# Tilbury Fort

Department of the Environment OFFICIAL GUIDEBOOK

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TILBURY is on the north bank of the Thames 25 miles downstream from London. The fort lies ½ mile south-east of the town and 400 yards east of the Tilbury–Gravesend Ferry.

There is a frequent train service from London (Fenchurch Street) to Tilbury Riverside, and there are also bus services from London (Aldgate), Romford and Brentwood. O.S. map no. 161: ref. TQ 651754.

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*The cover design is based on the trophies of arms carved on the upper part of the Water Gate* (1683)

Department of the Environment
Ancient Monuments and Historic Buildings

# Tilbury Fort

**ESSEX**

*by*

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LONDON: HER MAJESTY'S STATIONERY OFFICE
1960

*First published 1960*
*Fourth impression 1971*

SBN 11 670311 3

# Contents

# Summary

TILBURY FORT, as it stands today, was constructed in the last quarter of the seventeenth century, and replaced a smaller fort or blockhouse built during the reign of Henry VIII, later modified at the time of the Spanish Armada.

It was designed at a time when artillery had become the dominant weapon and was therefore low-lying and largely earthen to withstand the shock of bombardment. The heaviest guns were mounted along the river bank in order to protect the approaches to the Thames from hostile shipping. For its own defence from landward attack complicated outworks depending on a double line of moats were provided. This form of defence in depth based on the bastion system is extremely rare in this country and Tilbury presents the finest surviving example of it. The barracks, chapel and guard house, stores and magazines were placed inside the brick-revetted earth ramparts, and arranged round a central parade ground.

The fort was regularly garrisoned until after the first world war but it never saw the action for which it was built. It was used more and more as a depot and a storehouse. When the defences of the Thames estuary were being reorganized and new forts being built during the 1860s, however, an effort was made to bring Tilbury more up to date and extensive alterations were effected. More work on these new batteries was done in the early years of the present century.

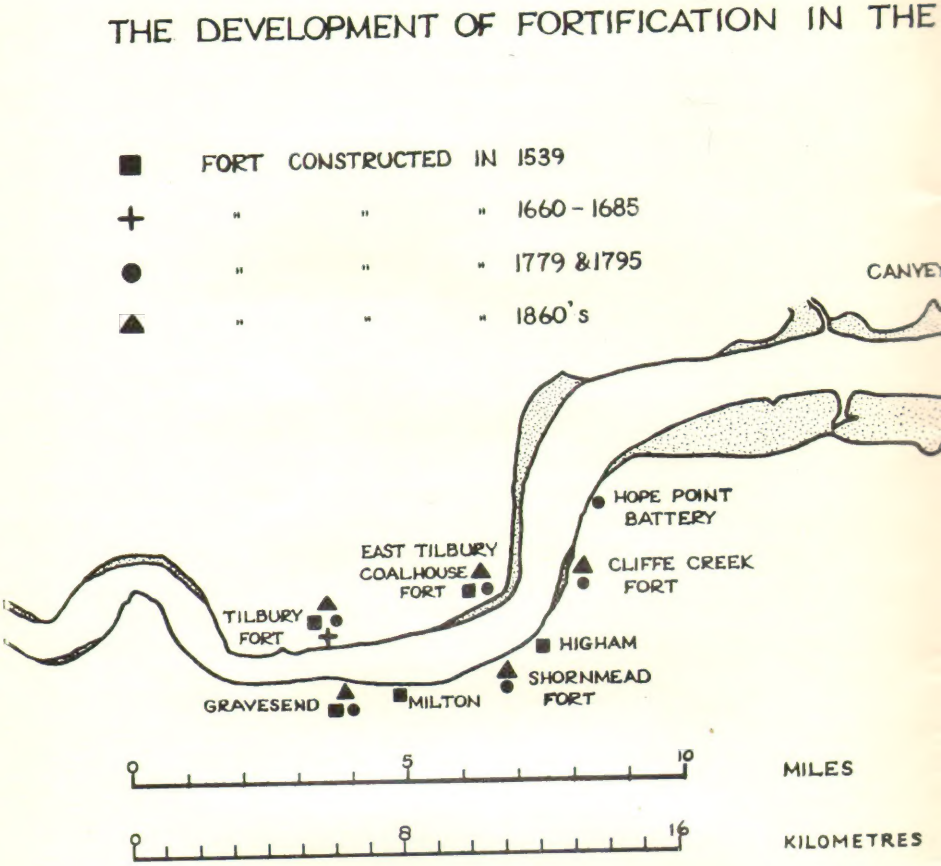
# Introduction

TILBURY FORT is the best preserved and in many ways the finest surviving example of late seventeenth-century military engineering in England. Its only rival is the Royal Citadel at Plymouth, which, while preserving much of its original character internally, retains virtually nothing of the extensive outworks—moats, ravelin and covered-way—which survive at Tilbury. The fort was designed by Sir Bernard de Gomme (1620–85), Charles II's Chief Engineer and Surveyor General of the Ordnance, and was comparable in scale and complexity with contemporary continental fortifications. The only major reconstruction, which occurred in the late 1860s, has left the overall plan substantially unaltered.

The fortifications are both offensive and defensive in purpose. The offensive strength is based on the riverside batteries or gun-lines on either side of the wharf and quay opposite the Water Gate. Here heavy guns could command the Thames at the point where its width is suddenly reduced to about eight hundred yards and, with the batteries at Gravesend opposite, could effect a crossfire which would deter hostile ships from approaching London or attacking the shipping lying up river. The brick-revetted, earthwork bastions at the angles of the fort, the intermediate curtain and the double moats, separated by an earthen covered-way, were provided for the defence of the fort and its garrison from flank or landward attack. The complicated outworks, each part covered by the guns of another, were designed to keep the enemy's batteries as far away from the fort as possible and to provide hazardous obstacles in the way of would-be attackers. The fort depended a great deal on its water defences: the water level in the moat was controlled by sluices and the adjacent marsh land could be inundated in an emergency.

The 'bastion system' of artillery fortification, of which Tilbury is an example, developed during the sixteenth century, reaching its climax in the late seventeenth and early eighteenth centuries. Its leading exponents, Vauban (1633–1707) in France and Coehorn (1641–1704) in the Low Countries, were rather younger contemporaries of de Gomme. In theory, the garrison retreated line by line, as each line of defence was forced, while the attackers were hampered by the concentrated fire which could be directed on the newly won breach. Each flank of a bastion covered the intervening curtain and one face of a neighbouring bastion, with the result that the enemy could be deterred from sapping the walls. In fact, no fort was ever invulnerable: at best a delaying action was fought, which held down a large number of the enemy in siege work while the field army reformed and counter-attacked. The 'bastion system', consequently, had its detractors during the eighteenth century, and before 1800 other defensive

