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WING BATTERY, COALHOUSE FORT
East Tilbury, Essex

Moraig Brown & Paul Pattison

SURVEY REPORT

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ARCHAEOLOGICAL INVESTIGATION REPORT SERIES 6/2003

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Drawings by: Moraig Brown
Field photography by: Alun Bull

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GLOSSARY OF TERMS

Ammunition store
A place for the storage of ammunition, in this case of the fixed type. Fixed ammunition combined the propellant (formerly in a separate cartridge) and the shell, with its burstnig charge, in a single unit

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

Board of Ordnance
The government department responsible for supply of arms, ammunition and warlike supplies to the country's fighting forces on land and sea. Abolished in 1855 and succeeded by the War Department

Bombproof
A thick covering of earth and other material over a vaulted room (barrack, store, magazine etc), providing protection against in-coming fire

Breech-loader (BL)
A gun which is loaded at the rear of the barrel

Caponier
A protected position running across or projecting into a ditch; usually with embrasures and loopholes to provide flanking fire along the ditch.

Casemate
A bombproof vaulted chamber used for a variety of purposes, including artillery or small arms positions, storage of ammunition and to provide troop accommodation

Glaçis
The external slope of a defensive work, carefully profiled so that attackers are exposed to fire from the defences. Often massively reinforced with earth and other materials to absorb in-coming bombardment

Quick-Firing
A gun equipped with a quick action breech mechanism, and using fixed ammunition, enabling a rapid rate of fire

Rifled muzzle-loader (RML)
A gun loaded at the front of the barrel, which is rifled

Rifling
The cutting of grooves in the barrel of a gun to make the shell spin, thereby increasing both its range and accuracy

ABBREVIATIONS USED IN THE TEXT

BL	Breech loader
CRE	Commanding Royal Engineer
DEL	Defence Electric Light
RML	Rifled muzzle loader
RSJ	Rolled steel joist
QF	Quick-firing
SME	Submarine mining establishment

1. INTRODUCTION

In October 2000 staff of the English Heritage (EH) Field Office in Cambridge carried out survey and analysis of Wing Battery in East Tilbury. Wing Battery, a coast artillery battery for 6-pounder quick-firing (QF) guns, was built in 1893 immediately south of Coalhouse Fort, an 1860s Royal Commission Fort.

Wing Battery is situated on the northern bank of the River Thames at NGR TQ 691 764, 2km south-east of the small village of East Tilbury (figure 1). At this point the Thames is 1.5km wide and there are substantial mudflats, known as the Mucking Flats, along the northern bank. The geology of the area is of deep clayey soils overlain by marine alluvium (Soil Survey of England and Wales 1983). There is open access to Wing Battery, which is situated in the park surrounding Coalhouse Fort.

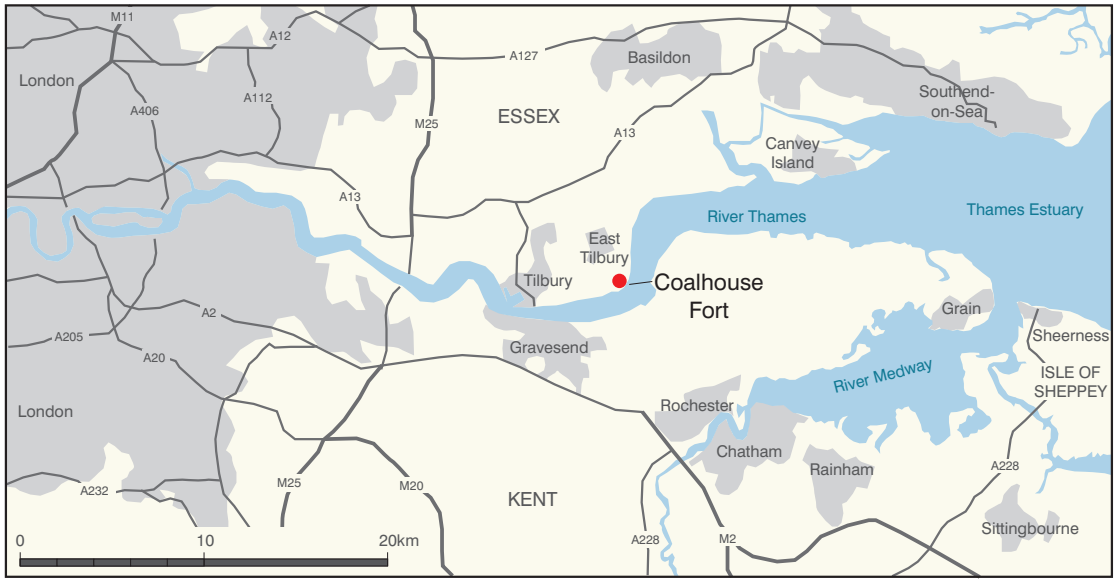

Figure 1
Location map

2. BACKGROUND HISTORY

The Thames has for many centuries been a strategically important corridor, allowing access from the North Sea to the capital and to the naval dockyards at Woolwich and Deptford, while also providing a haven for ships plying the East Coast. In consequence, both banks of the river have a long history of forts and batteries to defend against potential aggressors.

From the middle part of the 19th century, military technology underwent a series of rapid advances. One such advance was the advent of ironclad ships. Iron cladding was much harder to penetrate than traditional timber hulls, especially using smooth-bore ordnance which had a relatively short range and limited power. This meant that ships were able to come closer to land than previously, thereby able to mount more effective attacks on coast batteries while themselves being little damaged. The parallel introduction of rifled guns with improved propellants and bursting charges meant that this threat was even more potent. But it also meant that these new guns in new coast batteries could meet it, since shells could be fired over longer distances with greater accuracy, velocity and penetrative power.

It was against this background that the report of the Royal Commission on the Defences of the United Kingdom was delivered in 1860. This was a comprehensive investigation into the state of England's fixed defences that resulted, over the following decade, in a massive and co-ordinated programme of fort building. These new forts were built to withstand heavy bombardment from rifled artillery, while returning fire with similar or superior ordnance. In considering the Thames defences the report stated that:

"The defence of the Thames involves interests of vast magnitude; it includes the security of the great powder magazine establishment at Purfleet; the important arsenal at Woolwich and the adjoining dockyard; the Government victualling stores and ship-building yard at Deptford; the large amount of valuable property extending for many miles on either bank of the river; the fleet of merchant shipping moored in the port of London; and, lastly, the metropolis itself." (Smith 1985, 22)

For the Thames fortifications, it was agreed that existing locations were acceptable but that the condition of the defences was not. The report proposed that:

"We consider that the part of the river between Coalhouse Point and the opposite bank, where it is about 1000 yards broad, is that best adapted for preventing, by means of

permanent works, the further advances of a hostile fleet…We recommend that Shornemead Battery, which is admirable situated, should be enlarged…At Coalhouse Point, on the left bank, a powerful battery should be placed in addition to or in extension of the existing one, bringing the principal part of its fire to bear down the river and across the channel, but having some guns also bearing up the river in the direction of Gravesend. In addition to these, a work should be constructed on the right bank, opposite Coalhouse Point, at the southern entrance to Cliffe Creek; and a floating barrier should be moored in times of war across the river, under the protection of these batteries, leaving a passage for our own vessels, for closing which every possible precaution should be taken in time of expected attack." (Smith 1985, 22-3)

The report also recommended that Tilbury and New Tavern Forts should be modernised and that their guns should cross fire with those at Coalhouse Point and Shornemead, and that another floating barrier should be strung between Tilbury and Gravesend. In order to link the Thames and Medway defences, Slough Fort at Allhallows, Kent, was proposed (figure 2; Smith 1985, 23).

