

KENT'S TWENTIETH-CENTURY MILITARY AND CIVIL DEFENCES: PART 1 – THAMESIDE

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Kent County Council's *Defence of Kent Project* is studying the county's twentieth-century military and civil defences. Surveys of Gravesham, Dartford, Medway and Canterbury council districts have been completed. This paper, the first of three, provides an overview of findings from Gravesham and Dartford districts, known jointly as Kent Thameside. This involves analysis of over 500 sites, now available for viewing on the on-line Kent Historic Environment Record (www.kent.gov.uk/HER).

The aim of the *Defence of Kent Project* is to better understand the role, evolution, distribution and survival of the county's varied military and civil defence structures, built or used during the twentieth century.¹ It is hoped to bring this subject more fully into the public domain, providing greater awareness by publication, educational and interpretational projects, by highlighting sites for protection or conservation as well as by improving physical access.

Information sources have been wide and varied, including War Office and Home Office memoranda at the National Archives, records at the Centre for Kentish Studies and other local authority archives and libraries, as well as the holdings of service museums and Kent County Council's aerial photograph collection. Minutes of local councils provided useful information about civil defence. Studies by the Council for British Archaeology and the *Defence of Britain Project* have also been consulted.² Additional information was obtained from the recollections of individuals and from local historical societies and parish councils. This information has been assessed, mapped where possible, and visits to sites made, to produce an historical synthesis.

The Context for Kent's Defences

Over the centuries, Britain's surrounding seas have formed a natural defensive barrier but they have also been a means by which an enemy with a fleet might raid the coastline or invade. This was especially true

of Kent, given its closeness to the Continent via the short-sea crossing, exposing a vulnerability to a landing and making the broader landmass open to conquest. High cliffs or marshland on the one hand, or flat dry ground on the other, offered difficulties or opportunities for a landing; rivers, valleys, roads and hills suggested ways for an invader to penetrate inland and also holding positions for a defender. Ports and anchorages could be used as bases for naval defence but might also become points of entry for an invader. Not least of these was Dover, symbolically the 'Key to England'. At the northern extremity of the county the Thames penetrates deeply inland to London and the heartland of England. This was a commercial port and, when required, a naval one. As such, it was both a target and a defence. Joining with the Thames is the Medway, which for over half of the twentieth century contained two key naval bases.³

The first line of defence against invasion was the Royal Navy, supported by forts and troops ashore. But in the twentieth century appeared new technologies which, in various ways, began to circumvent the traditional defences of an island nation. Most significant of these was the threat of attack from the air, whether by airships or aeroplanes, which could overfly maritime and terrestrial defences to drop bombs anywhere. This required a fundamental re-thinking of defence strategy. Utilisation of the internal combustion engine as a power plant for military transport and for tanks was also a revolutionary new factor in warfare, of significance for both an invader and a defender. By the Second World War paratroops and towed gliders could be used to insert enemy forces inland. Radio had produced instantaneous communication and Radio Direction Finding (later called RADAR), a quantum leap in target detection methods. From the test tube came poison gas and biological weapons. Then came a vision of apocalypse, with the invention of the nuclear weapon.⁴

Britain entered the twentieth century during a period of tension with France, which sometimes threatened armed conflict but the Entente in 1904 signalled improved Franco-British relations. This left Germany as the expected future enemy, as it became in the First World War and again during the Second World War, succeeded by a Cold War with the Soviet Union. This has deposited its defensive signature on Kent Thameside, on Kent generally and the country beyond.⁵

Hitherto civilians were less directly affected by war, targets being primarily military. The two world wars changed that, as parts of the population became embraced in the war effort, especially in manufacturing to support a conflict of attrition. The country's industry, infrastructure and, indeed, the people themselves, therefore became perceived as legitimate targets, through the use of airpower. The *Defence of Kent Project* has shown that especially in the Second World War, conflict produced landscapes and townscapes visibly militarised. Blackouts and rationing,

long-term disruption of lives, death and injury touched civilians and destruction and damage of property expressed the new age of total war. During the Cold War, spanning much of the second half of the twentieth century, nuclear weapons threatened annihilation.

