gun (IWM: H28710-20).

Figure 18
An example of one of the Howarth ventilators which helped to draw damp air through the magazines and other rooms at the rear of the trace (NMR: AA051402)

Access between and behind the emplacements for guns I to III, and to the lower levels of the battery, was along a **covered way**, 1.19m (3ft 11in) wide. It is situated immediately above the main revetment and the drop is guarded by a metal railing. Narrow gullies, each 0.13m wide by 0.05m deep (5in by 2in), took rainwater from the gun pits to downpipes on the edge of the revetment. At intervals along the covered way are Howarth ventilators at the top of ceramic pipe vents coming through the body of the mound from the lower levels of the battery (figure 18). Behind emplacements I and II were davit hoists used for lifting heavy equipment; that for no I gun survives but only the bracket for no II gun is visible.

Along the south-east side of the covered way between no I and II guns is a row of five ready-use ammunition recesses, their floors situated 0.42m (1ft 4in) above the covered way. These are the most tangible evidence either of the aborted conversion plans of 1919 or of addition during the First World War; four were to hold 20 cartridges each while the fifth (second from the south) was for 25 shells (PRO: WO 78/4254). All but the south-western locker are equipped with steel frames and outward-opening heavy steel doors, secured by pivoting locking bars and padlocks. These doors are of the same pattern as those in the 1943 emplacements and may be replacements dating to the Second World War.

On the level ground above these recesses, now sheltered by the wall connecting the 1940 casemates, there is a small upright **concrete panel** (figure 19). Measuring 1.19m (3ft 11in) high, the panel contains two recesses. The largest is 0.80m wide by 0.25m deep by 0.89m high (2ft 6in by 10in by 2ft 10in) and is 0.12m (5in) from the floor: it has no trace of a frame, but there are the sheared ends of heavy-duty electric cabling as well as an electric light switch and a socket. The second recess is 0.32m wide by 0.28m deep by 0.30m high (1ft 1in by 11in by 1ft) and is 0.73m (2ft 4in) from the floor: it has no other features. This panel, which is rebated on the upper surface to take a lightly-built timber cover, is of unknown date but may have been installed to regulate electric supply to the emplacement(s). The original emplacement did not have electric lighting but it was added – at an unknown date. Some of the galvanized conduit remains in situ, along with switches and circular bulkhead lights. Electric lighting would certainly have been in place by 1940 for working inside the casemate but it was probably installed earlier, perhaps during the First World War. It is also possilbe that it was an early or temporary BC Post for the battery.

Figure 19 *Concrete control panel located between emplacements for gun nos I and II* (NMR: AA051382)

NO II GUN EMPLACEMENT (figures 9 and 20)
There are four, possibly five phases evident in this structure:

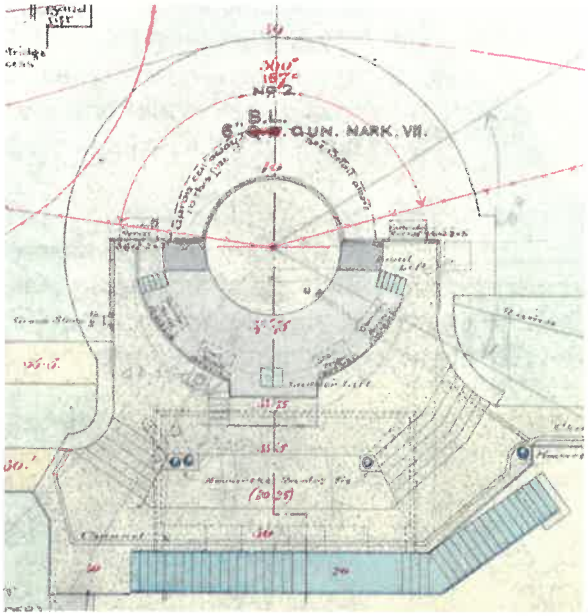


Figure 21
No II gun: record plan of the emplacement in 1901 (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

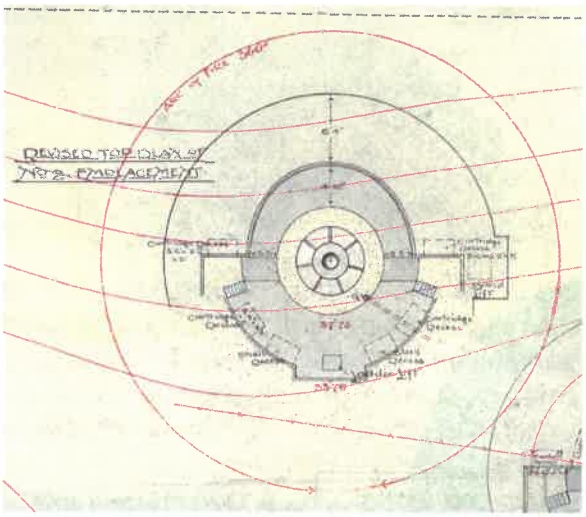


Figure 22
No II gun: detail from the record plan showing revision of the emplacement to accommodate a 360° angle gun (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

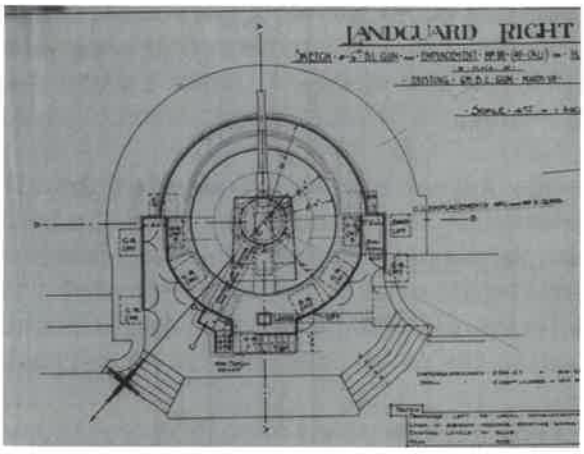


Figure 23
No II gun: plan of proposed conversion of the in 1919 (PRO: WO 78/4254; reproduced with the kind permission of the National Archives)

Phase one: the original emplacement of 1901 was for a 6-inch BL Mk VII gun with a 157° arc of fire. It comprised a circular gun pit, with a raised gun floor behind it, and a sloping apron in front. The rear of the gun floor and *barbette* contained six ready-use ammunition recesses, two ammunition lifts, and a recess for group stores (figure 21).

Phase two: by 1908 the emplacement was adapted for a new gun mounting to improve the arc of fire to 360° (PRO: WO 78/5136/11; 14; figure 22). This involved cutting away a section of the apron to extend the gun floor.

Phase three: In May 1920, proposal drawings were made for a similar conversion to that proposed for no I gun in 1919 ie a high angle mounting (figure 23). The only evidence for actual alterations are a series of recesses in the wing walls; these may be a result of the 1920 proposal but equally, they might have been formed during the First World War when the battery was in a full state of readiness.

Phase four: in July/August 1940 a concrete casemate was constructed over the emplacement to protect it from aerial attack (PRO: WO 192/213 p 37).

Phase five: the 6-inch gun was removed in April 1943, resulting in some damage to the emplacement and casemate. Subsequently the gun pit and gun floor were infilled and a rough concrete gun platform created over it, on which a smaller weapon was mounted. This appears to have been a 12-pdr QF gun, mounted probably as a temporary measure.

The original construction was formed in identical materials to no I emplacement, with the same basic features, but it differed in both layout and detail. The **apron** slopes to seaward at a similar angle but the *barbette* is obscured by the phase five gun floor, with only a short section visible on the south side of the emplacement, rising 0.66m (2ft 2in) above the original gun floor. Despite the phase five work, the emplacement walls can be seen to come back parallel to each other, framing the gun floor and reaching 1.95m (6ft 4in) in height. At the rear, they turn into short wing walls alongside the covered way.

There are two standard cartridge recesses at the front of the emplacement, on the flanks under the *barbette*, with scars from galvanized rain hoods above; if frames were present all traces have been obscured by re-rendering. Signs above both of the recesses record a change of use to "SHELL RECESS...", while an additional sign above the eastern recess reads "TO HOLD ...SHELLS" and "H – 2". As in emplacement no I, this probably refers to use in the period 1940-3 and indicates the gun designation at that time as H2.The original semi-circular **gun floor** encloses the rear half of the gun emplacement; it is 1.25m (4ft 1in) high. On the flanks, original flights of steel steps ascend the gun floor, which is guarded by a metal handrail to the rear and has two passages into the gun pit, both of which are obscured by the phase five alterations. Nevertheless, each passage is capped by steel chequer plates flush with the gun floor surface, which has anti-slip grooves. In a central position at the rear of the gun floor is a hinged metal hatch for a ladder lift that brought shells up to the gun; its mechanism is *in situ* (figure 24). There are also the remains of a bearing marker partly hidden by phase four work. It is identical to those in no I emplacement, in red concrete with white lettering reading "FO.." (possibly FORT).

Figure 24
No II gun: the top of the ladder lift on the gun floor (NMR: AA051386)

Under the gun floor there are four original ready-use ammunition recesses; two for cartridges and two for shells, of the standard design. Some retain their steel frames and paired doors carried on pintle hinges and secured by locking bars and padlocks. The makers' name, "FLAVELL & CHURCHILL" and "MAKERS, GREENWICH", is cast into some of the frames while some of the galvanized rain hoods survive.

The original gun pit is inaccessible and appears to have been filled with concrete-filled sandbags during phase five. Originally it would have been almost identical to no I emplacement. Alterations to the record plan, dated 1908, record changes to enable a 360° arc of fire, which required cutting away some of the apron to form an extended gun floor (PRO: WO 78/5136/14). A photograph taken in 1939 shows the gun crew on this extension (IWM: H698) (figure 25).

Under both wing walls are several recesses, most of which are additions to the original structure, indicated on the 1920 proposal for conversion to high angle fire but possibly of slightly earlier date. The north-eastern **wing wall** has two ready-use

Figure 25
No II gun: photograph taken in 1943 showing men on the forward part of the gun floor with the gun pointing over the rear of the emplacement (IWM: H698; reproduced with the kind permission of the Imperial War Museum)

ammunition recesses, allocated for cartridges in 1920, the southern one with a sign above: "TO HOLD 3..."; other signs nearby are illegible. Part of the galvanized rain hood survives over the northern locker. Between the lockers are two small recesses, one for fuzes, measuring internally 0.24m wide by 0.23m deep by 0.36m high (9in by 9in by 1ft 2in) and placed 0.87m (2ft 9in) from the floor. It has a 5cm wooden frame painted red, over green, with a wooden door hinged to the side and closed by a simple brass swivel catch. A sign above is illegible. The second of the small recesses is the only original one in this wing wall; it was a group store (PRO: WO 78/5136/14). Some 0.32m wide by 0.23m deep by 0.50m high internally (1ft by 9in by 1ft 7in), it is situated 1.22m (4ft) above the floor; it also has a wooden frame, identical to that of the fuze recess and painted red.

Figure 26
No II gun: the opening for the band lift which brought cartridges up from the magazine below; note the electric light fitting above (NMR: AA051389)

In the south-western **wing wall** is the original opening for a band lift for cartridges, complete with its steel door frame (figure 26). The door is missing but it was hinged to the side and locked by a stout metal bolt; inside the shaft much of the wooden framework of the mechanism is *in situ*. Over the lift is a scar from a galvanized rain hood and traces of an indecipherable sign. Adjacent, another inserted

Figure 27
No II gun: the sinuous concrete wall was an attempt to camouflage the otherwise straight lines of the casemate (NMR: AA051443)

ready-use ammunition recess has only part of its galvanized rain hood surviving and a sign above, painted over several times but clearly reading "SHELL RECESS..." although it is labelled for cartridges on the 1920 proposal (PRO: WO 78/5136/14; WO/78/4254).

The 1940 **casemate** is similar to that over emplacement no I but the roof is supported on only four piers. It has two doorways in the rear wall, each 2.0m (6ft 3in) high with steel frames for outward-opening steel doors, both of which are missing. The casemate has flanking walls of corrugated concrete: the south-west wall (see above) links to no I emplacement, while the north-east wall describes a wavy pattern in an attempt at camouflage (figure 26). The front of the casemate and part of the roof were broken out in 1943 to enable the removal of the gun (figure 28).

Figure 28
No II gun: Royal Engineers breaking the casemate in order to remove the gun in 1943; note the wooden prop on the right-hand side of the casemate, probably associated with the removal of the gun (IWM: H28717; reproduced with the kind permission of the Imperial War Museum)

The phase five work, probably dating to around 1943, is built over the infilled gun pit and part of the apron of the original emplacement. It is an open **platform**, D-shaped to the front and rectangular to the rear, the latter supported on three concrete piers and protected by a metal handrail (figure 29). Of crude construction, it rises 0.40m

Figure 29
No II gun: the concrete platform inserted into no II emplacement after the removal of the 6-inch gun in 1943 (left); and detail of the holdfast (right) (NMR: AA051392/ AA051388)

(1ft 4in) above the apron and 0.95m (3ft) above the original gun floor. The front of the platform has a steel holdfast plate for a 12-pdr QF gun, measuring a maximum of 1.22m (4ft) in diameter, formed by two concentric annular plates (figure 30). The outer plate holds a ring of six 0.04m (1½in) diameter bolts with hexagonal nuts, while the inner plate has a ring of eighteen 0.02m (¾in) bolt-holes.

3.3 ANCILLARY BUILDINGS FOR THE 6-INCH GUNS

Battery Command Post

This structure was the original Battery Command (BC) Post for the battery (including the 10-inch gun). It sits just behind the battery on a concrete platform supported on two high concrete piers that rise from ground level. The floor level of the building is only 0.27m (10in) above the level of the covered way, from which it is reached up two steps guarded by metal handrails (figure 30).

Figure 30 *BC Post: view from the south-west, with Landguard Fort in the backgound* (NMR: AA051385)

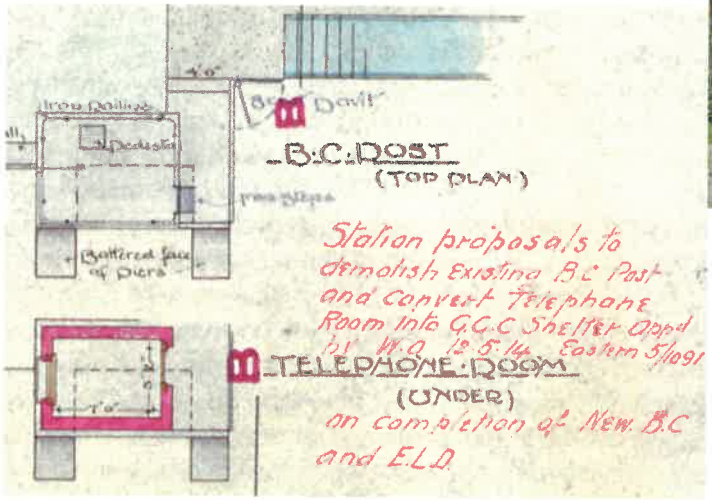


Figure 31 *BC Post: record plan of the original BC Post, dated 1901* (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

Originally, the platform supported a two-storey structure, comprising a BC Post with a Telephone Room underneath, shown on the 1901 record plan (PRO: WO78/5136/14). By 1903, this had been replaced by a single storey Telephone Room with an open BC Post on its roof – the latter protected only by a handrail (EH: LF96/B4/E7) (figures 31 and 32). With the construction of a new BC Post in 1914, the rooftop position was demolished and the Telephone Room converted into a shelter for the Gun Group Commander (GGC Shelter). The present structure is a modern re-build of the structure shown on a photograph of November 1939 (IWM H698). It has recently been refitted as a shower and WC for the bird observatory staff.

Figure 32 *BC Post: elevation drawings dated 1908* (EH: LF96/B4/E7)

The building is in brick laid to English bond, with a flat overhanging concrete roof. The doorway on the south-east side, 2.10m (6ft 10in) high, has a single wooden door opening inwards. There are windows in the north-east and south-west walls,

both with metal frames; the former has a concrete sill and a 4-light tilting casement; the latter has a fixed 6-light casement. The single room has few internal features: in the northern corner of the floor is a 0.12m (5in) diameter circular hole, possibly originally for cables issuing from the telephone room. There are also two metal pipes: one in the south-west wall close to the floor, and a second, 0.12m (5in) in diameter, in the south-east wall 0.79m (2ft 6in) from the floor.

Gun Floor Shelter (War Shelter 2) (figures 9 and 34)
This shelter, for six ordinary gunners on duty and ready to man the 6-inch guns, is located off the covered way between no I and II emplacements. It appears on a record plan dated 1914 but was built earlier, certainly by 1912 and possibly by 1908 (PRO: WO78/5136/6; 11; figure 33). It is currently referred to as War Shelter 2.
It is built entirely in concrete with an overhanging roof covered in asphalt that slopes very slightly towards the covered way (figure 35). The 1914 record plan calls it a 'PCC [Portland Cement Concrete] roof reinforced with 5/8" IS bars at 12" centres'. It opens only on the covered way elevation: a central doorway, 1.81m (5ft 10in) high, originally had a sliding door but this was at some time replaced with a single inward-opening wooden door on a crudely inserted frame. Inside, a metal rail let into in the floor guided the bottom of the sliding door. The top rail has been removed but three circular metal plates which supported it, set 1.90m (6ft 2in) from the ground, remain anchored in the wall: each is 0.08m (3in) in diameter and has a sawn-off pintle. Flanking the doorway are two windows, each 1.12m (3ft 7in) high. The north-east window has a concrete sill (although both did on the 1914 record plan) while external wooden battens formerly had brass fittings that held the windows open. Each window has an original wooden frame flush with the external wall, containing new outward-opening wooden shutters that replaced 6-light casements. Internally, simple wooden swivel pegs secured removable wooden shutters which do not appear on the 1914 record plan.

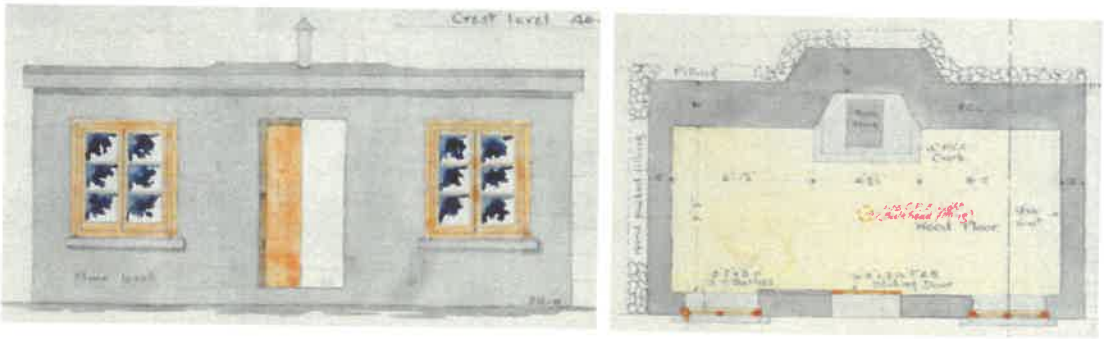


Figure 33
War Shelter 2: record plan and elevation, dated 1914 (PRO: WO 78/5136/6; reproduced with the kind permission of the National Archives)

The interior of the shelter is 2.14m (7ft) high and is whitewashed throughout. All traces of the boarded floor have been removed. An angled recess in the centre of the rear wall has a low concrete kerb defining the area for a rose stove, with a vertical flue which issued through a 0.15m (6in) diameter metal vent in the roof. The kerb, partly broken, is painted red along with the stove area. Original metal grilles are positioned at the top of the end walls to provide ventilation. On the south-west wall are metal brackets for a wooden shelf set 1.71m (5ft 6in) high, below which are the remains of a rifle rack for six guns; neither of these are shown on the 1914 plan. Scars indicate the position of a board fixed to the north-east wall. Electric lighting was provided by a single central bulkhead fitting on the ceiling, with the power being run in conduit through the vent in the south-west wall.

Figure 35 *War Shelter 2: external view* (NMR: AA051424)

Gun Floor Shelter (War Shelter 4) (figures 9 and 34)
This is a larger but otherwise identical building to War Shelter 2, located off the covered way immediately north-east of no II emplacement. It accommodated twelve ordinary gunners for the 6-inch guns and is shown in detail on the 1914 record plan, although it also appears to have been built a few years earlier (PRO: WO78/5136/6; 11; figure 36). It is currently referred to as War Shelter 4.

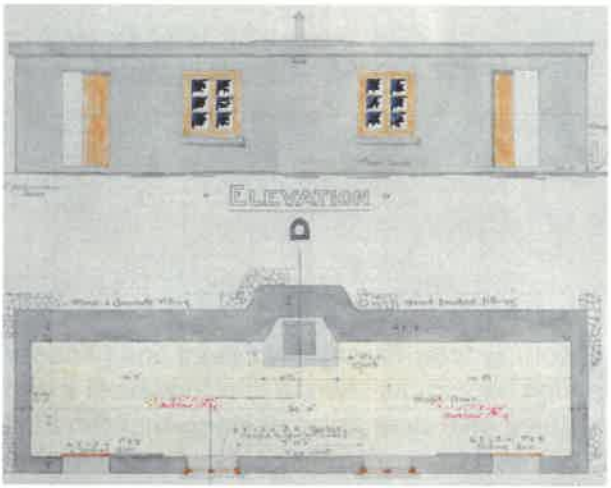


Figure 36 *War Shelter 4: record plan, dated 1914* (PRO: WO 78/5136/6; reproduced with the kind permission of the National Archives)

The shelter has two doorways, one at each end of the covered way elevation, both of which have new sliding wooden doors and mechanisms replacing earlier versions. Each was covered by a wooden storm porch (added at an unknown date) of which there are slight remains. There are two windows in this elevation, each with an external concrete sill and new 6-light casements: plans indicate that the originals opened outwards, while the replacements open inwards.

Figure 37 *War Shelter 4: interior view* (NMR: AA051426)

The interior (figure 37), 2.14m (7ft) high, has a black paint dado band at waist height. Above it the walls are cream and below are duck-egg blue. There is a new wooden floor, with boards running lengthways, and a small wooden skirting. On the north-east wall are brackets for a shelf, 0.23m (9in) deep and set 1.75m (5ft 8in by 9in) high. On the rear wall flanking the stove position are the remains of two rifle racks, each for six guns, above one of

which is a 2.33m (7ft 7in) high wooden coat rack with twelve hooks. All of this woodwork is painted duck-egg blue. The walls and ceilings have scars of conduit from secondary electric lighting, all of which has been removed. Two bulkhead lights are shown as undated additions to the 1914 record plan.

War Shelter No 1 and Artillery Store (later Shelter) (figure 33)
This is the original shelter and artillery store for the 6-inch no I gun, shown on the 1901 record plan, built behind the rear revetment wall at first floor level (PRO: WO78/5136/14; figure 38). It is currently in use as a dormitory for bird-watchers. The structure is of concrete with a brick lining forming a cavity on all but the front wall. It is divided into two rooms of equal size by a thick internal wall of brick laid to stretcher bond. The flat concrete roof is supported on cross-axial steel beams.

A door in the entrance elevation serves the shelter and is flanked by a window on both sides, one for each room. The doorway, 2.04m (6ft 7in) high, has new outward-opening double wooden doors in an original frame, and a crude modern concrete and wood step, 0.16m (6¼in) high. Small wooden plugs in the wall formerly had brass fittings for holding the doors open. Above the doorway an electric light fitting was operated by a switch to one side of the door, while a large ornamental steel bracket is of unknown function.

