ISSN 1478-7008

ENGLISH HERITAGE

COALHOUSE POINT: Archaeological features in the inter-tidal zone, East Tilbury, Essex

Moraig Brown & Paul Pattison

SURVEY REPORT

ARCHAEOLOGICAL INVESTIGATION SERIES
7/2003

ISSN 1478-7008

COALHOUSE POINT: Archaeological features in the inter-tidal zone, East Tilbury, Essex

Moraig Brown & Paul Pattison

ARCHAEOLOGICAL INVESTIGATION SERIES
7/2003

ENGLISH HERITAGE

COALHOUSE POINT: ARCHAEOLOGICAL FEATURES IN THE INTER-TIDAL ZONE, EAST TILBURY, ESSEX

ARCHAEOLOGICAL INVESTIGATION REPORT SERIES 7/2003

NMR Nos: TQ 97 NE 81-3

NGR: TQ 689761

Report by: Moraig Brown & Paul Pattison
Survey by: Louise Barker & Moraig Brown
Drawings by: Moraig Brown
Field photography by: Alun Bull

Coalhouse Point (©Crown copyright NMR: AA/031297)

CONTENTS

LIST OF FIGURES

GLOSSARY OF TERMS

Artillery:

Base
A large calibre smooth bore artillery piece

Bombard
A large smooth-bore artillery piece of 9-inch calibre

Demi-culverin
A medium smooth-bore artillery piece, 8½ feet long, of 4.2-inch calibre firing a 10 pound shot. Maximum range of 5,000 yards; effective range around 850 yards

Saker
A medium smooth-bore artillery piece, just under 7 feet long, of 4-inch calibre firing a 9 pound shot. Maximum range of 4,000 yards; effective range around 500 yards

Falcon
A small smooth-bore artillery piece, 6 feet long, of 2½-inch calibre firing a 3 pound shot. Maximum range of 2,500 yards; effective range 400 yards

Falconet
A small smooth-bore artillery piece, 3.7 feet long, of 2-inch calibre firing a 1 pound shot. Maximum range of 1,500 yards; effective range 280 yards

Serpentine
A small smooth-bore artillery piece, 3 feet long, of 1½-inch calibre firing a ½ pound shot. Maximum range 1,000 yards; effective range 250 yards

Blockhouse
An infantry strongpoint, usually a covered loopholed building, which acts as a defensible barrack or guardhouse

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

Bulwark
Early term for a bastion or blockhouse

Enceinte
The main line of bastions and curtains of a fortress, excluding the outworks. Also known as 'the body of the place'

Fowler
A large calibre handgun

Harquebus
An early form of light handgun for an infantyman

Musket
An infantry handgun, often fitted with a bayonet

Muzzle-loader (ML)
A gun which is loaded from the front of the barrel

Rifling
The cutting of spiral grooves into the barrel of a gun. Rifling ensured that the shell would spin when fired, providing greater accuracy, increased range and improved velocity

Smooth bore
A gun which has no rifling in its barrel

Terreplein
Level surface behind the parapet where the guns are mounted

ABBREVIATIONS USED IN THE TEXT

BL	Breech loader
CRE	Commanding Royal Engineer
DEL	Defence Electric Light
RA	Royal Artillery
RE	Royal Engineers
RML	Rifled muzzle loader
RSJ	Rolled steel joist
QF	Quick-firing

1. INTRODUCTION

In October 2000 staff of the English Heritage (EH) Field Office in Cambridge carried out survey and analysis of archaeological remains on the foreshore at Coalhouse Point, East Tilbury. The survey was requested by Deborah Priddy, EH Inspector, East of England Region, following the observation of fragments of stonework on the mudflats of the River Thames,which were thought possibly to mark the location of a documented Henrician artillery blockhouse. The remains are some 600m south of Coalhouse Fort.

Coalhouse Point is situated on the northern bank of the River Thames at NGR TQ 689 761, 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).

Figure 1
Location map

The site of the Henrician blockhouse has not previously been precisely defined but is thought to be at the Point, on mudflats in front of the river wall.

2. BACKGROUND HISTORY

The early defence of the River Thames and the blockhouse system

The Thames has always been important strategically, not only allowing access to the capital but also providing a rare haven for shipping plying the east coast of England. In consequence, it has a long history of defence by artillery batteries and forts on both banks.

During the 14th century, the first known system of warning against attack comprised a series of beacons along the river, two of which stood at Tilbury and Gravesend respectively. In 1380 this system provided inadequate warning when a combined French and Spanish fleet landed a force that plundered and damaged both towns. In view of the ever-present threat from continental Europe, castles were built at Hadleigh (Essex) and Cooling (Kent) between the 1360s and the 1380s, and in 1402 East Tilbury received royal approval for a rampart and towers (Smith 2002, 3-4).

By the 1530s there was growing concern about the state of England's defences, especially considering the increasing numbers of warships being built by Continental powers and the tension that had emerged between Henry VIII and the Pope. The Franco-Habsburg truce, signed in 1538, confirmed England's political isolation and the Pope sought to promote an invasion in order to restore Catholic control. In response, Henry VIII began a major programme of fort construction along the east and south coasts from Hull to Milford Haven (Saunders 1989, 35-6; Smith 2002, 4). The Thames was a key element in this defensive scheme since it formed the easiest approach to London and

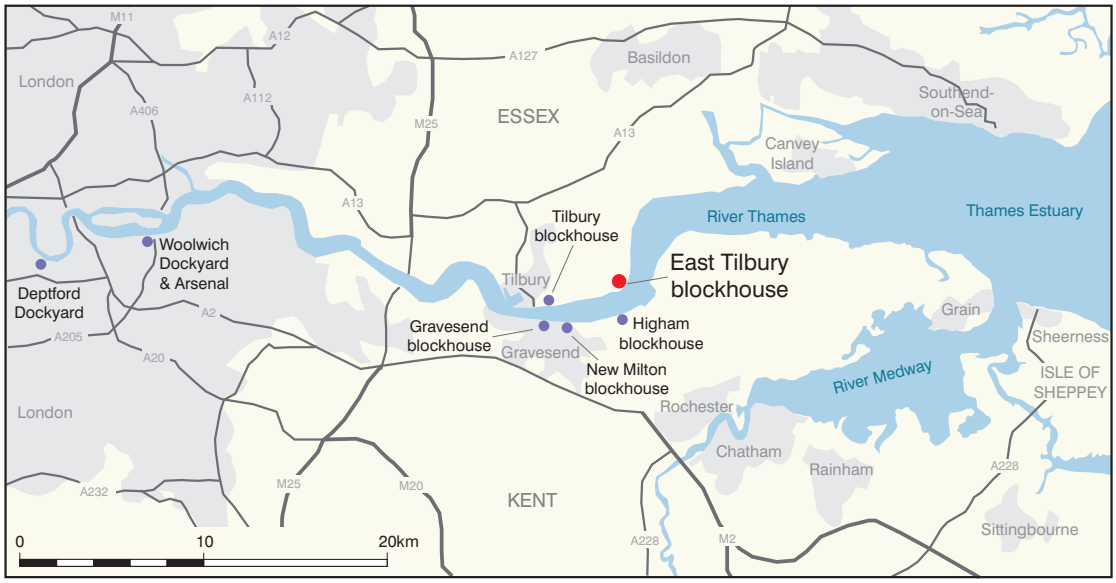

Figure 2
The Thames blockhouses in around 1540

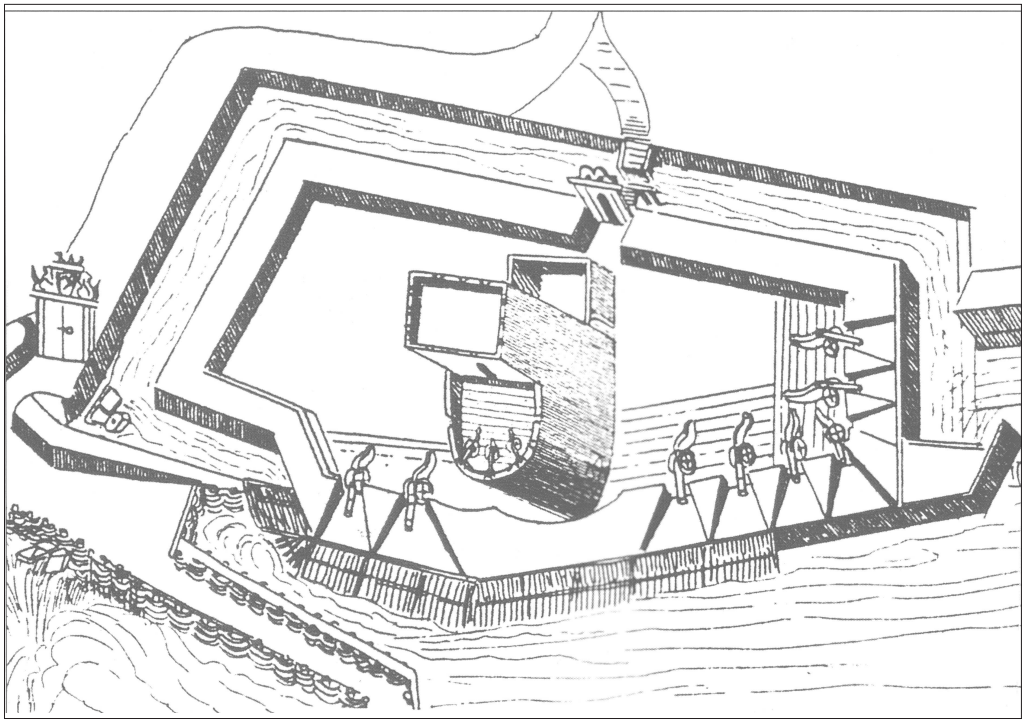

Figure 3
Tilbury fort in around 1588 showing the blockhouse at the centre. This drawing, by Federigo Genebelli, was in advance of the construction of a system of trenches outside the main fort (not shown). (Reproduced courtesy of the Public Record Office, PRO: SP 12/217/5)