Surviving sites, both military and civil, are reminders and emblems of this new age of warfare, providing in concrete, brick, earth and steel a tangible link with this past and presenting a range of opportunities for study and interpretation. Unlike much archaeological material, it was in large part created within living memory. Yet this is a fragile archaeological resource, devastatingly reduced by waves of post-conflict development.

Boundaries and Physical Characteristics

Kent Thameside occupies approximately 100 square miles (**Fig. 1**). It is bounded to the north by the River Thames, to the west by the London Borough of Bexley, to the east by Medway Unitary Authority and to the south by Tonbridge and Malling Borough Council and Sevenoaks Council. The ground rises south from the Thames towards the chalk scarp of the North Downs, bisected by the Darent and Ebbsfleet river valleys. The clays and alluvium forming the riverside marshes are also underlain by chalk.

Kent Thameside is divided north-south by the Watling Street (now A2) connecting the Kent coast with London. North of this is the Thameside conurbation, with faint remnants of industry which characterised it in the twentieth century. Through this passes the Lower Road connecting Dartford with Northfleet and Gravesend. Northwest and northeast are expanses of riverine marshes. Inland of the marshes to the east are the country villages of Shorne and Higham. South of the A2 are other villages and rural parishes and areas of farmland with some woodland. Road networks converge in villages and hamlets and connect with communities north across the A2.

Through the area passes the North Kent Railway joining London with the Kent coast. West of Dartford Station a divergence forms the Sidcup loop line connecting with London. From Shorne Marshes, a goods line connects with the Isle of Grain. Some 4 miles south is another parallel main line to London Victoria. Until the 1950s a branch line from Gravesend to Longfield connected these two major lines.⁶ From the later twentieth century there have been new road schemes, the Channel Tunnel Rail Link and much housing development.

Strategic Significance

Kent Thameside was a small but important part of broader strategic considerations and systems of defence. Firstly, being on the river route