Figure 2 *Major forts and installations on the Thames in the late 19th century*

Work on Coalhouse (built on the site of an earlier battery), Cliffe and Shornemead Forts began in 1861-2 and took over 10 years to complete (PRO: WO/192/45). For part of the building period, the officer in charge was Gordon of Khartoum, CRE at Gravesend until 1874 (Smith 1985, 23; Saunders 1960, 172). Its principal feature was a massive granite-faced semi-circular battery equipped with RML guns emplaced in bombproof casemates fronted by iron shields, and and in open emplacements (figures 3 and 4). Magazines were located in the basement below the battery and barrack accommodation formed the rear ranges of the fort. It was completed in 1874 when the armament

comprised twelve 11-inch RMLs in casemates and three 9-inch RMLs *en-barbette*; four 12.5-inch RML were added in 1878-9 and a further 11-inch RML in 1879-80.

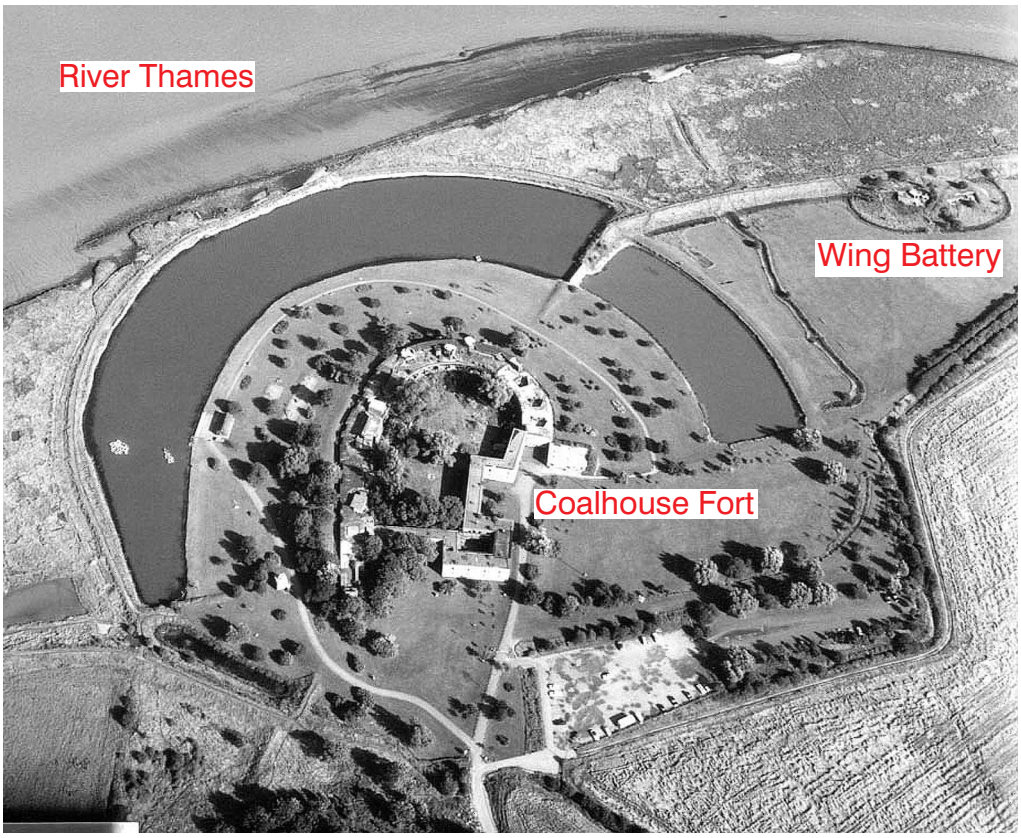

Figure 3
Coalhouse Fort and Wing Battery. Text in red added by author (©Crown copyright. NMR (1832/224))

The later 19th century

In the years following the completion of Coalhouse Fort, further developments in weaponry meant that the armament of the Thames forts underwent further changes, not least because the rôle of the RMLs rapidly became limited. Against fast-moving cruisers and marauding small craft, they were simply too large to manhandle and too slow to reload. Accordingly, in 1888 a Brennan Torpedo installation was built on the opposite bank at Cliffe Fort, designed to target vessels as they slowed down to make the crucial turn from Lower Hope Reach into Gravesend Reach. These torpedoes were wire-guided and could be steered onto their target (Smith 1985, 31; Pattison 1993).

In addition, a Submarine Mining Establishment (SME) was created *c*1890. This installation controlled a submarine minefield laid in the main channel of the river in a triangle between Coalhouse, Cliffe and Shornemead Forts. Each mine, moored to the riverbed, could be detonated electrically via a series of insulated wires by an observer in both Coalhouse and Shornemead Forts when a vessel was over or very close to it. Defence Electric Lights (DELs), pouring light on a fixed trajectory, provided both a