to the dockyards at Woolwich and Deptford. Consequently, between 1539 and 1540, five artillery blockhouses were constructed at Tilbury, East Tilbury, Higham, Milton and Gravesend. The blockhouses were based upon designs by Christopher Morice, Master of Ordnance, and James Needham, Clerk and Surveyor of Works (Saunders 1989, 45; figure 2). The East Tilbury blockhouse was placed at the important ferry crossing to Higham, at the place which later became known as Coalhouse Point.

These blockhouses were purpose-built to house artillery for the engagement of shipping on the river, denying an enemy the opportunity to bombard the river settlements or to disembark a marauding infantry force. For this reason, those at East Tilbury and Higham were placed at a critical point where the river narrows sufficiently for a cross fire to be established, forming a first line of defence while also guarding the ferry crossing. The remaining three blockhouses formed a second line of defence.

Developments in fortification at this time led to the construction of England's first major artillery forts, such as Deal and Walmer Castles in Kent. These followed the emerging north-west European school of fortification which favoured massive forts with rounded bastions and splayed embrasures providing flanking fire for the ditch (Saunders 1989, 16-7). Although the blockhouses were simpler structures, they were built along similar design principles.

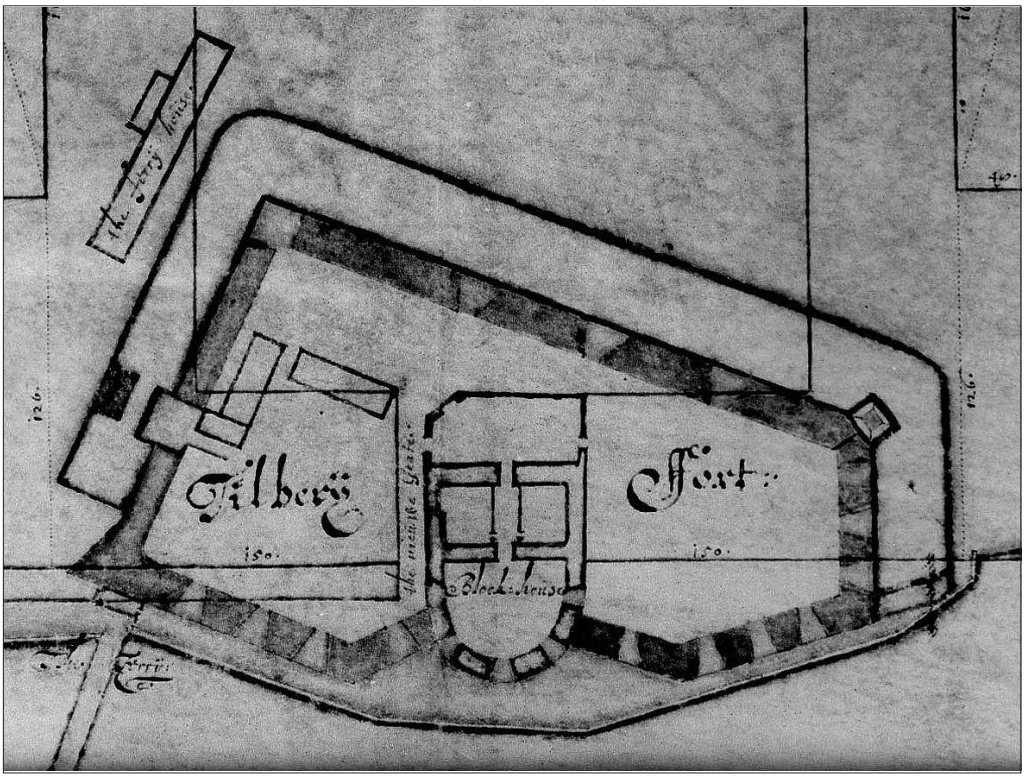

Figure 4
West Tilbury blockhouse as drawn by Bernard de Gomme in 1661, but showing it as it probably appeared in the mid-16th century (National Maritime Museum, London: GOM 218:8/26 MS)

The blockhouses were simple gun towers with splayed embrasures for artillery. Surviving plans of those at Gravesend and West Tilbury show that each was a squat two-storey brick tower of D-shaped form. Guns were mounted both in bombproof casemates and in open emplacements on the roof. Additionally, each tower may – originally or subsequently – have been placed within a small defended *enceinte* comprising an earth rampart with a *terreplein* supporting open emplacements for more artillery pieces ranged onto the river (figures 3 and 4). The *enceinte* also provided a capability to resist small-scale land assault.

The armament of each blockhouse was a mixture of both breech- and muzzle-loading cannon, ranging in calibre from small 1½-inch falconets to massive 9-inch bombards, some of which had a range of over a mile, although their effective range was considerably less. Close defence was provided by small arms including handguns, pikes, bills, bows and arrows, and even possibly crossbows (Smith 2002, 6).

Nothing is known of the structure of the blockhouse at East Tilbury, but it seems likely that it was built of brick and stone, with a rampart and ditch forming a defended *enceinte* on the landward side, similar to those at West Tilbury and Gravesend. A little is known of its history; in 1540, it was manned by a small permanent holding garrison comprising two soldiers and four gunners, equipped with fifteen iron cannon, and paid from funds

provided by the Exchequer and the Office of Ordnance. These men, possibly part-timers with other jobs locally, would have been supplemented from local musters in times of crisis (Saunders 1989, 47; Smith 2002, 6-7). By 1547 the armament included:

One iron demi-culverin mounted upon a wheeled carriage
One curtal saker mounted upon a wheeled carriage
One iron saker mounted upon a wheeled carriage
One iron bombard with 2 chambers
One brass falcon mounted upon a wheeled carriage
One brass falconet mounted upon a wheeled carriage
Three iron double bases, each with 2 chambers
Seven iron single bases, each (?) with 9 chambers

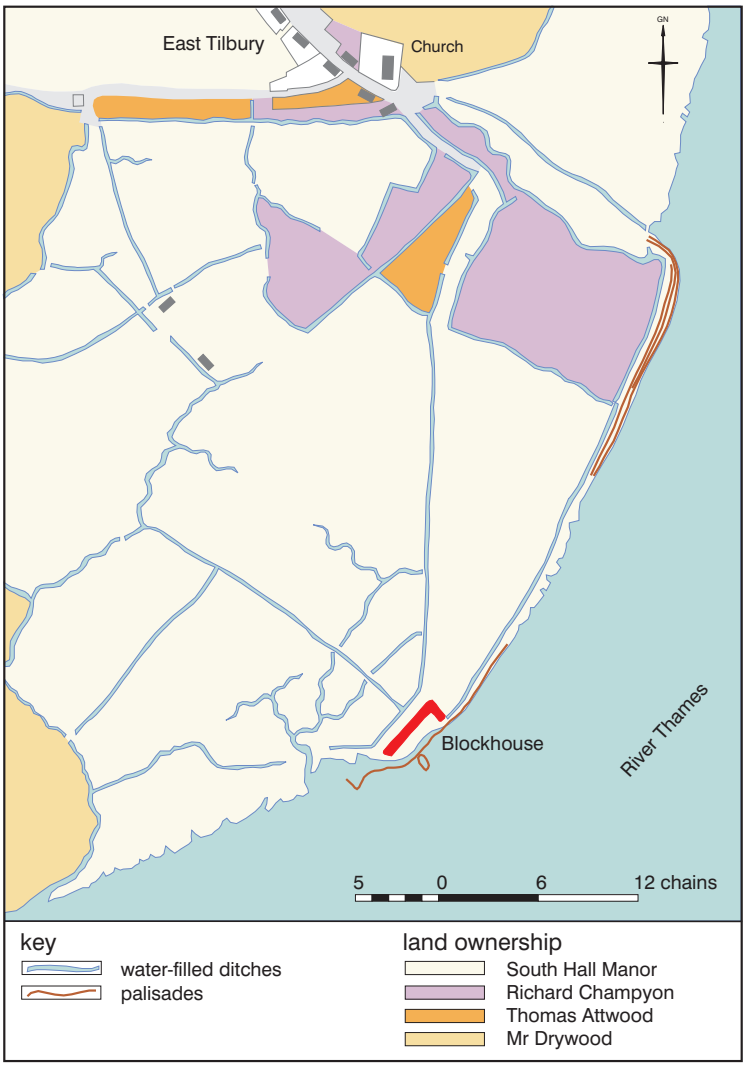

Figure 5
Coalhouse Point in 1594. The original survey labels the surviving structure 'blockhouse', although in fact it probably formed the rear of an enceinte, *while the rest of the work had fallen into ruin. Note the rows of palisades along the foreshore, presumably protecting the low-lying salt marsh from inundation while also serving as a defence against landings.* (after ERO: T/M 409/1)

One sling with 2 chambers, mounted upon a carriage

Four iron demi-slings, each (?) with 6 chambers, mounted upon a carriage

Three iron fowlers, each (?) with 5 chambers, mounted upon high wheels

Two serpentines, each (?) with 4 chambers

Four harquebuses

Thirty hanguns (Society of Antiquaries, 171-2).