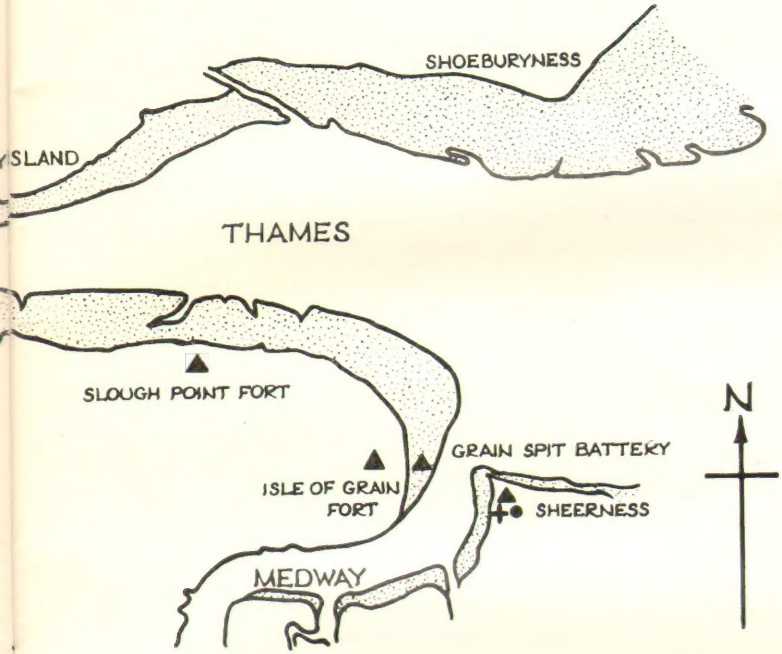
*Sketch map of forts in Thames estuary, sixteenth to nineteenth centuries*




systems had been established. When a thorough revision of the fortifications of the naval ports took place following the report of the Royal Commission on the Defence of the United Kingdom in 1860 the 'polygonal system' was in fashion. The chief feature of the new defences was the establishment of strong rings of detached and defensible batteries, usually with casemates, bomb-proof barracks and protecting ditches flanked by projecting *caponiers*.

Throughout the eighteenth and the first half of the nineteenth century Tilbury Fort and the batteries at Gravesend formed the first line of defence for the Thames and London. In 1795 forward batteries were established at Coalhouse Point, Hope Point and Shornmead. In the 1840s and 50s those at Coalhouse and Shornmead were replaced

THAMES ESTUARY




by earthen batteries for seventeen and thirteen guns respectively. Yet the Report of 1860 found all the existing defences insufficient. The Commissioners regarded the efficient defence of the Thames as an object of the most vital importance, involving 'interests of vast magnitude; including the security of the great powder magazine establishment at Purfleet, the important arsenal at Woolwich; 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'. Shortly afterwards large forts were constructed at Coalhouse, Shornmead and Cliffe Creek, and Slough Battery was built near the Isle of Grain in Kent to link the new defences of the Thames with those of the Medway. These

forts were strongly constructed casemated batteries with twenty or more guns in each. Their establishment meant that Tilbury had now been superseded as the first line of defence. It was recommended that the older forts of Tilbury and New Tavern at Gravesend (erected in 1779/80) be placed in a thoroughly efficient state, but their significance had diminished with their relegation to the second line, and the alterations made were not radical. It was this decline in its strategic importance, therefore, which made possible the survival of the old fort of Tilbury. If the improved range, calibre and accuracy of artillery had not necessitated a reconsideration of the siting of defences in the later nineteenth century, Tilbury would not today have retained the dominant features devised by de Gomme; instead it would have been difficult to distinguish it from the numerous forts that now encircle Plymouth and Portsmouth.

# History

THE first permanent fortifications at Tilbury were constructed in 1539, during the course of Henry VIII's national campaign of coastal defence. Temporary structures guarding the ferry at the important river crossing from Tilbury to Gravesend are known to have existed at various times in the fourteenth and fifteenth centuries, but the Henrician defences were more ambitious in purpose. To prevent enemy shipping advancing up the Thames, five blockhouses designed for artillery were built; they were sited at West and East Tilbury on the Essex bank and at Gravesend, Milton and Higham on the Kentish bank. None of these now survives, but their plan and elevation are known from later drawings: they were D-shaped, with the rounded side facing the river, and comprised two storeys. Details of the number and shape of gun-ports or of ancillary earthworks are not known. The building accounts for the blockhouse at West Tilbury, known at first as 'Thermitage Bullwark', indicate that its construction was largely of brick with ashlar dressings, although two hundred tons of chalk were bought, presumably for the foundations. The largest item was for the workmen's wages: £80 out of a total of £211 13s. 4d. The garrison when established consisted of nine men: the Captain, Francis Grant, was paid one shilling a day and his deputy eightpence, while the porter, two soldiers and four gunners were each paid sixpence.

This blockhouse survived in an altered form inside the later Tilbury fort until *c.*1867, and its foundations with some of the lower courses may still exist buried underneath later work. Nothing remains above ground, however, either of the original blockhouse or of the alterations made to the fort in the later sixteenth century. These were occasioned by the threat of invasion at the time of the Spanish Armada. As soon as news reached England that the Spanish fleet had at last left Corunna on 12th July 1588, levies were raised and a standing camp was set up at West Tilbury. It is possible to trace some of the earthworks of this encampment in the village. The choice of this site naturally focused attention on the nearby fort, and on the 23rd July the Earl of Leicester, commander of the Camp at Tilbury, wrote: 'I went often to this fort at Tylbury, which I find further out of order than the other [Gravesend], save that there be some better peces of artyllery but not a platforme to carry the least pece'. The next day he reported to the Privy Council: 'I have putt these forts in as good strength as tyme will permyt; but there must be plankes sent in all hast and workmen to make platforms'. The Armada was driven off at the end of July but the danger was by no means over. It was on the 8th August that Queen Elizabeth I paid her famous visit to the Camp in order to rally the troops. Only after the 17th August, when the

Duke of Parma withdrew from the coast of the Low Countries, where he had been waiting in the hope of joining the Spaniards in their invasion, was it felt safe to disband the levies and break up the camp. As the threat might recur the following year, work on the fort at Tilbury was continued and most of the important alterations were made during the autumn. They were carried out under the direction of the celebrated Italian engineer, Federigo Gianibelli, and Thomas Bedwell (*c.*1550–95). An outer ditch was dug and a counterscarp bank was raised. Two gates were renewed and a timber drawbridge was provided, as well as 1,500 fir poles for palisades. A boom across the river was constructed from ships' masts, chains and cables, which were fixed to anchored lighters, at a cost of £305 19s. 5d. The Henrician blockhouse was retained as the focal point and close to it, within the broad-ditched enclosure, were the barracks and stores.

During the first half of the seventeenth century the fort was kept garrisoned but its maintenance was apt to be neglected. Several surveys were made of its condition, but complaints and petitions from the captains of the fort to Parliament continued. In 1631 a detailed estimate of the repairs necessary was made, but in 1636 Captain John Talbot complained that, although the fort was in 'reasonable good repair', the outworks were so defective that high tides overflowed into the fort. There was such a shortage of fresh water that it had to be fetched from the high ground to the north or by boat from Gravesend. The adjacent ferry, further east than the present one, was also a great inconvenience since it allowed all kinds of people and even cattle to stray within the fort.

Tilbury was not greatly involved in the Civil War. It was controlled by the City militia as a Parliamentary outpost in the defence of London. In 1649 the Council of State ordered that no ship should pass the fort without giving to the commanding officer a list of the crew and guaranteeing that they would not act against Parliament. Two years later its garrison consisted of a governor, a lieutenant, an ensign, four corporals, one drummer, a master gunner, sixteen matrosses and forty-four soldiers.