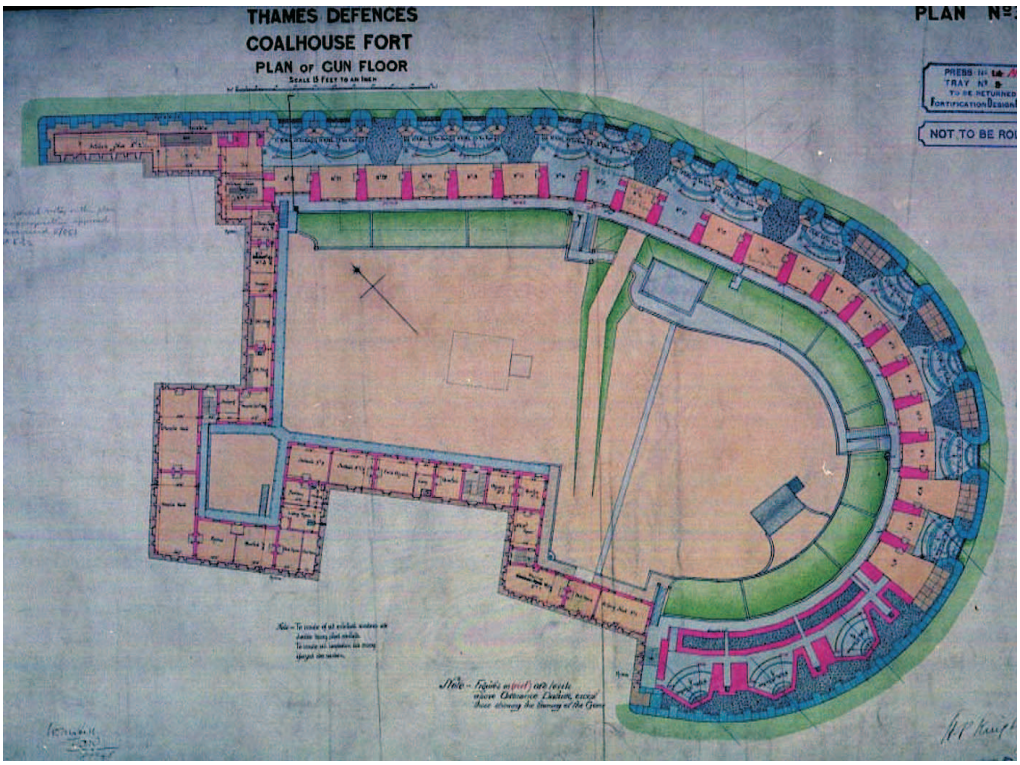

Figure 4
Coalhouse Fort: plan of the gun floor in 1897-8 (PRO: MPHH 1/171 (5) Reproduced by the kind permission of the Public Record Office © PRO)

visual deterrent for ships attempting to gain passage at night as well as light by which to check their position before detonation of a mine. The confined space of the river at this point would have made avoidance of the mines difficult.

Although the torpedoes and mines served as a prop to the ineffective RMLs, new guns were needed to complete the system for effective engagement of warships on the river. Ships were becoming faster, with stronger hulls and accurate ordnance that could threaten the highly visible casemated forts on land (Smith 1985, 31). Fast breech-loading guns had demonstrated their effectiveness during the Franco-Prussian war of 1870 and, from the late 1880s, were being emplaced in new low-visibility batteries, often on disappearing carriages that retracted below the *barbette* for concealed re-loading. One such battery was built in 1891 on the eastern edge of East Tilbury,

Figure 5
East Tilbury Battery in 1968 (NMR AP: MAL 59068/180 English Heritage NMR)

some 500m north-west of Coalhouse Fort. This housed four 6-inch BL and two 10-inch BL guns on disappearing mountings, and provided firepower over a range of 6000 yards right down the Lower Hope to the Sea Reach, rendering the RMLs at Coalhouse Fort obsolete (figure 5; Smith 1985, 35). The effectiveness of these guns was called into question, and they were suceeded by 6-inch guns *en barbette* on the roof of the Fort.

Wing Battery

Between June 1889 and July 1893 a second low-profile flanking battery, Wing Battery, was constructed 350m south of Coalhouse Fort (figure 6; PRO: WO78/5132 (1)). This, however, had a very different purpose. It was equipped with light 6-pdr quick-firing (QF) guns, specifically for the rapid engagement of small craft such as torpedo boats, which might try to find a passage through shallow water on either side of the main channel, thereby avoiding the minefield, to wreak havoc on shipping further upstream. Similar batteries were established at Cliffe and Shornemead Forts.

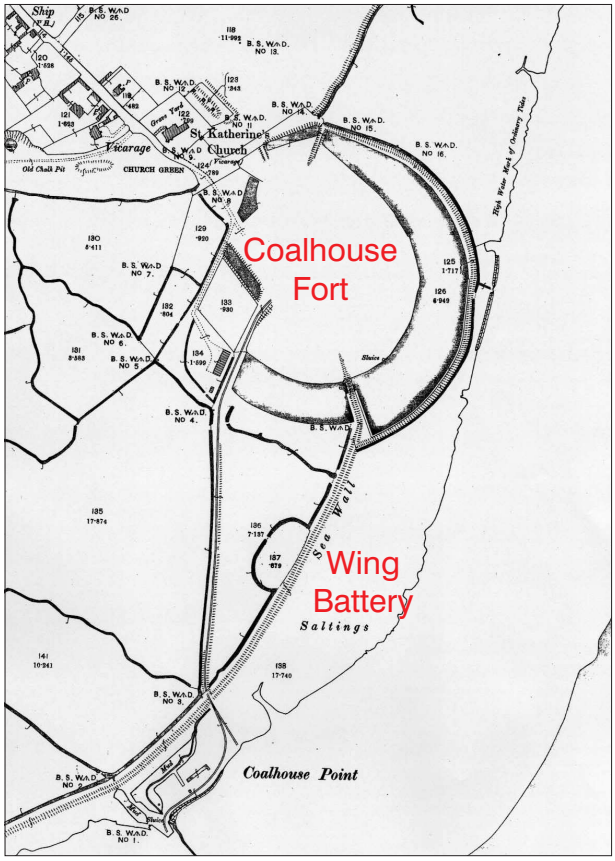

Figure 6
Coalhouse Fort and Wing Battery in 1897. Note the absence of what was considered sensitive information within the limits of the site. Text in red added by the author (OS 1897)

A record plan of Wing Battery, drawn in October 1893, shows *two* identical concrete 6-pdr QF emplacements set within an oval mound built against the river wall and protected on the flanks and rear by a ditch (figure 7). Today, the remains of the battery consist of *four* emplacements, in two pairs, showing that two were added to the original construction.

However, the battery was not operational much beyond 1902. The Approved Armament Return for that year details all guns mounted on forts and batteries on the Thames area, as well as those approved but not yet mounted (PRO: WO33/254). It proposed the removal of the four 6-pdr QFs in Wing Battery and their replacement by four similar but heavier guns in new emplacements on the roof of Coalhouse Fort. In 1905 and again in 1906, this comprised four 12-pdr QFs. In the