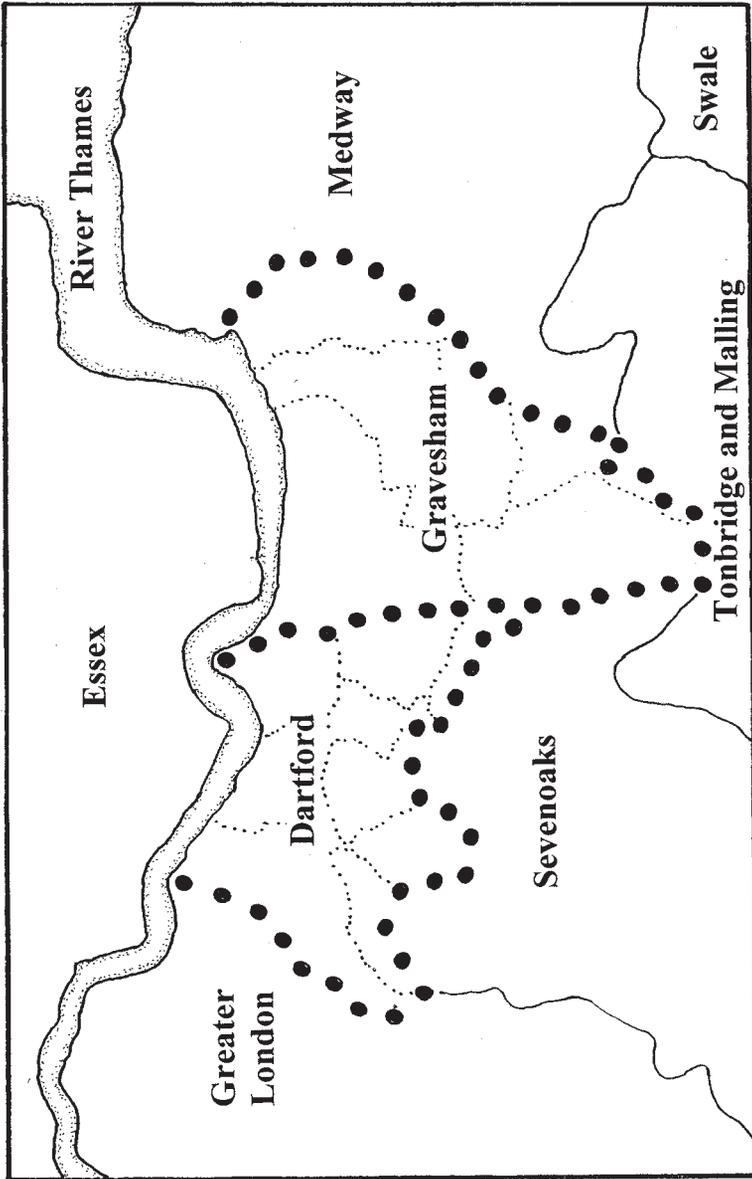


Fig. 1 The boundaries of Dartford and Gravesham, together known as Kent Thameside (Victor Smith 2009).

to the capital, London, with its commercial docks, the Royal Arsenal at Woolwich and shipyards, the security of the Thames was vital to the nation.⁷ Kent Thameside had therefore figured long before the twentieth century in the river defences, with guns crossing their fire with those on the Essex side to protect the way upstream. In the two world wars the Thames was a key means of entry for a range of vital and country-sustaining supplies and provided a communication with the Empire and overseas places in which Britain was fighting but advances in military technology were soon to eliminate a need for Kent Thameside's permanent role in anti-ship gun defence. Secondly, the land corridor on either side of the river might be used by an invader to advance on London, whether from a landing on the banks of the Thames or from the coast beyond. A corollary was to impede enemy penetration from the riverbank and to obstruct his progress along roads, their nodes, railways and across any other suitable ground. Thirdly, with the development of airpower, the Thames was a visual aid on the air route for bombers heading for London and its docks, and the river became incorporated within air defence systems to protect the capital as well as Thameside industry, important power stations and other targets. Concomitantly, civil defence protected workers and populations. In central and western Thameside were cement and paper factories, metal industries and armaments and explosives production, enhanced by war-related production during the two World Wars. Just before the First World War experimentation in aviation and aircraft manufacturing began at Dartford.⁸

All of these factors abundantly justified provision of military and civil defences. Kent Thameside remained strategically significant into the Cold War, having important infrastructural assets in the electrical power generation stations at Littlebrook and Northfleet, both targets for bombing, not far from their counterpart at Tilbury and, close by, Tilbury Docks.

FINDINGS

Pre First World War (1900-13)

River defence

The twentieth century opened with the traditional imperative to defend against attack from the sea, the possibility of a threat in a new dimension being imagined but not yet considered of immediate concern. Kent Thameside figured in both the outer and inner lines of anti-ship defence for the river approaches to London. As part of the outer line, at the eastern end of Gravesend Reach, was Shornemead Fort. Its rifled muzzle-loading guns mounted in the 1870s crossed their fire over the river with

similar weapons at Cliffe Fort downstream and with Coal house Fort at East Tilbury on the north shore. Close to Coalhouse Fort was a recently constructed wing battery armed with the new breech-loading guns. Upstream, at the western end of Gravesend Reach, was the inner line. This consisted of New Tavern Fort at Gravesend and Tilbury Fort on the north shore, both armed with rifled muzzle-loaders. However, advances in artillery which had already led to the mounting of faster-firing and more powerful breech-loaders at Coalhouse Fort's wing battery, were the way of the future. Soon all the slower-firing muzzle-loaders were eliminated from the Thames defences, as elsewhere, to be succeeded by the new weapons.⁹

New Tavern Fort, modernised in 1904, is an important survival and exemplar of the new low-profile batteries for breech-loading guns, especially with its two concrete barbette emplacements having been mounted with metal-shielded and centrally pivoted 6-inch guns (**Fig. 2**), like those originally provided. An underlying protected magazine was provided with mechanical lifts for raising ammunition to the guns. At the western extremity of the battery is a fire control position, whose concrete pillar mounted an optical range-finder utilising trigonometry to calculate distance to the target. Originally built to counter the perceived French threat, defence against the German challenge predominated after



Fig. 2 The 6-inch battery at New Tavern Fort (Victor Smith 2009).