With the Restoration, Charles II began a complete re-organization of the national defences and a costly building programme was undertaken on a scale comparable to that of Henry VIII's time more than a century before. The King's interest in fortifications was undoubtedly influenced by what he had seen when in exile in the Low Countries where regular, permanent fortifications were common. In this programme he was well served by Sir Bernard de Gomme, a Dutchman, who had spent his youth in the campaigns of Frederick Henry, Prince of Orange, and had later accompanied Prince Rupert to England.

He had served with great ability in the Royalist army as an engineer and with its collapse had gone with the court into exile. In 1661 as His Majesty's Chief Engineer he was already surveying Tilbury Fort, and in the following year he produced a plan of it with a preliminary sketch plan of a more powerful, up-to-date fort superimposed. De Gomme was more actively employed at Dunkirk, Portsmouth and Plymouth and it was not until after the highly successful Dutch raid up the Thames and Medway in 1667 that definite plans were made for a more adequate defence at Tilbury. The next year de Gomme submitted to Charles II two plans, together with estimates of cost, for a new fort at Tilbury. In accordance with the then customary geometrical character of fortification, one was based on a pentagon, the other on a parallelogram. In 1760 another plan (*see page* 12) was submitted and approved. It was based on a regular pentagon, and with certain exceptions, closely approximates to the plan of the fort today.

Work began in the last quarter of 1670 and the King paid a visit in the following summer. Almost from the first large numbers of workmen were pressed into service. They came from all the neighbouring villages in Kent, as well as Essex, and from places as far distant as Barking and Sittingbourne. On 19th April 1671, the names of 246 men are recorded in one impressment. Other labour, particularly skilled men, such as carpenters and watermen, was supplied by local contractors. The total number of men employed during 1671 varied from 158 to 265; they were supervised by five or seven 'officers', who acted as overseers and surveyors, a storekeeper, a tallyman and a 'clerk of the cheques'. The overall supervision was undertaken by Sir Bernard de Gomme himself. Bills of payment were countersigned by him, quite trivial accounts were occasionally written in his own hand, while at the same time he was supervising similar works in several other places and attending to his duties as one of the principal officers of the Ordnance. The actual work at Tilbury involved the removal of the ferry house westwards to the site now occupied by the 'The World's End' public house, levelling the ramparts and filling the ditch of the Elizabethan fort, cutting the two moats, throwing up the new ramparts and raising the general level of the ground within to prevent flooding. Also the main bastions and curtains were to be revetted in brick and these, together with all the buildings inside, were to have their foundations piled. Piles were essential for this marshy site. When, in 1672, de Gomme was asked to supply some from his stores for another site, he replied that to do so would entail a stoppage of the work at Tilbury; two to three thousand piles were needed there immediately besides those in stock, and he had sent three ships to Norway for them.

*Sir Bernard de Gomme's plan for Tilbury Fort, dated 24 October 1670 (B.M., Add. Mss. 16370/5)*

By 1676 the fort had taken shape but there was still a great deal to be done. The buildings within were sufficient to house a considerable garrison but the fort was far from being in a satisfactory state of defence. The earthen ramparts were not much more than half completed, and for long stretches the pile and frame foundations for the brick revetting wall had not even been started. The interior level still required raising with chalk, rubbish and clay dug from the surrounding marshes. The gates were unfinished, as well as much of the palisading, while nothing had been done towards constructing the ravelin and the powder houses.

It was evident that too much was being attempted at too many places and a warrant was issued to Sir Thomas Chichely, Master General of the Ordnance, ordering that commissioners be appointed to contract with all suitable persons for the speedy provision of materials and carriage on the fortifications already begun at Ports-

mouth, Plymouth, Tilbury, Sheerness, Cockham Wood, Gillingham and Holy Island. Accordingly at Tilbury an agreement for the completion of the work was made between the officers of the Ordnance and Sir William Pritchard, an Alderman of the City of London, who had in 1672 and 1675 contracted to supply timber, laths, deals, tiles, bricks, lime and sand. Sir Bernard de Gomme still maintained general supervision and drew up the contracts, but he seems to have been less concerned with the day-to-day management. The fort was already armed by 1680, but in a survey of its condition de Gomme found much to be done: in the next year he prepared an estimate for over £14,500 for its completion. Another agreement was made with Sir William Pritchard to complete the brickwork and parts of the two gates, also for the provision of palisades and sentry boxes at the salients of the bastions. Agreements were made with small contractors mainly for carpentry and the carriage of earth and chalk, work chiefly concerning the covered-way between the moats. By 1683 work had virtually finished on the façades of the Water and Landport Gates, a powder tower had been constructed in the East Bastion and the old sixteenth-century blockhouse had been raised and converted into a magazine and store.

The fort was entered from the north. Leaving the road from West Tilbury the visitor passed a two-storeyed, machicolated redoubt, triangular in plan, with the upper floor in timber. He then crossed the outer moat into the covered-way, turned a right angle to go over the bridge into the ravelin in the inner moat and finally crossed a bridge provided with two drawbridges to the Landport Gate. Throughout this approach the visitor could be covered and flanked by cannon and small arms in the covered way, ravelin and bastions. The Water Gate, as its name implies, was the entrance from the river near the wharf and quay. The approaches along the riverside on the east and west were blocked by palisades. Another redoubt guarded the western end of the gun lines. Inside, only the guardhouse and chapel of the present buildings were in existence. Much of the barracks and store accommodation must have been of a temporary nature. At the salients of each bastion were sentry boxes, looking like pepper pots, of the design de Gomme had used at Plymouth. The most notable departure from the original plan was the absence of the fifth bastion of the pentagon, the Water Bastion. In 1676 a decision to include it in the contract was postponed and by 1681 it was omitted altogether, whether as an economy measure or because of the structural difficulties involved is not clear. Similarly the provision of an earthen *fausse-braye* before the east and west curtains was dispensed with and palisading along the wide berm substituted. It is probably impossible to assess

the total cost of the work, which was spread, without a break, over more than thirteen years, but it is certain that it far exceeded the £47,000 which de Gomme originally estimated. John Evelyn described it as a 'Royall work indeede' and for a time it was intended to make Tilbury the central artillery arsenal until Woolwich was found to be more suitable. However, a contemporary note of criticism from Lord Dartmouth, who held the office of Master General of the Ordnance, was recorded by Pepys. In his opinion it would have been better to have sited the new fort at a point approximately where Coalhouse Fort now stands. It would then have provided a greater obstacle to ships tacking up-river.

Sir Bernard de Gomme died in 1685 and his post as Chief Engineer was filled by Sir Martin Beckman. Probably about two years later the northern redoubt was enclosed by a redan which gave additional strength to the main entrance. Beckman also examined the condition of the ravelin. Some repairs were necessary elsewhere and in 1694 the engineers reported that 'the platforms are so rotten that a gun cannot be fired but the carriage sinks into the ground and throws the shot up into the air, so that a ship may very easily go by'. The wooden platforms were replaced by stone and the gun-lines soon took much the same form as they have today. In 1715 there were thirty-one demi-cannon and one culverin in the east line and seventeen demi-cannon and twenty-six culverin in the west.