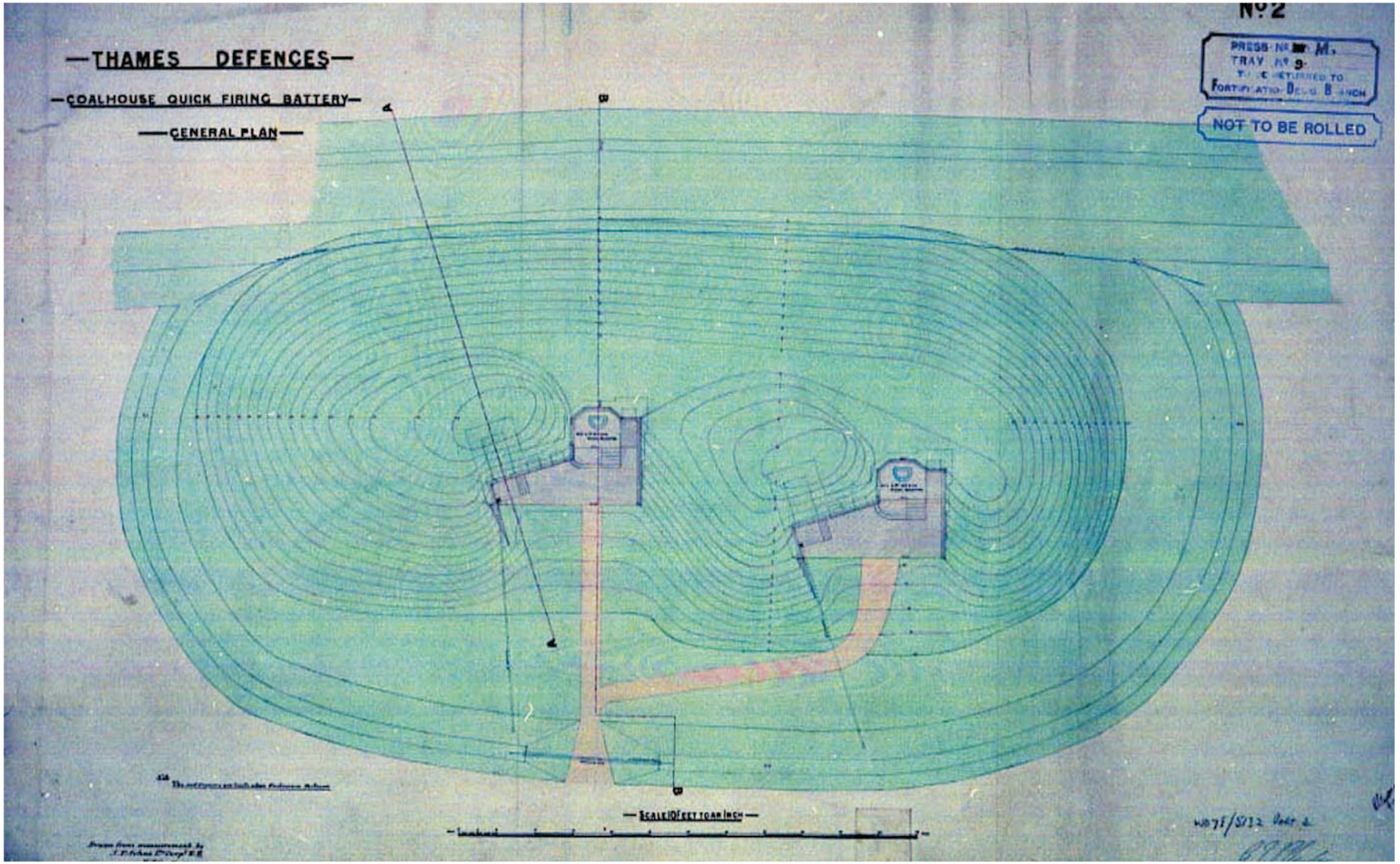

Figure 7 *Wing Battery, record plan dated 1893* (PRO: WO 78/5132 (2) Reproduced by the kind permission of the Public Record Office © PRO)

latter case it is recorded that they replaced an earlier battery of two 6-pounder Hotchkiss guns; presumably those at Wing Battery which must, therefore, have been reduced to two between 1902 and 1905 (PRO: CAB/16/1; WO/33/395). Two Defence Electric Lights (DELs) were built over one pair of the disused 6-pdr emplacements on Wing Battery between 1902 and 1905, working in conjunction with the 12-pdrs in Coalhouse Fort (Brown & Pattison 2003).

The 12-pdr battery was itself short-lived. The report of the Committee on the Armament of Home Ports (the 'Owen' Committee) in 1905 designated the Thames as liable only to 'C' class attack, the lowest grade. In fact, the likelihood of attack this far up the river was considered '*practically non-existent*' and in consequence, the Committee recommended that only four recently installed 6-inch BL guns at Coalhouse Fort should be retained. These were the new BL guns mounted *en barbette* and effectively replaced the disappearing guns at East Tilbury battery; all other armament in all forts was superfluous. In the event of attack at night, three electric lights should be retained to work in conjunction with the 6-inch BL guns, but as conversions to concentrated moveable beams to act as fighting lights rather than fixed beams: all other lights were superfluous (PRO: CAB/16/1). It is unlikely that the DELs on Wing Battery were among the three retained, as they were in too retired a position.

It was the Owen Committee, then, that spelled the end for much of the Thames coast artillery armament. Development in artillery and the replacement of torpedo boats by larger cruisers, against which the 12-pdr QF guns were ineffective, meant that 6-inch BLs were the most appropriate weapons for this part of the river. It is likely that the QF batteries and lights at Coalhouse were dismantled shortly after the Committee's report of 1905.

Apparently, there were temporary searchlights on the outer works of Coalhouse Fort between 1914 and 1918, and it is possible that the lights on Wing Battery were brought back into service and adapted for the duration of the war as dual purpose sea and air lights like those on the north *caponier* of the Fort (Tom Wilson, pers comm).

There is no further record of activity at Wing Battery.