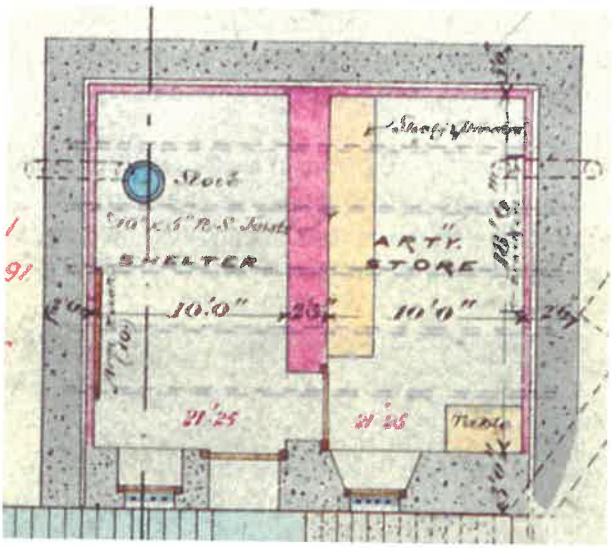


Figure 38
War Shelter 1 and Artillery Store: record plan dated 1901. This structure was located beneath the emplacement for no I gun (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

The windows, with external concrete sills and lintels, are replacements smaller than the original openings: the gaps are filled with brick forming one row (north-east window) and three rows (south-west window). On one side, the north-east window has a fixed light with a small top-hinged light above, and on the other side a single-light outward-opening casement. The south-west window, which is internally splayed, has two single-light inward-opening casement windows (on the outside, steps leading up to the covered way prevent the windows from opening outwards). There are glazed ceramic airbricks above the windows.

Both rooms are whitewashed though traces of cream paint are apparent beneath; the ceilings are 2.21m (7ft 3in) high, and the floor is unpainted concrete.

The roof of the shelter has a circular vent, with a metal plate, close to the south-eastern corner: this was for a stove shown on the 1901 record plan. Remaining fittings are secondary and comprise, on the north-east wall, a wooden shelf supported on metal brackets 1.76m (5ft 8in) above the floor. Along the south-east and south-west walls are the remains of wooden frames for bunk beds, comprising heavy-duty timber of 0.1m (4in) square scantling set into ferrous collars in the floor and ceiling. The frames supported wooden bed boards approximately 1.98 (6ft 6in) long by 0.72m (2ft 4in) deep at heights of 0.64m (2ft 1in) and 1.39m (4ft 6in) above

the floor, some of which survive. To demarcate the area of the beds, the floor below is painted white with a black band around the edges; an identical band along the north-east wall indicates the position of another bunk. The room accommodated 8 men but it is uncertain when the beds were constructed; it seems likely that they are of Second World War date and may have formed semi-permanent barracks accommodation for gun crews; graffiti on the timber uprights of the beds in Shelter No 2 date to 1939 (see below).

The doorway to the artillery store, 2.01m (6ft 6in) high, has a segmental arch of two orders and inward-opening wooden double doors. The 1901 plans show a shelf and drawers along the north-east wall, a small table in the western corner, and a vent in the ceiling close to the southern corner; the vent is a circular ceramic pipe 0.23m (9in) in diameter. Other visible fittings are secondary and comprise, on the south-west wall, metal brackets for shelves at heights of 0.61m (2ft), 1.21m (3ft 10in) and 1.84m (6ft). Around the edges of the room is a black and white painted band on the floor like that in the adjacent room (see above), probably demarcating the former positions of furniture and no doubt of the same era. These included the shelves as described, bunk beds along the north-east wall for a maximum of four men, and possibly tables/dressers/cupboards against the north-west and south-east walls.

War Shelter No 3 (figure 33)

This is the original shelter for the crew of 6-inch no II gun, built behind the rear revetment wall at first floor level. It is shown on a record plan of the battery dated 1901 (PRO: WO78/5136/14; figure 39). It is currently referred to as War Shelter 3.

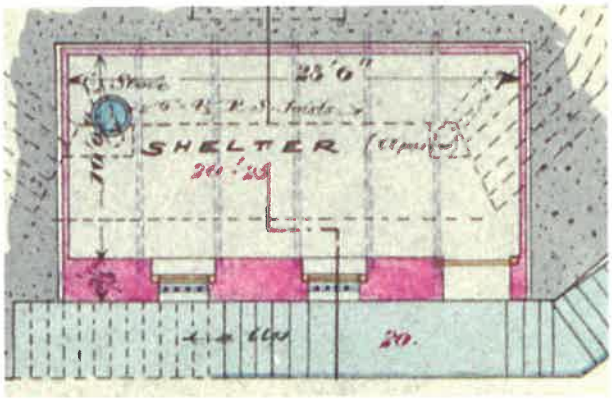


Figure 39 *War Shelter 3: record plan dated 1901* (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

Figure 40 *War Shelter 3: interior view showing the frames for Second World War bunk beds* (NMR: AA051442)

The interior is 2.20m (7ft 2in) high and painted cream (figure 40). Close to the eastern corner is a vent in the ceiling, 23cm (9in) in diameter, for a circular stove shown on the 1901 record plan; there is a ceramic air vent in the southern corner and two square vents with glazed ceramic airbricks high in the north-west wall. The remains of rifle racks, each for 6 guns, are located along the north-east and south-east walls, above which are metal brackets for 1.73m (5ft 7in) high shelves. There are traces of secondary electric lighting.

There are remains of heavy-duty timber framing for bunk beds along the north-west, south-east and south-west walls, partially blocking the doorway and windows, for 10 men. It is of identical pattern and scantling to that in Shelter no 1, and 0.72m (2ft 4in) deep with bed

boards at heights of 0.64m (2ft 1in) and 1.39m (4ft 6in). Graffiti on the uprights indicates "1939" and "24-8-1939" (the latter repeated in Roman numerals).

The structure is in concrete with a brick lining forming a cavity, and a thick brick wall forming the entrance elevation; the bricks are laid to English bond. The flat concrete ceiling is supported on cross-axial steel beams. The doorway, at the southern end of the main elevation, is 2.0m (6ft 6in) high and has a wooden frame supporting new outward-opening double doors. Two adjacent windows, each 1.04m high (3ft 4in), have external concrete sills and lintels, with shallow brick relieving arches of two orders internally. The new wooden casements each have double outward-opening 4-light windows. One of the sills is broken to accommodate the metal stair ascending to the covered way.

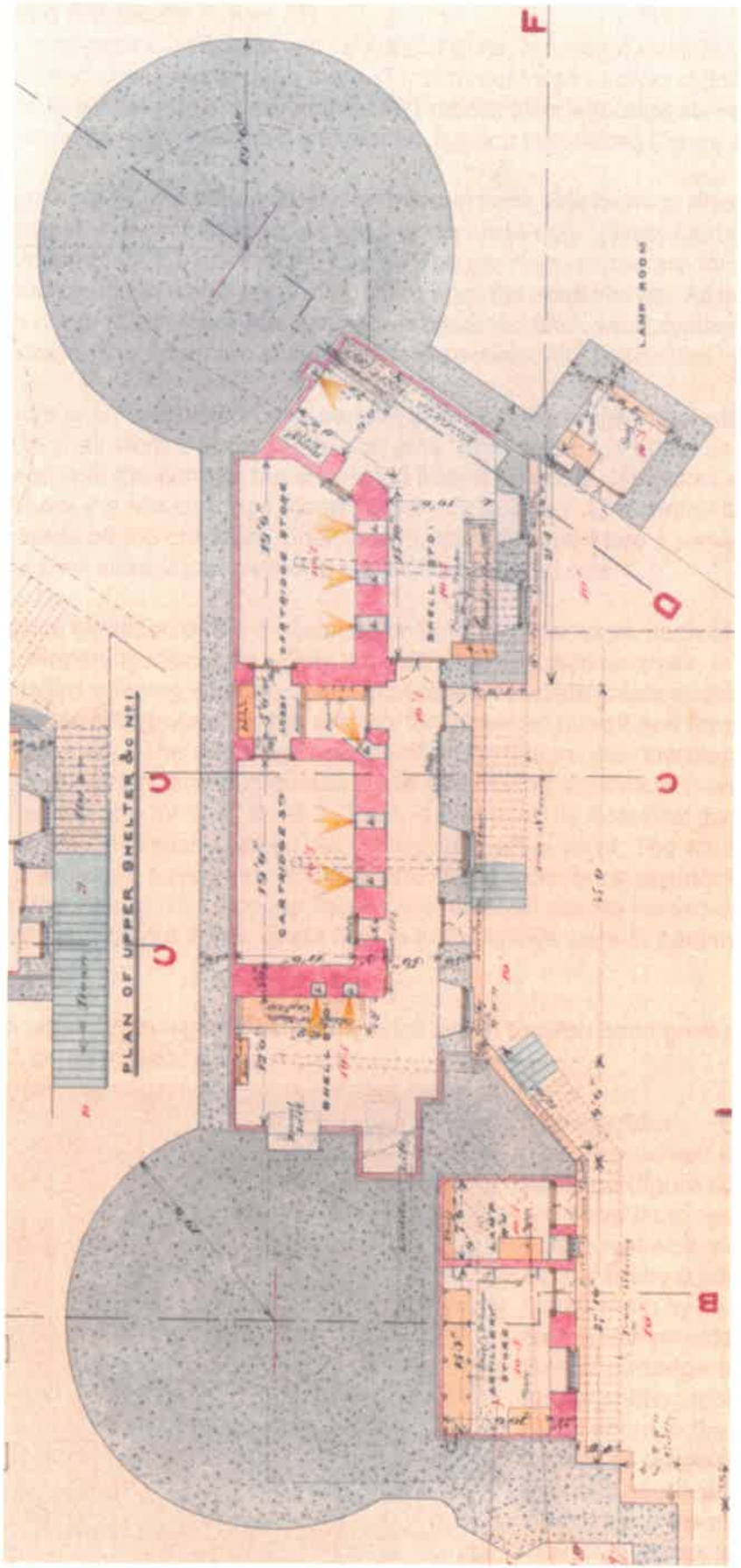


Figure 42 *6-inch Magazine: record plan of the magazine for the 6-inch guns* (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

The 6-inch Magazine (figure 41)

The 6-inch magazine, which served no I and II guns, is located deep in the body of the mound and accessed through the main revetment wall at ground floor level. Today, it is essentially as shown on the 1901 record plan, although some internal arrangements have been altered and electric lighting introduced (figure 42).

The magazine is built in concrete with an internal brick skin forming a ventilation cavity, except the main elevation, which is of concrete only. Glazed airbricks in the main elevation mark the ends of the cavity. The cartridge stores are formed by internal brick partition walls, separating them from the shell stores. All brickwork is in English bond. Each room has a shallow segmental brick vault, typically 2.41m (7ft 10in) high. The floors are laid in concrete sections with expansion joints.

In plan there is an internal corridor, parallel to the entrance elevation, which leads directly into shell store 2 at the north-east end. Shell store 1 is at the south-west end, aligned with the corridor but separated from it by doors. The shell stores partially frame the two cartridge stores, which are entered via a central shifting lobby that also leads off the corridor. Shell store 1 and cartridge store 1 served gun no I gun, while shell store 2 and cartridge store 2 served no II gun.

The entrance elevation of the magazine contains two doorways, each of which had an outward-opening steel gate. Only the north-eastern gate survives, in front of a pair of outward-opening wooden doors. There are concrete lintels above the doorways, concrete sills grooved to the exterior for rainwater run-off and metal strips beneath the doors. The doorways are edged at the bottom with low black-and-white painted bands. There are four windows, two illuminating shell store I, one lighting the corridor and one for shell store 2. Each is protected by 6 vertical iron bars and has a concrete sill similarly picked out in black-and-white paint. The windows, each 1.18m (3ft 9in) high, have internal splays and single order brick segmental relieving arches on the inside. The wooden frames are new with double inward-opening casements each of four lights. Brass fittings in the splays were to hold the windows open.

In front, a later 1.70m high **blast wall** in brick laid to English bond protects the entrances to the magazine and stores.

Figure 43
6-inch Magazine: the corridor of the magazine, looking towards Shell store 2. The lamp recesses and issue hatch are for Cartridge store 2; the remains of brackets for later shelving are also visible (NMR: 051406)

The corridor

This also served as a lighting passage (figure 43) and there are three lamp recesses in the south-east wall, each measuring 0.41m by 0.56 by 0.53m high (1ft 4in by 1ft 10in by 1ft 8in), which provided illumination for cartridge store 2 and for the shifting lobby. The metal doors to the recesses survive as do glazed ceramic airbricks above and to the side of each the shifting lobby. The metal doors to the re

Figure 44
6-inch Magazine: lamp recess door in the corridor of the magazine (NMR: AA051420)

cesses survive as do glazed ceramic airbricks above and to the side, venting the lamps (figure 44). White-on-black painted signs indicate that they were numbered 1 to 3 from north-east to south-west. At ground level near its north-east end, the south-east wall contains the issue hatch from cartridge store 2, some 0.93m (3ft) high, its sides of neatly rounded brick, with a stone lintel that is chamfered and stopped. Broken brackets above it were for shelves at heights of 0.90m (2ft 11in), 1.32m (4ft 4in) and 1.77m (5ft 9in); adjacent are the remains of a rifle rack.

Shell store 2

This is a simple rectangular chamber, with one ceramic vent pipe in the ceiling, 0.26m (10in) in diameter (figure 45). Along the south-west wall are piers, two of brick and one of metal, which formerly supported a shelf 0.94m (3ft) above the floor, on which the 6-inch shells were stored. The piers are as depicted on the 1901 record plan, though they look inserted and might have been renewed in the same locations (PRO: WO 78/5136/14). Higher up on the wall, over the northern end of the shelf position, are two lamp recesses with concrete lintels and glazed airbricks above and to the side, though no trace of their frames survive. These recesses are blind, as the lamps were inserted in the shell store for its own illumination.

Figure 45
6-inch Magazine: Shell store 2 at the north-eastern end of the magazine complex. The brick and metal piers supported the shelf where shells were stored before being taken to the gun (NMR: AA051410)

In the north-east wall are two recesses for lifting ammunition up to the guns. The southern recess, some 1.88m (6ft 2in) high, is not cavity-walled and forms the base of a vertical shaft, 0.81m (2ft 7in) square, part of which houses the wooden framework of a band lift, 0.55m by 0.69m (1ft 9in by 2ft 3in), that lifted cartridges up to no II gun (figure 46, left). The mechanism is in good order, including the steel loading plate and winch handle. An RSJ supported on a corbelled sandstone pad serves as a lintel over the front of the recess: this is not shown on the 1901 record plan.

The northern recess is within the brick skin of the magazine and has a shallow brick vault, at the front of which an RSJ on a corbelled sandstone pad serves as a lintel. In the north-east corner of the recess, a concrete shaft is angled upwards towards the north-east and contains a ladder lift that took shells to no II gun (figure 46, right).

Figure 46
6-inch Magazine: ammunition lifts in shell store 2. The band lift transported cartridges (left), while the ladder lift transported shells (right) (NMR: AA051407/ AA051408)

Immediately west of the shaft is the lift mechanism, occupying a space 0.41m by 0.48m by 0.59m high (1ft 4in by 1ft 6in by 1ft 11in) and secured to a concrete pad on the floor. The loading plate and winch are intact. South-east of the shaft is a wooden bench, 0.81m (2ft 7in) high, on which shells were placed before being placed onto the loading plate.

The shifting lobby

The lobby is reached through a doorway, 1.93m (6ft 3in) high, at the south-west end of the corridor immediately opposite one of the external doors (figure 47). Its wooden frame is original, but the double outward-opening wooden doors have been moved from elsewhere. Lamp recess no 3 originates in the corridor and is angled through the north-east wall, emerging near the door to illuminate the lobby. Along the south-west wall scars in the wall and floor indicate the presence of a low bench, 0.47m (1ft 6in) high, and a row of hooks above where the soldiers changed out of their everyday clothes; there was also a sign on this wall. In the centre of the room are the remains of a wooden shifting barrier, 0.92m (3ft) high, and on the north-east wall, a groove into which the lifting arm of the barrier closed. Beyond the barrier are the doors to both cartridge stores 1 and 2 and, on the end wall, scars from another bench and hooks for magazine clothes.

Figure 47
6-inch Magazine: the shifting lobby, with the entrances to both cartridge stores at the far end beyond the remains of the wooden shifting barrier (NMR: AA051412)

The cartridge stores

The doorway to cartridge store 2, some 2.18m (7ft 2in) high, is under a segmental arch of two orders. It has a wooden frame and a pair of outward-opening doors. The interior is painted cream with a whitewashed vault, in which is a single ceramic pipe vent, 0.24m (9in) in diameter (figure 48). There are remains of the fixed glazing

Figure 48 *9-inch Magazine: cartridge store 2, showing (at left) a lamp recess and the larger aperture for the issue hatch. A solitary vent pierces the vault* (NMR: AA051411)

frames for the lamp recesses, and the canted brass housing into which the base of the oil lamps were fitted. The issue hatch retains the wooden framework for a wooden door which slid vertically in a 12cm (5in) recess in the wall.
Cartridge store 1 has exactly the same features, built to a slightly different ground plan because of an angled western corner. Only the wooden framework for the issue hatch is missing.

Shell store 1

The western end of the corridor ends against the entrance to shell store 1. The doorway, 2.19m (7ft 2in) high, lies beneath an arch of three orders and contains a wooden frame with a pair of original outward-opening doors. The store is L-shaped in plan and, like the corridor, also served as a lighting passage, in this case for cartridge store 1 (figure 49). The three lamp recesses in the south wall are identical to those in the corridor but only the sign for no 4 recess is legible. Along the north-west wall, in front of and partially across the windows, is a shelf arrangement like that in shell store 2, comprising a central steel support between two concrete piers. The shelf has been replaced by one of the doors to the shifting lobby, painted cream and labelled in black '(LO)BBY 1 & 2'. The piers for a second shelf survive along

the west wall. Along the north-east wall is a metal bracket for a shelf 1.48m (4ft 9in) above the floor, below which are the remains of a rifle rack.

Figure 49
6-inch Magazine: shell store 1, with the remains of a shelf along the right-hand wall and the ladder lift at the far end of the room (NMR: AA051405)

The southern end wall contains a single blind lamp recess, illuminating this part of the shell store. It has been placed lower than usual, at 0.86m (2ft 9in) from the floor rather than 1.10m (3ft 9in). The issue hatch for cartridge store 1 and a recess for the band lift that conveyed cartridges to no I gun are both located in the east wall. Both are broadly as described for shell store 2, except that the wooden framework for the lift has been removed at this level, though it survives further up the shaft. Against the west wall is the well-preserved mechanism for the ladder lift that took shells to no I gun. This is similar as that described for shell store 2, except that the lift is not contained within a recess but ascends through the vault of the main room.

Lamp room 1

This small rectangular room is currently used as a tool store by staff of the bird observatory. It lies just west of the 6-inch magazine, on the same level behind the wing wall of the main revetment. It is constructed in concrete with a segmental brick vault. The doorway, 2.0m (6ft 6in) high, has a chamfered and stopped lintel and a wooden frame for a new pair of outward-opening wooden doors. There is a small window next to it, with an external concrete sill and lintel, the glazing protected by vertical iron bars. The opening, 0.73m (2ft 4in) wide by 1.04m (3ft 4in) high, contains a new single fixed light in a wooden frame.

The interior is whitewashed and along the north-west wall there is wooden cupboard, 0.87m (2ft 10in) high, divided by a shelf at 0.51m (1ft 8in). Another shelf, above the cupboard at a height of 1.53m (5ft), is shown on the 1901 record plan along with a table beneath the window (PRO: WO 78/5136/14).

Artillery store (later Shelter) and lamp room 2

These adjacent rooms form a single unit at first floor level, behind the main revetment under the emplacement for no II gun. In 1914 it was proposed to convert them into a shelter for 10 men "in lieu of the old 10" shelter" (PRO: WO 78/5136/14). Construction is in concrete with a brick cavity wall in stretcher bond, except the front elevation and the internal partition wall, which are entirely in brick laid to English bond. Both rooms have segmental brick-vaults ventilated by a ceramic vent pipe 23cm (9in) in diameter.

The doorway to each room is 1.92m (6ft 3in) high, with a chamfered and stopped concrete lintel and a wooden frame for outward-opening wooden double doors; the lamp room door is new on an old frame; the artillery store door and frame are original. A window in each room, 0.79m (2ft 7in) high, has a shallow segmental arch of three orders, a concrete sill, vertical iron bars and a wooden frame for an inward-opening 2-light casement window (only the lamp room window is original). Both rooms have been recently whitewashed, obscuring earlier decorative details.

In the artillery store, original metal brackets along the west wall were for shelves at heights of 0.61m (2ft), 1.21m (3ft 11in) and 1.82m (5ft 11in), while paint marks on the floor suggest that there may have been secondary bunk beds similar to those in the other shelters. Electric fittings are modern and the room is in use as a kitchen for the bird observatory, obscuring earlier details. The 1901 record plan shows a shelf and drawers along the south wall and a table in the north-east corner (PRO: WO 78/5136/14). Information from the staff of the Landguard Bird Observatory indicates that this room was equipped with later bunk beds as seen in the other shelters.

The lamp room has original metal brackets along the south wall for shelves at heights of 0.68m (2ft 3in) and 1.57m (5ft 2in). This room is in use as a store by the bird observatory, such that any original details are obscured, but the 1901 plan shows a table on the east wall in addition to the shelves on the south wall (PRO: WO 78/5136/14). There are traces of secondary electric lighting.

3.4 THE 10-INCH GUN OF 1901-10

No III gun emplacement (figure 50)

The features relating to the 10-inch gun are all of one short phase which ended in 1909/10. In 1913-14 the emplacement was converted for use as a combined Battery Command (BC) and Electric Light Director Station (ELDS), of which there are complex remains. Finally, between 1940 and 1943, this structure was subsumed within a larger Close Defence Battery Observation Post (CD BOP). These later works have obscured many of the features of the 10-inch gun and are described separately in Section 3.5 below.

The 1901 record plan shows a deep concrete pit, open to the rear, for a gun firing en barbette around a 143° arc, with a large sloping concrete apron to the front. The gun floor was formed by a steel gantry supported on steel columns, describing an arc at the rear of the pit, effectively blocking the covered way. Consequently, access behind was provided by a cantilever gallery which projected to the rear over the top of the steps that descended to the foot of the main revetment (PRO: WO 78/5136/14) (figure 51).

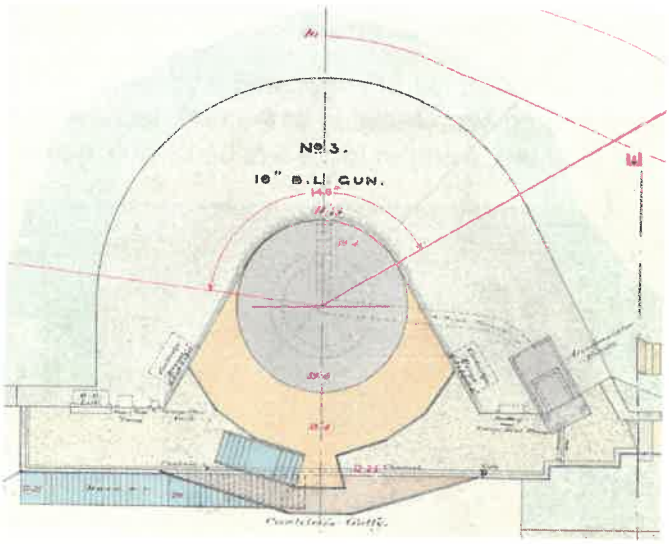


Figure 51 *No III gun: record plan dated 1901 of the 10-inch emplacement, showing the metal gun floor (orange) and cantilever gallery (brown) to the rear* (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

On the sloping concrete apron and on the glaçis nearby are several metal ringbolts anchored firmly in place. These are probably associated with the CD BOP, possibly securing cables for a radio mast (figure 52).