During the eighteenth century alterations and additions were made to the existing structures but the fort's building history was generally uneventful. The large powder magazines on either side of the Landport Gate, calculated to hold 3,600 barrels each, were built in 1716. The soldiers' and officers' barracks were reconstructed and then enlarged in 1772. The now vanished sutler's or master gunner's house, the storehouse and the store-keeper's house were all in existence before 1725. In 1788 an engineer, Thomas Hyde Page, wrote a report on the state of the fortifications in the Medway Division and dealt at some length with Tilbury. He clearly saw the chief military weakness: because of the omission of the Water Bastion, the southern side fronting the river was virtually open and unprotected. He doubted whether it was worth the expense of constructing the bastion as first planned, but recommended that the gap should be filled with earthwork. This does not seem to have been carried out, but his other main suggestion, to remodel the south-east corner of the covered-way by constructing a battery giving a good field of fire down-stream, was completed. Work was also done at New Tavern Fort across the river. Gravesend became the headquarters for the Division and it became increasingly evident that the senior officers preferred to live close to

the amenities of the town, rather than at the more powerful but less inviting fort of Tilbury. There was still a shortage of fresh water and the garrison depended on rain water which was collected in cisterns. In addition there were all the disadvantages of a marshy site. Early in the nineteenth century the barracks were chiefly occupied by recruits who after examination were sent to the grand depot in the Isle of Wight. The recruits were locked in their rooms at night to prevent desertion. The garrison itself varied greatly in numbers as it did in composition. In 1818 a detachment from Chatham, fifty strong under a lieutenant, mounted guard and six invalid artillery men under the command of a master gunner looked after the ordnance. Entries in the parish burial and baptism registers of Chadwell St. Mary and West Tilbury indicate men from many regiments. Baptisms are known to have taken place in the fort's chapel and there was a chaplain appointed as early as 1690. There was accommodation for about fifteen officers and 150 N.C.O.s and privates in 1830. The governor was paid a salary of £300 per annum to which were added the valuable rents of the sutler's and ferry houses.

As the strength of the garrison varied so did the weight of the armament. In 1716 there were 161 guns of which ninety-two were declared unserviceable and the effective strength was reduced to sixty pieces. Eight years later Daniel Defoe estimated that there were up to one hundred guns 'generally all of them carrying from twenty-four to forty-six pound ball, a battery so terrible as well imports the consequence of the place. Besides which there are smaller pieces planted between them and the bastions and curtains also are planted with guns so that they must be bold fellows who will venture in the biggest ships the world has heard of to pass such a battery'. From 1793–1815 fourteen 42-pounders were mounted in the east gun line and fourteen 32-pounders in the west: six 32-pounders were in the later battery on the covered-way and there were up to thirty-five 9-pounders mounted in various parts of the bastions and curtains.

Alterations in the barrack accommodation continued to be made; in 1809 a range consisting of kitchen, mess room and hospital was built on the west curtain rampart behind the soldiers' barracks. But the greatest change in the character of the fort followed upon the 1860 *Royal Commission's Report on Defence*. After the reconstruction of Shornmead, Coalhouse Point and Cliffe Creek Forts the remodelling of Tilbury and New Tavern Forts was begun in 1868. The work took three or more years and was in the charge of Captain Charles Gordon (1833–85), later better known for his defence of Khartoum, but then Commanding Royal Engineer at Gravesend under Lt.-Col. Jervois, the Deputy Director of Fortifications. The main emphasis

*Map to illustrate lines of fire between Tilbury and Gravesend as proposed by Thomas Hyde Page in 1778 (B.M., King's Library, Book of Drawings)*


TILBURY
FORT

of the armament switched from the gun-lines to the north-east, east, and west bastions and the south-east curtain, where heavy batteries for nine-inch guns were created on the earlier rampart with magazines below, and separate powder magazines. Shortly before the 1914–18 war further alterations were made to the south-eastern battery in order to mount improved weapons.

Perhaps because of its strength Tilbury Fort has never been involved in the kind of action for which it was designed. Indeed its sole military success was during the 1914–18 war when anti-aircraft guns on the parade shot down a German Zeppelin. Its history, however, has not been entirely without alarms and incidents. In 1690, an Edward Laurence claimed that he was instrumental in saving the forts of Tilbury and Gravesend from an attack by 700 Irishmen, presumably soldiers. A few years later there was a mutiny at the fort. In the eighteenth century, bloodshed took place there after a dispute at a cricket match; this episode was described in a letter in the *Ipswich Journal* of 2nd November 1776. The match was a county match between Kent and Essex; feeling ran high and a fight broke out. Thereupon the Kentish men ran to the guardroom and, seizing a gun, killed one of the Essex men. There were only four soldiers on duty and they were unable to restrain the cricketers, who armed themselves with guns. An elderly Invalid was bayoneted and the sergeant, who was commanding the fort in the absence of the officer, was shot dead trying to quell them. At this point the players panicked: the Essex men ran off over the drawbridge and the Kentish men retreated across the river.

During the invasion scare of 1803 the Royal Trinity House Volunteer Artillery manned ten armed hulks moored across the Thames from Tilbury to Gravesend, but for the greater part of the nineteenth century the fort served as a depot and powder magazine. The fort was the Headquarters of the Thames District Establishment from 1894 until 1904 and continued to be garrisoned into the 1920s. At the beginning of the second world war it again played a part in the outer defences of London when the Gun Operations Room controlling the anti-aircraft defences of the Thames and Medway (North) Gun Zone was established in the chapel until moved to a specially designed building at Vange in the middle of 1940.

In 1950 the War Department placed it in the care of the Ministry of Works (now the Department of the Environment) for conservation and display as a national monument.

# Description

## River Front

THE visitor to Tilbury usually approaches the fort along the river front, from the west end of the gun-lines past 'The World's End' public house, formerly the ferry house as rebuilt in 1788. The long, low weather-boarded building at right angles to it and the river was the baggage store during the early nineteenth century, where troops crossing the Thames could leave their equipment. Alongside the river are the much silted remains of twelve of the fourteen brick-revetted gun positions of the West Line which formed, with the East Line, the main batteries for the defence of the Thames. The square gun-platforms were set diamond-fashion to the riverside and still retain their early eighteenth-century plan, although they were renewed towards the end of that century or perhaps a little later. The East Line has been eroded away except for one platform. Early in the eighteenth century at the salients of the east and west bastions, just inside the inner moat, were earthen traverses, protecting the gun lines from enfilade fire. Behind each line are the remains of artillery store buildings, which were probably built in the 1840s. That behind the West Line is now masked by public conveniences built against it; the other is in ruins. Like the adjacent but now destroyed magazines, the buildings were of concrete, lined with brick, and had an arched roof covered with asphalt. In front of the Water Gate are the quay and causeway which served it. Stores and munitions were more easily conveyed by water and these features were part of Sir Bernard de Gomme's final design. His earlier schemes provided for a small harbour within the fort's walls. Further to the east are remains of the powder-bridge which served the re-modelled Henrician blockhouse after it was turned into a store. At low water the close-set piles and framing which were provided for the foundations of the uncompleted Water Bastion can still be seen. Most of the piles are more than a foot in diameter.

## OUTWORKS

Originally the fort was entered from the north into a roughly triangular-shaped *redan* which has now lost most of its features except its plan and some of its rampiring. It was here that de Gomme constructed a redoubt, similar to that at the west end of the gun-lines, to defend the entrance from the road. The *covered-way* between the moats is reached by a causeway and its trace along the north side of the fort is very complicated. Spurs flanked the approaches to the fort, and opposite the salients of the north-east and north-west bastions they took the form of a star trace, a development of the *tenaille* trace

*The fort from the air, 1957*

which appeared on the original plan. This provided additional fire power in front of the weakest point in the 'bastion system'. The plan retains its late seventeenth-century form and, particularly on the north-east, the profile of the rampart, *banquette* and pathway are well preserved. On the west and east sides are larger spurs, which provided assembly points, 'places of arms', for the troops defending the covered way. The spurs and the 'places of arms' were originally equipped with platforms for cannon but most of their fire power was provided by musketry. In 1779 alterations were made in the trace in the south-eastern portion of the covered way to obtain a greater field of fire down-river and these can still be seen with their internal revetment of now much decayed brickwork. They formed the later Six Gun Battery.