In 1553, all of the blockhouses were disarmed and thereafter national security was maintained through Elizabeth's skilful diplomacy with France and Spain. The failure of this policy in 1558 prompted an inspection of the blockhouses which, not unsurprisingly, were in a parlous condition. Repairs were undertaken at West Tilbury and Gravesend but Milton and Higham were demolished and their materials re-used in repairs at the Tower of London (Smith 2002, 7). Moreover, the catalogue entry of a document in the Essex Record Office refers to the demolition of East Tilbury blockhouse during the reign of Mary I (ERO: D/Q 18/26). Unfortunately this record could not be examined in detail, but

Figure 6
Coalhouse Point in 1735. Note the area marked 'blockhouse ruins' on the foreshore, and also note the loss of land behind and to the right of the ruins (labelled 'land lost') compared with the situation in 1594 (by permission of the Wardens and Assistants of Rochester Bridge in the County of Kent; ref: E11/1/37 (a copy is held at the Essex Record Office; ref: T/M 528/2))

a sketch map of 1594 shows an L-shaped structure labelled blockhouse (figure 5). This is probably the rear part of the defended *enceinte*.

In the 18th century, only the blockhouses at Gravesend and West Tilbury were still in use (Smith 2002, 7). An estate map of 1735 shows the site of the East Tilbury blockhouse, defined by an area of ruins and parts of the earlier river wall on the foreshore, as well as a new river wall slightly further inland. By this date land had been lost to the river and is labelled as 'land lost' (figure 6) .

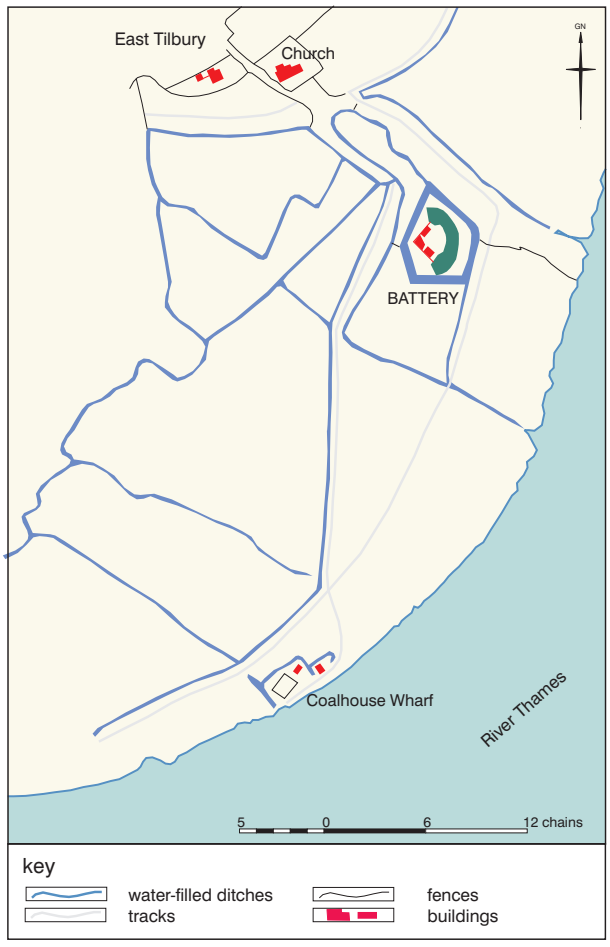

Figure 7
Coalhouse Point in 1838, showing the wharf at the point and a new battery built in 1799 on the site of what would later become Coalhouse Fort. Note no sign of the blockhouse (after ERO: D/CT 359B)

The ferry and coal wharf at Coalhouse Point

It is thought that there has been a ferry between East Tilbury and Higham since the Roman period when it provided a connection to Watling Street and thereby to London and Dover (Ormston 1998, 5). The ferry was protected by the bend in the river against the worst elements of weather coming off the North Sea.

In the 13th century, the ferry from East Tilbury to Higham was part of the manor of South Hall (see figure 5). In the 14th century, Sir John de Cobham gave both the manor and the proceeds of the ferry to the Wardens of Rochester Bridge; the return ferry from Higham was in the hands of the Prioress of Higham. There is some suggestion that both ferries had fallen out of regular use by about 1530 (Ormston 1998, 5). However, map evidence demonstrates that there was a ferry house on the Point in 1777 and possibly in 1731 (ERO: Chapman and André 1777, plate 22; T/M 528/3; T/M 528/6). It appears to have been succeeded by the development of a coal wharf, shown on maps from 1838, and 1838 (figure 7). In 1864 a Coastguard's Lookout is shown next to the coal wharf (Ordnance Survey 1864).

Figure 8
Principal forts along the River Thames in the 1860s

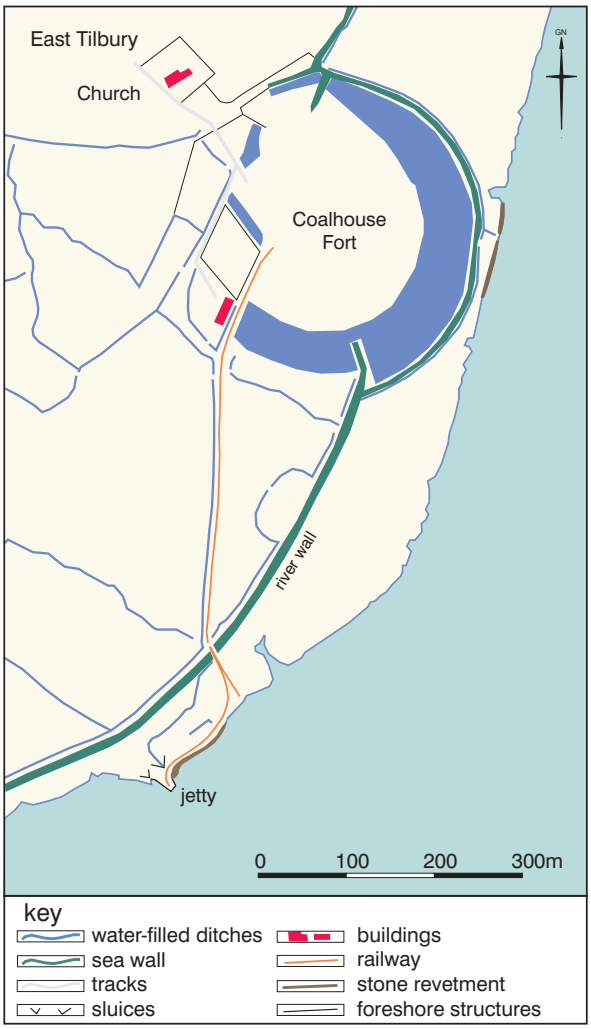

Figure 9
Coalhouse Point in 1897, showing the jetty and two sluices but no buildings (after Ordnance Survey 1897)

Coalhouse Fort

An 1861 map shows planned land acquisition by the War Department for a new fort at Coalhouse - along with other works along the River Thames (figure 8) - following recommendations by the Royal Commission on on the Defence of the United Kingdom in 1860 (ERO: Q/RUm 2/139A).

Work began in 1861-2 on the massive casemated Coalhouse Fort which survives today (figure 9). The coal wharf was used for the delivery of guns and stores to the fort via the short tramway established for the purpose in the 1860s (ERO: D/CT 359B). In 1897 the tramway extended right onto a jetty forming part of the coal wharf (Ordnance Survey 1897).

The coal wharf remained in use until after the Second World War. By 1897 it had assumed the plan form recorded during the present survey.

The late 19th century

In 1893 a new battery for quick-firing (QF) guns was built close to Coalhouse Fort (Brown & Pattison 2003). The guns were removed in 1902, and replaced by a similar battery of heavier calibre on the roof of Coalhouse Fort. The latter required searchlights to provide a night-fighting capability, resulting in the construction of two Defence Electric Lights (DELs) on the foreshore at Coalhouse Point, over the earlier battery.