The gun pit is 2.89m (9ft 6in) deep and has a large ready-use cartridge recess on each side at the rear (figure 53). Each one, 1.83m wide by 1.23m deep by 1.05m high (6' by 4' by 3'6"), is rendered and whitewashed internally and has a narrow steel frame for a pair of outward-opening metal doors on pintle hinges (the doors do not survive). The frames have housings for vertical bolts at top and bottom. Above both recesses are superimposed painted signs, the most recent read "CARTRIDGE RECESS NO 1" (eastern) and "CARTRIDGE RECESS..." (western); an earlier sign above the latter reads "TO HOLD 24 CYLINDERS".

Figure 52 *No III gun: one of the metal ringbolts on the apron of the emplacement* (NMR: AA051421)

The removal of the gun floor gantry has left some traces: the anchoring of its eastern end into the gun pit wall is marked by two sawn-off RSJs, located 0.95m (3ft 1in) apart and 2.05m (6ft 8in) from the floor of the pit. At the rear, among the later structures, are the stumps of five 12cm (5in) diameter sawn-off columns resting on 17cm (7in) square metal plates. The

Figure 53
No III gun: recess to hold cartridges for the 10-inch gun. Noth the metal frame and hinges for the heavy metal doors (NMR: AA051414)

sawn-off RSJs from the cantilever gallery are visible in the main revetment wall. At the rear, the gun pit turns into wing walls alongside the covered way. The eastern wing wall accommodates three recesses (figure 54). The first, a Group Store, is a very small white-washed recess, 0.25m wide by 0.19m deep by 0.36m high (10in by 7in by 1ft 2in), rebated for a wooden frame of which there are traces. Next to this is another small recess for fuzes and tubes measuring 0.48m wide by 0.40m deep by 0.56m high (1ft 6in by 1ft 3in by 1 ft 10in). It is also rebated for a new wooden frame and outward-opening door with a hasp and padlock. The third recess, contained in a slight rebate in the wall, houses the top of the quick-return lift which transported both shells and cartridges by turns from the magazine below. It appears to be unaltered (PRO: WO 78/5136/14). The top of the vertical shaft is closed by a pair of outward-opening wooden doors which could be locked by a pivoting strap and padlock. The shaft, 1.42m wide by 0.63m deep (4ft 7in by 2ft), descends 7.71m (25ft 3in) to the magazine floor. Internally, the top part of the shaft is rendered and there are scars in the side walls for steel runners which extended the full height of the shaft and housed the lifting tray. Part of the rear wall is patched in brick, resulting from the insertion of electric cabling in 1943, leading from the CD BOP down into a Battery Plotting Room (BPR) established in the old 10-inch magazine (see below). On the wall above the recess are two illegible signs, next to a replica which reads 'LANDGUARD RIGHT BATTERY'.

Figure 54
No III gun: the flanking wing wall of the 10-inch emplacement, with openings for (left to right) the ammunition lift and group and fuse stores (NMR: AA051427)

There are two recesses in the western wing wall, which housed the Battery and Range Dials equipment and a hydraulic accumulator (PRO: WO78/5136/14) (figure 55). The former is rebated for a wooden frame. The much larger hydraulic accumulator recess extends 0.40m (1ft 3in) below the level of the gun floor and 2.56m (8ft 4in) above it; originally it extended 0.80m (2ft 6in) onto the covered way. The

Figure 55
No III gun: recess for the hydraulic accumulator, later converted into a shelter for signallers (see section 3.5); the recess in the angled face just to the left was for battery and dials equipment (NMR: AA051418)

top of the recess was open, in the flank of the gun apron, though later covered by a steel plate (see below). Hydraulic power was relayed from the accumulator to the gun pit in pipes via a small curving tunnel of parabolic section, 1.03m (3ft 4in) high. In a later phase, the tunnel was reused as a conduit for electric cabling, much of which is *in situ*.

3.5 BATTERY COMMAND POST AND ELECTRIC LIGHT DIRECTING STATION. CLOSE DEFENCE BATTERY OBSERVATION POST (figures 9 and 56)

Figure 56
The CD BOP in the old 10-inch emplacement (NMR: AA051372)

Introduction

A sketch plan of October 1913 shows a proposal for two small conjoined structures to be built inside the disused 10-inch emplacement. It is clear from a later note on the 1901 record plan that these were to be completed in 1914 (PRO: WO 78 5136/13; figure 57). These were a Battery Command Post (BCP), to replace the original one behind the battery (see above), and an Electric Light Directing Station (ELDS) for controlling the artillery fighting lights on the peninsula. The ELDS was to be established to make up for the loss of this function in the Fire Control (FC) Post on the roof of Landguard Fort, which was at this time built a storey higher to make room for a Port War Signal Station (PWSS). That the BCP and ELDS were built is confirmed by comparing the pro-

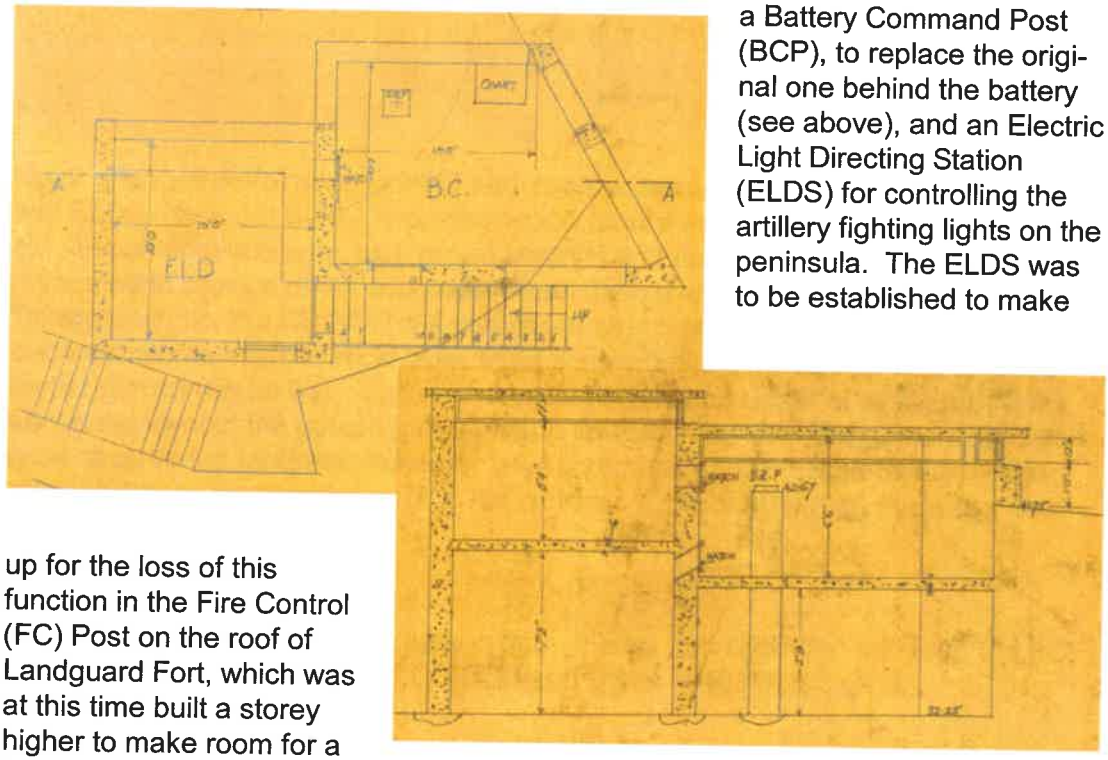


Figure 57
BCP & ELDS: proposal plan (left) and section (right) for BC and ELD posts in the old 10-inch emplacement (PRO: WO 78/5136/13; reproduced with the kind permission of the National Archives)

posal plan of 1913 and the plan as it is today. Both positions had wide observation windows on the first floor, covering an arc consistent with the guns and lights which they controlled. It seems likely that both operated successfully until they were incorporated into a larger structure in 1940 and 1943 (PRO: WO 192/213).

The BCP and ELDS comprise two small rectilinear buildings at the rear of the 10-inch emplacement). Because of the height needed to see over the barbette of the gun pit, each structure had two storeys, with the upper floors forming the observation positions. The actual form of the buildings differs slightly to the 1913 proposal: the door to the ELDS was built in the north-west rather than the south-west wall, and there is one rather than the two planned communication hatches between the BCP and ELDS positions (PRO: WO 78/5136/13).

A proposal was made in 1915 to build a shelter for officers immediately adjoining the forward part of the ELDS (PRO: WO 78/5136/12) (figure 58). There is no evidence that this proposal was ever put into effect, although since the proposed structure was of light timber construction it's removal later may have resulted in little trace.

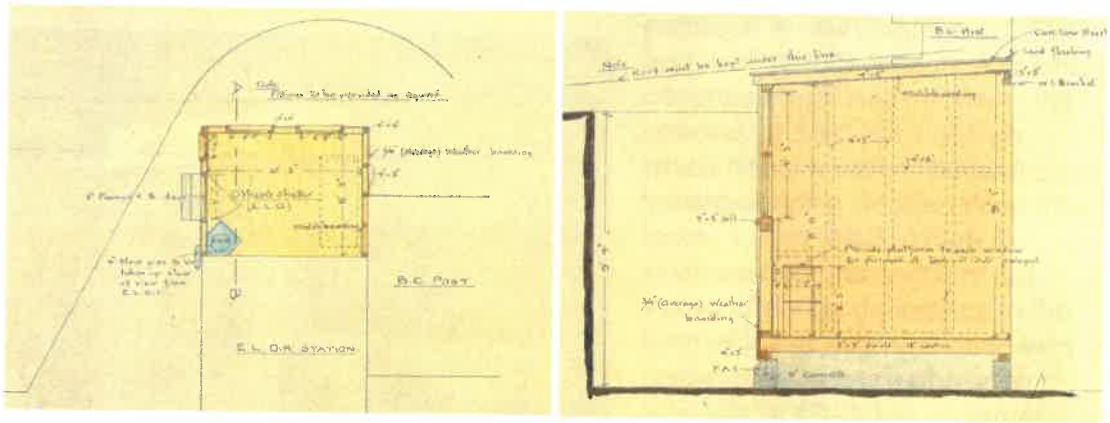


Figure 58 *Proposal plan (left) and section (right) for a shelter for officers in the old 10-inch emplacement* (PRO: WO 78/5136/12; reproduced with the kind permission of the National Archives)

Major changes were made in 1940 and 1943, extending and subsuming the old BCP and ELDS into a CD BOP. Two observation rooms were inserted in the front of the old 10-inch emplacement, also of two storeys, and the internal arrangements were revamped to provide direct access between the old and new parts of the structure. Taken as whole, the CD BOP is a composite structure constructed mainly of concrete with some internal brick walls, fitted somewhat awkwardly into and onto the earlier gun pit (figure 56). It is formed on two levels, the upper of which protrudes above the level of the gun pit (presenting a low profile to seaward) and incorporates wide observation windows; the lower level comprised the Directing Station (DS) for searchlights on the foreshore. The flat concrete roofs, 0.16m (6in) thick, are weatherproofed by a layer of asphalt.

Upper level

This was the main operational area in both phases and is divided into four: the BCP and ELDS of 1913-14, and the CD BOP and DS of 1940/43.

Electric Light Directing Station (later **War Shelter**)
The original external metal stair on the north-west wall survives but the doorway, 1.84m (6ft) high, is blocked and a small window, 0.67m wide by 0.45m high (2ft 2in

by 1ft 5in), occupies the upper part: it has a wooden frame for a single top-hinged pane. The entrance to the ELDS is now internal, in the party wall with the CD BOP, and dates from 1943: it is 1.90m (6ft 2in) high, with a wooden frame for a single inward-opening door; brick patching around it confirms the insertion. The room, 1.90m (6ft 2in) high, has a wooden floor covered by a carpet, and whitewashed walls. The original long observation windows, 0.36m high (1ft 2in), at ceiling level along the south-west wall and part of the south-east and north-east walls, have fixed single panels of glass incorporating a wire mesh. A hatch in the south-west wall, measuring 0.60m wide by 0.33m high (1ft 11in by 1ft), is situated 1.07m (3ft 5in) from the floor and served for communicating with the BCP. Other features are probably from 1940/3: a 0.08m (3in) high concrete kerb for a stove against the north-west wall, and part of the metal stove pipe, 0.1m diameter (4in), in the ceiling; a metal vent, 0.21m diameter (8in), in the centre of the ceiling. These attest to use of the room as a War Shelter.

Battery Command Post (later **War Shelter** for CD BOP)
This was originally reached via the same external metal stair. The doorway, 1.91m (6ft 3in) high, is unused, although the inward-opening door is still in place. The entrance is now from the CD BOP and is of 1940/3 vintage; a flight of concrete steps leads down to the doorway, 1.88m (6ft 1in) high, which has a wooden frame and an inward-opening wooden door. The room, 1.91m (6ft 3in) high, is whitewashed though there are traces of earlier decoration in the form of a black painted dado with cream paint below it (the latter probably of 1913-14). A carpet obscures the decaying wooden floor. The north-west and south walls contain original observation windows, identical to those in the ELDS, although there is a slight external splay at the northern corner to increase the arc of visibility. Two communication hatches in the top of the south-east wall, part of the 1943 work, have sliding shutters in wooden frames and are formed in a rebuilt roughly-coursed brick section of the original concrete wall (figure 59). However, one hatch is 0.36m (1ft 2in) high and flush with the ceiling – as are all the 1913-14 observation windows – suggesting that it may be a remnant of the earlier work. Other features are part of the 1940 or 1943 conversion into a War Shelter for the CD BOP. These include a concrete kerb, 0.08m (3in) high, against the north-west wall, for a stove vented through the roof by a circular metal pipe, 0.1m in diameter (4in). The stove is in situ but badly rusted. There is a circular metal vent, 0.21m in diameter (8in), in the centre of the roof and an arrow-shaped wooden table, 0.91m (2ft 11in) high, in the acutely angled western corner of the room.

Figure 59
CD BOP: communication hatches between the rooms (NMR: AA051374)

Close Defence Battery Observation Post (CD BOP) and **Directing Station (DS)** (figure 60)
The main part of the CD BOP was housed in the room adjoining the BCP and ELDS, and is entirely of concrete (figure 61). The entrance is 2.03m high, with a wooden frame and an inward-opening wooden door. The room is 2.30m (7ft 6in) high with

Figure 60 *CD BOP: Second World War photographs showing men in the CD BOP* (IWM: H2954 & H3292; reproduced with the kind permission of the Imperial War Museum)

0.76m (2ft 6in) high observation slits along the seaward-facing walls at ceiling level. The shutters currently fitted into these slits are modern and most details of the original windows and shutters are lost. The modern arrangement comprises inward-opening wooden-framed windows hinged at the top and held open by brass hooks in the ceiling, and outward-opening wooden shutters, hinged at the bottom, which rest open on the concrete sill.

Figure 61 *CD BOP: interior view, with (at right) the observation embrasure across the front wall* (NMR: AA051373)

In the south-east wall, below the observation embrasure, there is a communications hatch to the DS, with a wooden frame for a glass pane or wooden shutter. In addition to the observation slits, a fixed light window in the north-west wall provides a view over the roof of the BCP across Harwich Haven. A concrete pedestal, 0.36m (1ft 2in) square by 1.15m (3ft 9in) high, supported a range-finding instrument on three bolts; it is referred to as the "battery pivot" on a contemporary plan (figure 62; PRO: WO/192/206). A frameless recess in the rear of the pedestal, 0.25m wide by 0.09m deep by 0.25m high (10in by 3in by 10in), probably held a telephone. The original BCP of 1913/14 had a pedestal, but a new one was made for the CD BOP in 1940 or 1943.

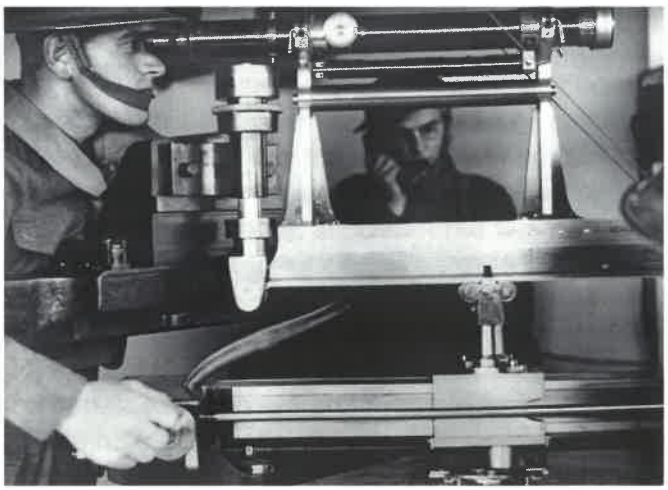


Figure 62 *CD BOP: photograph of the range-finding equipment in use in the CD BOP in 1943* (IWM: H2953; reproduced with the kind permission of the Imperial War Museum)

Steps along the north-east wall lead down 0.92m (3ft) into the DS (Directing Station) (figure 63). This is shown on a contemporary plan and probably served to control the fighting lights on the peninsula (PRO: WO/192/206). The entrance

Figure 63
CD BOP: interior view of the DS (NMR: AA051375)

could be covered by a wooden hatch, which when closed would have enabled use of the observation embrasure above. The doorway, 1.97m (6ft 5in) high, has a wooden frame for an inward-opening wooden door. The interior, 2.03m (6ft 7in) high, is whitewashed and has a north-west wall of brick laid to stretcher bond, in which is the communication hatch described above. Observation embrasures, identical to those in the CD BOP, line the seaward-facing walls. Above them are traces of a metal frame, possibly part of the original arrangement. Below the embrasure is a wooden table, 0.85m (2ft 9in) high, with wooden panelling lining the barbette of the original emplacement below.

Lower level

The lower level of the position is formed by a series of irregular spaces. The entrance to room **A** is in the north-west wall, a doorway 1.91m high (6ft 3in) with an original wooden frame and inward-opening wooden door. An adjacent window, 1.25m (4ft 1in) high, has a concrete sill and an old wooden frame with new double casements, each of six lights. The interior, 2.20m (7ft 3in) high, is whitewashed and has electric lighting. Concrete dwarf walls once supported a wooden floor, removal of which has revealed two sawn-off steel columns from the original 10-inch gun floor gantry. A concrete kerb against the north-east wall was for a stove, with a metal stove pipe exiting the wall above, and there are two high-level ceramic airbricks. The precise function of the room is unknown.

Figure 64
CD BOP: the space (B) beneath the BCP post, showing the base of the 1913/14l DRF pillar and wooden panelling which supported electric wiring and fuse boxes (NMR: AA051417)

The adjacent room **B**, 1.67m (5ft 6in) high, is built against the 10-inch gun pit and was probably a walled void supporting the original BC post of 1913-14, as its ceiling is too low for a person to stand upright. The north-west wall originally incorporated two open segmental arches, which were subsequently infilled with brickwork in English bond and rendered flush on the exterior, while forming two recessed panels on the interior. Each panel is 1.52m (5ft) wide and high and incorporates a glazed ceramic airbrick. A doorway, 1.44m high (4ft 9in), in the western panel has a wooden frame for a single inward-opening door that is cut into the concrete of the original structure. The south and east walls are lined with 0.03m (1in) thick wood panels to which are attached galvanised conduit pipes for electric wiring and multiple fuse boxes (figure 64). The conduit can be seen continuing both through a hole in the south-east wall and through the hydraulic

accumulator tunnel which is just visible in the southern corner of the room. It seems, therefore, that the electric supply to the various observation positions was regulated from here; perhaps prior to construction of the CD BOP. The base of the DRF pillar for the 1913-14 BCP extends from floor to ceiling in this room. The floor contains two sawn-off metal columns from the 10-inch gun floor gantry.

East of room A, two adjacent doorways lead to rooms below the CD BOP. The south-west doorway, 2.05m (6ft 9in) high, leads to an oddly-shaped room **C**, 2.22m (7ft 3in) high and painted cream. The flat ceiling is partly supported on an RSJ. There are numerous galvanised conduit pipes attached to the walls; these formerly carried electric wiring into room B. Larger pipes are for hot water for a central heating system. An opening in the brickwork of the south-east wall, 1.30m (4ft 3in) high, leads into room **D**, which occupies the forward part of the gun pit below the DS. This space, only 1.30m (4ft 3in) high, is empty and unpainted. The second doorway, 1.86m (6ft 1in) high with pintles for a metal gate, leads into room **E**, a narrow corridor alongside the gun pit wall. A low brick wall, 0.62m (2ft) high, at the far end of the corridor and the scar from another closer to the door, probably supported a boiler for the central heating system. Deep slots high up in the gun pit wall are from the 10-inch gun floor gantry.

Signallers' shelter 1 (figure 9)

A plan records work undertaken in 1912 to convert the hydraulic accumulator recess of the 10-inch emplacement into a rectangular shelter for signallers working with the Examination Battery (using semaphore). It was not much larger than a sentry box (figures 55 and 65). A shuttered concrete floor, 0.15m (6in) thick, was inserted 1.60m (5ft 3in) above the bottom of the recess, forming a floor for the shelter. Two metal rings anchored into the floor supported a short timber stair leading down to the covered way at the rear. The rear wall was of timber construction, with a door at the top of the stair. The roof was provided in part by an existing 5cm (2in) thick steel plate, while the central part of the shelter extended upwards above the level of the apron, providing observation embrasures to the front and sides sealed by wooden shutters hinged to open downwards and rest on the apron. In the floor, a square

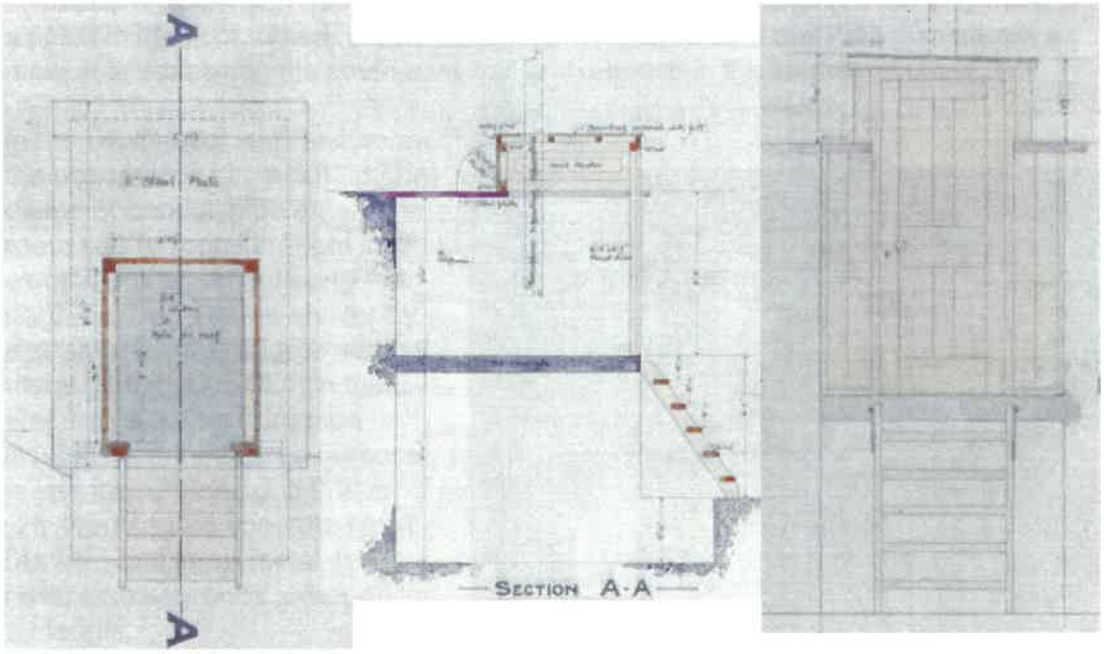


Figure 65 *Signallers' shelter 1: plan, section and elevation of the signallers shelter constructed in 1912 within the hydraulic accumulator recess of the old 10-inch emplacement* (PRO: WO 78/5136/10; reproduced with the kind permission of the National Archives)

hole of 0.16m (6in), surrounded by four circular holes arranged in a rectangle 0.57m by 0.4m (1ft 10½in by 1ft 3¾in) may be a socket and flange housing for semaphore apparatus which projected through the roof. Today, the shelter has gone and the gap left by it is sealed by steel plates bolted onto the apron.