The *ravelin*, the quadrangular island in the inner moat, which acted

as a strong-point opposite the main entrance, had an important role in the defence of the fort. It blocked the Landport Gate from direct shot and its guns could be turned on any breach in the northern part of the covered-way. In addition, it acted as a check point for those entering the fort. It was linked with the covered-way and the berm opposite the Landport Gate by timber bridges; that to the gate included two drawbridges. A brick-lined passage remains on the west, replacing earlier lines of palisades, and there are remains of high earthen ramparts with traces of the *banquette* and ramp.

The *inner moat* has a shallow V-shaped profile with a *cunette*. At first only the berm outside the brick-revetted ramparts was protected by piling. The berm on the east side was widened in the 1860s to allow for the earth banked against the walls. The outer side of the moat remained unpiled until after 1742. As a result, the proportions of the moat have become altered by erosion and there are at least two subsequent lines of campshedding. The inner and outer moats are connected by a sluice east of the ravelin. Another sluice controls the level of water in the moats and connects the south-eastern corner of the inner moat with the river. It was complemented soon after its construction by a sluice at the south-western corner of the outer moat. The sluices were vital to the defence of the place for, besides their obvious advantage for the cleaning of the moats, experience in the Low Countries had shown that heavy winter frosts made moats an asset to the attackers instead of an obstacle, so that means of emptying the moats in such conditions were essential.

## INTERIOR

### Landport Gate

Opposite the Landport Gate is a re-entrant cut into the berm for the bridge abutment with at one side the outlet of the main drain. This is of brick, barrel-vaulted construction and ran around the perimeter of the Parade behind the soldiers' and officers' barracks. The gate is simple with an elliptical arch, plain keystone and imposts, all in fine Portland ashlar. It rises perpendicularly in front of the battered brick revetment. The gate itself is in two panelled leaves with ovolo mouldings and has a wicket in the eastern leaf. The tympanum is also panelled. Below the parapet and *banquette* of the rampart the gateway is barrel-vaulted in brick. The internal arch has moulded ashlar jambs and the remains of a rubbed-brick moulding. The flanking walls on either side of the passage were added in the early nineteenth century. The gatehouse, or Dead House as it is sometimes called for no clear reason, is a rectangular room over the gate passage. It is approached

*The Water Gate in the late nIneteenth century*

from the north-west bastion along the north curtain. It has a pyramidal tile roof and two square, unglazed windows, each with a pair of wooden shutters. A feature of interest are some rough paintings on the fragmentary wall plaster. One shows the head and shoulders of a man in seventeenth-century dress, smoking a clay pipe, with a full tankard in his other hand. Also outlined in red paint is an eagle-like bird.

## Water Gate

The entrance today is through the fine, monumental Water Gate. This impressive architectural feature is common in fortifications of this date in England as well as on the Continent. Slightly earlier and more ornate is the gate of Plymouth Citadel, and a little later and much plainer are the surviving gates at Portsmouth. The gatehouse faces south and has an ashlar façade in two storeys. The lower storey has a wide central bay containing a gate arch with elliptical head and carved trophies of arms in the spandrels, between narrower flanking bays defined by pairs of Ionic columns; over the arch, the bowed frieze breaks forward into a die bearing the inscription 'CAROLUS II REX AO. REG. XXXIV'. The upper storey corresponds in width to the central bay and has a coved niche, probably for a statue of Charles II, between Corinthian columns on pedestals, sporting a segmental pediment with an achievement of the Stuart Royal Arms in high relief. This storey is flanked by ramped trophies of cannon and contemporary munitions of war, weapons and classical armour, which mask the pitch of the roof behind.* The gate itself is of two panelled leaves with a wicket in the east leaf. The inner arch is of rubbed brick with panelled spandrels and plain Portland ashlar jambs and imposts. The gatehouse over the passage is now entered at first-floor level by an external stair against the east wall. This must have been the original arrangement, but, as can be seen by a roof line on this wall, the building was later entered through the sutler's house which was built against it. The gable of this latter structure, which was in existence during the early part of the eighteenth century, also made it necessary to move the window south of the door. Its original position can be seen in the blocked outline with segmental head. The first-floor room is large with another window on the north side. On either side of the fireplace, which retains early pink coloured plastering, are two recesses. That to the west is a blocked doorway into a later building, one of a number which were built at various

*A detailed architectural description of the Water Gate can be found in the Royal Commission on Historical Monuments' volume on South East Essex, p. 70.

times against the west wall. A later fireplace opposite, beside the door, contains a Victorian grate issued by the Board of Ordnance; its flue joined the chimney of the now destroyed sutler's house. A wooden stair leads to the second floor, which is lit by a dormer window on the east and a small window on the north: like the other window fittings in the gatehouse, these are modern. The recess in the south wall once held a commemorative plaque recording the inspection of troops by Queen Elizabeth I nearby. The wooden fireplace surround is of elaborate but poor design and portions of it are now missing. It probably dates from the late eighteenth century. The clock is not an original feature.

### Guardroom and Chapel

Just west of the gate is the Guardroom with the Chapel above it. It is built of brick with rubbed dressings and the hipped tile roof has a modillion cornice. The ground-floor doors and windows have segmental heads with false key-stones, while the windows of the chapel are tall with round-arched heads. This building seems to have been completed by the end of the seventeenth century, and the handsome lead down-pipes dated 1715 must have been added later. The main entrance to the guardroom is on the east, facing the gate. To the left of the passage is a cell, large and securely barred with a spy-hole in the door. Above the door to the guardroom itself are a row of hooks to carry a curtain rail. The room is large with a wide fireplace, but has only one window on the north. The ceiling beams are stop-chamfered. There is a smaller room at the back with its own entrance; it contains a fireplace with a small Board of Ordnance issue grate. The chapel is entered at first-floor level from over the store buildings erected against the curtain wall; there has never been a means of access between the two floors. A small vestry on the left of the entrance passage has a small iron grate in the fireplace bearing the Board of Ordnance coat of arms. The chapel itself now retains none of its fittings. It is well lit by windows in the north and east walls. The walls have a plain, coloured wooden dado. A ventilating shaft in the corner behind the door connects the guardroom below with the roof space.