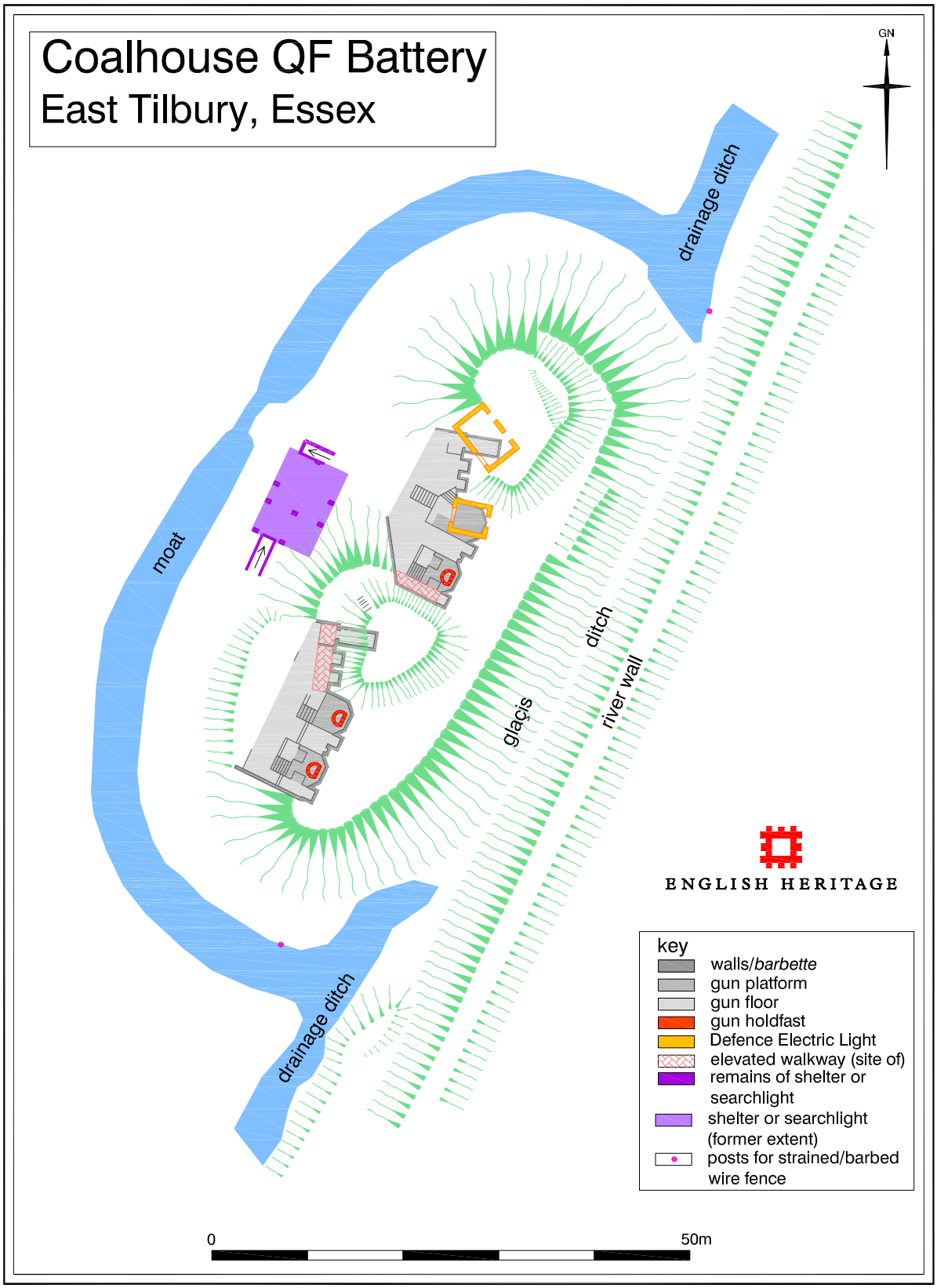

Figure 8 *English Heritage main plan of the battery*

3. DESCRIPTION AND INTERPRETATION

Words and letters that are shown in **bold** appear on figures 8 and 9; the appropriate figure is indicated at the beginning of each section. Other figures of relevance are given in the body text.

Summary (figure 8)

The battery consists of four gun emplacements (I to IV) arranged as two pairs. Each pair is served by a small ammunition store (or magazine) protected from hostile bombardment by large earthen mounds. Each gun emplacement has its own ammunition lockers for ready-use. Built over emplacement no IV and its ammunition store are the two later DELs.

The gun emplacements are set within a large protective oval mound, designed to absorb in-coming bombardment, which measures some 75m north-east to south-west by 33m transversely, and 1.9m high. The mound is situated immediately behind the river wall, the juxtaposition of which provides a narrow **ditch** at the base of the ***glaçis***. A water-filled **drainage ditch** on the landward side of the river wall was diverted to run around the sides and rear of the battery, providing a **moat** (figure 8).

Originally, there was a 5ft-high barbed wire fence at the base of the *glaçis* and, at the rear just north of centre, a causeway across the moat guarded by double gates forming the only entrance; some of the metal fence posts survive (PRO: WO/78/5132/2-3). Today, a narrower section of moat has replaced the causeway.

Gun emplacements I and II (figure 9)

At the south-western end of the battery, gun emplacements **I** and **II** survive in much their original condition. They are recessed into the mound, built in concrete and are placed side by side, with the raised gun floors terminating in low canted *barbettes*. There are six ready-use ammunition lockers, a small recess in the *barbette* and a common ammunition store at the northern end of the pair. A level concrete floor behind the emplacements is protected on the south-western flank by a 1.80m (6ft) high rendered wall.

Emplacements I and II are virtually, but not quite identical. The gun platform to no I is raised 1.14m (3ft 9in), fronted by a *barbette* 0.77m (2ft 6in) high, and has the sockets for a steel handrail which formerly edged the rear (figure 10). The gun was mounted towards the front of the gun platform, where the steel D-shaped plate for the gun holdfast remains