Signallers' shelter 2 (figure 9)

In 1914, the signaller's shelter was replaced by another building, immediately north-east of the 10-inch emplacement, at the same time as the Port War Signal Station (PWSS) was established on the roof of Landguard Fort. It was built on the *terreplein*, partly behind and partly cut into the infantry parapet (PRO: WO78/5136/5) (figure 66). The shelter is a rectangular concrete structure built on a concrete base (figure 67). The overhanging roof is flat. The doorway in the rear wall is 1.91m high (6ft 3in) high and has a new inward-opening wooden door on an old frame. The south-east and most of the south-west walls have narrow observation slits, 0.47m (1ft 6in) high: those to the south-east had shutters, while that to the south-west had a fixed glass pane; all now have new wooden shutters hinged at the bottom.

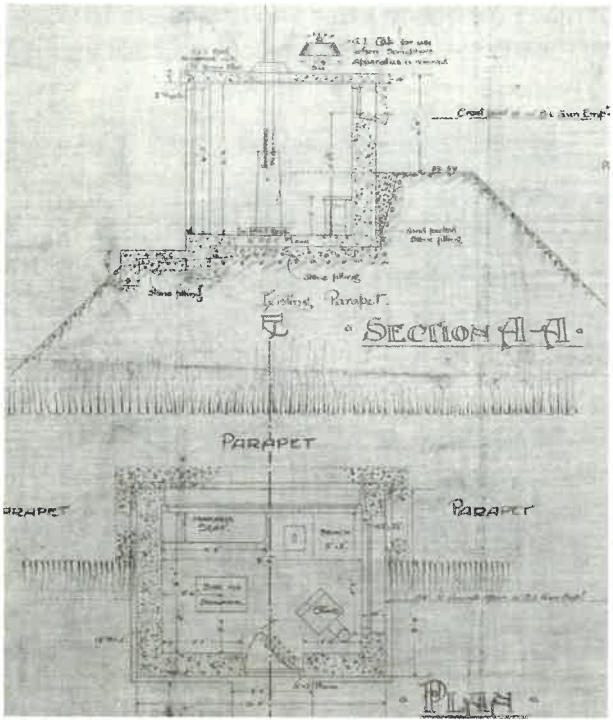


Figure 66 *Signallers' shelter 2: record plan (bottom) and section (top) of the new shelter of 1914* (PRO: WO 78/5136/5; reproduced with the kind permission of the National Archives)

Inside, the walls retain slight traces of whitewash. In the western corner, a ceramic vent pipe 0.19m (7in) in diameter carried the flue from a stove through the roof. A second hole in the roof, 0.28m (11in) in diameter, with an external concrete lip and metal cover carried the semaphore pole which was supported by a pedestal inside, of which the only trace is a patch in the floor. There are no other internal features but the 1914 plan shows a moveable seat along the south-east wall and a bench in the southern corner.

In the south-west wall, just below the observation slit, a 0.03m (1in) diameter conduit pipe enters the room and formerly brought in electric power. Attached to the north-east side of the shelter by a strap bracket is a large vertical metal pipe, 0.17m (6in) in diameter with a 0.03m (1in) pipe issuing from the top: its purpose is unknown. Nearby, a 0.91m (2ft 11in) square concrete block (*ex situ*) has three metal 1cm (¼in) diameter bolts arranged in a triangle.

Figure 67 *Signallers' shelter 2* (NMR: AA051429)

3.6 ANCILLARY BUILDINGS FOR THE 10-INCH GUN

The 10-inch magazine

Later Battery Plotting Room and Battery Command Post (figure 41)

The 10-inch magazine is located deep in the body of the mound and accessed from a passage at the foot of and alongside the main revetment wall, sunk 0.77m (2ft 6in) below ground level. Today, the magazine is essentially as shown on the 1901 record plan, although some of the internal arrangements have been altered and electric lighting introduced to all of the rooms (figure 68; PRO: WO 78/5136/14). Many of the alterations were associated with the conversion of the magazine into a Battery Plotting Room (BPR) in 1943 (PRO: WO 199/1173).

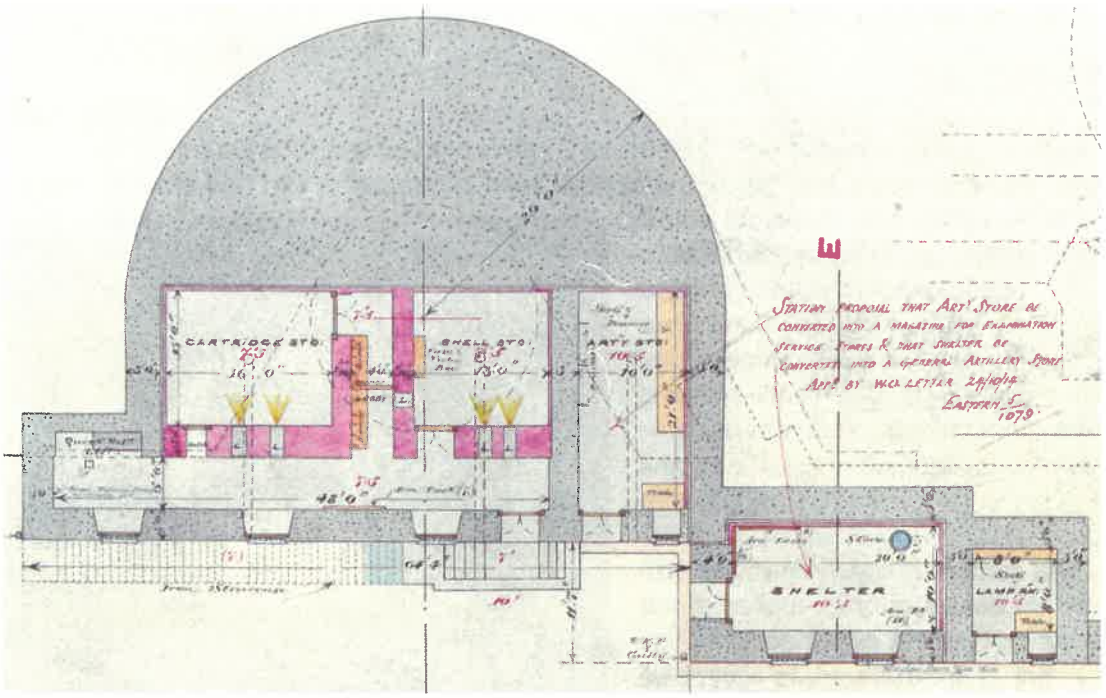


Figure 68 *10-inch Magazine: record plan of the magazine, stores and shelter for the 10-inch gun. Note the shifting lobby between the cartridge and shell stores* (PRO: WO 78/5136/14; reproduced with the kind permission of the National Archives)

The magazine is built in concrete with an internal brick skin forming a ventilation cavity, except the main elevation, which is of concrete only. The cartridge store and shell store are formed by thick internal partition walls formed entirely of brick. All brickwork is in English bond. Each room has a shallow segmental brick vault and a floor formed from concrete sections.

The sunken passage, built in concrete, runs the full length of the magazine elevation and was originally reached via four steps at the south-west end. The magazine entrance was subsequently (though at an unknown date) given greater protection by the addition of a 1.53m (5ft) high concrete blast wall along the outer edge of the passage, pierced only by a gap that made the route to the magazine door an indirect one. However, this wall blocked the original steps and made access to the eastern part of the passage difficult because of the obstruction effected by the external metal stair against the main revetment. The solution was to construct steps against the east external end of the passage, giving onto a vertical steel ladder fixed to the revetment, and leading back down into the passage.

Later still, probably in 1943, a second, free-standing brick blast wall, laid to English bond, was built in front of the earlier arrangement.

In plan, the magazine comprises an internal corridor along the north-west side, off the south-east side of which are, in series, a shell store, a shifting lobby (site of), a cartridge store and a quick return lift.

In the main elevation, the entrance to the magazine is at the southern end. Of three original windows which lit the internal corridor, only one is now open, the others having been blocked with brick and rendered externally – once more probably in 1943. The entrance has a concrete step, 0.20m (8in) high, to the doorway, 1.89m (6ft 2in) high, which is closed by a pair of outward-opening wooden doors. There is a chamfered and stopped lintel partially concealed by the render of the elevation, and an inserted bulkhead light.

The corridor

The walls of the corridor are painted cream (figure 69). The only remaining window splays inwards and has a segmental brick arch of one order and a new wooden frame for a pair of inward-opening casements, each of four lights. The blocking of the other windows includes 0.3m (1ft) square metal ventilation grilles. Between the blocked windows is an original wooden rifle rack, above which are wooden plugs in the wall for a coat rack (figure 70).

Figure 69 *10-inch Magazine: the corridor, showing the doors of the lamp recesses in the right-hand wall* (NMR: AA051440)

The south-east wall is in brick and contains four lamp recesses for the shell and cartridge stores, two on each side of the entrance to the shifting lobby. The recesses are similar to those in the 6-inch magazine but only one retains its outward-opening metal door. All have concrete lintels with illegible traces of painted signs, and glazed airbricks above and to one side. Wooden fittings, possibly for shelves at heights of 1.48m (4ft 10in) and 1.81m (5ft 11in), would have blocked the lamp recesses and are additions that postdate the 1901 record plan; they were probably part of the 1943 conversion (PRO: WO 78/5136/14). The issue hatch from the cartridge store is located in the south-east wall near the northern end. This opening, 0.94m (3ft 1in) high, has a chamfered and stopped sandstone lintel.

Figure 70 *10-inch Magazine: the remains of a rifle rack in the corridor of the 10-inch magazine. The rifle butts rested in the lower brackets, while the muzzle slotted into the upper bracket* (NMR: AA051419)

At the end of the corridor a vertical shaft contains the quick return lift which carried ammunition up to the gun. The shaft is contained within a 1.93m (6ft 4in) high recess that extends 1.06m (3ft 5in) below floor level. The opening of the shaft is protected by a sandstone lintel over an RSJ supported on sand-

Figure 71 *10-inch Magazine: detail of the end of the corridor, showing the array of fuse boxes installed during conversion of the magazine into a battery plotting room in 1943, and the brick channel which guided cables (extract from NMR: AA051440)*

stone pads (a wooden board covering the RSJ supports later electric wiring conduit). Scars in the side walls are all that remain of the lift mechanism.

The lift shaft and its immediate environs contain a group of features dating to the conversion of the 10-inch magazine into a BPR for the two new 6-inch guns in 1943. In the lift shaft at ground level there are metal brackets for several shelves. In the end wall of the corridor is a small arched recess, 1.96m (6ft 5in) high, now partially covered by a wooden board on which are mounted over twenty electrical fuse boxes (figure 71). Galvanised conduit from these took electric power into the BPR through the old issue hatch. At the base of the arched recess are two holes broken through the concrete to allow the passage of multiple large electric cables. These cables are now truncated but originally passed along a narrow channel, 0.37m (1ft 2½in) wide by 0.33m high (1ft 1in), defined at floor level by two brick dwarf walls across the front of the lift shaft. This channel guided the cables through the issue hatch into the BPR (see below).

The shifting lobby

Near the centre of the corridor is an entrance which originally opened into the shifting lobby unguarded by doors (PRO: WO 78/5136/14). The doorway, 1.91m (6ft 3in) high, has a flat concrete lintel which extends southwards to also cover the original shell store door. The wooden frame and outward-opening double doors were inserted when the cartridge store was extended to take in the area of the shifting lobby for the BPR in 1943 (see below). The wall that originally separated the shifting lobby from the cartridge store has been removed but part of the wooden shifting barrier remains in place (figure 72). A lamp recess in the southwest wall of the shifting lobby illuminated both the shell store and shifting lobby.

Figure 72 *10-inch Magazine: the cartridge store (later Battery Plotting Room) showing the remains of the shifting lobby at the far end: note the scars where the dividing wall has been removed (NMR: AA051415)*

The cartridge store (later **Battery Plotting Room**)
Original features include two lamp recesses, the issue hatch and a ceramic vent, 0.23m (9in) diameter, in the ceiling - the last with a later metal cover. The lamp recess frames have been removed but the metal settings which held the lamp in place are in situ. Part of the wooden frame for a vertical-sliding door survives in the issue hatch.

The store is now dominated by the extensive alterations undertaken in 1943 for conversion into a BPR (figure 73). This involved removal of the wall to the shifting lobby, plastering of the vault and laying of a new concrete floor. The plaster and concrete stop just short of the walls, and this, combined with the presence of wooden battens along the foot of the walls, show that the room was dry-lined to make it comfortable for staff manning the BPR. Removal of the dry lining has exposed the cream-painted walls of the magazine phase; the ceiling is whitewashed.

Figure 73
10-inch Magazine: the carttridge store, later Battery Plotting Room, showing the arrangements for electrical cabling at the far end (NMR: AA051416)

The base of the north-east wall has a low wooden box-like structure built against it, in effect a continuation of the brick lined gully protecting the electrical cabling coming through the issue hatch from the end of the corridor. These cables connected to five metal boxes attached to the wall above the boxing: these are the Magslip terminals that received range and bearing information from both BOPs (Close Defence and Counter-Bombardment) and sent it electrically to switch rooms (see below) in the two 6-inch Mk 24 guns above (the Magslip terminal boxes are embossed with "Box terminating; Magslip; 22 core; Seamans; 2888". There are five smaller boxes immediately adjacent and a large board on the wall above, with scars from the removal of several other boxes and terminals.

Let into the floor and running north-east to south-west across the centre of the room is a gully, 0.14m (5in) deep, rebated for metal covers. This linked the Magslip system to equipment operated by the BPR staff, who processed the range and bearing information from the BOPs using co-ordinate converters and fire direction tables and transmitted it to the guns via Magslip. Various other fixtures and fittings include metal brackets and a shelf on the east wall, 1.36m (4ft 5in) high.

The shell store (later **Battery Command Post**)
Original features include lamp recesses in the north-east and north-west walls; these are of the normal pattern, though that shared with the shifting lobby is vented both sides. The ceramic ceiling vent, 0.23m (9in) diameter, has a later metal cover.

It seems that this room was altered in 1943 at the same time as the cartridge store, in a similar manner, for use as the Battery Command Post (BCP). The alterations

included a new entrance: the room originally opened onto the corridor but the doorway, 1.14m wide by 1.91m high (3ft 8in by 6ft 3in) is bricked up, leaving a small vent covered by a metal grille similar to those in the corridor windows. The replacement entrance is a doorway inserted into the eastern corner of the BPR, with a flimsy wooden frame, 2.02m (6ft 7in) high, for an outward-opening wooden door. Like the BPR, the vault was whitewashed and the room dry-lined. The sawn-off stumps of some of the battens remain, and removal of the lining has exposed the magazine's cream-painted walls. Two rough holes in the north-east and south-west walls were made for electric cable conduit, while there are traces of a wooden board for electrical equipment on the north-east wall.

Artillery Store (later **Examination Service Store**; later **War Shelter** for BPR)
This structure is located securely in the body of the mound, immediately adjacent to the 10-inch magazine. It is essentially as shown on the 1901 record plan, with some later internal alterations that include electric lighting (PRO: WO 78/5136/14) (figures 68 and 74).

The doorway, 2.02m (6ft 7in) high, has an original wooden frame and a pair of new outward-opening wooden doors; these have safety glass in the top panels and can be held open with brass catches. There is a chamfered and stopped concrete lintel. Adjacent is a window with a wooden frame for a pair of new inward-opening two-light casements protected externally by vertical steel bars.

Figure 74
The Artillery Store for the 10-inch gun (NMR: AA051437)

The walls are of concrete but a brick skin, in stretcher bond, forms a cavity on the south-east and south-west. The segmental vault is also of brick while the floor is of concrete sections. The walls are painted cream; the ceiling is whitewashed. In the centre of the vault is a circular ceramic vent.

Internal fittings relate to use as a shelter for the BPR from 1943. These include, on the north-east wall, metal brackets for shelves at heights of 0.75m (2ft 5in) and 1.36m (4ft 5in). Along the north-east and south-east walls are remains of rifle racks for 30 weapons, including the floor-level rebated blocks which held the rifle butts in place. Wooden plugs in the south-west wall may have secured a clothes rack.

War Shelter 5

This building is situated next to the 10-inch artillery store, in the usual protected position but slightly forward of the magazine and artillery store. It is essentially as shown on the 1901 record plan, with some later alterations, including a porch and electric lighting (PRO: WO 78/5136/14) (figures 68 and 75).

Figure 75
The War Shelter for the 10-inch gun crew with Second World War bunkbeds along two walls and the remains of the gun floor gantry on the floor (NMR: AA051436)

A doorway with an old wooden frame and a new outward-opening wooden door leads into the porch. This is built entirely in concrete with a flat roof. In its south-west wall is the original doorway to the shelter, with its original pair of inward-opening doors.

The shelter is built in concrete with a brick skin in stretcher bond forming a cavity on the south-west and south-east. The floor is of concrete sections. The walls are painted cream and the shallow segmental brick vault is whitewashed. Two windows in the north-west wall are splayed internally: their wooden frames have been removed but the external vertical steel bars remain.

Most of the original internal features have been removed, although traces remain of a rifle rack along the north-east wall, and a metal pipe in the roof in the southern corner was for a circular stove shown on the 1901 record plan (PRO: WO 78/5136/14). Along the south-east and south-west walls are the wooden frames for bunk beds as seen in the other shelters, here capable of housing 6 men. In one bunk are the original tongue-and-grooved boards, each 0.16m (6½in) wide, and the ends of the bed frames are closed by sheets of sacking stapled to the woodwork. Metalwork stacked against the north-west wall is the dismantled remains of the gantry for the original 10-inch gun.

Lamp Room

This is next to War Shelter 5 and is essentially as shown on the 1901 record plan. Internal alterations include electric lighting (PRO: WO 78/5136/14) (figures 68 and 76). The doorway has a wooden frame for a pair of outward-opening wooden doors held open by brass catches, with a concrete sill and a chamfered and stopped lintel. The adjacent window has a wooden frame for a pair of inward-opening two-light wooden casements behind external vertical metal bars.

The interior has a floor of concrete sections and the walls are entirely of concrete under a shallow segmental brick vault. The room is whitewashed over traces of a black painted dado with green below, and there are also traces of blue paint. The walls and vault are badly cracked.

Figure 76
The Lamp Room for the 10-inch magazine (NMR: AA051439)

Metal brackets along the south-east wall were for shelves at heights of 0.65m (2ft 3in) and 1.57m (5ft 2in). In the western corner below the window, traces in the paintwork indicate the position of a table, 0.84m (2ft 9in) high, as shown on the 1901 record plan (PRO: WO 78/5136/14).

3.7 The new 6-inch battery of 1943-5

Two new gun houses for new gun nos 2 and 3 were completed late in 1942 to the north-east of the old emplacements, one on the existing *terreplein*, the other 100m away on a new earthwork. The old 10-inch position was adapted to accommodate the CD BOP for the new guns.

There is a description of the gun houses' construction in the Fort Record Book (PRO: WO 192/206, Part 11). In each case, a 'mat' of concrete was laid in the base of a large hole excavated 20ft down into the shingle mound. Concrete pillars were built on this base and surrounded by backfilled shingle, over which a thick ferroconcrete floor became the foundation for the emplacement.

The emplacement was then formed as a vertical drum of concrete, the upper part forming a circular gun pit. A rectangular casemate or gun house enclosed the rear half of the gun pit with high walls and a flat roof formed by a canopy of plastic armour, supported on a steel framework, as protection against aerial attack. Attached to or behind the rear of each gun house, on a lower level and terraced into the mound, is a war shelter and a gun store. A shell store and a cartridge store occupy detached positions a short distance from each gun house.

Construction is almost entirely in reinforced concrete; horizontal shuttering was used in the gun house and vertical shuttering in the gun pit. Variations are recorded below. All of the timber and steel detail to the gun houses and ancillary buildings has been conserved recently and is painted mid green.

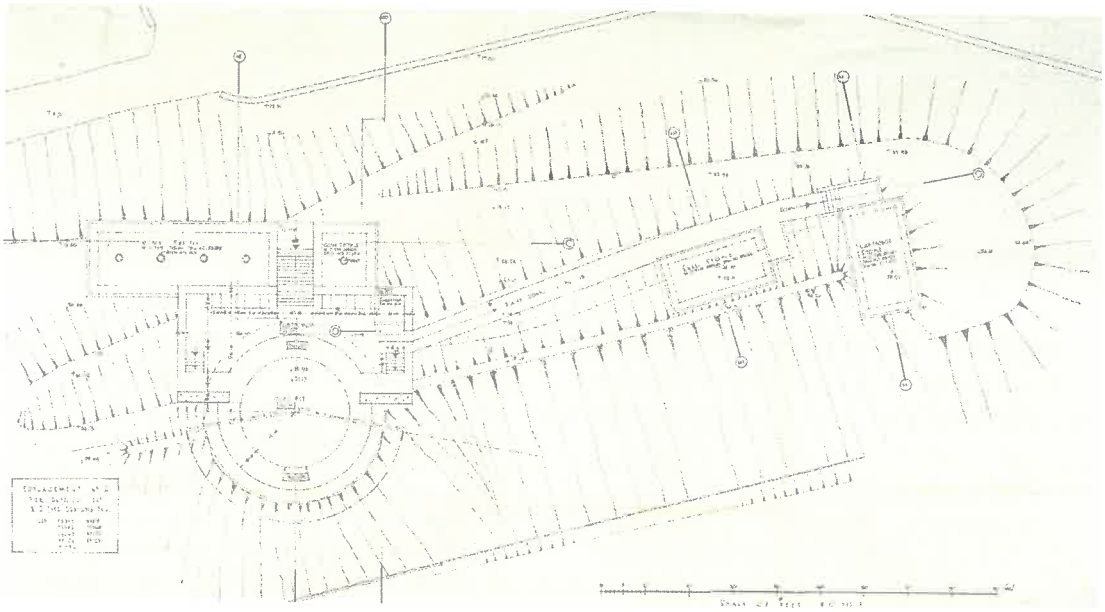


Figure 78 *Second World War no 2 gun: plan dated 1942 of the gun and ancillary buildings* (PRO: WO 192/206; reproduced with the kind permission of the National Archives)

No 2 gun emplacement (figure 77)

The gun house and emplacement

The gun pit is currently used as a pond, making investigation impossible but contemporary plans demonstrate that it was identical to that for no 3 gun (figure 78). The forward aspect has a gently-sloping concrete apron, with a circular internal face and a slightly facetted external face; the latter is rendered, and white painted lines

define both edges. At **a**, a ceramic pipe exiting the earthwork is probably the outflow of the gun pit drain.

The rear of the gun pit is defined by the raised gun floor, 1.52m (5ft) high, reached from the floor of the gun house by steps on each side: a steel railing guards the change in level and the steps (figure 79). A narrow passage, 0.76m (2ft 6in) wide, passes through the gun floor into the gun pit, originally covered by steel chequer

Figure 79
Second World War no 2 gun: the gunhouse, with the raised gun floor to the right and the remaining piers which supported the anti-strafing cover (NMR: AA051401)

plate at gun floor level. A gully, 0.16m (6¼in) wide by 0.31m (1ft) deep, in the floor of the passage, extends from the gun pit into the switch room at the west end of the gun house. This gully, which retains its steel chequer plate covers, carried electrical cables from the switch room to the gun.