The Second World War

Coalhouse Point was the focus of increased activity during the Second World War when a radar tower and ancillary buildings were constructed there. The tower was a naval establishment, apparently provided with a Type 287 array, which was used to aid friendly shipping in negotiating the channel (Tom Wilson, pers comm).

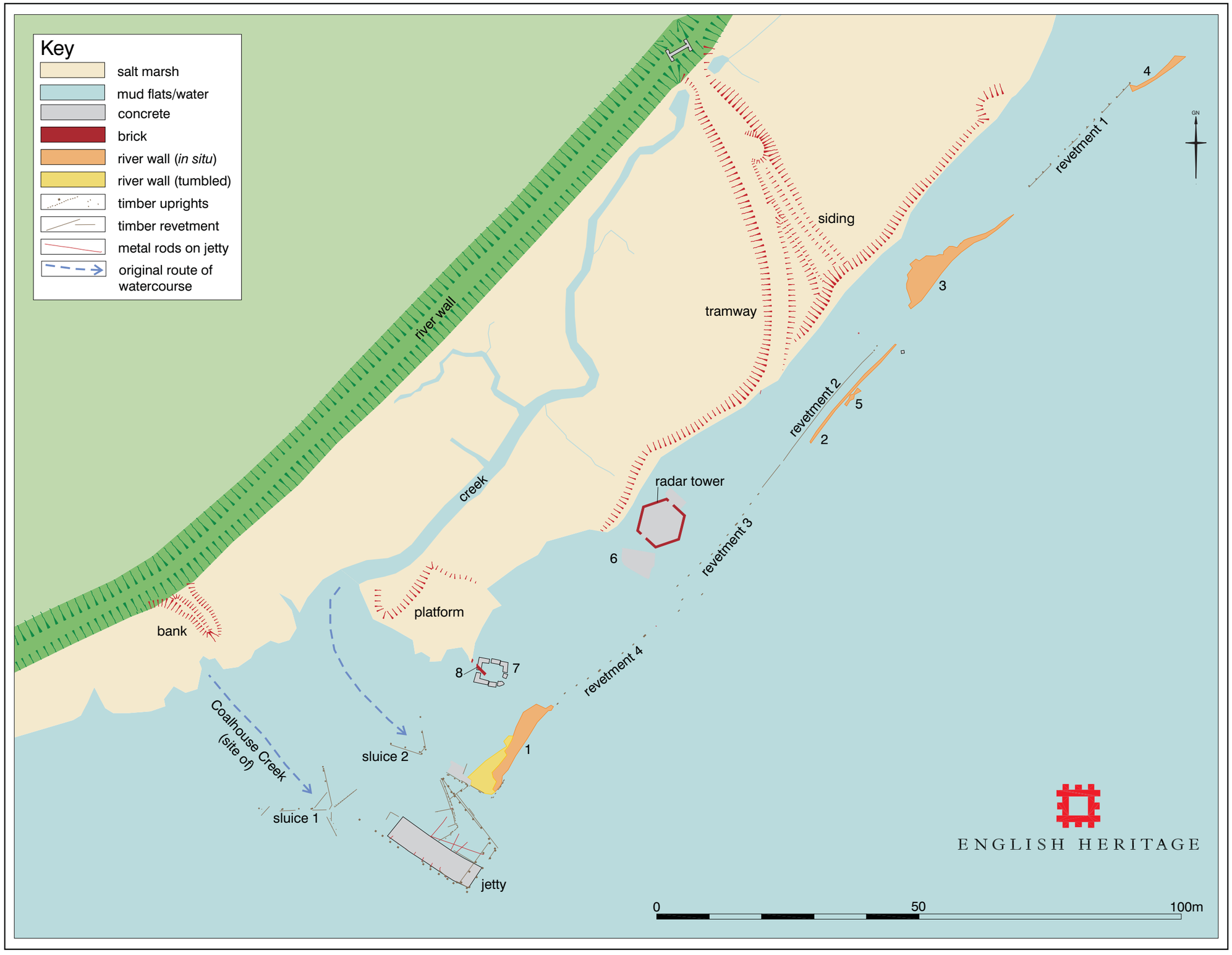

Figure 11 *English Heritage interpretation plan of the features at Coalhouse Point*

3. DESCRIPTION AND INTERPRETATION

In the area investigated, a variety of archaeological features were apparent and are described in discrete sections in the following text. Words and letters shown in **bold** in the text appear on figure 10 (at the back of the report) and on figure 11, an interpretation of the archaeological features at Coalhouse Point; other figures of relevance are given in the body of the text.

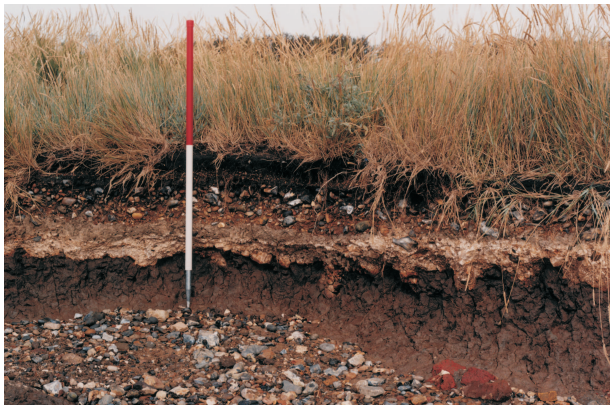

Figure 12
Section of the salt marsh at Coalhouse Point, clearly showing the redeposited layers of chalk, mud and coal (©Crown copyright NMR: AA/046710)

The extent of survey comprised a small strip of salt marsh and part of the mudflats immediately in front of the present river wall, covering an area of approximately 1.63 hectares (4.02 acres), defined also by the former tramway to the north-east and a jetty to the south-west. In general terms, the tidal action of the river is eroding the salt marsh, which is on average only 0.4m higher than the highest point on the mud flats. However, between the jetty and the radar tower, it is apparent that there is a considerable depth of made ground which is also being eroded. This comprises clear stratification in the form of layers of redeposited chalk and clay mixed with various inclusions including coal, earthenware pipes, bricks and other debris, probably the result of made up ground for thebuildings on the coal wharf and, before it, the ferry (figure 12). Similar erosion is evident elsewhere along the salt marsh but without any evidence for made ground. Immediately west of the radar tower in late 2002, sherds of pottery were discovered within a scatter of domestic ceramic types dating from *c*1680 to the later 18th century. The pieces were reconstructed and formed a Georgian chamber pot bearing a royal cipher and crown upon an oval escutcheon (figure 13; for full details see Appendix two).

Figure 13
Georgian chamber pot recovered from the salt marsh at Coalhouse Point and reconstructed. Note the royal cipher and crown upon the oval escutcheon (Thurrock Museum, Acc No 3706)

River defences

The line of the **river wall**, unchanged from at least 1864, forms a flood defence for the fields and villages behind it (Ordnance Survey 1864). It is an earthen bank, probably with a clay core, some 1.4m high on the seaward side and 1.6m on the landward side, with a water-filled ditch behind.

The area of salt marsh in front of the river wall is inundated at high tide; beyond are mudflats which contain evidence for earlier river defences that must have protected structures now on the salt marsh and mudflats from erosion. These take the form of intermittent patches of collapsed stone revetment interspersed by lines of close-set timbers, together forming an attempt to prevent inundation which may have been patched and repaired on several occasions. Map regression analysis suggests that this structure is essentially of late 19th-century date, perhaps directly associated with the development of the coal wharf (see figure 21 and page 21 for further details).

Figure 14
A fragment of worked stonework on the foreshore at Coalhouse Point
(©Crown copyright NMR: AA/046707)

The lengths of stone revetment are approximately *in situ* but the material that formed the main structure has been eroded out, causing the stonework to slump onto a bed of clay beneath. The most southerly section (**1**) corresponds with a length of stonework on the 1897 map (Ordnance Survey 1897). The stones are generally sub-angular, the largest approximately 0.85m by 0.65m by 0.40m deep. In the absence of a detailed examination of the stones it was nevertheless clear that some had been shaped and may have been re-used (figure 14).

There are three other lengths of seawall (**2**, **3** & **4**) which are not explicitly shown on the 1897 map but broadly correspond with the edge of the saltings (Ordnance Survey 1897; and see figure 21). These are made up of much smaller pieces of stone, on average 0.25m by 0.20m, now lying in a less ordered fashion. In front of 2, a small patch of stonework (**5**) is composed of almost brick-shaped pieces, each about 0.19m by 0.13m (figure 15) .

The size, shape and condition of the timbers is extremely variable, ranging from 0.05m diameter stumps protruding a few centimetres from the mud, to those forming the framework of the jetty, the largest of which measure some 0.31m square and stand up to

2.0m high. Where they form part of a continuous revetment, the individual timbers are generally of a similar size and shape to one another.