### Officers' Barracks

On the east side of the parade is the fine terrace of houses which comprised the officers' barracks. A row of houses has existed on this site since the end of the seventeenth century but there have been a

number of alterations and rebuildings. The ground plan has probably remained the same but in about 1742 the block, significantly named the 'New Barracks', had a single gable at each end with dormer windows lighting the upper floor, as opposed to the present elevation with its hipped valley roof; the existing block probably dates from about 1772 but more work was done early in the nineteenth century. The row is divided, structurally, into eleven bays, subdivided again longitudinally to give two fireplaces on each floor in each bay making possibly a double row of houses, back to back. Today the row contains seven separate houses. Externally the doorways have wooden canopies supported on brackets, except for the central doorway which is round-headed with an ashlar keystone and pediment. There are two small lights on either side and a circular window above. The windows are all square-headed; those on the first floor show that considerable freedom was allowed the officers occupying the houses in the matter of structural alterations. Originally the upper windows were small and square with thick glazing bars but in some houses these have been enlarged to produce the same proportions as the windows on the ground floor. Such alterations were also made at the back, which originally was treated in almost the same manner as the front with canopies over the doors. As fewer and fewer officers occupied more and more rooms during the early nineteenth century, the space at the back of the block was enclosed to provide gardens with individual brick privies, which replaced the communal 'bog-house' which had existed on the south of the block. In 1812 a stable for the commandant's horses, with three stalls and a loft above, was built at an angle to the northern end of the block and later still additions were made at the south end. In the early nineteeth century the Fort Major occupied the southernmost house with the Barrack Master next door. Three of the houses are inhabited at the present, but none is yet open to the public. Internally they are not of great interest, being very similar to the mass of surviving eighteenth-century terrace houses. They have been much altered to suit their occupants' tastes but some are panelled in the same way as the chapel and retain other early fittings.

### Powder magazines

The remaining buildings flanking the parade are the two powder magazines on either side of the passage from the Landport Gate. They were built in 1716 but were greatly altered later. At first they were not subdivided but measured 106 ft long by 25 ft wide internally with a pointed vault under a pitched timber and lead-covered roof.

By 1746 they had been divided longitudinally by piers supporting two barrel vaults still within a pitched roof. The magazines probably took their present shape with brick cross walls and flat-domed roofs during the reconstruction of the late 1860s. The purpose of the magazines is everywhere revealed by the precautions taken to avoid accidental ignition of the gunpowder. Each has two doors on the south side covered with copper sheeting. The north and the west walls had ventilation slits, two to each external opening and arranged to deny direct access. The south and partly the west and east walls had windows, more intricate than those existing at present. Some of the windows have been altered by the insertion of ventilation slits and those in the gables have been blocked with brick. The heavy wooden board floor with its wooden pegs is carried by arches to reduce the chance of damp rising and spoiling the powder. Externally the magazines keep much of their early eighteenth-century character. The buttresses have moulded ashlar plinths and early brickwork but have lost their ball finials. The openings have rubbed brick dressings as well as the string course. The recessed panels above the string on the south side were rebuilt in the nineteenth century. By 1746 blast walls had been built on three sides of the magazines with gates opposite the doors. Later the error of this was recognized, the gates were blocked with brick and new ones cut to provide a staggered entrance and so prevent the possibility of a chance shot entering a magazine through the gate and door. The passage from the Landport Gate was lined with brick walls also enclosing the ends of the magazines and in the 1860s the west end of the blast wall was rebuilt with a rounded corner.

## Parade

The parade has an area of two and a half acres, and was made up with clay, gravel and chalk to a depth of about two and a half feet over the pre-existing marsh. It was finished with a rough stone paving which is being restored. In the middle of the nineteenth century the level was again raised by about one foot with a layer of chalk and dirt which was afterwards grassed. Towards the end of the century a light, narrow-gauge railway was laid out at this higher level to aid the transport of ammunition and stores. Lengths of track can be seen on the quay, near the powder magazines, the modern gateway in the curtain wall east of the Water Gate and elsewhere. Towards the end of the nineteenth and early in the present century large steel and concrete store buildings were erected but have since been demolished. Prominent on the parade are the remains of three pumps in Doric

style with flat tops dating from the middle of the nineteenth century and replacing older pumps.

The numerous early plans of the fort make it possible to visualize the other buildings ranged around the parade which have not survived. Balancing the officers' block on the opposite side was the soldiers' barracks, also a two-storeyed building originating in the late seventeenth century. It was demolished after being severely damaged by bombing in the 1939–45 war. A similar fate overtook the kitchen, mess room and hospital, all built in 1809 behind the soldiers' barracks in the rampart of the west curtain. The most serious loss is, of course, that of the Henrician blockhouse, which at the time of its destruction was used as a powder magazine and shifting-house. North-east of the blockhouse near the site of the present modern workshop was a large storehouse, originally of three floors, and a separate store-keeper's house, also of three floors. Both were built early in the eighteenth century, but by the early nineteenth century the store-keeper's house had been removed and the storehouse rebuilt. Behind it against the curtain were smaller store buildings and nearby a small sally port giving access under the rampart to the east gun line. Within the east bastion was a small powder magazine built by de Gomme. In the middle of the eighteenth century it was used as a prison but was demolished in the following century and replaced by another magazine. Against the Water Gate was the sutler's house, which normally served the garrison as a canteen but for a time became the master gunner's house. In the early nineteenth century on the west side of the gate in the gap between the chapel and the curtain were the barrack stores, bricklayers' toolshop and carpenters' workshop.

Within the body of the fort were its means of defence, the brick-revetted ramparts on which artillery could be mounted. The bastions at four angles were designed to be mutually supporting besides covering a large area of ground in front of them. A large part of the original brickwork of the bastions and curtains survives, but they have been heavily patched with later stock-bricks and the parapets have been almost entirely renewed. The curtain east of the Water Gate and the salient of the west bastion are built on arched counter forts. The cordon in Portland stone separates the wall from the parapet and is largely original. The three blocked embrasures in the southern and eastern flanks of the north-west bastion and others in the west and north-east bastions probably belong to the early eighteenth century. The original profiles of the ramparts with their *banquettes*, *terre-pleins* and ramps for the movement of artillery and the supply of ammunition have all been lost. From the evidence of old plans and drawings an attempt is being made to reform the west curtain and the north-

west bastion to an approximation of their early eighteenth-century form. This was slightly different from the rampiring designed by de Gomme in the positioning of the ramps, which were then on either side of the Landport Gate instead of in the salients of the north-east and north-west bastions and in the east and west curtains.

## NINETEENTH-CENTURY RECONSTRUCTION

The reconstruction of 1868 did not greatly alter the north-east and west bastions, although embrasures and platforms for respectively three and two heavy guns, later nine-inch, twelve-ton rifled muzzle loaders, were built on the ramparts of the eastern flanks covering the river. The pivots and racers for the traversing platforms survive. Beside each gun position was a small expense magazine in brick with a vaulted roof, containing the lift shaft from cartridge and shell magazines below (where the powder and shot were put together) and the ventilators for the magazines. Somewhat later the lift shafts were blocked by the insertion of pipes for additional ventilation. In the magazine below, small chambers corresponding to the shelters beside the guns led off a passage. A separate passage gave access for lighting, the lamps being placed behind plate glass windows so that no naked flame penetrated within the magazine. Although the way is now blocked, these magazines were originally connected underground, with the detached main magazine within the bastions. This consisted of two large rooms, one of which had stone corbels to support racks. This magazine had its own entrance and again a separate lighting passage, serving the rooms and the other passage. These arrangements, although on a somewhat smaller scale, apply to the west bastion except that one emplacement has been roofed over and converted into a store. The brick revetted walls were reinforced externally by buttresses and banks of earth, wherever there was danger of shot penetrating to the magazines. Both these bastions have positions for 10-inch smooth bore howitzers mounted in the northern flank and face to cover the landward approach.