The rectangular gun house is defined by walls 3.50m (10ft 6in) high. Most of the steel framework of the roof does not survive, except for fourteen sawn-off piers formed from steel RSJs bolted down via steel flanges and base plates. Those at the rear measure 0.2m (8in) by 0.15m (6in), while those secured on the gun floor are 0.15m (6in) by 0.1m (4in), a difference recorded on the construction proposal plan. The plastic armour was arranged in tiles 0.82m (2ft 8in) square and 0.06m (2¼in) thick, carried on horizontal girders supported by the piers and on the walls on a 0.1m (4in) by 0.05m (2in) 'grillage' (PRO: WO (B)). Two remaining tiles can be seen in one of the ammunition recesses (figure 80). Electric bulkhead lights illuminated the gun floor.

Figure 80 *Second World War no 2 gun: two tiles of plastic armour inside an ammunition recess; the tiles formed part of the anti-strafing cover above the gunhouse* (NMR: AA051397)

The gun house contains eleven ready-use ammunition recesses: five are built in a line against the rear wall and six are beneath the gun floor (figure 81). Each recess is 1.06m (3ft 6in) wide by 0.90m (2ft 11½in) high by 0.92m (3ft) deep, with a heavy steel frame for twin steel doors on pintle hinges, secured by a pivoting locking bar with a padlock. Two shallow gullies in front of the rear range of lockers drained water away to the rear.

At the western end of the gun house, a doorway with a wooden frame for an outward-opening door leads into the tiny switch room (figure 82). This room contained several Magslip terminal boxes, transformers, changeover switches and a five-way

Figure 81 *Second World War no 2 gun: ammunition recesses along the rear wall of the gunhouse, many of which still have their heavy metal doors* (NMR: AA051398)

distribution board. Firing information would be transmitted to the gun from bearing and range receivers in the switch room, via electrical cables. Orders for setting the bearing for ballistic and drift corrections, followed by the range, were received from the BCP by loudspeaker (PRO: WO 199/1173; WO 196/206). The switch room, only 2.43m by 1.24m by 1.84m high (8ft by 4ft by 6ft), is built in the angle between the

Figure 82 *Second WorldWar no 2 gun: the interior of the switch room, showing the electrical equipment* (NMR: AA051400)

gun house and the shelter; it has a gently-sloping asphalted roof. The room was lit by a bulkhead light on the ceiling, with a switch beside the door. Electric cabling came in through a hole low in the north-west corner, under a steel plate, to equipment mounted on the walls. Two steel supports project 0.3m (1ft) from the north-west wall where there are also four fuse boxes. The west wall supports a large steel board (the distribution board?), and there is a junction box and a hole for cabling on the south wall. A gully around the perimeter, with steel chequer plate covers, continues across the gun floor to the gun pit and carried electrical cables to the gun.

An opening at the rear of the gun house leads down a flight of steps to the shelter and gun store, while a second doorway in the eastern flank wall gives onto a concrete path leading to the cartridge and shell stores.

Gun store (later **war shelter**)

The entrances to the gun store and crew shelter are opposite each other at the foot of the steps. The gun store is a small room with walls 0.62m (2ft 1in) thick and a flat asphalted roof that overhangs the north-west and north-east walls by 0.16m (6in). A Howarth ventilator crowns the centre of the roof. The entrance, 1.06m wide by 1.99m high (3ft 6in by 6ft 7in), has double outward-opening steel doors, with a galvanized drip hood above and a narrow drain at the base, 0.07m wide and 0.02m deep (3in by 1in). There is a single Crittal-type nine-light window in the south-west wall, hinged at the top (figure 83).

Figure 83 *Second World War no 2 gun: the interior of the gun store. The timber bunkbeds relate to its later use as a war shelter* (NMR: AA051434)

The interior is whitewashed and the window has an internal wooden frame, painted green, which formerly held a blackout shutter secured by toggles on the sides and base.

The building was re-used as a shelter and along the south-east wall is the familiar timber frame for bunk

beds, of the usual, 0.1m by 0.1m (4in by 4in) scantling, supporting beds at heights of 0.86 and 1.47m (2ft 10in and 4ft 10in) for four men. The north-west and north-east walls have regularly-spaced filled holes which may have held shelf brackets. Galvanized conduit for electrical cabling entered at the southern corner and carried power to a bulkhead light on the ceiling; there is wall switch by the door and a pull switch situated centrally above the bunks.

War shelter

This rectangular building has a flat asphalted roof, 0.46m (1ft 6in) thick, which overhangs the walls by 0.16m (6in) on the north-west and north-east sides. The doorway, 1.08m wide by 1.96m high (3ft 3in by 6ft 5in), has a steel frame and double outward-opening steel doors, each supported on three pintle hinges, and secured by a mortise lock. Four square vents in the ceiling are capped by Howarth ventilators on the roof. Three Crittal-type metal-framed windows are each divided into nine lights, with reinforced glass, in three rows. The two upper outer lights are hinged at the top to open outwards (figure 84).

Figure 84
Second World War no 2 gun: the interior of the War Shelter for the crew; there were shelves along the right-hand wall flanking the stove position (NMR: AA051435)

The interior, 2.74m (9ft) high, is whitewashed. Two cross-axial concrete joists at ceiling level divide the interior into three bays. All three windows have frames for timber shutters, as in the gun store. There are scars from two rifle racks and shelves along the south-east and north-east walls. A rectangular concrete stove base, 1.04 by 0.93m (3ft 5in by 3ft 1in), is situated centrally on the north-west wall. Conduit for electric cable enters at the eastern corner, replacing an earlier arrangement through a hole in the south-east wall, serving three bulkhead lights on the ceiling with switches beside the door and in the middle of the south-east wall.

There are no surviving fittings to indicate how the accommodation was arranged. Manning details for the battery show that each 6-inch Mk 24 gun was manned by three crews of nine men working to a rota: one crew on the gun, one in the war shelter and one at the barracks (PRO: WO 199/206).

Shell store and **cartridge store** (figure 77)

These rectangular buildings are terraced into the rear of the old battery mound, some 40m north-east of the emplacement and connected to it by a concrete path. They are of reinforced concrete, with asphalted roofs 0.28m (9½in) thick, overhanging the walls by 0.16m (6in), and with a very slight pitch along the main axis. A layer of asphalt is carried up the walls to 1.68m (5ft 6in) as a means of preventing moisture entering the buildings from the mound. The entrance to each building, pro-

Figure 85
Second World War no II gun: the interior of the shell store, showing the shelves where shells were stored (NMR: AA051403)

tected by an L-shaped blast wall, 0.22m (9in) thick, has a single outward-opening steel door in a steel frame. There are no windows but each building is ventilated by small rectangular vents in the walls covered by metal grilles. Both buildings are whitewashed inside and retain fragments of conduit for electric cabling.

In January 1943 this store was stocked with 464 shells (400 x Common Pointed Ballistic Capped Mk 27B shells containing Percussion Base 480 fuses and 64 x High Explosive Mk 29B shells with Percussion DA230 fuses (PRO WO 192/206). Common Pointed and High Explosive shells were for use against lightly armoured and unarmoured ships.

The sunken entrance to the cartridge store is framed by a blast wall, 1.01m (3ft 4in) high. The threshold of the doorway retains faded traces of red paint, while an electrical switch is fixed to the right-hand side of the door on the exterior wall (figure 86).

Figure 86
Second World War no 2 gun: the interior of the cartridge store (NMR: AA051404)

Unlike the shell store, the interior has a 0.22m (9in) thick internal brick lining, in stretcher bond, pierced only by small square ventilators with internal and external metal grilles. The brick is whitewashed. The internal plan and the racking is of the same design as that in the shell store although here the shelves of both tiers are of identical width, set 1.17m (3ft 10in) and 0.69m (2ft 3in) above the floor. First-hand evidence of the store's working life is provided by pencil tally marks on the walls by the entrance.

In January 1943 this magazine was stocked with 464 full-charge cartridges, each containing 31lbs of cordite (PRO: WO 196/206).

No 3 gun emplacement (figure 87)

The gun house and emplacement

The gun house and emplacement are of almost identical design and detail as that for no 2 gun (figure 88). There are minor differences in the positions of the ready-use ammunition recesses and the openings in the rear walls that lead to the gun store and crew shelter. Only variations and additional features are described below.

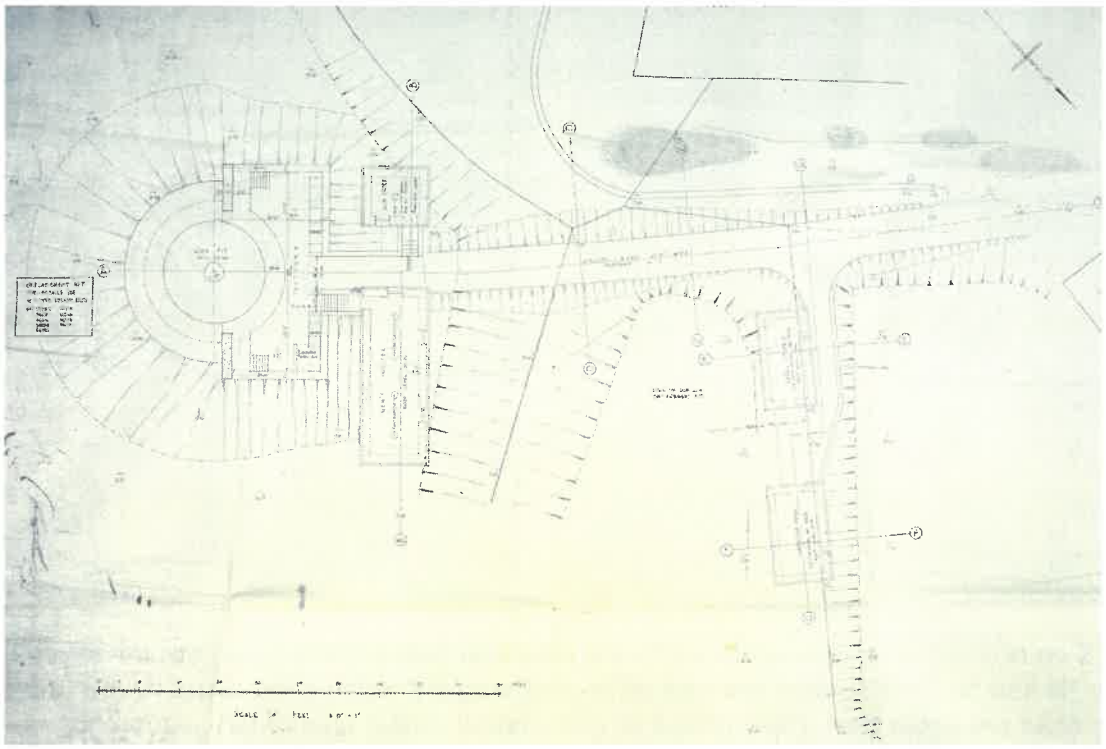


Figure 88 *Second World War no 3 gun: plan dated 1942 of the gun and ancillary buildings* (PRO: WO 192/206; reproduced with the kind permission of the National Archives)

The gun pit is 7.61m (25ft) in diameter and 1.65m (5ft 5in) deep; the apron is partly rendered (figure 89). At the centre of the gun pit is the steel holdfast plate for the gun, in plan a square with chamfered corners and twenty-eight bolts 0.08m (3in) high by 0.04m (1½in) in diameter. There is a drainage gully, 0.15m (6in) wide by 0.20m deep (8in) around the perimeter of the gun pit, exiting through a ceramic pipe to an open concrete drain (**a**) on the glaçis.

The gun floor is edged by faded bands of white paint. A semi-circular groove, 0.21m (8in) wide and 0.14m (5½in) deep, extends around the rear half of the gun pit wall close to the top. Both ends contain steel pipes, 0.075m (3in) in diameter, extending 0.27m (11in) into the concrete. Their function is unclear.

Two lower walls join the flank walls to the gun floor at the front. The lower parts of the flank walls are 0.61m (2ft) wide, while the upper parts are 0.38m (1ft 3in) wide. In the north-eastern flank wall is an inserted, crudely-rendered niche measuring 0.27m (10½in) high by 0.07m (3in) deep: its purpose is unknown. The remains of electric cabling run along the north wall and up one steel pier, formerly serving lights on the ceiling.

Figure 89
Second World War no 3 gun: the gun pit and holdfast (NMR: AA051431)

The eleven ready-use ammunition recesses are of the same design to those in no 2 gun. Seven are located below the gun floor, while four are against the rear wall of the gun house. A drainage gulley, 0.08m (3in) by 0.02m (¾in), runs along the base of the rear recesses and empties down the ramp to the rear of the gun house.

There are two openings, without doors, in the rear wall of the gun house: one leads directly down a flight of steps to the war shelter while a wider opening leads to a ramp. The entrance to the gun store lies at the base of the ramp, from which a path continues to the shell and cartridge stores. This path is marked as a 'gravel road' on a plan dated 1942, though it is now grass- covered (PRO: WO 192/206).

Gun store (later **war shelter**)
The positions of the gun store and crew shelter are reversed to those of gun no 2. However, in most respects the gun store is identical to its partner and has identical features, and only variations are noted here.

The building sits on a concrete platform and its entrance is reached down a short flight of steps, protected by high concrete blast walls. The asphalted roof overhangs on all sides and the exterior walls are asphalted to a height of 0.15m (6in).

Inside, the timber framework of bunk beds for 4 men stands against the south-west wall. The 0.05m (2in) thick bed boards are in situ, set 0.91m (3ft) and 1.53m (5ft) above the floor, providing bunks 0.77m (2ft 6in) wide.

War shelter
The shelter is approached down a flight of steps from the gun house, protected by high concrete blast walls. It is almost identical to the shelter for no 2 gun and only variations are noted here.

The roof overhangs on all but the south-west sides. The exterior walls have a coat of asphalt extending to a maximum height of 0.48m (1ft 7in) from the floor.

All three windows had internal blackout shutters, of which only the south-west window has substantial remains. Each shutter slid upwards to the closed position in a timber frame and was secured by three wooden toggles on each side.

On the south wall above the stove base, at a height of 2.13m (7ft), is the asbestos stove vent pipe, 0.1m (4in) in diameter, protruding 0.31m (1ft) and containing a ferrous pipe of 0.15m (6in) diameter. To either side of the stove base are scars from shelves at a height of 1.58m (5ft 2in) and rifle racks for 12 weapons. There are traces of conduit for electric cable on the south-east wall and the scars of switches are visible near the door and the stove. Centrally positioned in the ceiling of each bay was a circular bulkhead light, of which two survive.

Shell store and **cartridge store**
These are located in a sunken position north of the gun house and originally reached via a narrow passage running between the shell store and a battered concrete wall, 2.10m (6ft 11in) high, although this is now largely infilled. The stores have opposing entrances and are essentially the same as those serving gun no 2, such that only variations are recorded below (figure 87).

The door to the shell store has attached a galvanised sign, with the number 3 inside a triangle. Internally, the racking is not as well preserved and the ceramic airbricks are missing from the vents. There are two bulkhead lights on the ceiling.

In the cartridge store the internal and external grilles survive on all four vents. The electrical fittings are of standard form but the cables, conduit, bulkhead lights and light bulbs appear to be modern. There are two fuse or switch-boxes on the exterior wall.

3.8 MISCELLANEOUS STRUCTURES

Practice Battery (figure 90)
Probably built between 1903 and 1905 for four guns, this battery served for practice fire; only two emplacements survive. Detailed survey of the battery was not possible due to the overgrown nature of the area and the sensitivity of the overlying vegetation.

Only the western two gun positions survive the other two having been removed or destroyed by the construction of the concrete road which now divides Left and Right Batteries. The guns stood on open concrete platforms on a shingle mound 0.97m (3ft 2in) high. Each platform is a flattened octagon in plan, constructed of mass concrete and containing a pivot at the front, behind which is a holdfast plate and racers for what were probably 6-inch guns on Vavasseur mountings (figure 91). The circular pivot, which has four flanges for bolts securing it to the platform, is 0.22m (8in) high and tapers in diameter from 0.28m (11in) at the base to 0.25 (10in) at the top. The top is hollow to secure the gun. The holdfast plate is secured by nine bolts in two rows, each bolt 0.03m (1in) in diameter and 0.04m (1½in) high, with a 0.05m (2in) wide outer rail which is rebated opposite the bolts. Each platform has three curved ferrous racers: the front one is 0.215m (8½in) wide, while the twin racers to the rear measure 0.215m and 0.1m (8½in and 4in) wide. The rear racer has a flat inner part and a toothed outer part which is inclined in order to engage with the wheels of the traversing gear on the gun carriage. A 0.075m (3in) wide graduated copper alloy traverse arc to the rear is barely visible, with graduations from 257° to 275° visible.

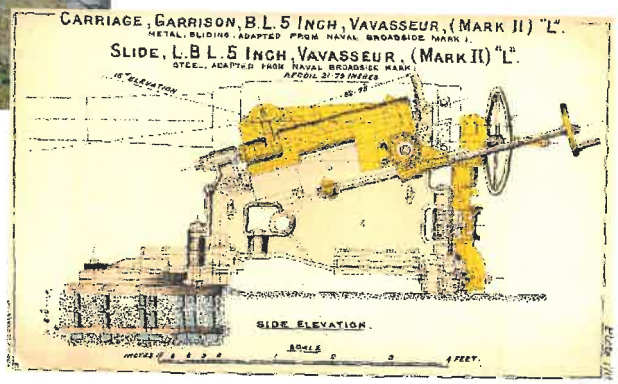


Figure 91
Practice Battery: one of the Vavasseur emplacements, heavily overgrown (left) (NMR: AA051430) *and a detailed elevation of the garrison carriage for a 5-inch Vavasseur Mk II, very similar to the 6-inch variety (right)* (Treatise on Military Carriages, War Office, 1911)

Immediately in front of the practice battery is a large approximately oval shaped depression (**a**) measuring 25.0m by 12.0m by as much as 1.2m deep. This appears to form the northern boundary of a rectilinear platform partly overlain by the earthwork for the Second World War no 3 gun emplacement. The platform, which survives on only two sides, is defined by a 0.6m high scarp with an internal bank along its eastern side (**b**). Inside, a small hollow (**c**) measures 3.1m by 2.6m by 0.2m deep and has the remains of an outer scarp along three sides. It seems likely that these features formed part of a coherent complex whose interpretation remains elusive.

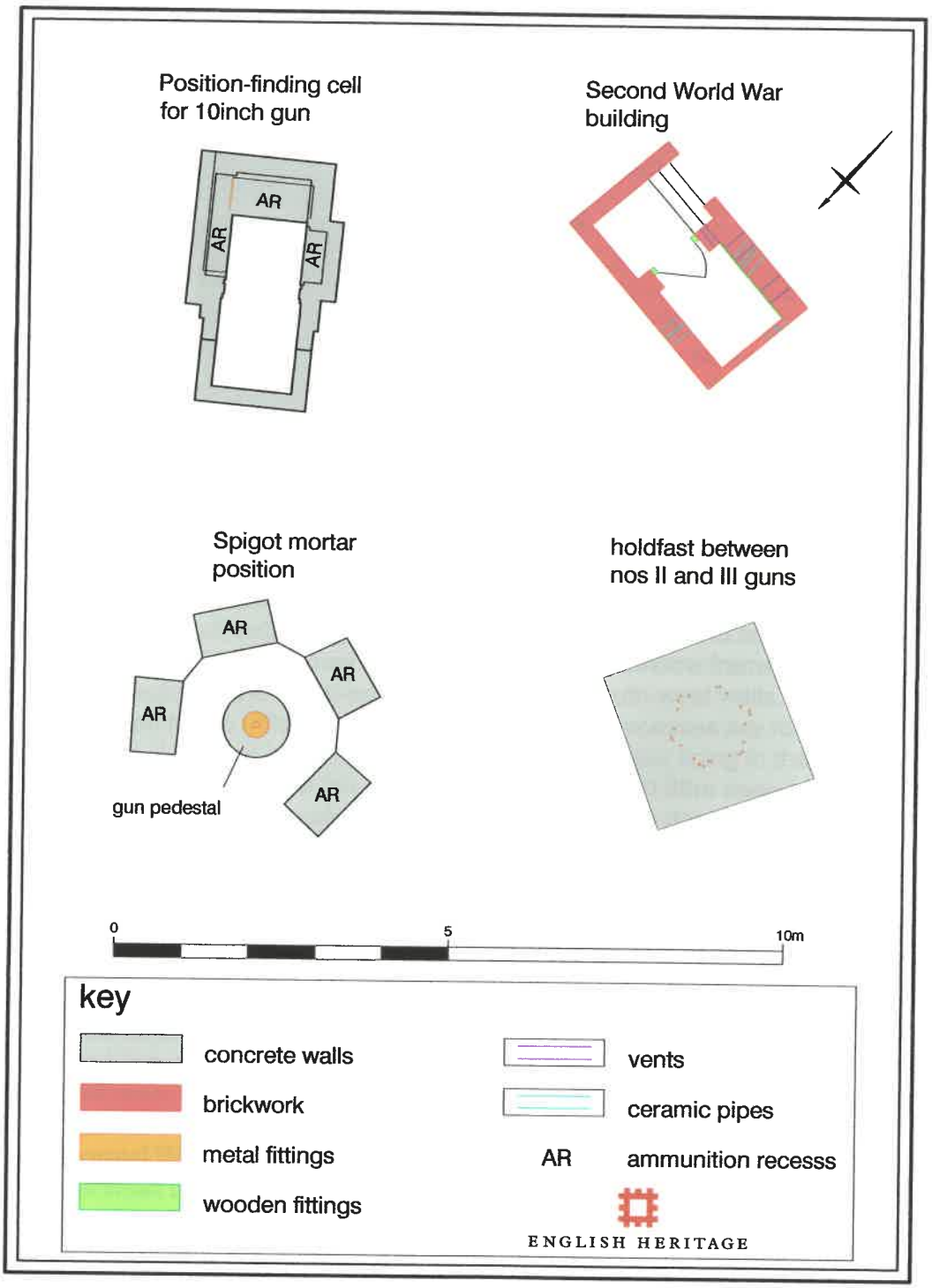


Figure 92 *English Heritage survey plan of miscellaneous structures (1:100 scale)*

Position-finding (PF) cell (figure 92)

This is a small concrete structure on the top of the battery mound located immediately north-east of the Second World War no 2 gun emplacement, with a wide view out to sea (figure 93). It is the transmitting PF cell for the 10-inch gun. It was not built by 1901, but a pencil note on the plan shows the "approx site of Transmitting PF Cell to be demolished" and approved by the War Department on 23rd June 1912 (PRO: WO78/5136/11). It is also shown as a proposal on a plan of 1904 (PRO: WO 78/4052/1). It had a short life, becoming redundant once the 10-inch gun was removed in 1909/10.

Figure 93
Position-finding cell: the remains of the structure (NMR: AA051428)

Investigation of this rectangular structure, only the lower part of which survives, was made difficult by the surrounding dense vegetation. Built of mass concrete, its measures 3.14m by 1.20m (10ft 3in by 3ft 11in) internally and is now open to the rear. This was the entrance elevation and may have been of brick with a door and a window (other contemporary Landguard examples appear on record plans eg PRO: WO 78/5144/2; WO 78/5164/2; WO 78/5147/2). The top of the surviving wall corresponds with the sill of an observation slit along the south-east wall, extending along parts of the north-east and south-west walls; an embedded metal strip may be part of a shutter or window frame. Internally, there are recesses in the south-east, north-east and south-west walls, the last rebated for a wooden frame. The north-east and south-west recesses are rendered, while wooden plugs and battening grooves suggest a timber lining in the south-east one. The recesses measure (south-west) 0.78m wide by 0.26m deep by 0.62m high (2ft 6in by 10in by 2ft); (south-east) 1.12m wide by 0.70m deep by 0.87m high (3ft 8in by 2ft 3in by 2ft 10in); (north-east) 1.53m wide by 0.31m deep by 0.53m high (5ft by 1ft by 1ft 8in).