Revetment 1: a line of fifteen evenly spaced upright timbers, each measuring 1.21m high by 0.18m square. Some are linked at ground level by horizontal planks surviving to a height of 0.18m, but presumably once built to the full height of the uprights.

Revetment 2: two lines of upright timbers, forming a continuous revetment. The first comprises 127 uprights, each measuring 0.75m high by 0.26m by 0.11m, while the 20 uprights of the second each measure 1.10m high by 0.31m by 0.11m. The ground behind the larger group is 0.45m higher than the ground in front (figure 15).

Figure 15
Revetment 2, showing collapsed wall in front
(©Crown copyright NMR: AA/046704)

Revetment 3: a line of ten evenly spaced uprights, each 0.63m high by 0.28m by 0.13m, continuing the alignment of revetment 2.

Revetment 4: a line of nine evenly spaced uprights, each 0.63m high by 0.28m by 0.13m, aligned at a slight angle between revetment 3 and river wall 1, precisely following the 1897 shoreline (Ordnance Survey 1897).

The jetty and tramway

The surviving remains of the **jetty**, which formed part of the coal wharf, comprise principally the main structural timbers (figure 16). These are a series of uprights of heavy scantling, each 2.25m high by 0.35m square, and almost equally substantial cross-members, each with a cross-section of 0.38m by 0.21m, the whole structure secured by heavy iron bolts and plates into a sturdy framework. On top of the uprights, small square tenons formerly secured the jetty's decking.

Along the southern side of the jetty, a hard standing, 18.2m by 4.7m by 1.2m deep, consists of four layers of mass concrete lying on a raft of timbers. The concrete is defined on two sides by the jetty timbers, with additional concrete patches between each of the uprights, presumably providing additional support and strength. Hollow metal rods

Figure 16
The jetty at Coalhouse Point

(NMR: AA/046706)

between the layers were bolted into the timber uprights to strengthen the hard standing.

Immediately north of the jetty, a second patch of mass concrete measures roughly 4.2m by 2.8m by 1.20m deep. This has no obvious function and may not be *in situ*.

The **tramway** was built along the line of an earlier path leading from the village of East Tilbury to the Coastguard's Lookout and coal wharf. Given that the tramway follows the route precisely, it can be reasonably assumed that the earlier path was also raised, providing dry access across the marshes and salt marsh.

The tramway runs directly south from Coalhouse Fort to the river wall, beyond which it describes a tight curve before running along the edge of the salt marsh to the jetty -

although much of this part has been lost to erosion. A **siding** ran from the river wall directly towards the sea.

Most of the tramway causeway survives to a height of 0.7m, although tidal encroachment has removed all traces beyond the main curve. The causeway for the siding, 0.4m high, survives for most of its length. Many sleepers remain *in situ*, although only a few can be seen, most being at least partially covered by vegetation. The rails have been removed. The intersection of the tramway with the river wall is blocked by a large sloping concrete barrier of I-shaped plan. Although of uncertain function, it may have functioned to bar access during the Second World War, or to prevent flooding during high tides.

Water management

Water channels have always formed an important part of the landscape in this area, as testified by early mapping (see figures 5, 7 and 9). The outflow of water from those channels into the River Thames was of particular importance around the area of the blockhouse and later the ferry house and coal wharf, for which at least two sluices were constructed.

In the strip of salt marsh behind the jetty there are traces of evidence of a large water-filled channel. This **creek** (**1**) survives today as an ill-defined muddy area with a short length of **bank**, 11.2m long by 5.4m wide and 0.5m high, close by. A second **creek** (**2**) drains

Figure 17
The probable remains of one of the sluices which during the 19th century controlled the flow of water between the river and the salt marsh
(©Crown copyright NMR: AA/046708)

south-westwards from the junction of the tramway and the river wall to the mudflats. It meanders only slightly and the south-western half is relatively straight. Versions of this creek are shown on maps from 1838 onwards (see figures 7 and 9), and it seems likely that it formed part of the perimeter of Coalhouse Wharf. A small **platform** at the western end of the creek measures 16.2m by 15.8m by 0.3m high. The ground surface is very rough and no internal features are visible, but it may have once supported a structure.

Water issuing from these creeks was controlled by **sluices**. Although the details of these have disappeared, sufficient of the surrounding structures survive to provide a clear understanding of how they worked. A V-shaped arrangement of timber uprights linked by horizontal planking which survives only at ground level would have funelled the water into the sluice, and a corresponding arrangement on the other side of the sluice effected efficient despatch of the water into the Thames.

Defence Electric Lights

North-east of the jetty are the remains of a concrete structure resting on the mudflats (**6**) with walls of mass concrete containing pebble and flint (figure 18). Although partially broken-up, its rectilinear plan, measuring approximately 5.2m by 4.3m externally, is still apparent. The walls are 0.8m-wide at foundation level, capped by narrower structural walls, in smoother concrete, approximately 0.4m wide. The interior has a broken concrete floor, and in the centre of the west wall is an area of smooth concrete, possibly the base of a doorway or window. It is a Defence Electric Light (Smith 1985, 37).

Below the west wall of this structure are the remains of an earlier wall (**7**). This lies on a different alignment and is eroding out of the salt marsh. The wall is built in red brick laid to English bond, surviving to at least four courses in height, broken through at the river end. It has the same alignment to a coal wharf building shown in 1864 (Ordnance Survey 1864).

Figure 18
Remains of one of the two Defence Electric Lights at Coalhouse Point
(©Crown copyright NMR: AA046711)

North-east of this, and immediately south of the radar tower (see below) are the remains of a second concrete structure (**8**). This structure is badly broken up and lies among a large pile of concrete and brick rubble, but a large stone sill in the south-west wall has a central hole for a vertical bolt, and is clearly the site of a doorway for

double doors. Within the rubble are the remains of a sloping concrete roof supported on a brick wall. This structure lies on the same alignment as (6), and it seems certain that it was a second Defence Electric Light (Smith 1985, 37).

Second World War structures

The principal survival from the Second World War is the brick and steel **radar tower**, situated midway between the jetty and the tramway and currently being undermined by the river (figure 18). This general form of hexagonal tower is found elsewhere (for example at Beacon Hill Fort, Harwich) but the low-lying situation of Coalhouse Point meant that the upper level - which supported the radar array - had to be elevated by means of a steel framework.

The tower has a concrete floor, raised and supported on concrete piers; all of this has been undermined by tidal action, making the whole structure unsafe. Additionally, the metal stairs leading to the upper level are badly rusted and damaged, making investigation impossible. As a result, survey was confined to the lower level (figure 19).

The lower level mostly comprised accommodation for personnel manning the radar tower; a small power room on the south-west side had separate access. The structure is of

Figure 19
The Second World War radar tower at Coalhouse Point. Note the unusual raising of the upper level, probably neccessitated by the low lying location on the mudflats
(©Crown copyright NMR: AA/031291)