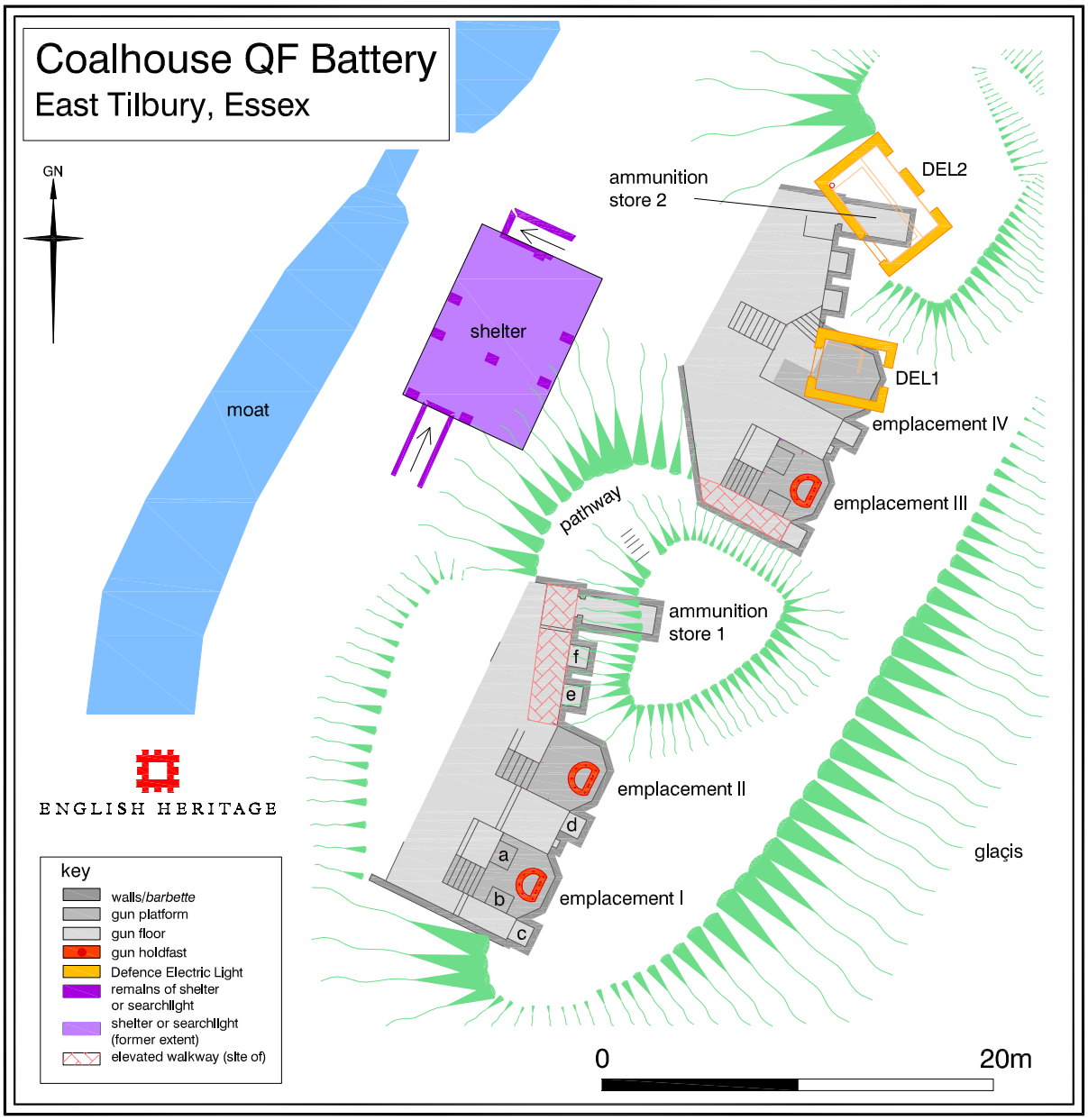

Figure 9 *English Heritage detailed plan of battery*

in situ, with ten bolts (8 at 2cm by 11cm (4/5 in by 4 ¼ in) high; 2 at 2cm by 7cm (4/5 in by 2¾ in) high) (figure 11). The 1893 plan noted that the guns had recoil mountings (PRO: WO/78/5132/2).

Figure 10
Emplacement for gun no III, showing the gun floor, ready-use lockers and barbette (©Crown copyright. NMR: AA/031303)

In both emplacements, flights of steps descend from the gun platform to the gun floor at the rear. In no I, immediately next to the base of the steps and extending under the gun platform is an ammunition locker (**a**). Two more ready-use lockers (**b**) and (**c**) are reached along a short open passage along the south-west flank of emplacement no I; one under the gun floor, the other under the *barbette*. For gun no II, one ready-use locker (**d**) is under the *barbette* on the south-west flank of the gun platform, with two more (**e**) and (**f**) in the flank wall leading to the ammunition store. The variation in the arrangement of the lockers is evidence of phasing: emplacement II formed part of the original battery, as shown on the record plan of 1893, and had lockers in the flanking walls to either side; emplacement I is an addition, and its lockers were placed beneath the gun floor and to one side (figure 7).

The ready-use lockers are all of similar type. Most have simple openings and are 1.05m (3ft 5in) wide by 0.90m (3ft) deep by 1.26m (4ft 2in) high, with chamfered corners and no surviving evidence for doors. Those under the gun platforms have slightly different dimensions of 1.23m (4ft) wide by 0.93m (3ft) deep by 0.86m (2ft 10in) high, but similar storage capacities. The floors of all lockers are 1cm higher than the exterior ground level

Figure 11
Holdfast for gun no III (©Crown copyright. NMR: AA/031308)

and the walls are rendered internally. Ready-use locker (**a**) under gun no I has large patches of its internal render missing, revealing cross-axial metal beams in the roof.

Between each pair of emplacements there is a small recess, 0.44m (1ft 5in) wide by 0.24m (9½in) deep by 0.23m (9in) high. It is rendered internally but otherwise featureless. These may have held fuses for the guns.

Gun emplacements III and IV (figure 9)

Situated towards the centre of the battery, gun emplacements **III** and **IV** have identical arrangements to those of emplacements I and II. However, no IV has been totally obscured by the construction of DEL 1 (see figure 10).

The ammunition stores (figure 9)

In both pairs of emplacements, beyond the northernmost ready-use lockers, a short flight of steps descends 0.40m (1ft 4in) to identical **ammunition stores** (**nos 1** and **2**). Each has a doorway in the flank wall leading into a rectangular chamber, 3.69m (12ft 1in) by 1.44m (4ft 9in), constructed in concrete with an internal brick skin (all stretchers) and a cavity between the two (figure 12). The interiors have shallow segmental vaults and are whitewashed except for patterns of widely-spaced brown glazed headers. Missing bricks in the south walls, and the stub of a metal bracket in ammunition store 2, indicate shelves or racks. Each entrance is 1.2m (3ft 11in) wide by 2.0m high, rebated for a single

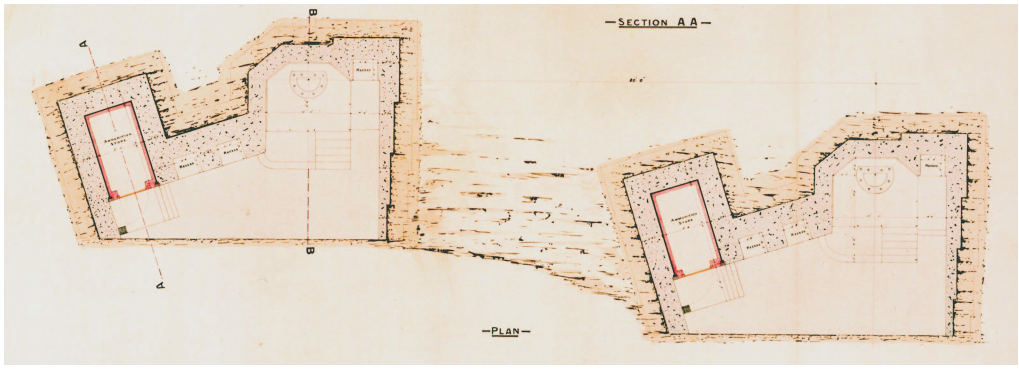

Figure 12
Wing Battery, plan showing ammunition stores outlined in red, dated 1893 (PRO: WO 78/5132 (3) Reproduced by the kind permission of the Public Record Office © PRO)

outward-opening door (figure 13). Columns of airbricks on each flank of the doorways mark the position of the cavities. Above the doorways, flat stone lintels are situated immediately above the apex of the vaults. Each store held 100 boxes of ammunition (PRO: WO78/5132 (1)).

Figure 13
The entrance to ammunition store 1 (©Crown copyright. NMR: AA/031307)

Modifications to the emplacements (figure 9)

Above ammunition store 1 and ready-use lockers (e) and (f), nine RSJs have been inserted into the wall at a height of 1.83m; these have since been sawn off (figure 14). Along the flank wall next to ready-use locker (j) (emplacement III) is a second line of five

sawn-off RSJs at a height of 1.27m from the ground. Both sets of RSJs are at the same level as a terrace in the earthwork between the two pairs of emplacements. It is likely that these RSJs supported elevated steel **walkways**, and together with the **terrace** enabled communication between the two pairs of emplacements. However, the low height of the steel walkway would have inhibited or even prevented effective supply of ammunition to the guns. Hence it is likely that they post-date the working life of the QF battery, and are probably related to the functioning of the DELs (see later).

Figure 14
Ready use lockers in the flank wall north of emplacement no II, with the scars of sawn-off RSJs for the elevated walkway above (©Crown copyright. NMR: AA/046703*)*

The Defence Electric Lights (DELs) (figure 9)

Gun emplacement IV was totally obscured by the construction of **DEL 1** (figure 15). The gun floor was extended 2.09m to the rear (the original steps can still be seen in elevation), providing a larger platform on which to position the new building. Steps between the two DELs partially overhang and block an ammunition locker. **DEL 2** is built above and projecting from ammunition store 2, supported on an RSJ.