Some debris from the cell lies nearby in the form of a slab of concrete with steel fittings, 0.16m thick.

To the south of the PF cell are the infilled remains of a slit-trench lined with corrugated-iron sheeting. This may relate to re-use of the cell as a defended position for small arms during the First or Second World Wars.

Second World War building (figure 92)

This small building, with a slightly sunken floor, occupies a safe position let into the rear of the battery at the base of the *talus*. It is of Second World War date.

The building is of Fletton brick laid to English bond, with a concrete floor sunk 0.59m (2ft) below ground level and an overhanging concrete roof which slopes slightly to the rear (figure 94). The doorway, 1.40m (4ft) high, in the north-west wall has no frame and leads onto steps which descend into a small featureless lobby. From

here, another doorway, 1.93m (6ft 3in) high, with a wooden frame for a single outward-opening door, leads into the main room. The north-west wall of this room retains wooden panelling which originally covered all four walls: on it are several junction boxes. Pairs of circular ceramic vents, 11cm (4in) in diameter, pierce the north-west, north-east and south-east walls, and rectangular vents in the north-west and south-west walls provided ventilation via small holes drilled through the panelling.

Figure 94 *Second World War building at the foot of the trace, probably connected with ctrical power or communications MR: AA051423)*

It is likely that the building was concerned with the control and relay of electrical power or information to the battery. As it is quite close to the BPR in the former 10-inch magazine, it may be connected with the Magslip transmission for the 6-inch Mk 24 guns, or perhaps with telephone communications.

Spigot mortar (figure 92)

Near the north-eastern end of the battery mound, between gun emplacements 2 and 3, is a Second World War spigot mortar position of standard design. The low drum-like concrete pedestal, 1.00m (3ft 3in) in diameter, has a slightly domed top surmounted by a circular steel plate containing a ferrous pintle on which the weapon was mounted (figure 95). The ferrous pintle is unusual, as they are generally of stainless steel. Surrounding the pedestal are the remains of four ready-use ammunition and storage lockers, built in brick with flat concrete roofs.

Figure 95 *Spigot Mortar position: the overgrown nature of the position hindered investigation* (NMR: AA051396)

Gun holdfast (figure 92)

Situated approximately mid-way between nos II and III guns is a square concrete block on the top of the terreplein, with a holdfast for an unidentified gun. The concrete block, 2.50m (8ft 2in) square, is flush with the ground surface. The holdfast comprised 24 sawn-off bolts (1cm (½in) in diameter) broadly arranged into a hexagon, although one is missing and there are two extra bolts which do not follow the main pattern. The size of the bolts indicates a light weapon, probably a First World War anti-aircraft gun.

Slit trenches

There are a several slit trenches cut into the shingle mound of the battery, notably near to emplacements no I and III and the PF cell. Most of them have been infilled but in some places, fragments of the corrugated metal sheet lining protrude slightly from the ground.

4. CONCLUSIONS

Landguard Right Battery was constructed between 1898 and 1901 as a coastal battery, and for most of its life served as the principal Examination Battery for Harwich Haven, working in close collaboration with the guns at Beacon Hill Fort in Harwich. The original design of the battery represents an early application of medium calibre BL guns mounted on barbette carriages, rather than disappearing ones like its earlier neighbour, Left Battery. The two together exhibit the response to new developments in fortification design and in military technology. The surviving evidence clearly demonstrates this and subsequent developments through the 20th century, and as a result at Landguard there is a rare opportunity to examine the changing nature of coastal defence in England. The battery survives in an exceptionally good condition, and represents one of the best surviving examples of its type in the country.

However, the significant aspects of Right Battery are part of a much wider story:

1) The defences on the Landguard Peninsula are themselves a unique representation of coastal defence in England, with buried and surface remains spanning the period from the early 17th century to the mid 20th century.

2) The Landguard defences are further enhanced by the way in which they were designed to collaborate with other fortifications around Harwich Haven, namely in Harwich and Shotley. Consequently, Harwich Haven provides a unique opportunity to investigate and understand the nature and form of coastal defence in England from the 17th to the 20th centuries.

5. SURVEY AND RESEARCH METHODS

The archaeological survey was carried out during June and July 2003 by Louise Barker, Nathalie Barrett, Moraig Brown and Paul Pattison. Hard detail and most of the larger archaeological features were surveyed in the field at a scale of 1:500 using a Trimble 5600 theodolite with integral electronic distance measurement. Further details were supplied using conventional graphical methods. In addition, all structural elements were surveyed using conventional graphical methods at a scale of 1:100.

All photography was by Steve Cole.

The report was researched and written by Moraig Brown, Paul Pattison and Nathalie Barrett. Moraig Brown and Nathalie Barrett prepared the illustrations using Trimble Geomatics, AutoCAD, Adobe Photoshop and Adobe Illustrator software. The final report was assembled using Adobe Pagemaker software. Editing was by Paul Pattison.

The site archive has been deposited in the National Monuments Record Centre, Great West Village, Kemble Drive, Swindon SN2 2GZ (NMR No: TM 23 SE 230).

6. ACKNOWLEDGEMENTS

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The Landguard Bird Observatory
The Imperial War Museum
The National Archives (formerly the Public Record Office)

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Eastern Coast defences Harwich Site plan shewing prepared defence positions, 14/2/1916

WO 78/4423/2
Eastern Coast defences Harwich Site plan shewing prepared defensive positions, undated (eC20th)

WO 78/4423/4
Harwich Harbour. Plan showing defensive positions, undated (eC20th)

WO 78/4423/5
Harwich Harbour. Plan showing defensive positions, with detailed information regarding Line of Defence across Landguard Common, undated (eC20th)

WO 78/4423/6
Harwich Harbour. Plan showing defensive positions, with detailed information regarding Defence of Vicinity of EL Emplacements, Landguard, undated (eC20th)

WO 78/5135
Sheerness, Medway, Thames and Harwich Area: Harwich Defences: Index Plans, 1922

WO 78/5136/1A
Ipswich Area, Landguard. Conversion of 6"15° emplacement into 6"45° emplacement – plans, Aug 1942

WO 78/5136/4
Harwich Coast Defences, Landguard Battery. Site Plan Showing Gun Floor Shelters etc (No 2 of 3), 8/6/1914, revisions 25/6/1914

WO 78/5136/5
Harwich Coast Defences, Landguard Battery. Shelter for Signallers (for Examination Battery). (Plan No 2 of 2), 21/4/1914 & 2/1/1915

WO 78/5136/6
Landguard Battery (No 3 of 3) ,8/6/1914, undated revisions

WO 78/5136/7
Landguard Right Battery Harwich Division ED Block Plan (Record Plan No 2 of 4) showing in pencil existing and proposed BC posts, ?revisions 26/10/1911

WO 78/5136/8
Harwich Harbour from the latest Admiralty Surveys to 1912, 1912

WO 78/5136/10
Harwich Coast Defences, Landguard Battery. Shelter for Signallers (Record Plan), 22/8/1913

WO 78/5136/11
Landguard Right Wing Battery, Harwich Division ED. Block Plan (Record Plan No 2 of 4), May 1901, revisions 13/6/1902, 3/4/1908

WO 78/5136/12
Landguard EL Directing Station. Proposed Officer's Shelter plan, section and block plan

WO 78/5136/13
Harwich Coast Defences Landguard Battery sketch plan of proposed BC and ELD posts, amendment to station design, Oct 1913

WO 78/5136/14
Landguard Right Wing Battery, Harwich Division ED. (Record Plan No 3 of 4), Jun 1901revisions 1902, 1908

WO 78/5137/2
Sheerness, Medway, Thames and Harwich Area: Harwich Defences: Landguard Left Battery, 1891, 1901, 1922

WO 78/5141
Sheerness, Medway, Thames and Harwich Area: Harwich Defences: Beacon Hill Battery, 1890-98, 1903

WO 78/5144/2
Harwich Division Eastern District Landguard Electric Light Defences No 3, 4 & 5 Fixed Beam Emplacements & No 1 SM Observing Cell. Plans, sections, elevation and block plan, 10/10/1903, revisions 2/2/1904

WO 78/5143/2
Eastern Coast Defences Harwich Defence Electric Lights, 19/7/1910

WO 78/5145/3
Harwich Coast Defences Landguard Record Plan of EL Engine Room & Reserve Oil Stores for nos 7-10 Electric Lights. Plan, sections, elevation and block plan, 17/9/1906

WO 78/5146/1
Harwich Defences ED Landguard Electric Light Engine Room, Oil Stores etc for two oil engines. Plans, sections, elevations and block plan (Record Plan Sheet No 1 of 1), May 1901revisions 26/2/1902

WO 78/5146/3
Harwich Defences Landguard Fort. Plan and armament table, 15/3/1886

WO 78/5147/2
Eastern District Harwich Defences Landguard Fort Depression PF Cell. Plan, section, elevation, block plan, 2/12/1896

WO 192/206
Right Battery Fort Record Book including:CRE Drawing No 1553. Landguard 6" 45° Guns. Plan for No.3 Emplacement. CRE Drawing 1550. Landguard 6" 45° Guns. Plan for No.2 Emplacement, Jan 1942

WO 192/213
Landguard Fort Fort Record Book, including plans: Harwich Area Fixed Defences circuit diagram (26/2/1941), RE Enclosure (undated), Landguard Barracks (undated), Landguard Fort (undated)

WO 199/523
Formation of Coast Batteries, 1940-2

WO 199/930
Reduction of Coastal Artillery Armaments, 1944/5

WO 199/1173
Notes and Letters – Harwich Fixed Defences, 1941-5

WO (A)
CRE Drawing No.39, Aug 1942. *Ipswich Area Landguard. Conversion of 6" 15° Emplacement into 6" 45° Emplacement* – Site Plan.

WO (B)
CRE Drawing ?, Revised 1-5-1942. *Landguard 6" 45° Guns. Overhead cover for Emplacements Nos 2 &3.*

WO (C)
CRE Drawing No 20, Aug 1942. *Landguard 6" 45° Guns. Handrail and Chequer plating to Emplacements 2 & 3.*

8. PHOTOGRAPHS TAKEN DURING THE SURVEY

AA051358	Exterior. Landguard Fort Right Battery. WWII no 3 gun: view from foreshore	COLOUR
AA051359	Exterior. Landguard Fort Right Battery. WWII no 2 gun: view from foreshore	COLOUR
AA051360	Exterior. Landguard Fort Right Battery. WWII no 2 gun: view from foreshore	COLOUR
AA051361	Exterior. Landguard Fort Right Battery. No III gun and Close Defence Battery Observation Post: view from foreshore	COLOUR
AA051362	Exterior. Landguard Fort Right Battery. General view of battery from foreshore	COLOUR
AA051363	Exterior. Landguard Fort Right Battery. No I gun: view from foreshore	COLOUR
AA051364	Exterior. Landguard Fort Right Battery. No I gun: view from foreshore	COLOUR
AA051365	Exterior. Landguard Fort Right Battery. No III gun: WWII Close Defence Battery Observation Post, view from south west	COLOUR
AA051366	Exterior. Landguard Fort Right Battery. No III gun: Close Defence Battery Observation Post from rear	COLOUR
AA051367	Exterior. Landguard Fort Right Battery. Nos I and II guns: emplacements from rear	COLOUR
AA051368	Exterior. Landguard Fort Right Battery. No III gun: Close Defence Battery Observation Post from rear	COLOUR
AA051369	Exterior. Landguard Fort Right Battery. No I gun: view from north east, showing WWII gunposition in foreground	COLOUR
AA051370	Exterior. Landguard Fort Right Battery. No I gun: view from north east	COLOUR
AA051371	Exterior. Landguard Fort Right Battery. No I gun: casemate camouflage wall, view from south west	COLOUR
AA051372	Exterior. Landguard Fort Right Battery. No III gun: WWII Close Defence Battery Observation Post	COLOUR
AA051373	Interior. Landguard Fort Right Battery. No III gun: WWII Civil Defence Battery Observation Post	COLOUR
AA051374	Interior. Landguard Fort Right Battery. No III gun: WWII Civil Defence Battery Observation Post, showing communication hatches	COLOUR
AA051375	Interior. Landguard Fort Right Battery. No III gun: WWII Civil Defence Battery Observation Post, showing Directing Station	COLOUR
AA051376	Exterior. Landguard Fort Right Battery. No I gun: gun pit from gun floor	COLOUR
AA051377	Exterior. Landguard Fort Right Battery. No I gun: gun pit from gun floor, showing detail of bearing marker	COLOUR
AA051378	Exterior. Landguard Fort Right Battery. No I gun: detail of bearing marker	COLOUR
AA051379	Exterior. Landguard Fort Right Battery. No I gun: detail of bearing marker	COLOUR
AA051380	Exterior. Landguard Fort Right Battery. No I gun: detail of top of band lift, showing internalfittings	COLOUR
AA051381	Exterior. Landguard Fort Right Battery. WWII no 3 gun: view from west showing rear	COLOUR
AA051382	Exterior. Landguard Fort Right Battery. Control panel between nos I and II guns	COLOUR
AA051383	Exterior. Landguard Fort Right Battery. No II gun: view from south east showing no III gun andClose Defense Battery Observation Post in distance	COLOUR
AA051384	Exterior. Landguard Fort Right Battery. Rebuilt Battery Command post behind no II gun	COLOUR
AA051385	Exterior. Landguard Fort Right Battery. Rebuilt Battery Command post behind no II gun	COLOUR
AA051386	Exterior. Landguard Fort Right Battery. No II gun: detail of top of ladder lift on gun floor	COLOUR
AA051387	Exterior. Landguard Fort Right Battery. No II gun: detail of top of ladder lift on gun floor	COLOUR
AA051388	Exterior.Landguard Fort Right Battery. No II gun: detail of WWII holdfast	COLOUR
AA051389	Exterior.Landguard Fort Right Battery. No II gun: top of band lift	COLOUR
AA051390	Exterior. Landguard Fort Right Battery. No II gun: detail of sign above cartridge recess (latershell recess)	COLOUR
AA051391	Exterior. Landguard Fort Right Battery. Howarth Ventilator on covered way behind no II gun	COLOUR
AA051392	Exterior. Landguard Fort Right Battery. No II gun: WWII gun platform and holdfast, view fromabove	COLOUR
AA051393	Exterior. Landguard Fort Right Battery. No II gun: bulkhead light above cartridge recess	COLOUR
AA051394	Exterior. Landguard Fort Right Battery. No II gun: cartridge recesses beside gun floor	COLOUR
AA051395	Exterior. Landguard Fort Right Battery. No II gun: WWII platform from rear of gun floor	COLOUR
AA051396	Exterior. Landguard Fort Right Battery. Spigot Mortar position	COLOUR
AA051397	Exterior. Landguard Fort Right Battery. WWII no 2 gun: plastic armour in ammunition recess	COLOUR
AA051398	Exterior. Landguard Fort Right Battery. WWII no 2 gun: ammunition recesses along rear wall of gunhouse	COLOUR
AA051399	Exterior. Landguard Fort Right Battery. WWII no 2 gun: gun floor	COLOUR
AA051400	Interior. Landguard Fort Right Battery. WWII no 2 gun: switch room	COLOUR
AA051401	Exterior. Landguard Fort Right Battery. WWII no 2 gun: gunhouse and gun floor	COLOUR
AA051402	Exterior. Landguard Fort Right Battery. WWII no 2 gun: gunhouse from rear, showing Howarth Ventilators on roof of shelter	COLOUR
AA051403	Interior. Landguard Fort Right Battery. WWII no 2 gun: shell store	COLOUR

AA051404	Interior. Landguard Fort Right Battery. WWII no 2 gun: cartridge store	COLOUR
AA051405	Interior. Landguard Fort Right Battery. 6inch magazine: shell store 1 showing ladder lift and remains of shelf	COLOUR
AA051406	Interior. Landguard Fort Right Battery. 6inch magazine: corridor looking NE	COLOUR
AA051407	Interior. Landguard Fort Right Battery. 6inch magazine: band lift in shell store 2 for no II gun	COLOUR
AA051408	Interior. Landguard Fort Right Battery. 6inch magazine: ladder lift in shell store 2 for no IIgun	COLOUR
AA051409	Exterior. Landguard Fort Right Battery. No II gun: band lift and cartridge recess beside gunfloor	COLOUR
AA051410	Interior. Landguard Fort Right Battery. 6inch magazine: shell store 2 for no II gun	COLOUR
AA051411	Interior. Landguard Fort Right Battery. 6inch magazine: cartridge store 2 for no II gun	COLOUR
AA051412	Interior. Landguard Fort Right Battery. 6inch magazine: shifting lobby	COLOUR
AA051413	Interior. Landguard Fort Right Battery. 6inch magazine: shifting lobby	COLOUR
AA051414	Interior.Landguard Fort Right Battery. No III gun: cartridge recess	COLOUR
AA051415	Interior. Landguard Fort Right Battery. 10inch magazine: Battery Plotting Room in cartridge store and shifting lobby; view from north east	COLOUR
AA051416	Interior. Landguard Fort Right Battery. 10inch magazine: Battery Plotting Room in cartridge store and shifting lobby; view from SW, showing Magslip terminals on wall	COLOUR
AA051417	Interior. Landguard Fort Right Battery. CD BOP in no II emplacement: detail of void below 1913 BCP showing pillar for Depression Range Finding instrument and wooden panelling on walls	COLOUR
AA051418	Exterior. Landguard Fort Right Battery. No III gun: hydraulic accumulator recess to rear of emplacement	COLOUR
AA051419	Interior. Landguard Fort Right Battery. 10inch magazine: detail of rifle rack in corridor	COLOUR
AA051420	Interior. Landguard Fort Right Battery. 10inch magazine: detail of lamp recess door in corridor	COLOUR
AA051421	Exterior. Landguard Fort Right Battery. No III gun: detail of ringbolt on apron	COLOUR
AA051422	Exterior. Landguard Fort Right Battery. No III gun: view from foot of rear revetment wall	COLOUR
AA051423	Exterior. Landguard Fort Right Battery. WWII building to rear of battery	COLOUR
AA051424	Exterior. Landguard Fort Right Battery. War Shelter 2: view from north west	COLOUR
AA051425	Exterior. Landguard Fort Right Battery. War Shelter 4: view from west	COLOUR
AA051426	Interior. Landguard Fort Right Battery. War Shelter 4: view from north east	COLOUR
AA051427	Exterior. Landguard Fort Right Battery. No III gun: quick return lift and recesses to rear of emplacement	COLOUR
AA051428	Exterior. Landguard Fort Right Battery. Position-finding cell for no III gun	COLOUR
AA051429	Exterior. Landguard Fort Right Battery. Signallers Shelter 2 next to no III gun	COLOUR
AA051430	Exterior. Landguard Fort Right Battery. Practice Battery	COLOUR
AA051431	Exterior. Landguard Fort Right Battery. WWII no 3 gun: gun pit, view from apron	COLOUR
AA051432	Exterior. Landguard Fort Right Battery. WWII no 3 gun: gun pit, view from access passage	COLOUR
AA051433	Interior. Landguard Fort Right Battery. WWII no 3 gun: gun store	COLOUR
AA051434	Interior. Landguard Fort Right Battery. WWII no 3 gun: gun store	COLOUR
AA051435	Interior. Landguard Fort Right Battery. WWII no 3 gun: shelter	COLOUR
AA051436	Interior. Landguard Fort Right Battery. War Shelter 5, showing WWII bunk beds and removed gun floor gantry	COLOUR
AA051437	Interior. Landguard Fort Right Battery. Artillery Store for no III gun	COLOUR
AA051438	Interior. Landguard Fort Right Battery. Artillery Store for no III gun, detail of rifle rack	COLOUR
AA051439	Interior. Landguard Fort Right Battery. Lamp Room 3	COLOUR
AA051440	Interior. Landguard Fort Right Battery. 10inch magazine, corridor looking north-east	COLOUR
AA051441	Exterior. Landguard Fort Right Battery. No I gun: view from north	COLOUR
AA051442	Interior. Landguard Fort Right Battery. War Shelter 3: showing WWII bunk beds	COLOUR
AA051443	Exterior. Landguard Fort Right Battery. No II gun: casemate camouflage wall	COLOUR

Figure 7
English Heritage survey plan of Right Battery showing all of the main features. Inset: excerpt from the 1901 Record Plan of the Battery, showing the original form of the earthwork, including the parapet with terreplein behind and the network of paths providing acess to it (PRO: WO 78/5136/14)

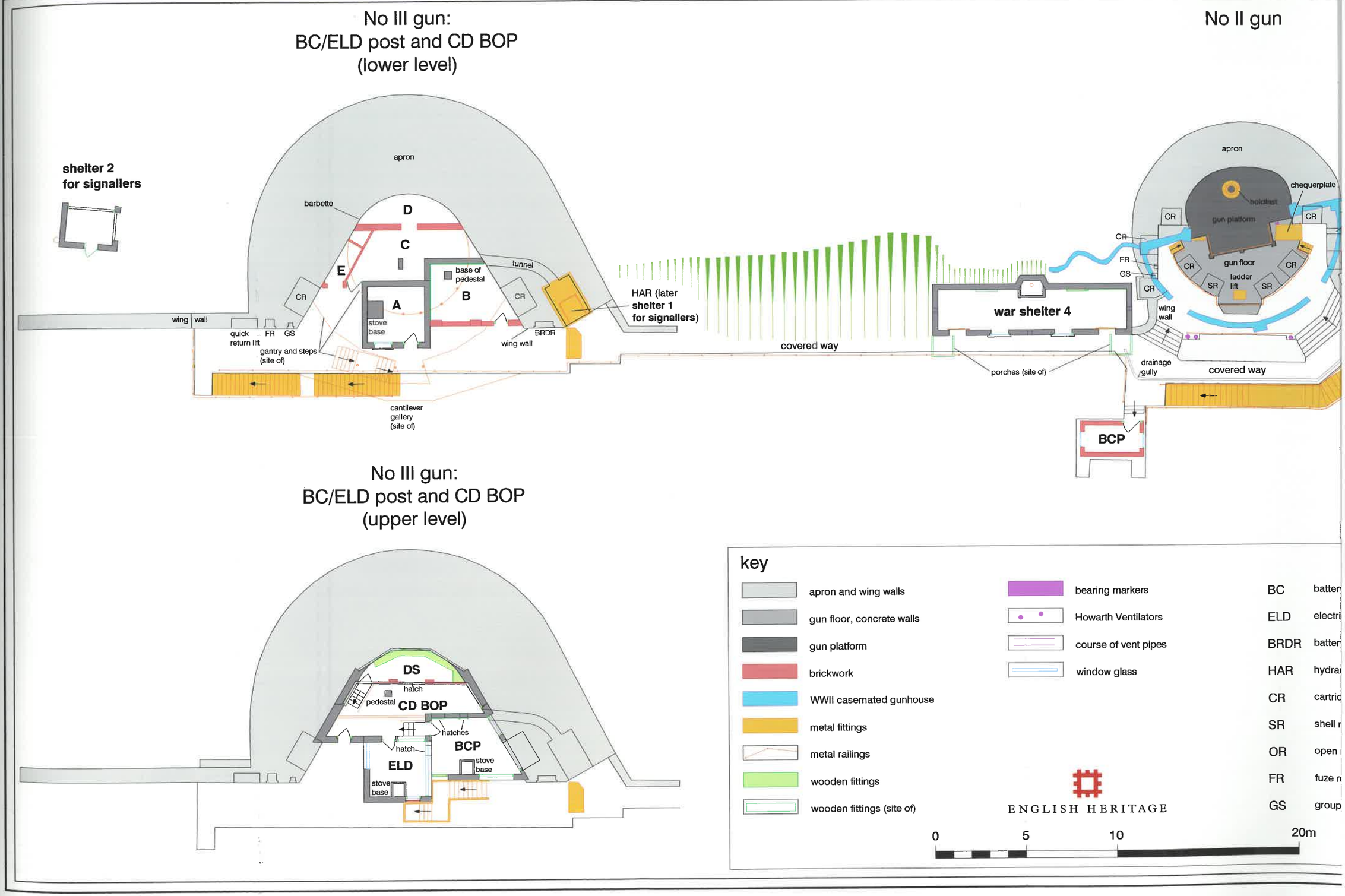

Figure 9 *English Heritage survey plan of the 1901 battery, showing gun nos I, II and III, including major alterations to the emplacements (1:200 scale)*