the *Entente* in 1904, although the possibility the latter might break down exercised strategic planners. Such had been the rapid increase in the range of the new breech-loading artillery to 7 miles or more that it was soon recognised to be more effective to concentrate heavy gun defence further downstream at Slough Fort, Allhallows, and at Sheerness and Grain. These places became in effect the new outer line of defence, with an inner line based on Coalhouse Fort and its wing battery at East Tilbury. Light quick-firing guns against attack by torpedo boats were also positioned at Cliffe and Shornemead forts and at East Tilbury, with the requisite searchlights for night firing. In consequence of these changes, New Tavern Fort's guns were withdrawn in 1908 and those at Tilbury Fort at about the same time, ending their role as inner line defences.¹⁰

Shornemead Fort had also been dropped from heavy gun defence, but for a time remained in use for submarine mine warfare: in marshes 100 yards west of the fort, and originating in the later nineteenth century for mine defence of the river, was an extensive mine warfare depot. It had mine stores, lecture rooms and, linked by tramways, a riverside jetty to which mines could be taken on trucks for loading into mine laying vessels. The depot provided training for visiting units, using tugs hired from Gravesend.¹¹ Two light quick-firing guns next to the fort were noted in a local defence plan of 1904 as having been ordered to be withdrawn. The designated place for the minefield for this part of the river was now downstream off Cliffe Fort. Nonetheless, mine warfare training at Shornemead Fort appeared to continue for a time. Although now without surface traces, there may be buried archaeology, perhaps providing an opportunity for investigation. Detached from the left flank of the fort is a partly filled room which might have been connected with mine warfare activity and on the left of the fort's casemate roof is what might have been a related observation position.¹²

The London Defence Positions

The East Hill area at Dartford was earmarked for anti-invasion defence in an 1890s contingency plan for entrenching the high ground encircling the south and east of London on the outbreak of a war with the French. If brought into being, this stop line known as the London Defence Positions, was to be manned by the Volunteers, with reinforcing formations from the regular army. The scheme was discontinued in 1906, but not before defensible mobilisation centres had been built along the course of the line, the nearest to Dartford being at Farningham.¹³

Volunteers and musketry training

The volunteer movement was the popular expression of home defence,



Fig. 3 Milton Range – Victorian target raising frame (foreground) and Metropolitan Police replacements (Victor Smith 2000).

evidenced by the building of drill halls. Although no longer extant, from the beginning of the twentieth century, these were an iron hut erected in the 1890s in Milton Road, Gravesend and a large brick building in Lowfield Street, Dartford (1908), with a still surviving small training building at Factory Road, Northfleet.¹⁴

Musketry training was important and, surviving on Eastcourt Marshes, east of Gravesend is Milton Range, for the use of the volunteer and regular forces (**Fig. 3**). Here the latest mechanical systems for raising and lowering of targets were introduced at the turn of the nineteenth century as part of reorganisation of an earlier range on this site.¹⁵ Prominent is a linear bullet-trap mound, spaced behind a steel-lined shingle and turf-covered gallery, in which markers served the targets placed in metal frames, raised or lowered on pulleys. There was a railway track for removal of targets for repair and a metal-plated latrine with a truck running on a short length of rail to remove solid waste. The firing points were reorganised in 2000 for the Metropolitan Police, which also altered a section of the linear mound. Firers on courses were accommodated either at Shornemead Fort, in whose magazines is an extensive wall archive recording visiting units,¹⁶ or at Milton Barracks (1860s+), Wellington Street, Gravesend, now having only its brick boundary walls and several internal buildings.¹⁷