The east bastion and south-east curtain were almost entirely remodelled in a similar manner, with magazines below the gun positions. There were five embrasures in the curtain and three in the bastion. The six cartridge and shell magazines differ from those elsewhere in the fort in that their main magazine is adjacent. The eastern end of the long passage which services them leads into the east bastion, which contains a rectangular vaulted chamber, apparently, from its position and dimensions, a replacement in 1860–61 of de

Gomme's powder magazine. It is surrounded by a lighting passage and later was brought into the 1868 system.

The 1868 gun positions themselves are now masked by later emplacements, built a few years before the 1914–18 war. Along the curtain, which was realigned to give a better field of fire and was further strengthened with earth, are four concrete emplacements let into the earlier embrasures; they are designed for breech-loading guns, firing over a low concrete apron, and therefore with a wide arc of fire. Lockers for shells are placed about the position. The bastion, however, contains two concrete emplacements for heavier guns, probably naval six-inch. The positions are very like those in the curtain but on a larger scale and with the added feature that the magazine below was provided with mechanical hoists to keep the guns served with shells: these still survive.

# Glossary

| | |
|---|---|
| ASHLAR | Square block(s) of stone. |
| BASTION | Projection from the general outline of a fortress from which the garrison can see, and defend by flanking fire, the ground before the ramparts. |
| BANQUETTE | Firing step along the interior of the parapet. |
| BLOCKHOUSE | Small fortified barrack. |
| BULWARK | Bastion or (in first half of sixteenth century) a block-house. |
| CAMPSHEDDING | Facing of piles and boarding along a bank. |
| CAPONIER | Covered passage within a ditch of a fort either for sheltering communication with the outworks or for providing flanking fire in the ditch. |
| CASEMATE | Bomb-proof vault providing an emplacement for a gun. |
| CORDON | Coping of a scarp wall below the parapet. |
| COUNTERSCARP | Outer side of ditch. |
| COVERED-WAY | Protected communication all round the works of a fortress on the outer edge of a ditch, covered by earth-work from enemy fire. |
| CROWNWORK | Large kind of advanced work. Consists of a bastion, two curtains and two half bastions. |
| CULVERIN | Artillery piece with a calibre of about five and a half inches. |
| CUNETTE | Trench in the bottom of a ditch. |
| CURTAIN | Portion of the rampart which connects two adjacent bastions. |
| DEMI-CULVERIN | Artillery piece with calibre of about four and a half inches. |
| DORMER | Upright window in a sloping roof. |
| DRAWBRIDGE | Wooden bridge which can be raised towards a gate-way by means of chains or ropes attached to its outer end. |
| ENCEINTE | Main line of bastions and curtains as distinguished from outworks. |
| ENFILADE FIRE | Fire of musketry or artillery which sweeps a line of works from end to end in the direction of its length. |
| FACE | Two sides of a bastion which meet in an angle projecting towards the field. |
| FAUSSE-BRAYE | Secondary enceinte, exterior and parallel to the main rampart and considerably below its level. |
| FLANK | Part of a fort constructed at an angle to the general line in order to command the ground before the latter by side or flanking fire. |

| | |
|---|---|
| GLACIS | Parapet of the covered-way extended in a long slope to meet the natural surface of the ground. |
| GORGE | Rear, whether opened or closed, of any work. |
| IMPOST | Member at the springing of an arch on which the arch rests. |
| INVALID | Soldier either too old or not physically fit for active service but capable of garrison duty. |
| KEYSTONE | Middle stone in an arch. |
| MACHICOLATION | Openings between supporting corbels for directing missiles on to attackers below. |
| MATROSS | Gunner's assistant or mate. |
| OVOLO | Classical moulding forming a quarter round in section. |
| OUTWORKS | All the works constructed beyond the body of the place, such as ravelins, covered-ways, etc. |
| PALISADE | Palings of strong timber. |
| PARADE | Ground on which regular musters and exercises are held. |
| PARAPET | Screen on the terre-plein covering troops and guns from the enemy's observation and fire. |
| PEDIMENT | Low pitched gable used in Classical and Renaissance architecture above a portico, doors, windows, niches, etc. |
| PLACES OF ARMS | Assembly point at the re-entering angles of the covered-way to enable the formation of troops for a sortie or for the defence of the outworks. |
| PLATFORM | Floor on which cannon in battery are placed. |
| POWDERBRIDGE | Quay or jetty for the use of boats supplying munitions. |
| RAMP | Inclined plane to facilitate ascent. |
| RAMPART | Mass of excavated earth on which the troops and guns of the garrison are elevated. |
| RAMPIRING | Rampart. |
| RAVELIN | Fortified island in the moat in front of a curtain. |
| REDAN | Outwork consisting of two faces forming a salient angle. |
| REDOUBT | Small enclosed work without flank defence from its own parapet. |
| SALIENT | Angle projecting towards the country |
| SALLY PORT | Subsidiary opening which serves as a communication for troops engaged in a sally. |
| SAP | Making of trenches to cover attackers' approach to a besieged place. |

| | |
|---|---|
| SHIFTING HOUSE | Building where gunpowder is checked and prepared. |
| SPANDREL | Triangular space above the haunch of an arch. |
| SPUR | Redan. |
| SUTLER | Camp follower who sells drink and provisions to the troops. |
| TERRE-PLEIN | Surface of rampart behind the parapet where guns are mounted. |
| TRACE | Plan of a fortified place with its angles of fire. |
| TRAVERSE | Mound of earth or wall thrown up to bar enfilade fire along any line of a work which is liable to it. |
| TYMPANUM | Enclosed space within an arch or in the triangle of a pediment. |
| WICKET | Small door or gate at side of, or forming part of, larger one. |

## CONVERSION TABLE

*Figures are approximate*

| | | |
|---|---|---|
| Page 15 | 42-pounders | 19·0 kg |
| | 32-pounders | 14·5 kg |
| | 9-pounders | 4·0 kg |
| Page 18 | 9 in | 0·22 m |
| Page 25 | 106 ft | 32·3 m |
| | 25 ft | 7·6 m |
| Page 26 | 2½ acres | 1 hectare |
| | 2½ ft | 0·76 m |
| | 1 ft | 0·30 m |
| Page 28 | 9 in | 0·22 m |
| | 12 tons | 12·2 tonnes |
| | 10 in | 0·25 m |
| Page 29 | 6 in | 0·15 m |
| Page 30 | 5½ in | 0·13 m |
| | 4½ in | 0·11 m |