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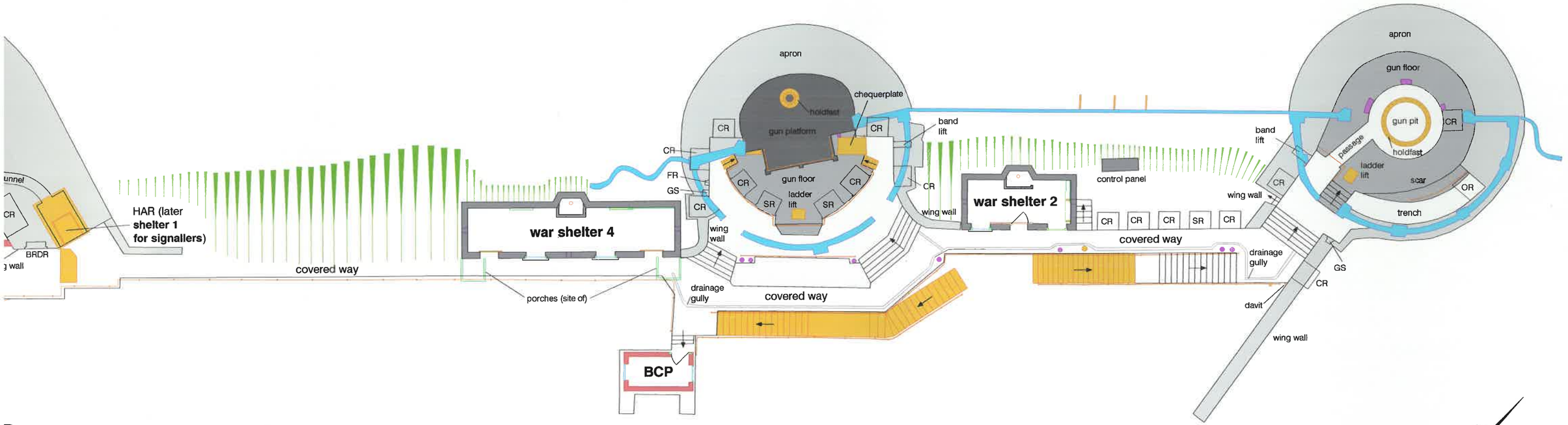

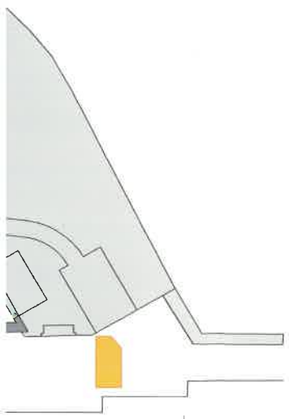

key

- apron and wing walls
- gun floor, concrete walls
- gun platform
- brickwork
- WWII casemated gunhouse
- metal fittings
- metal railings
- wooden fittings
- wooden fittings (site of)
- bearing markers
- Howarth Ventilators
- course of vent pipes
- window glass

BC	battery command
ELD	electric light directing
BRDR	battery range and dials recess
HAR	hydraulic accumulator recess
CR	cartridge recess
SR	shell recess
OR	open recess
FR	fuze recess
GS	group store

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enlarged detail of holdfasts for nos I and II guns (1:100 scale)

to the emplacements (1:200 scale)

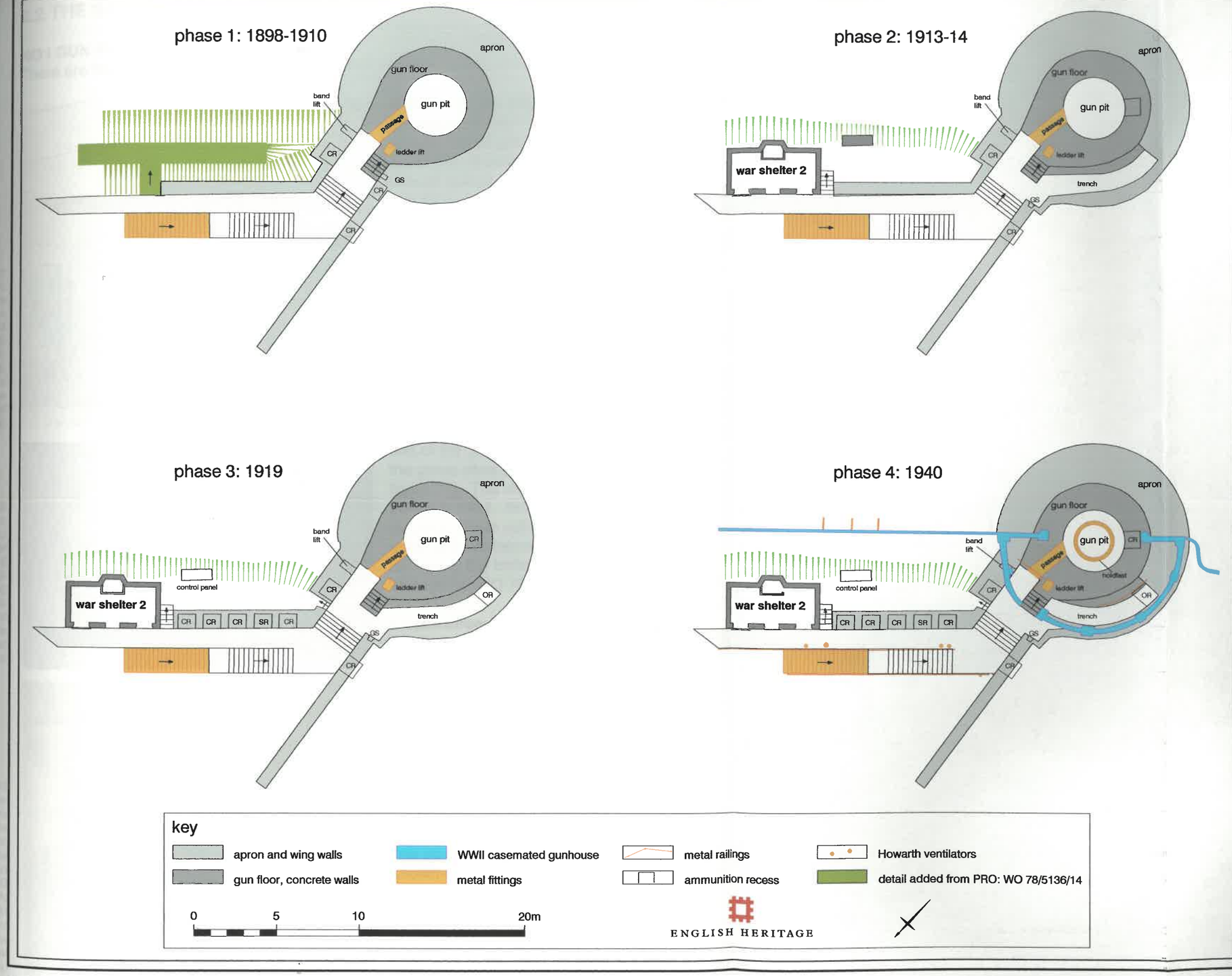
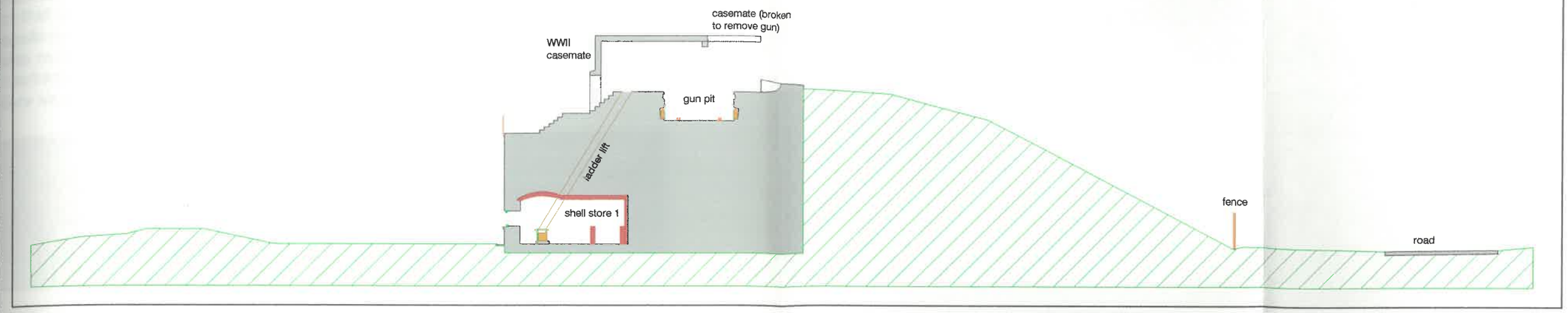
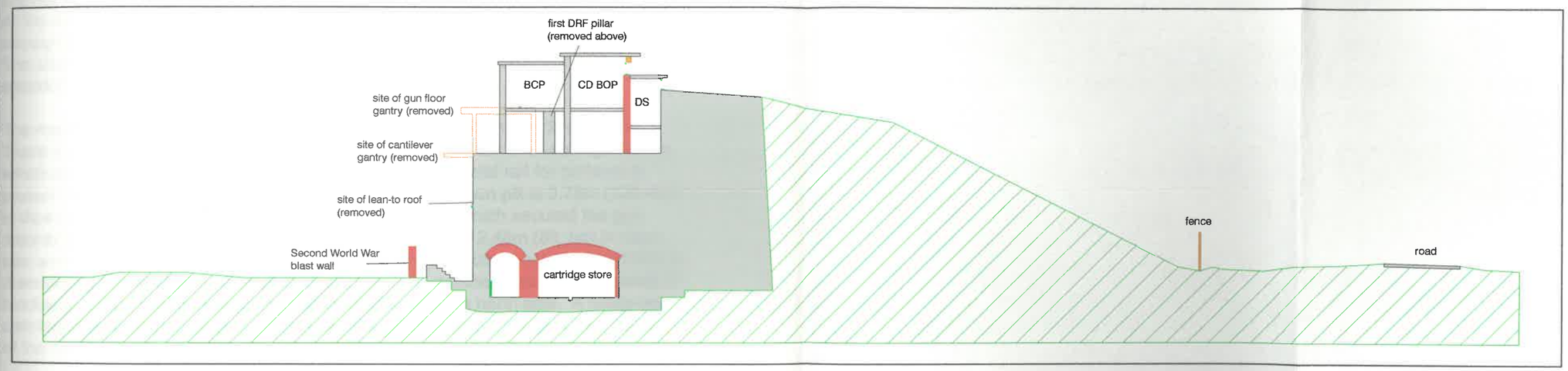


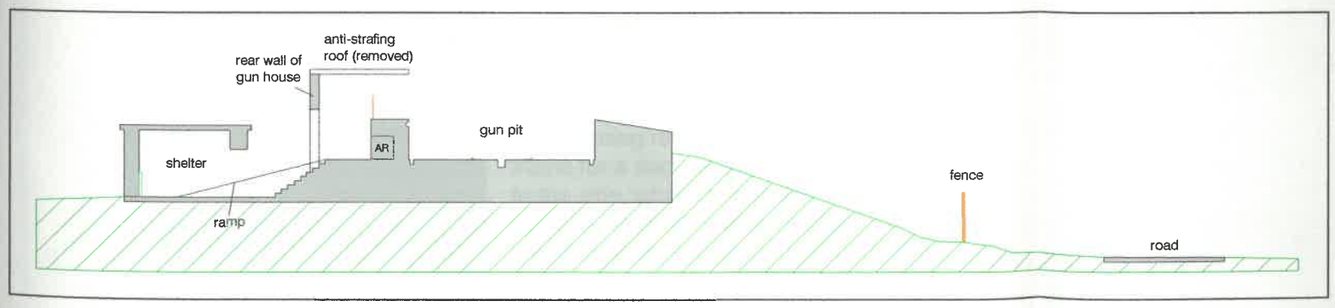
Figure 10 *Phase plans of no I gun (1:250 scale)*



a No I gun emplacement



b No III gun emplacement



c Second World War no 3 gun emplacement

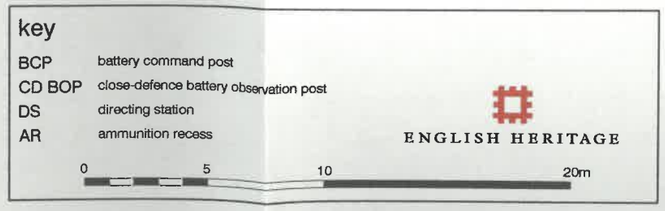
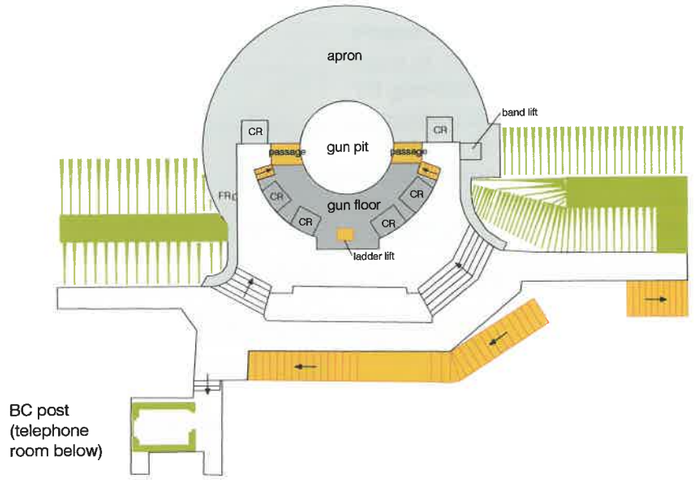
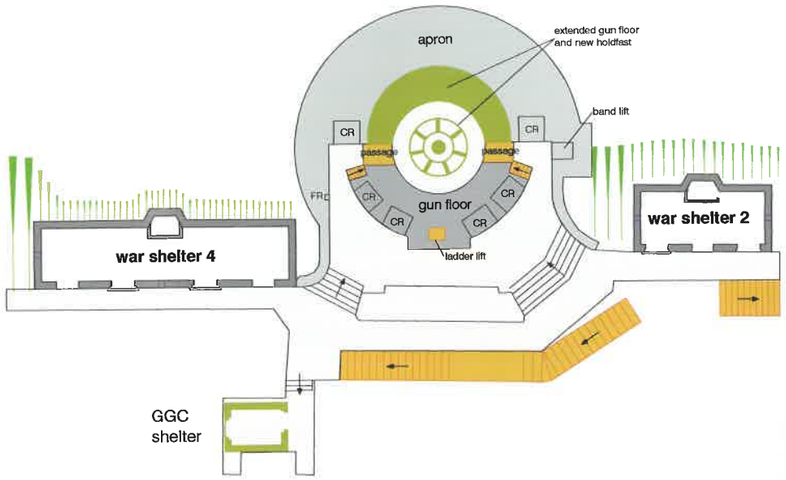


Figure 15 *English Heritage profiles through gun emplacements I, III and 3 (1:250 scale)*

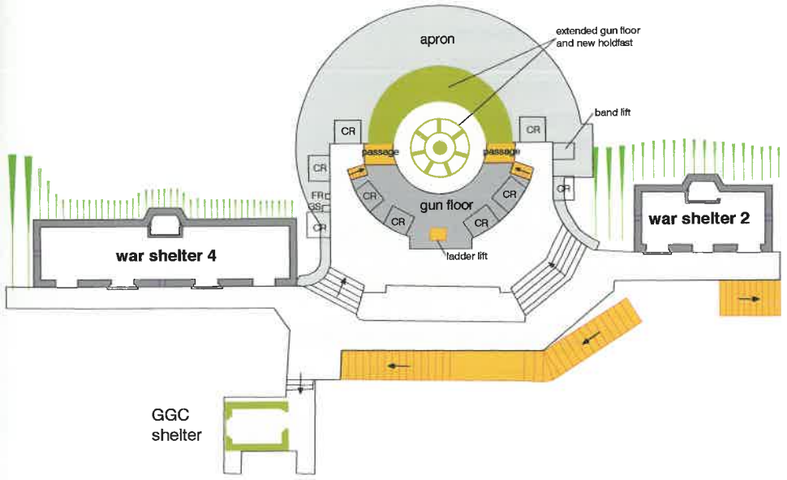
phase 1: 1898-1907



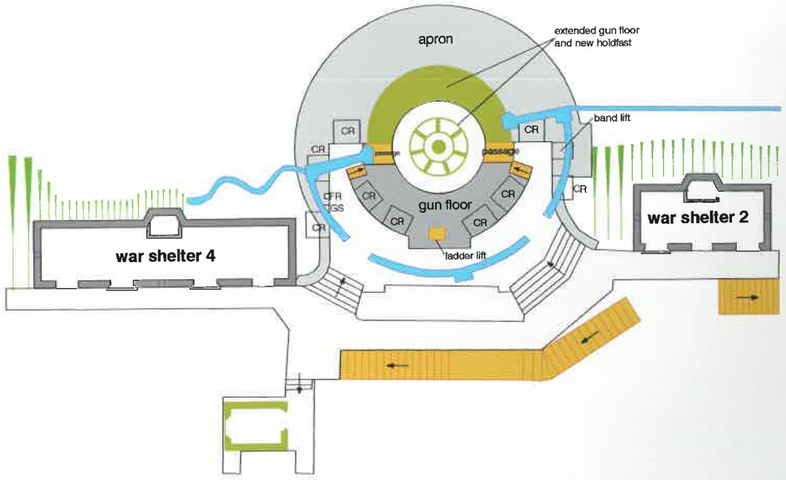
phase 2: 1908-1914



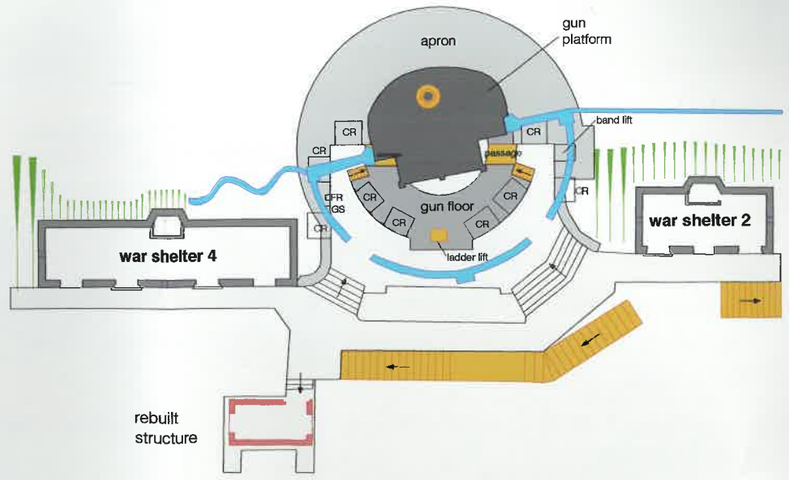
phase 3: 1920



phase 4: 1940



phase 5: post 1943



key

- apron and wing walls
- gun floor, concrete walls
- gun platform
- brickwork
- WWII casemated gunhouse
- metal fittings
- metal railings
- detail taken from PRO: WO 78/5136/14

BC battery command

GGC gun group commander

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ure 20 phase plans of no II gun (1:250 scale)

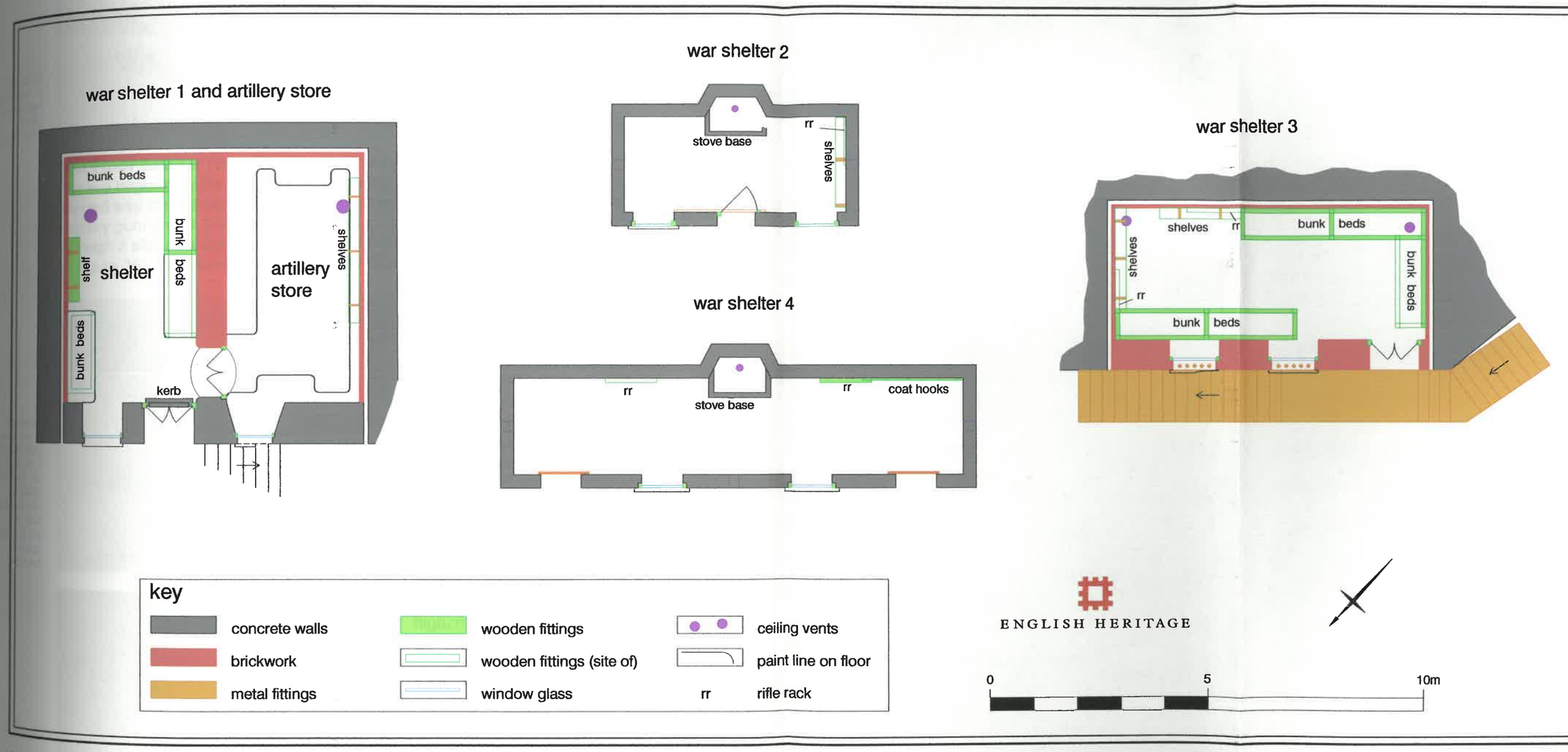

Figure 34 *English Heritage survey plan of War Shelters 1-4 (1:100 scale)*

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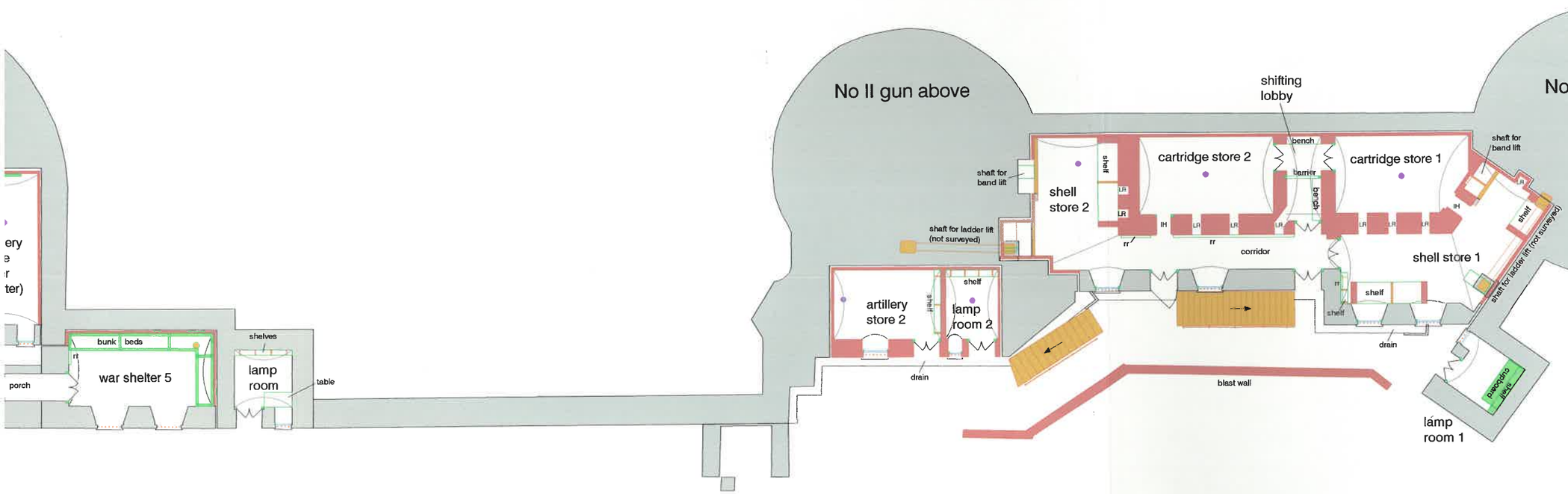