The First World War 1914-18

Air defence

Until 1914, the Defence Committee considered invasion to be a naval problem, preventable by the fleet. Yet when war with Germany came, that optimism evaporated.¹⁸ Moreover, threat of attack from the air by airships and aeroplanes required radical new approaches to defence. In anticipation, as early as 1913/14 an anti-aircraft gun battery – perhaps the earliest in Britain – was built to defend the Lodge Hill naval ammunition stores just outside the study area, near Frindsbury.¹⁹ Following the opening of hostilities, and especially from 1915, a considered scheme of air defence began to be created, leading by 1917 to the innovative London Air Defence Area.²⁰ Controlled from a command post in London, this had radial belts of gun and fighter defences and balloon barrages to protect the air approaches to the capital and its vital docks (**Fig. 4**). Kent Thameside became part of this network, its western half being within a fighter patrol zone encircling London, with an interceptor airfield at Joyce Green, and with guns and searchlights at Dartford, Joyce Green, Betsham, Singlewell, Cobham and Higham, with others thought to have existed at Southfleet and The Brent.²¹ From evidence elsewhere, these batteries were concrete structures and they may have left archaeology. There were also ground observation posts²² and limited civil defence in the form of premises such as cellars designated as air raid shelters, the introduction of air raid warning sirens together with reduction of the electric and gas lighting of streets and buildings which could be seen at night from the air. The Central Library in Windmill Street, Gravesend was used as a base for foot patrols to search the skies for enemy raiders.²³ Volunteer first aid detachments stood ready on East and West Hills, Dartford, to assist in the event of an air raid on the town.²⁴

Strategic industry and assets in Kent Thameside included cement works, paper factories and wharves along the shore and hinterland from Northfleet to Dartford Creek and inland, chemical works, engineering factories and explosives and ammunition manufacture. There were other possible targets for bombing, such as railways, electricity and gas works.²⁵ Although there were nearly 40 German over flights of the area from 1915-18,²⁶ these were mainly to bomb London. Kent Thameside received lesser attention although bombs did fall upon its territory. Fighters based at Joyce Green and elsewhere in the fighter zone often intercepted formations of enemy bombers.²⁷ The sight of giant cigar-shaped Zeppelin airships and of aeroplanes in the sky remained a vivid memory for many local people. Concrete blocks on Windmill Hill in Gravesend mark where bombs fell.²⁸ Anti-aircraft guns in the Dartford area contributed their fire to the ultimate destruction of Zeppelin L15 in