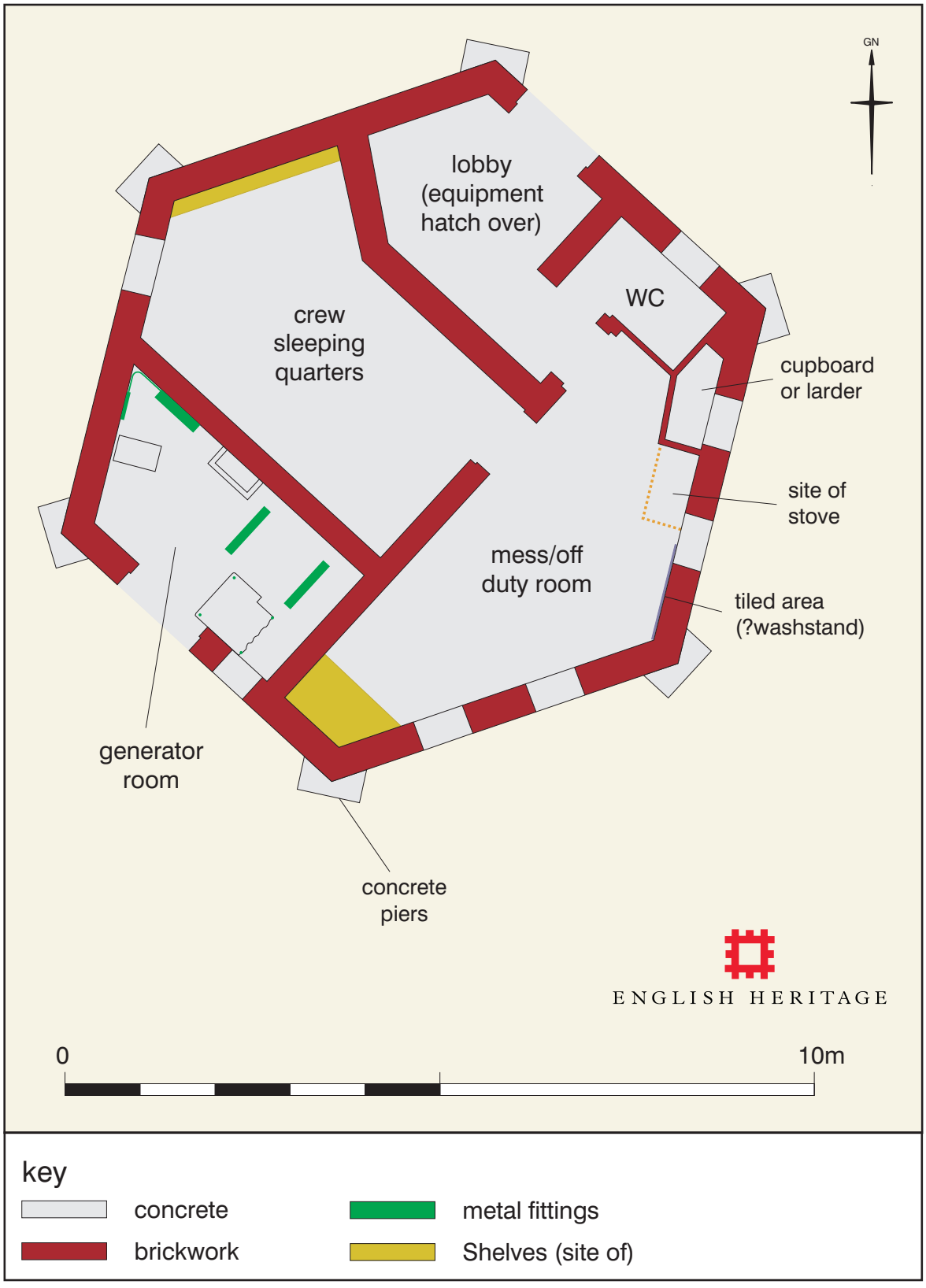

Figure 20
EH plan of the lower level of the radar tower

cavity wall construction, of Fletton brick laid to English bond, with a flat, reinforced concrete roof. There are two doorways, in the north-east and south-west walls, both of which originally had 0.22m wide baffle walls protecting the external concrete stairs which approached up from the beach level. Each opening, 1.24m wide, has a flat-headed doorway with a concrete lintel and was for a single outward-opening door.

On the lower level all internal doorways have shallow segmental brick arches. The rooms retain no traces of whitewashing or decoration, but fittings for electric lighting are present, as well as remains of piping from a central heating system. Except where described otherwise,all of the windows are of the metal 4-light Crittal type, hinged at the top.

The doorway in the north-east wall of the tower gives onto a lobby which has a hatch in the roof measuring 1.30m by 2.09m. Above, the floor of the upper level contains a similar hatch with a large hoist hook above it: this arrangement must have been for raising and lowering heavy pieces of equipment from the lobby. A small square vent high in the north-west wall of the lobby provided ventilation. Adjacent on the south-east side is a small room with a Crittal window and the remains of fittings for a WC.

Beyond the WC is a long room with four Crittal windows, probably serving as a mess and off-duty room for the radar crew. At the northern end of the room there are the remains of a brick cupboard (1.22m by 0.5m by 1.15m high) with a flat concrete shelf above; inside is a small window or ventilator with a rendered sloping lower face and traces of an external wooden frame. This may have been a small larder. Next to the cupboard, a metal vent in the wall is part of the flue for a small stove. Next to this on the same wall is an area of white tiles, below which are two sawn-off brackets which probably supported a sink or washstand. Wooden pegs and scars at the southern end of the room were for a cupboard or shelves, the cupboard was 1.92m high and 0.77m deep and the top shelf was 1.51m high.

A doorway in the north-west wall of the off-duty room gives onto the crew sleeping quarters. It contains a single Crittal window as well as a square vent high in the north-west wall. There are no internal features other than two rows of substantial hooks along the north-east and south-west walls for six hammocks. Wooden pegs supported 0.20m deep shelves along the north-west wall, at heights of 1.39m and 1.81m. A metal pipe, angled steeply upwards, issues from the centre of the south-west wall: there is no evidence as to its function.

The south-western entrance of the tower gives onto a generator room. Measuring only 4.14m by 1.92m, it has a small square vent high in the west wall and a window high in the

south-west wall; the latter appears to have had an internal wooden frame, but no traces survive. Inside the room, a small rectangular concrete block, 0.75m by 0.81m by 0.15m high, with a metal pin in each corner, is located immediately south-east of the doorway and may have supported a small generator. On the north-east wall are the remains of a metal junction box, 0.70m wide by 1.56 high by 0.12m deep: this controlled the power for the whole of the radar tower. Power was provided to the upper level via a smaller junction box (0.37m square by 0.07m deep) on the west wall which transported it outside the tower and then up the side of the nearest metal stanchion before it entered the upper level through the centre of the floor. Next to the generator bed are two parallel flat metal strips, each 0.75m by 0.12m, perhaps for a boiler supplying hot water for the central heating system. In the centre of the north-east wall at floor level, a low concrete kerb - similar to but smaller than those associated elsewhere with stoves - defines an area 0.58m by 0.22m, with metal pipes issuing from the wall above, possibly sending hot water around the rest of the tower.

The radar equipment was located in the upper floor of the radar tower, which was reached via an external metal stair on the north-west side. Access to the roof and the actual array was possible from the upper level via a ladder and access hatch directly above the equipment hatch on the north-east side; there may have been a safety fence around the perimeter of the roof.

Miscellaneous structures

Scattered over the mudflats are several timber uprights which have no obvious function, together with many fragments of structural debris, including concrete blocks and metalwork, which are not *in situ*.

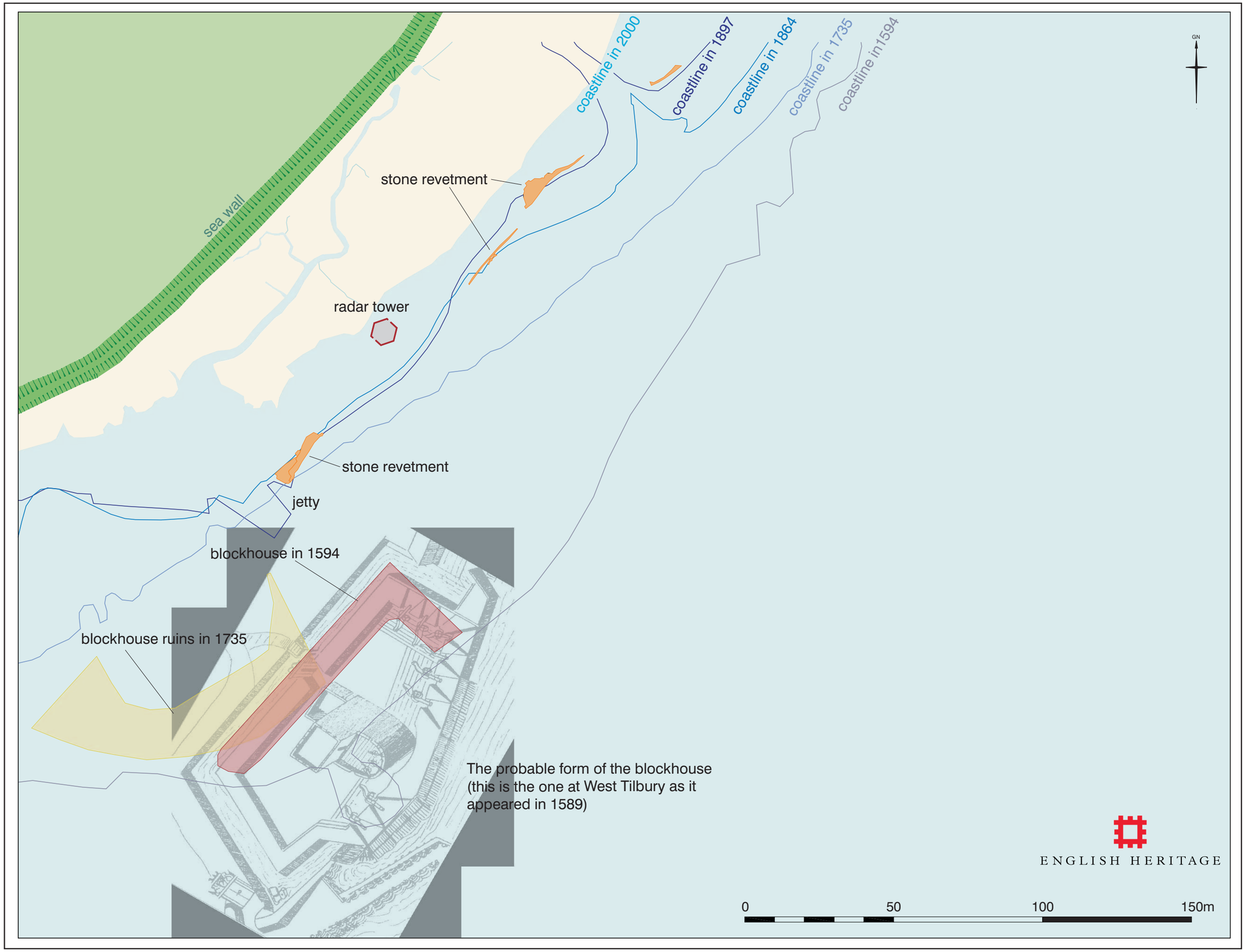

Figure 21 *The regression of the riverline at Coalhouse Point since 1594, showing the location of the blockhouse in 1594 and its ruins in 1735. This drawing has been produced from historic maps of various scales and accuracies, but nevertheless the general trend of erosion is clear. Superimposed is Genebelli's plan of West Tilbury blockhouse in 1589 - it is likely that the blockhouse at East Tilbury was built to the same design*

4. DISCUSSION

Henrician blockhouse

The blockhouse at Coalhouse Point formed a major element in the defence of the Thames for a short period in the second half of the 16th century. Situated at a major bend in the river between Lower Hope and Gravesend Reaches, it was perfectly placed to engage with ships which were negotiating the turn. Moreover, in conjunction with four more blockhouses on both banks, it could have served to establish dangerous crossfires through which hostile ships would have to sail.