DEL 1 is of shuttered concrete construction throughout, with a roof which slopes gently towards the front. Wooden battens on the walls and roof suggest that the interior was originally dry-lined. The doorway in the rear is 1.61m (5ft 3in) wide by 2.14m (7ft) high, rebated for a wooden frame with double doors. There is a stone sill in the centre of which is a small circular depression for a vertical bolt. The front wall contains a simple rectangular opening, 1.02m (3ft 4in) wide by 1.14m (3ft 9in) high, with a sloping

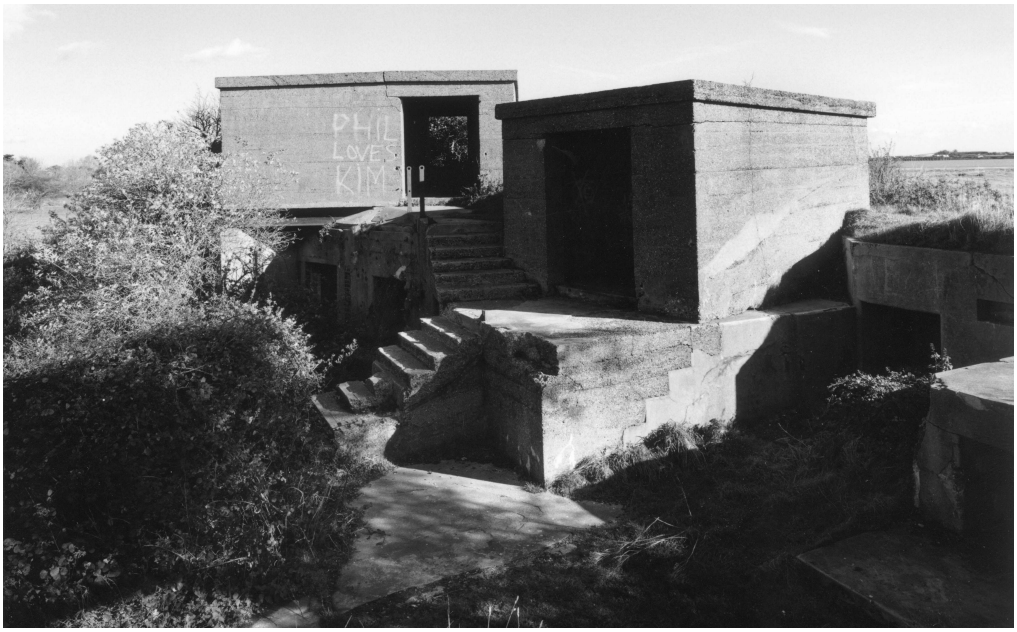

Figure 15
View across the battery, showing DEL 1 (right) over emplacement IV and DEL 2 over the ammunition store
(©Crown copyright. NMR: AA/031302)

rendered sill and steel lintel. This wall has mounted two parallel metal guide rails, part of the mechanism for horizontally sliding shutters, as are fragments of metal wheels which ran along the rails (Figure 16). In the floor, a gully 0.10m (4in) deep and rebated for a metal cover, contained cables carrying electric power for the light.

Figure 16
Detail of the aperture inside DEL 2, showing the remains of metal guide rails for sliding shutters
(©Crown copyright. NMR: AA/031300)

DEL 2 is of the same general design but larger since it was designed to hold two lights. It is built partially over ammunition store 2 and the base of its western corner is supported by an RSJ. The flat roof is supported on cross-axial metal beams which were not apparent in no 1; below these are two RSJs which were inserted at a later date, probably to deal with severe cracking in the roof. The two apertures facing the river are identical to that in DEL 1, though partially blocked by a build up of earth.

Building (figure 9)

At the rear of the battery, just inside the site of the original entrance, are several concrete blocks, each 0.60m (2ft) by 0.45m (1ft 6in) by 0.40m (1ft 4in) high. These are arranged in a regular pattern defining a rectangular area measuring 9.6m (31ft3in) by 6.7m (22ft) overall. On the south-west and north-east sides, and arranged at right angles, are pairs of parallel walls ramped down to the south-west and east respectively and closed at the opposite ends. These formerly supported steps leading up to a building - presumably made of more temporary materials - raised above ground level by the concrete blocks. The situation of this building is very low-lying and it was probably raised to avoid the periodic flooding of the area. There is a metal stanchion on one of the ramped walls, possibly for a handrail.

The function of this building is unclear and it does not appear on the 1893 plan. There are several possibilities; it may have been a guard post and shelter for the gun crews (and, later, the DEL crews), with independent entrances from the two gun pairs. Alternatively, it may have supported the air serachlights of the dual sea and air searchlight installation known to have been at Coalhouse during the First World War.

4. DISCUSSION

Wing Battery was built in 1893 to provide close defence against light craft on the river. There is some question regarding the original design of the battery since the only available record plans are for a two-gun battery, while there are in fact emplacements for four guns. Examination of the barbettes demonstrates variation between the emplacements in each pair, but it is clear that the rendering was carried out in a single episode. From this it can be surmised that the battery was largely constructed as depicted on the record plan, but altered very soon afterwards, probably before the installation of the guns (PRO: WO78/5132 (1)).

Generally QF emplacements were built onto or within existing fortifications. Wing Battery is, therefore, a very rare example of an independent purpose-built coastal battery for 6-pounder QF guns. One of the only comparable sites is at Hurst Castle in Hampshire, where a battery was built at the end of the fort in 1893 for three 6-pounder QF guns. The battery at Hurst, however, is much simpler, the three emplacements being arranged in series behind a low earthen parapet with a glaçis to the front. Each emplacement (figure 17) comprises a simple 0.9m high gun floor reached by steps to the rear, with a D-shaped metal holdfast identical to those at Coalhouse. On either side of the gun floor is an

Figure 17
One of the emplacments of the 1893 6-pounder QF battery at Hurst Castle. Note the similar gun floor and barbette but the simpler layout and the scarcity of ammunition lockers

ammunition locker measuring 1.04m wide by 0.92m high by 0.94m deep: one has a rebate for a substantial wooden frame while the other is frameless. There is no magazine: a low brick wall at the eastern end of the battery may mark its location, although it is possible that ammunition was stored in the fort.

The state of preservation at Wing Battery, which is exceptional, serves to underline the importance as a rare example of a transient installation: in the main, 6-pounder QF batteries quickly fell out of use, being replaced by the heavier 12-pounder versions. This pattern is seen at Coalhouse, where a new battery, constructed on top of the Fort, also remains visible.

5. SURVEY AND RESEARCH METHODS

The archaeological survey was carried out during October 2000 by Moraig Brown and Louise Barker. Hard detail and most of the larger archaeological features were surveyed at a scale of 1:500 using a Trimble Global Positioning Satellite System (GPS), followed by limited graphical survey using conventional methods.

Photography was by Alun Bull.