Printed in Scotland by Her Majesty's Stationery Office Press, Edinburgh

Dd. 501341 K26 4/71 (7631) *T.S.* 30747

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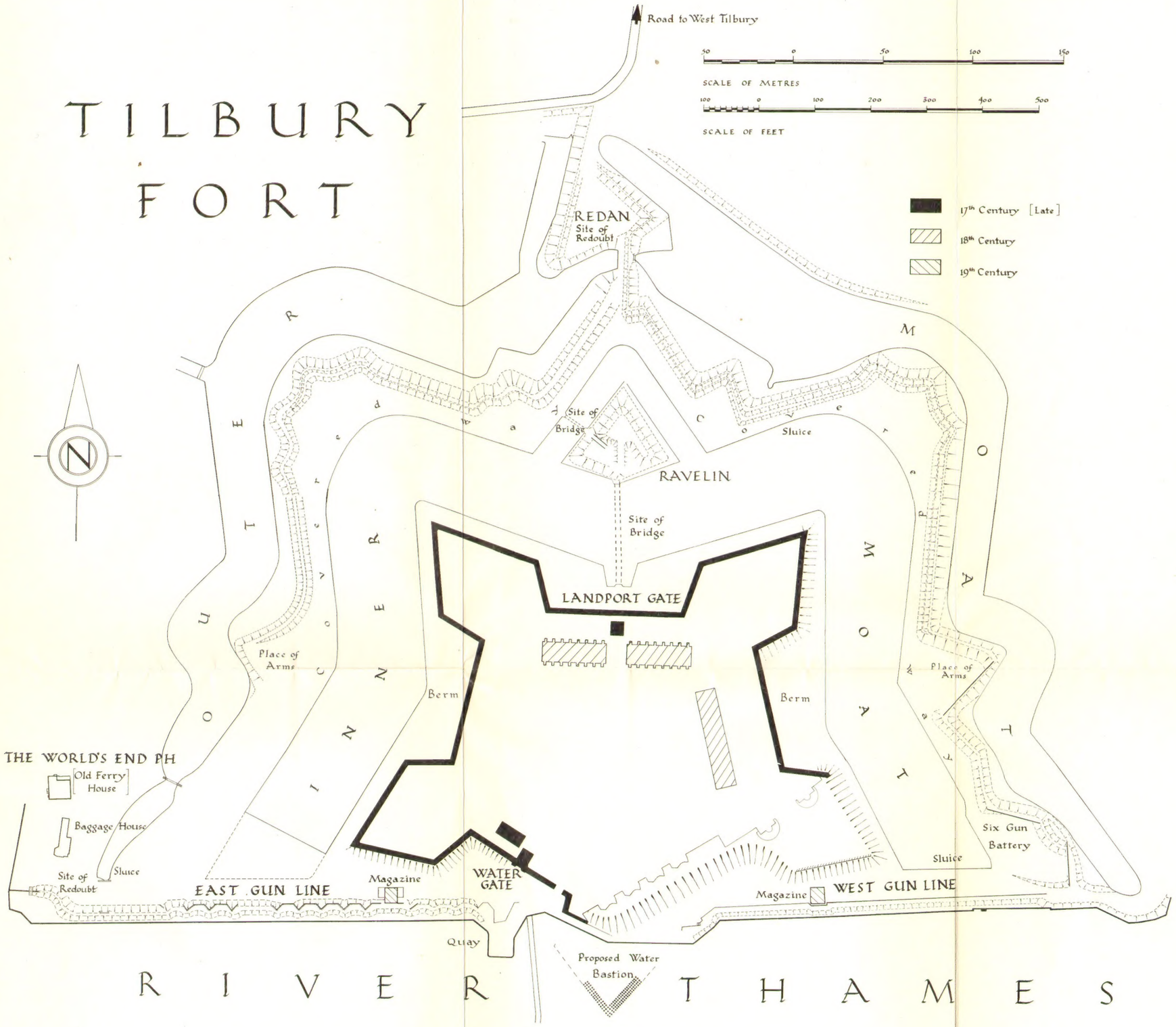


SITE PLAN OF FORT AND OUTWORKS

SHIFTING
SPANDREL
SPUR
SUTLER

TERRE-PL

TRACE
TRAVERSE

TYMPANU

WICKET

## CONV

*Figures are*

Page 15

Page 18

Page 25

Page 26

Page 28

Page 29

Page 30

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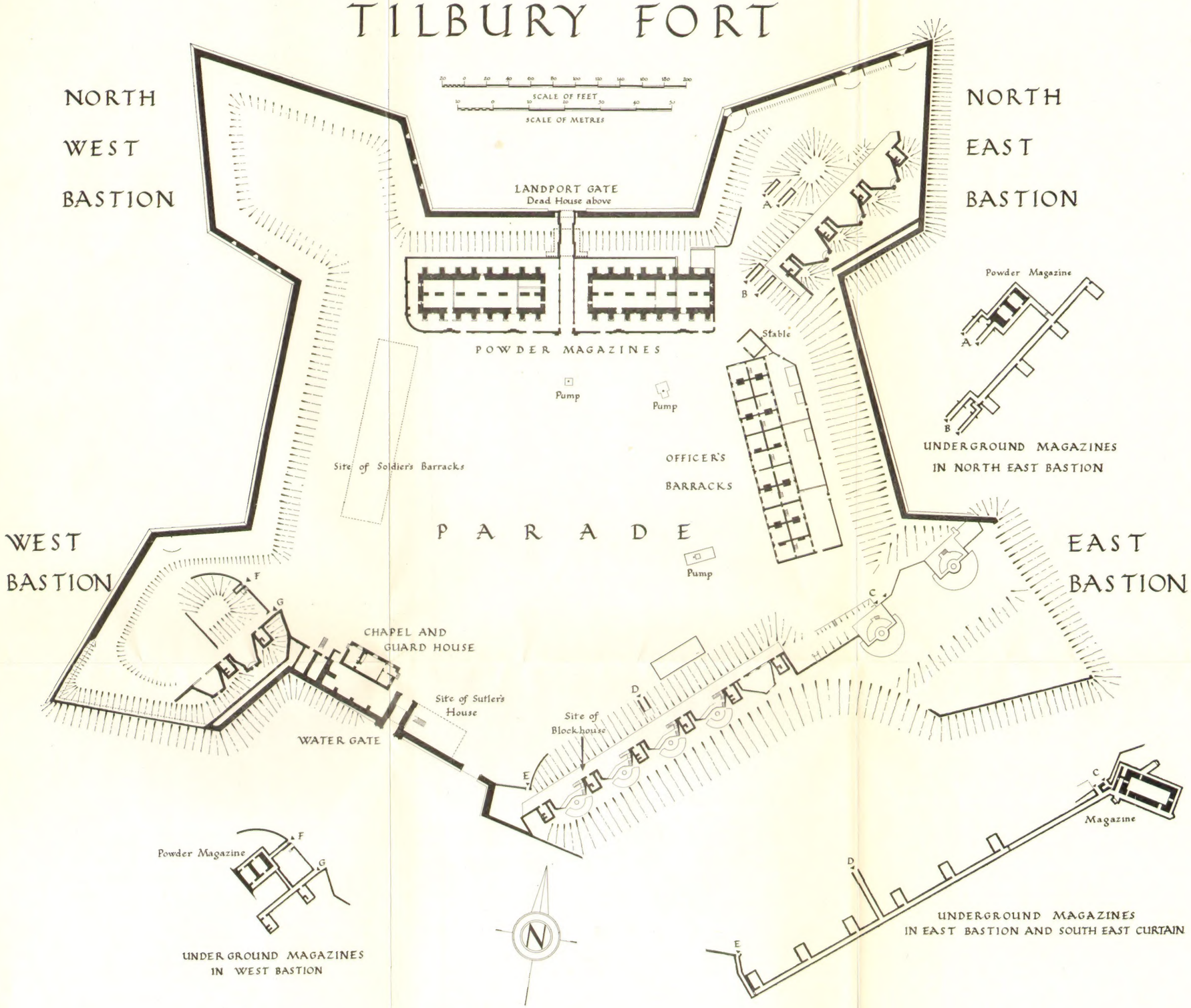


## GROUND PLAN OF FORT

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Printed and published by
HER MAJESTY'S STATIONERY OFFICE

To be purchased from
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13a Castle Street, Edinburgh EH2 3AR
109 St Mary Street, Cardiff CF1 1JW
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SBN 11 670311 3