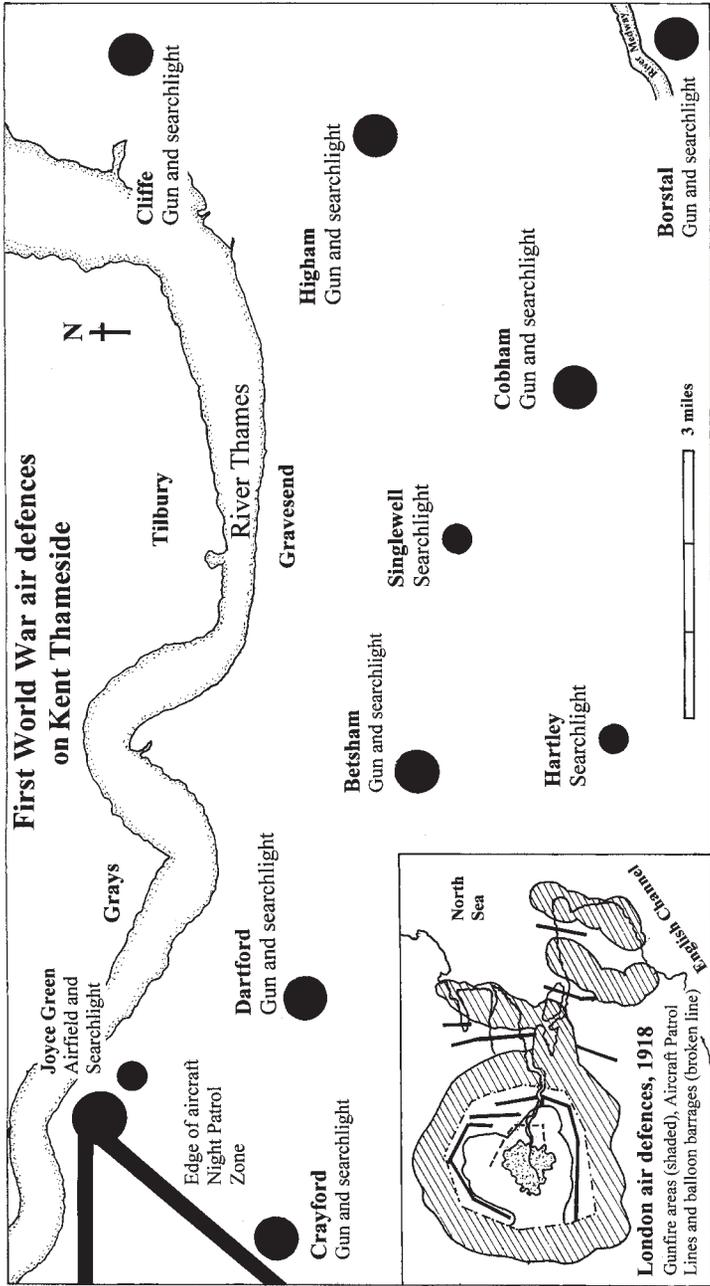


Fig. 4 Map of permanent First World War air defences on Kent Thameside. There may have been other temporary sites (Victor Smith 2009).

1915. In 1917 a giant Gotha bomber was first damaged by gunfire from near Gravesend, and then crashed outside the area, a victim of gunfire from Maidstone, which delivered a *coup de grace*.²⁹ Destruction from air bombing did not critically disrupt Britain's war effort. But use of German airpower had been threatening, raising the spectre of more severe damage and requiring considerable resources to be committed to air defence. This also hinted at the potentially greater destruction in a future war.

River security

Although since 1908 Kent Thameside had not featured in artillery defence of the river there were still searchlights at Shornemead Fort, which had a Royal Engineers detachment.³⁰ Another detachment was barracked at New Tavern Fort.³¹ The river remained a vital strategic artery, a defence plan of 1914 having emphasised that 'a large proportion of the food of this country is imported via the Thames', making the defences downstream ever more important.³² Port operations were directed from a still extant building in Whitehall Place, East Terrace, Gravesend and the Examination Service for the searching of ships was enforced by the guns of Coalhouse Fort in Essex.³³

Anti-invasion defence

Anti-invasion defences have left no known archaeology. Nationally, the strategy evolved immediately pre-war was for initial contact by local forces, followed by the counter-attack of a Central Force, once the invader's intentions became clear.³⁴ The War Cabinet was convinced that a knock-out blow against London would be the prime objective, an advance on the capital from the Kent coast or the Thames and Medway being considered likely. Pre-war defence plans and one of early 1914 refer to the significance for defence of the rising ground south of the Thames marshes.³⁵ Between Gravesend and Tilbury a military pontoon bridge, with a removable middle section, facilitated general use by military and official traffic and the transfer of defending forces reciprocally to counter a German landing.³⁶ Local forces in Kent Thameside were both units of the regular army based at Milton Barracks at Gravesend and part-timers of the Volunteer Training Corps (later called the Volunteer Force), with companies at Dartford and Gravesend, as well as at many other places across the county and the country.³⁷ Whether the 1890s London Defence Positions were reactivated within the study area is unclear but appear to have been to the south at Wrotham, Sevenoaks and Westerham. Trenches may have been cut within Kent Thameside but have yet to be identified. Key industries were guarded by troops. In Dartford some footpaths near to factories were closed.³⁸

On the north side of the Thames were plans for evacuating people in face of an actual invasion.³⁹ Probably the same obtained on the south side. Despite contemporary fears, there is little to suggest that the German General Staff seriously considered invading after 1916; trench warfare in France and Belgium absorbed their energies.⁴⁰ The last time that Germany challenged British naval supremacy was at the Battle of Jutland in that year, but as late as 1918 anxiety arising from the German Ludendorff offensive raised the spectre of an allied defeat and the possibility of invasion.⁴¹

Milton Barracks at Gravesend were a transit camp for troops to and from foreign service. Civilian premises were occupied as Voluntary Aid Detachment and Red Cross hospitals for service patients, mainly casualties from the Western Front. These were at Great Hermitage at Higham; the Yacht Club in the Undershore, Gravesend; and at the Rosherville Hotel in Burch Road, Northfleet; the Central Hall, Kent Road, Dartford; and Heath Close, Dartford Heath. All these buildings have vanished, except for slight traces of the Rosherville Hotel.⁴²

Feeling threatened by, and sometimes experiencing, air bombardment gave populations a new experience of war. Communities were also denuded by withdrawal of unprecedented numbers of men, volunteering or conscripted for the armed forces. Moreover, they also contributed labour, innovatively including many women, to the voracious demands of war industry, for example working at the Vickers factory, Dartford. Later in the war, the German U-boat campaign induced food shortages, leading to some rationing, government regulation of agriculture and the digging of small plots for food production. Finally, there were the emotional and social effects of a lost generation of war dead, poignant reminders being the proliferation of war memorials erected in the 1920s.