Magazine for the 6-inch battery

metal railings
wooden fittings
wooden fittings (site of)
vents
vault
window glass

IH issue hatch
LR lamp recess
rr rifle rack

BPR battery plotting room
BCP battery command post

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ater alterations (1:200 scale)

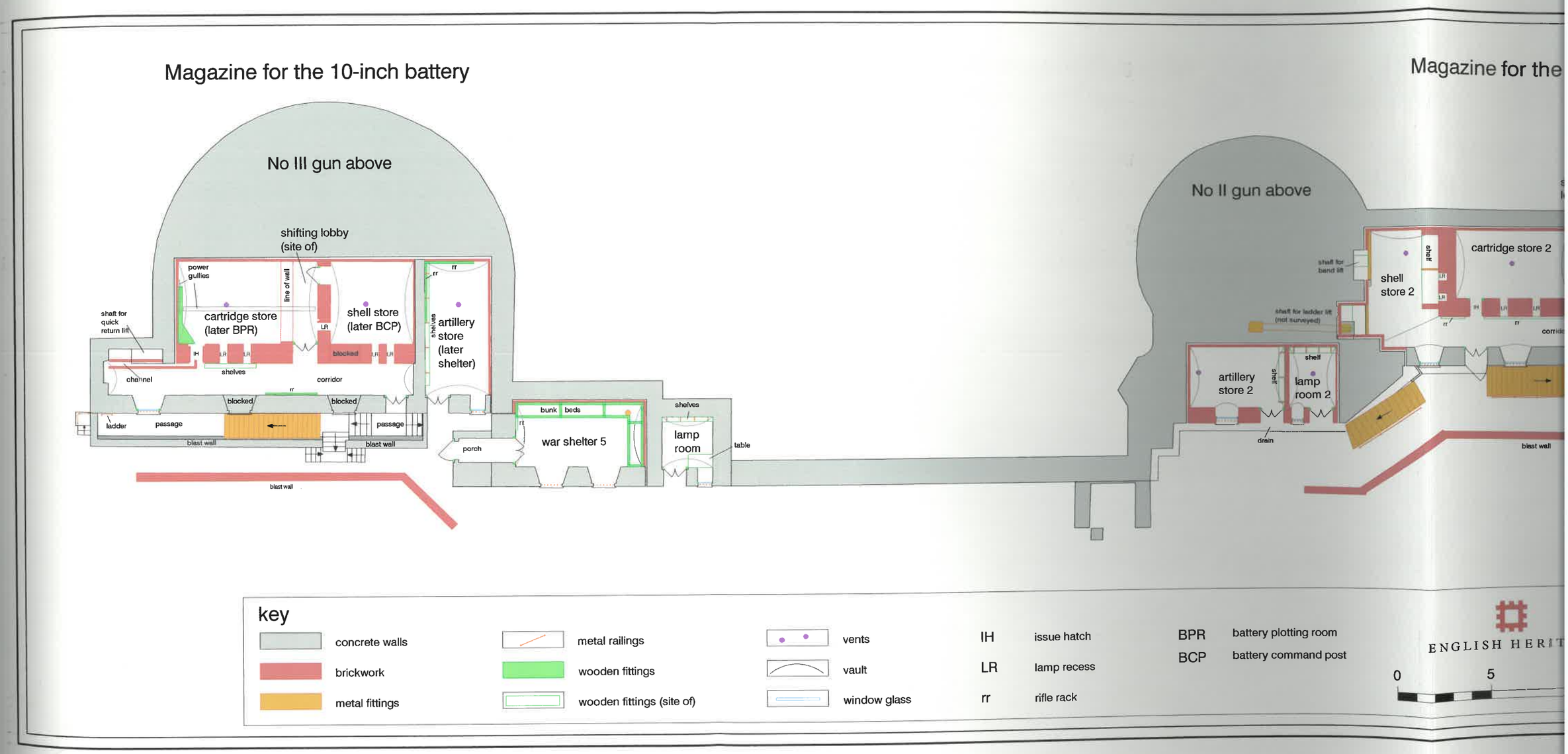

Figure 41 *English Heritage survey plan of the magazines for the 1901 battery, including later alterations (1:200 scale)*

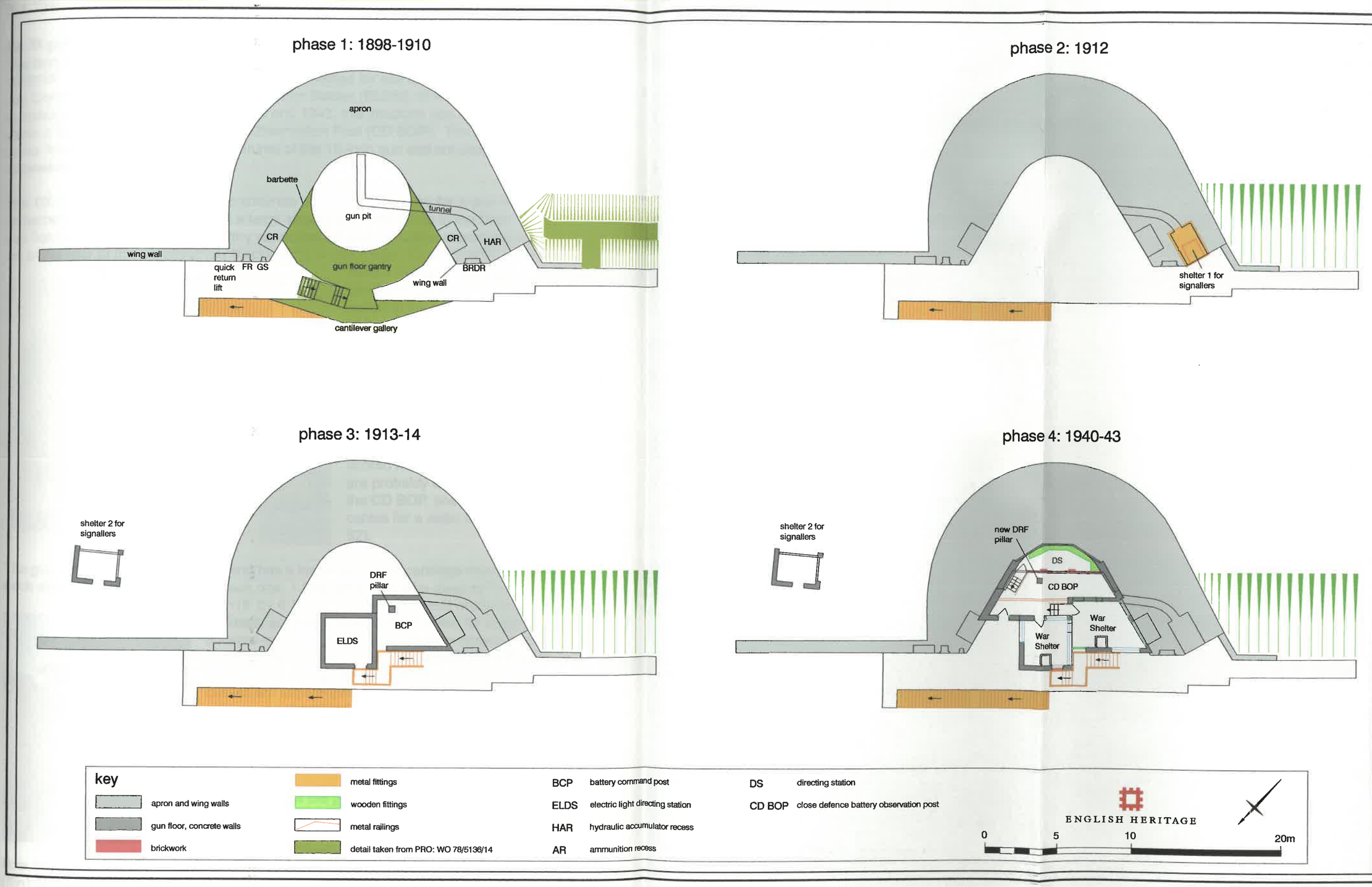

Figure 50 Phase plans of no III gun, including its conversion into a BCP/ELDS and later into a CD BOP (1:250 scale)
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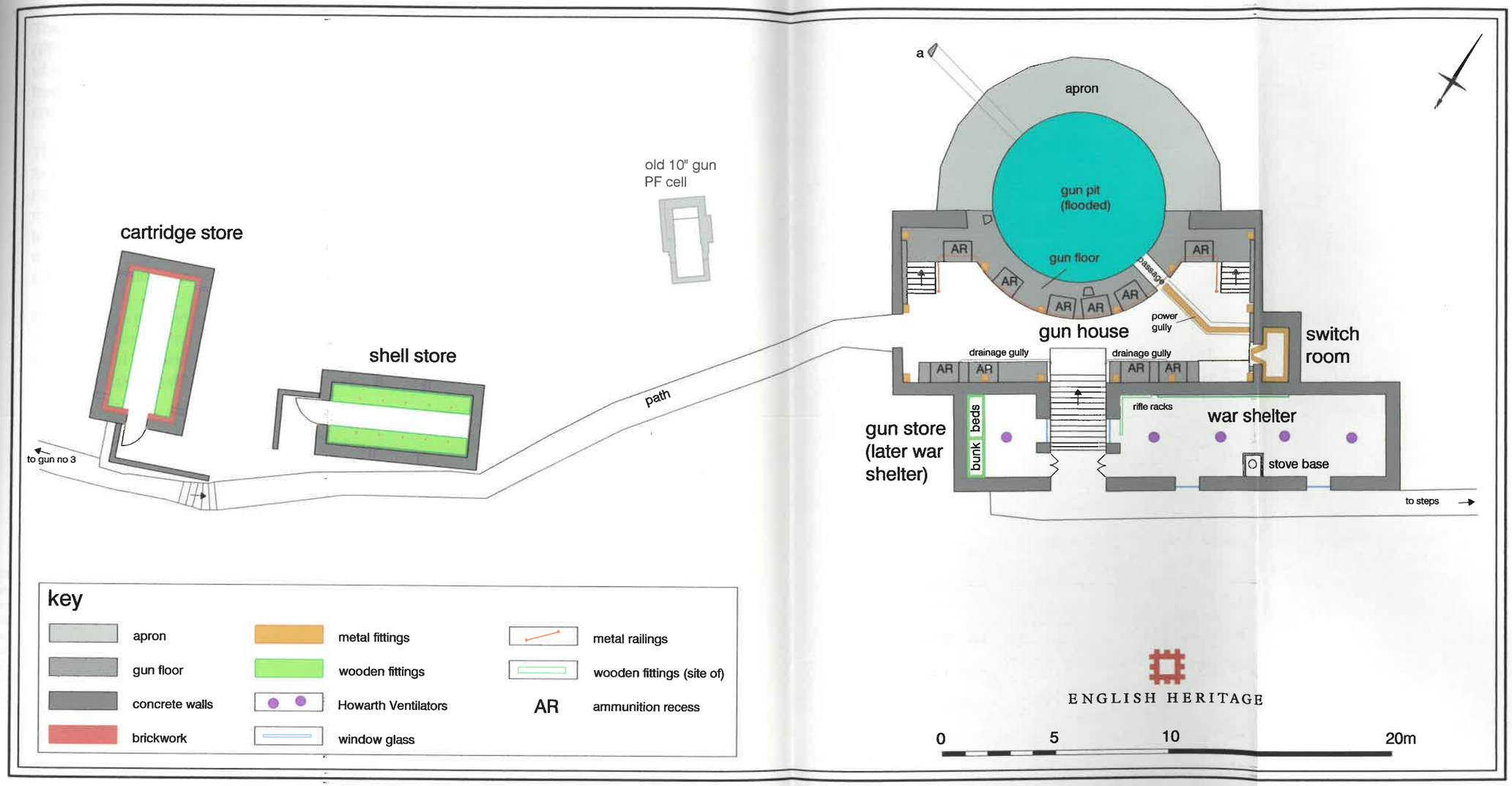


Figure 77 *English Heritage survey plan of the Second World War no 2 gun, including shell and cartridge stores (1:200 scale)*

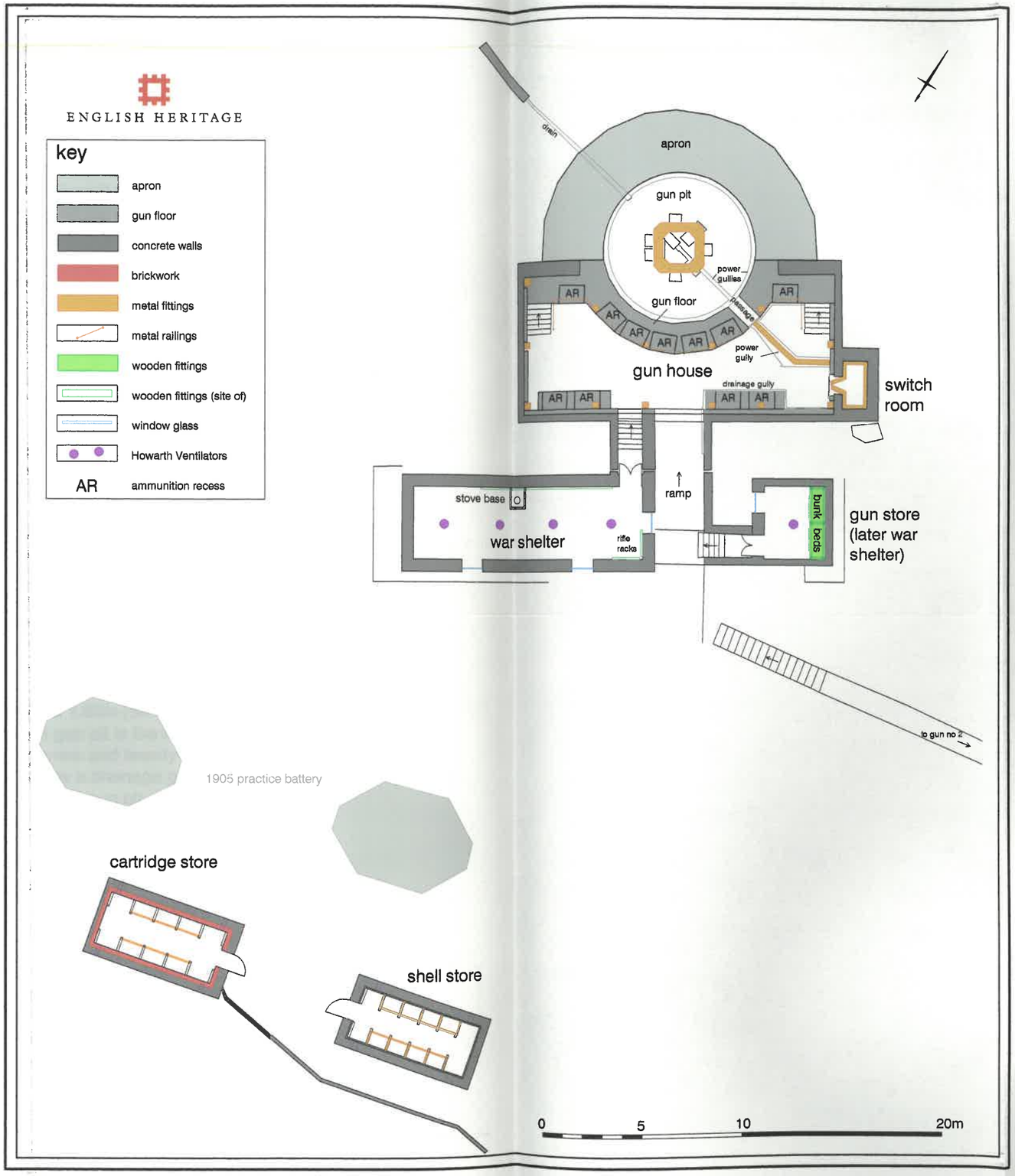
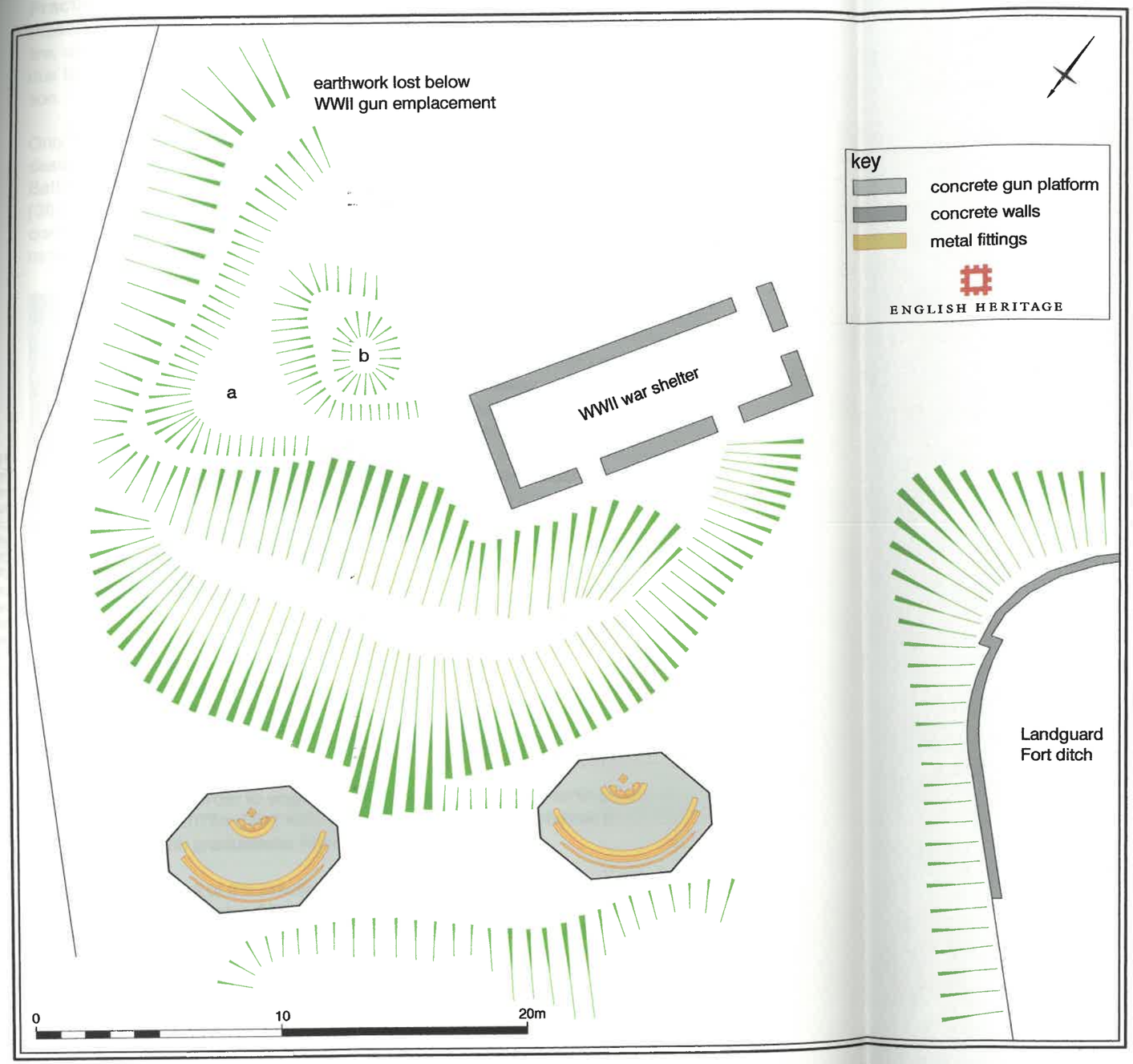
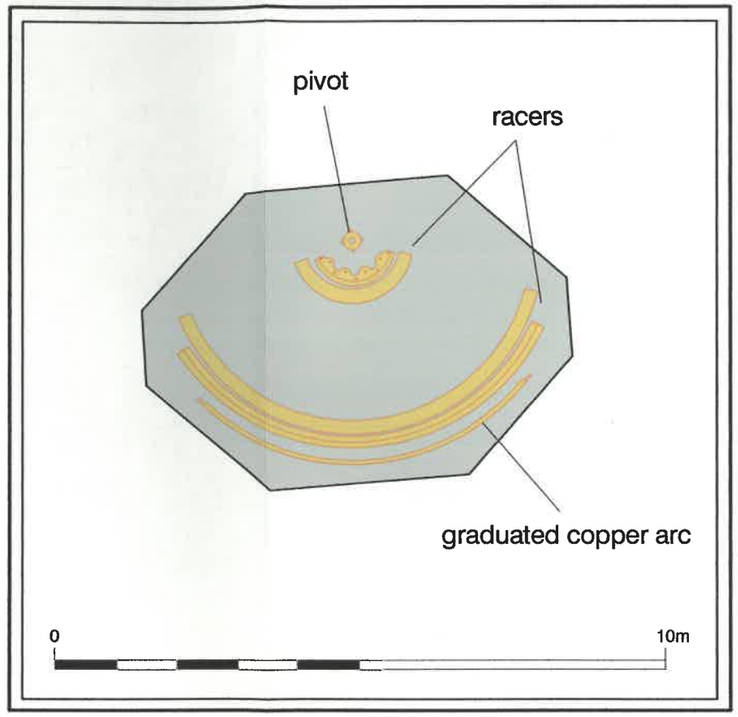


Figure 87 *English Heritage survey plan of the Second World War no 3 gun, including the shell and cartridge stores (1:200 scale)*





Detail of gun mounting (1:50 scale)

Figure 90 *English Heritage survey plan of the Practice Battery, built around 1903, probably for 6-inch guns on Vavasseur mountings (1200 scale), with (inset) detail of gun mounting*

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