The report was researched and written by Moraig Brown and Paul Pattison; Moraig Brown prepared the illustrations and assembled the final report, using Trimble Geomatics, AutoCAD, Adobe Photoshop, CorelDraw, CorelPaint and CorelVentura software.

The site archive has been deposited in the National Monuments Record Centre, Great Western Village, Kemble Drive, Swindon SN2 2GZ (NMR reference TQ 67 NE 80).

6. ACKNOWLDEGEMENTS

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7. BIBLIOGRAPHY AND SOURCES

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UNPUBLISHED SOURCES

National Monuments Record (NMR), Swindon

Aerial photographs

MAL/59068/180	26/8/1968 – good view of East Tilbury Battery
TQ 6976/44	30/7/1980 – good view of Fort and QF battery

Public Record Office (PRO), Kew

MPHH1/171(1) Thames Defences Coalhouse Fort Site Plan. OS 1894 Edition War Department 6-inch map showing range and firing angle of the guns at Coalhouse Fort. Signed off 2/3/1898

MPHH1/171(2) Thames Defences Coalhouse Fort Plan of Magazines, Drainage etc. Drawn to a scale of 15 feet to 1 inch and signed off 1897-8 & 2/3/1898

MPHH1/171(3) Gravesend Sub-District Coalhouse Fort First Floor Plan. Drawn to a scale of 45 feet to 1 inch and signed off 16/6/1897. Includes an armament table marked obsolete in red (undated)

MPHH1/171(4) Gravesend Sub-District Coalhouse Fort Magazine Plan. Drawn to a scale of 45 feet to 1 inch; no sign-off date, and later additions in red also undated

MPHH1/171(5) Thames Defences Coalhouse Fort Plan of Gun Floor. Drawn to a scale of 15 feet to 1 inch and signed off 1897-8 & 2/3/1898

MPHH1/171(6) Thames Defences Coalhouse Fort Roof Plan. Drawn to a scale of 15 feet to 1 inch and signed off 1897-8 & 2/3/1898

MPHH1/171(7) Thames Defences Coalhouse Fort Sections. Drawn to scales of 5 feet to 1 inch & 10 feet to 1 inch and signed off 1897-8 & 2/3/1898

WO10/2264 11th Battalion *Major NJE* Grants *Company* Coalhouse Point, Tilbury *Fort*, March ½ Year 1857. Book containing monthly muster and pay information for the Royal Artillery stationed at Coalhouse Point.

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WO78/2278(1) Coalhouse Fort and Battery. OS 1864 Edition 25" map showing Coalhouse Fort and Battery

WO78/2278(2) Coalhouse Fort and Battery. OS undated Edition 6" map showing War Department land and land over which they have clearance rights

WO78/2308 OS 1882 War Department Edition 25" map land purchased or leased

WO78/4964(1) Thames Defences Coalhouse Fort Site Plan. OS 1894 Edition 6" map showing range and firing angle of the guns at Coalhouse Fort. Signed off 1897 & 2/3/1898

WO78/5111(1) Key plan to the Sheerness & Thames 25" Plans. OS map showing the Thames and Medway defences

WO78/5112(3) Broadness to Mucking Light including Gravesend and Lower Hope Reaches. OS 1887 Edition map showing proposed electric lights, surveyed by Tizzard, RN

WO78/5125(1) Broadness to Mucking Flats including Gravesend and Lower Hope Reaches. OS 1897 Edition map showing range and firing angles for guns at Coalhouse and Cliffe Forts, dated 18/9/1924(?)

WO78/5125(2) Broadness to Mucking Flats including Gravesend and Lower Hope Reaches. OS 1897 Edition map showing range and firing angles for guns at Coalhouse and Cliffe Forts, dated 22/1/1916

WO78/5125(3) Broadness to Mucking Flats including Gravesend and Lower Hope Reaches. OS 1897 Edition map showing range and firing angles for guns at Coalhouse and Cliffe Forts, dated 24/5/1911, with alterations dated 18/9/1911

WO78/5125(5) Broadness to Mucking Flats including Gravesend and Lower Hope Reaches. OS 1897 Edition map showing range and firing angles for guns at Coalhouse, Tilbury, New Tavern and Cliffe Forts and East Tilbury and Hope Batteries. Includes armament and dated 1/2/1904, 31/12/1907, 18/1/1909 & 24/5/1911

WO78/5132(1) Thames Defences Coalhouse Quick Firing Battery Block Plan. Ordnance Survey 1894 Edition 25" map showing Coalhouse Fort and QF Battery, with detail added in 19/10/1893

WO78/5132(2) Thames Defences Coalhouse Quick Firing Battery General Plan. Drawn 19/10/1893 by Lt Corp JP Johns, RE, to a scale of 10 feet to 1 inch

WO78/5132(3) Thames Defences Coalhouse Quick Firing Battery Sections. Drawn 19/10/1893 by Lt Corp JP Johns, RE, to a scale of 5 feet to 1 inch

WO78/5134(8) Thames Defences 25" Index Plan. OS 1893 Edition War Department 25-inch map showing Coalhouse Fort, Battery, Wing Battery and Cliffe Fort

WO192/48 Coalhouse Fort Record Book for Defence Electric Lights, Electrical Communications etc & Coalhouse Fort Record Book Army Book No 360 2 BL Naval 5.5 Mk I. Includes a history of the fortifications at Coalhouse Point and the following aerial photographs:

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WO192/48c Ref 37/XX/264, undated but possibly 1918

WO199/60 Radio Direction Finding Stations Eastern Command. Apr 1941-Nov 1943

WO199/65 Radio Direction Finding Stations South Eastern Command. Feb 1941-Jul 1943

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Q/RUm 2/139A Coalhouse Point Plan of Lands in the Parish of East Tilbury. 20/1/1861, showing land to be taken into military use as a result of the Defence Act

Q/RUm 2/139B Coalhouse Fort Plans of Lands in the Parish of East Tilbury in the County of Essex. 26/4/1861, showing lands to be taken absolutely for the construction of works as a result of the Defence Act

Q/RUm 2/139C Coalhouse Fort Plans of Lands in the Parish of East Tilbury in the County of Essex. 26/8/1861, showing lands to be taken absolutely for the construction of works as a result of the Defence Act

8. PHOTOGRAPHS TAKEN DURING THE SURVEY

AA03/1299	Gun no IV, holdfast
AA03/1300	Double light DEL, interior view showing detail around windows
AA03/1301	Single light DEL, interior showing detail around window
AA03/1302	General view across guns I & II showing DELs, Coalhouse Fort in background
AA03/1303	Gun no II, exterior view from west showing gun floor and ready-use lockers
AA03/1304	General view across guns I & II showing both DELs
AA03/1305	Gun platforms III & IV, view from southwest
AA03/1306	DELs, exterior view from east
AA03/1307	Entrance to magazine no 1
AA03/1308	Gun no III, holdfast
AA04/6703	QF battery, rear wall of battery. View from SW