Interwar Years 1919-1939

Disarmament followed the end of the war. Indeed, after 1918 there was no immediate enemy to face, and a strong wish for continuing peace, hope being placed in the League of Nations (formed in 1920) to improve international relations. But caution led government to seek a balance of power enhancement for parity with the French Air Force, which was the strongest other air arm within flying range. Plans, falteringly implemented, were therefore laid for increasing the number of British home defence squadrons. Anti-aircraft gun defence received lesser emphasis. Kent Thameside came within an updated London Air Defence Area, largely a paper scheme.⁴³

By 1920, if not before, a large building, which had originated as a skating rink in Grange Road, Gravesend, was taken over by the Territorial Army for use as a drill hall. This was destroyed by enemy action in 1943.⁴⁴

An unusual episode during the General Strike of 1926 found the Bowater's Paper Mill at Northfleet defended against feared revolutionaries by troops, barbed wire, sandbags and a temporary blockhouse to secure its paper used to print a government propaganda newspaper.⁴⁵

Remains of a new railway halt for Milton Rifle Range may be seen. Lecture rooms for range users and for other training were added in the 1920s-early 30s next to Shornemead Fort.⁴⁶ In 1930, the 6-inch battery at New Tavern Fort was rearmed for training Territorial Army gunners who would serve elsewhere in war.⁴⁷ Reserve forces were gradually expanded, shown in surviving buildings of a Territorial Army drill hall and associated structures built at Grove Road, Northfleet, in 1934, together with another constructed in 1939, recently demolished, at Stone Place Road at Horns Cross.⁴⁸ Both were for air defence units, the threat of air attack being an increasing national preoccupation, emphasised by former Prime Minister Stanley Baldwin's statement in 1932 that in future wars 'the bomber would always get through'.⁴⁹ Increasing enemy bomber capacities and the threats to military, industrial and infrastructural assets were worrying. Matters were treated more seriously from 1934/5 following Germany's withdrawal from the League of Nations, her abrogation of the Treaty of Versailles of 1919 and her programme of rearmament.

A revival of air defence

This led to a scheme to expand the air force, to provide new gun defences and to upgrade planning for London's Air Defence. Kent Thameside initially came within a fighter defence zone (although Joyce Green airfield itself had closed); then, following reorganisation, within an anti-aircraft gun belt.⁵⁰ As part of a national network, two ground observer posts were set up in 1937 at Cobham and at Dartford, reporting to a control centre for co-ordination of fighter and gun defence.⁵¹ In the same year sites for an initial two gun batteries for mounting the new heavier 3.7-in. and 4.5-in. guns were chosen in Kent Thameside, at Denton (later designated by the War Office as TS 16) and Northumberland Bottom (TS 17), part of a larger network on both sides of the Thames. Construction probably began in the following year.⁵² The new design had four emplacements on the points of a trapezium, with a rear-centred command post containing optical range and direction finding equipment to direct the guns on to target. There were on-site magazines and an accommodation camp. From the end of 1937 a recently established civil airfield at Gravesend became used as an Elementary Reserve and Training Flying School for the RAF, fighter defence being based on airfields outside the area.⁵³

With this was creation of a countrywide system of civil defence against the effects of air attack. Following earlier discussion, an Air Raid Precautions Committee, formed in 1935 at the Home Office, issued a

circular to local authorities advising them to plan protective measures. Under Kent County Council, the authorities then constituting the areas today labelled Kent Thameside, were Dartford Borough Council, part of Dartford Rural District Council, Swanscombe and Northfleet Urban District Councils, Gravesend Municipal Borough Council and part of Strood Rural District Council, with their constituent parish councils. Effort concentrated initially on providing training, mostly for council works staff, with earmarking of sites for wardens, first aid posts and emergency water tanks for the fire service, together with buying of gas masks and ambulances, and initial steps for recruiting civilian air raid precautions volunteers. Industry was encouraged to provide air raid shelters for factory workers but there was yet no scheme for public shelters, personal protection being largely the responsibility of householders.⁵⁴