During the current investigation, no surface trace of the Henrician blockhouse was located at Coalhouse Point. Moreover, there is no evidence to suggest that stonework eroding out of the mudflats has any direct association with the structure, although much of it is worked and shaped and could have been re-used following demolition. In reality, map evidence reveals that the river has eroded the salt marsh along this part of the river, such that the site of the blockhouse is now well within the mudflats (figure 21). The maps further demonstrate that there were a series of post-medieval river walls of which the surviving stonework and timber revetments are the last remains. In addition, a document, probably of late 16th-century date, states that *"...the said blockhouse...lyeth in great daunger the watter hath alreadie eaten the most parte of the bulwarke away..."* (ERO: T/B 57/1-6, and reproduced here as appendix 1). Clearly, erosion had set in very soon after construction, and it may be that the palisades along the foreshore shown on the 1594 map (figure 5) were an attempt at keeping back the tide.

It has been suggested that this blockhouse, in common with at least two others on the Thames, was a reused medieval hospital or chantry known as *Stonehouse* (Powell 1988, 155). The evidence for this claim appears to be based upon the location of the blockhouse close to a piece of land known in 1588 as '*Stonehouse*' (*ibid*, 157). There are also references to a chapel at the end of a bridge which ran from the blockhouse to the low water mark (see below) (ERO: T/B 57/1-6). A chapel at a medieval ferry point would not be unusual but, since no trace of the blockhouse survives, the suggestion cannot be further elaborated in the field. However, the bridge to the low water mark - probably in reality a jetty or timber causeway - is mentioned in a document dated 1402 and apparently referred to in 1624 and 1679 as being in poor condition (ERO: T/B 57/1-6 – see appendix one; ERO: T/A 418/102/16 & T/A 418/130/30). No identifiable remains of this structure were identified.

The ferry house and coal wharf

No definitive remains of the ferry house survive above ground. Likewise, all surface traces of the coal wharf buildings have disappeared. The surviving timbers of the jetty are from the structure shown on the OS map of 1897 but it probably dates to the 1860s. During the construction of Coalhouse Fort in the 1860s the tramway was built between the Fort and the jetty, allowing material, equipment and guns to be landed at the jetty and transported directly to the Fort. Nevertheless, the survival of stratigraphy in the made-up ground north-east of the jetty hints that there is some archaeological potential for buried remains that may stretch back into the 18th century (see figures 13 and 21).

Second World War activity

The radar tower was built in 1940. In general during the Second World War, radar was the responsibility of the army but some sets were operated by the navy for the detection of submarines on the surface, and this seems to have been the case at Coalhouse Point (Tom Wilson, pers comm; Pearson 1991, 93-6). The tower appears to have been for a Type 287 radar array and was probably concerned with assisting friendly shipping in negotiating the channel (Tom Wilson, pers comm). A mobile unit of Royal Marines guarded the tower, which despite its vulnerable and isolated position was not heavily fortified. The radar equipment comprised a revolving parabolic wheel array mounted on the roof of the tower, driven by an electric motor and monitored from a control room on the upper level of the tower (Tom Wilson, pers comm). Part of the array is now in Coalhouse Fort.

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 references TQ 67 NE/81-2).

6. ACKNOWLEDGEMENTS

Thanks are due to the following people who assisted with various elements of the survey:

Jonathan Catton, Thurrock Unitary Council

Tom Wilson, Coalhouse Fort Project

Essex County Record Office

The Public Record Office

Andrew Williams, English Heritage

Chris Hughes

David Higgins, Julie Edwards, David Gaimster and Jacqui Pearce

7. BIBLIOGRAPHY AND SOURCES

PUBLISHED WORKS

Brown, M & Pattison, P 2003 *Coalhouse Fort: Wing Battery, East Tilbury, Essex* (English Heritage Archaeological Investigation Series **AI 6/2003**)

Gough, J 1993 *Watching the Skies: The History of Ground Radar in the Air Defences of the United Kingdom* (London, HMSO)

Hughes, Q 1991 *Military Architecture* (Beaufort)

Morant, P 1768 *The History and Antiquities of the County of Essex*, Vol **I** (London) [Reprinted in 1978 by EP Publishing Ltd & Essex County Library]

Norris, J 2000 *Artillery: A History* (Sutton Publishing)

Ordnance Survey 1864 1st Edition 25" Essex LXXXIV.15

1897 2nd Edition 25" Essex LXXXIV.15 / parts of Kent IV & XI

1898 2nd Edition 6" Essex LXXXIV SE / parts of Kent IV & XI

1961 1:2500 Sheet TQ 6876-6976

1991 1:10000 Sheet TQ 67 NE

Ormston, JM 1998 *The Five Minute Crossing: The Tilbury – Gravesend Ferries* (Thurrock Local History Society)

Pearson, M 1991 'Coast defence radar' *Fort*, **19**, 93-106

Powell, WR 1988 'The medieval hospitals at East Tilbury and West Tilbury and Henry VIII's forts' *Essex Archaeology and History* **19**, 154-8

RCHM(E) 1923 *An Inventory of the Historical Monuments in Essex*, Vol **IV**

Reynolds, R & Catton, J 1997 *Thurrock goes to War* (Brent Publications, Essex)

Reynolds, R 1998 *Thurrock 1914-1918: The Great War* (Brent Publications, Essex)

Saunders, A 1960 'Tilbury Fort and the development of artillery fortification in the Thames Estuary' *Antiquaries Journal* **40**, 152

Saunders, A 1989 *Fortress Britain: Artillery Fortification in the British Isles and Ireland* (Beaufort)

Soil Survey of England and Wales 1983 *Soils of England and Wales Sheet 4 Eastern England*

Smith, VTC 1968 'The Higham Blockhouse hypothesis' *Transactions of the Gravesend Historical Society* **14**

Smith, VTC 1985 *Coalhouse Fort and the artillery defences at East Tilbury* (Coalhouse Fort Project, Essex)

Smith, VTC 2001 *Front Line Kent: defence against invasion from 1400 to the Cold War* (Kent County Council)

Smith, VTC 2002 *Defending London's River: the story of the Thames forts 1540-1945* (North Kent Books)

Smith, VTC & Green, ER 2000 *Defending London's River 3: The Gravesend Blockhouse* (Thames Defence heritage (New Tavern Fort Project) in association with Gravesham Leisure)

Society of Antiquaries MS 129, Folios 259-260, p 171-2

VCH 1903 *A History of Essex*, **1**

UNPUBLISHED SOURCES

National Monuments Record (NMR), Swindon

Aerial photographs

58/720/Pt 4/5056-7	6/6/1951 – shows salt marsh edge beyond radar tower etc but already cutting off tramway to jetty (which looks abandoned)
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

SP 12/217/5 State Papers, dated 1588

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.

WO33/395 Thames & Medway Defence Scheme. Book, revised to 1/1/1906 and including armament details

WO33/477 Eastern Coast Defence Scheme Vol I Thames & Medway. Book, revised to Feb 1909 and including armament details

WO33/671 Eastern Coast Defences Defence Scheme Thames & Medway, Part I Headquarters. Revised to 1/2/1914

WO33/944 Chain of Artillery Command No 13 Thames & Medway. Dated 1/7/1919

WO78/596 Thames and Medway shewing the Fortifications existing and in progress 1863. OS map extract showing Thames and Medway area and fortifications there. Map scale is 1 mile to 3 inches, and signed off 10/6/1863, 21/5/1866, 30/5/1866 & 30/6/1866

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

WO78/5111(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

WO78/5134(1) Southend & District. OS 1921 Edition map overlain with military information regarding anchorages and fighting and artillery zones

WO166/2056 War Diary of HQ Fixed Defences Thames & Medway. 22/8/1939 to Dec 1941

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:

WO192/46a Ref AC93/414/B, dated 17/8/1942

WO192/48b Ref AC39/B/414, dated 17/8/1942

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

Unreferenced A survey of the River Thames from London, and of the River Medway from Rochester, to the Nore. Drawn by George Allen and published by David Steel 2/8/1802, showing an illustration of Garrison Point Fort at Sheerness

Essex Record Office (ERO), Chelmsford

D/CT 359A East Tilbury Tithe Award Transcript. 1838

D/CT 359B East Tilbury Tithe Award Map. 1838

D/DBy/P15 Plan Sketch of the Rivers Thames and Medway shewing the situations of the various Batteries ashore and afloat, as proposed for the defence of the River Thames. Drawn c1795 at a scale of ¾ inch to 1 mile

D/Q 18/25 Untitled. Various leases and indentures ranging in date from 1507 to 1893. Includes 'Expired leases of the manor and farm of South Hall [including lease of part of Tilbury Ferry owned by wardens of Rochester Bridge, with 2 boats, 1507; the earliest lease of the manor in this bundle is dated 1552; laying of cable across foreshore of R Thames close to Coal House Creek for purposes of coast defence, 1893]'

D/Q 18/26 Untitled. Mentions bulwark built by Henry VIII and demolished by Mary I with damage to the value of £3,100 by 1574

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

T/A 418/102/16 Calendar of Essex Assize Files, 9/7/1627. Reference to a footbridge in East Tilbury leading from the blockhouse to the low water mark (item not seen, details taken from archive catalogue)

T/A 418/130/30 Calendar of Essex Assize Files, 9/7/1627. Reference to "le Blockhouse Ferry Bridge" in Tilbury (item not seen, details taken from archive catalogue)

T/A 856/2 (microfilm copy of D/Q18/25)

T/B 57/1-6 Various documents dating from 1402 to 1788-9

T/M 208/1 A Plan of South Hall Situate in the Parish of East Tilbury in the County of Essex belonging to the Wardens and Community of Rochester Bridge. Surveyed by George Sittingbourne, 1825

T/M 409/1 The Plott and Measurement of the Mannor of South Hall, Lying in the parish of East Tilbury in Essex. Parcell of the lands belonging to Rochester Bridge in Kent. 20/5/1594

T/M 528/2 A Map of South Hall in the Parish of East Tilbury in Essex, part of the lands belonging to Rochester Bridge. Surveyed in 1735 by C Sloane, showing the ruins of the blockhouse. [NB The original is held by the Rochester Bridge Trust under the reference E11/1/37]

T/M 528/3 A Map of the Manor of South hall alias East Tilbury in the Parish of East Tilbury in the County of Essex, belonging to the Wardens and Community of the New Bridge Rochester. Surveyed by H Hogben, undated, but thought to be 1796

T/M 528/6 A Map of lands in the Parishes of West Thurrock & Stifford… belonging to the New College of Cobham…in Kent as Accurately Surveyed in the Year 1731

Essex Assize 35/70/1 10th March 1628. "A footbridge in East Tilbury leading from 'the Blockhouse' to a place there called 'the low water marke', 1 June and until this inquisition, was broken and in great decay. Dame Margt. Southwell of London widow, and Tho. Walters of Gravesend, Kent, gent,. Should repair it."

Chapman and André *Map of Essex* drawn and delineated by John Chapman and Peter André, 1777

National Maritime Museum (NMM), Woolwich

GOM 218:8/26 MS "Plan of the Niewe Fortifications of Tilbury Fort" by Sir Bernard de Gomme, 29/3/166½, scale 1:600

8. PHOTOGRAPHS TAKEN DURING THE SURVEY

AA031291	Radar tower, view from north
AA031292	Radar tower, interior, view from upper floor from lower floor
AA031293	Radar tower, view from southwest
AA031294	Coalhouse Point, general view showing radar tower and jetty, view from southwest
AA031295	Radar tower, view from north
AA031296	Radar tower, view from north showing embanked tramway to right
AA031297	Wooden revetment on foreshore (? sluice), view from north
AA031298	Jetty revetment, view from northwest
AA046704	Remains of sea wall and revetment on foreshore. View from NE
AA046705	Remains of jetty. View from NW
AA046706	Remains of jetty. View from NW
AA046707	Worked stone on foreshore
AA046708	Sluice timbers and revetment. View from E
AA046709	Sluice timbers and revetment. View from E
AA046710	Section of salt maech. View from E
AA046711	Remains of Defence Electric Light. View from NW
AA046712	Remains of Defence Electric Light. View from NW

APPENDIX ONE

Extracts from a document held in the Essex Record Office (ERO: T/B 57/1-6)

One part, undated, but appears to be *c*1588 according to names which appear in other, dated, parts. No clear heading, but includes "*Essex*" and "*Maner de Southhall in Est Tylbery*" at top of page

Extracts:

"*There is excepted from the farm*(e)*r the ferry called est Tylbery ferrie, beinge indeede of very smale valewe, and also the grounde or soyle wheruppon the bulwarke or fortres called East Tylbery bulwarke is set and made*"

"*The said m*(ar)*she called Southhall m*(ar)*she doth adioyne uppon the Thames* [the] *sparr of Cxlii roddes* (162)*, of the w*(hi)*ch iiii*^{xx} (40) *roddes is on the west syde of the blockhouse there, and is not greatly in daunger for that the foreland beinge good, and of good breadeth, dothe sufficiently fence the same, and xxxvi* (36) *roddes is the plott and soyle wheruppon the said blockhouse…, and lyeth in great daunger the watter hath alreadie eaten the most p*(ar)*te of the bulwarke away, and so w*(i)*thout* [remendement] *in short tyme, lyke to indaunger the hole levell, and also iiij*^{xx} (40) *roddes therof is betweene the said bulwarke and the head of Mr Champion's m*(ar)*she, …east from the same bulwarke, and that must of necessitie from tyme to tyme be repayred, for that it lyeth openlye uppon the Thames, and the foreland not above vj* (6) *roddes and in most places one rodde in bredeth, and the* (crossed out) *resydue being xlvj* (66) *roddes* [lieth] [both] *against the said m*(ar)*she of Mr Champion and nevertheles this farmer hath hitherto ben charged therw*(i)*th and Mr Champion paying nothing thisto.*"

"*It is thought that the well repayringe of that p*(ar)*te of the wall w*(hi)*ch only is w*(i)*thin the compasse of the blockhouse will cost C*^{li} (£100)"

(Transcribed by Chris Hughes)

This is the only piece which mentions the blockhouse; several others refer to Rochester Bridge.

APPENDIX TWO

Georgian Chamber Pot found at East Tilbury, Thurrock Museum, Grays, Essex

Brought in to Thurrock Museum on 28th February 2003 – Finder R. Bingley & S.Flanders

The Chamber pot has a single Royal cipher and crown upon an oval escutcheon; white fabric, with blue glazed and incised foliate pattern around the bowl and with banding of blue above the foot and below rim. The escutcheon is applied and is surrounded by an incised, blue glaze petal decoration.

Collected as a series of sherds between 26-29 November 2002 by R. Bingley and S. Flanders from Thames foreshore mud at East Tilbury, TQ67 GPS 68958 76226 (Coalhouse site, west side of Radar Tower) and reconstructed by them. Donated to Thurrock Museum by R. Bingley and S. Flanders.

Note on site: Pottery scatter in mud here of very limited date-range, comprising ceramic types from c.1680s – later 18th century, of domestic sorts – pancheons, kitchenware, etc. (possible occupation). The chamber pot pieces were all grouped around a wooden stake at the upper limit of the mud, by the sand shoreline and were collected to a depth of about 9" deeper digging showed no farther evidence.

Donated to Thurrock Museum, Acc. No. 3706.

For further information: Jonathan Catton, Heritage & Museum Officer, Thurrock Museum, Orsett Road, Grays, Essex, RM17 5DX

www.thurrock.gov.uk/museum

Further information from David Higgins, Julie Edwards, David Gaimster and Jacqui Pearce seems to suggest that although the pot bears similarities to Westerwald stoneware it is probably a Staffordshire Scratch-Blue pot. Staffordshire Scratch-Blue is a white salt-glazed stoneware with cobalt blue decoration, often with applied crowned portraits or GR monograms of George III, although it should be noted that most pottery of this type is in tankard or jug form. It generally dates to the late 18th century (1765-95) (David Higgins, pers comm).

Coalhouse Point,
East Tilbury, Essex

key

- concrete
- brick
- sea wall (*in situ*)
- sea wall (tumbled)
- timber uprights
- timber revetment
- metal rods

scale 1:500

5688 50, 1763 40

5690 80, 1763 40

river wall

creek

bank

platform

tramway

siding

radar tower

revetment 1

revetment 2

revetment 3

revetment 4

sluice 1

sluice 2

jetty

1

2

3

4

5

6

7

8

0 50 100m

ENGLISH HERITAGE

5688 50, 1761 60

5690 80, 1761 60