The Munich Crisis and the year before the Second World War

The Munich Crisis in the autumn of 1938 frightened the population lest it lead to war with Germany. This period saw the cutting of air raid shelter trenches for public use at many places. In the Dartford area these were at Central and Hesketh Parks, Dartford Heath, Shepherds Lane, Overy and Lowfield Streets, Birch Place and St Johns and Hart Dyke Road, Stone. In Gravesend they were at Woodlands Park, Church Walk, Dashwood recreation ground and Clifton Road; elsewhere they appeared in Upper and Lower Higham and at Luddesdown.⁵⁵ Generally these were in open spaces close to housing and town centres but were insufficient for the whole population. Where not altered by later reconstruction, valuable archaeological evidence may remain. Civil defence was now taken more seriously, a particular fear being of attack with poison gas, a terrifying memory from the Western Front in the First World War and used more recently by the Italians in Ethiopia. Concurrently, the Spanish Civil War provided an example of death, injury and destruction from German bombing to focus the mind.⁵⁶

The anti-aircraft batteries at Denton and Northumberland Bottom were armed during the crisis, but perhaps at this stage with the older, less powerful 3-inch guns, the new larger calibres not yet being available for all of the country's batteries.⁵⁷ The RAF had few modern fighters and was less than well prepared. For a time during the crisis a Handley Page Heyford bomber was based at the airfield in Gravesend.⁵⁸

Agreement with Germany in October 1938 offered a hope of peace. Indeed, one Strood councillor even called for cessation of civil defence.⁵⁹ Government however, saw this as a breathing space to prepare for an inevitable war.

The Munich Crisis was rapidly followed by establishment of a well-planned civil defence infrastructure, at times impeded by delays in confirmation of

government grant. There were also new council committees, centred on the Air Raid Precautions and Emergency Committees but with Works, Finance and General Purposes and other committees also involved.⁶⁰

Command and control needs saw occupation or earmarking of premises at Avenue House, Darenth, Overy Street Dartford, Knockhall at Greenhithe, the town halls at Northfleet and Gravesend as well as Hollywood House at Strood, with a new civil defence headquarters at Harmer Street, Gravesend. As part of the reporting chain were the first of the air raid warden posts. As well as this several First Aid Posts and fire action stations were built. An organisation for rescue, repair and gas decontamination was formed, with a repair depot at the Canal Basin, Gravesend and a decontamination facility at Swanscombe swimming pool. Decontamination services were to provide for cleansing of people, clothing, buildings, streets and vehicles. With this went the first of the new air raid warning sirens, alongside temporary use of steam whistles at factories. Depots were also established for storage and issue of civil defence supplies. Further trench shelters were cut, surveys being carried out for more.⁶¹ An Air Raid Precautions map for Kent in April, 1939, labels most of Kent Thameside a shelter priority area, the remainder being given the highest level of vulnerability to air raiding.⁶² From this pre-war period the premises at Harmer Street, Gravesend and facilities at Northfleet Town Hall and at Avenue House, Darenth, survive.

The Second World War: the Beleaguered Years 1939-41

Threat of air attack rather than of invasion loomed larger in government's mind on the outbreak of war. Evacuation of children from areas most vulnerable to bombing, including Kent Thameside, was carried out in the first few days.⁶³

Strengthening civil defence

Civil Defence organisation had already advanced enough for Gravesend's Council to express confidence.⁶⁴ Gravesend became a 'Blitzmerge' area, for rapid civil defence reinforcement in the event of catastrophic air raiding, a rendezvous point being set up at the Railway Hotel at Greenhithe. Overall coordination of civil defence and approval for government grant was vested in the South East Regional Commissioner's office at Tunbridge Wells.⁶⁵

Command and control was strengthened, with reserve centres earmarked for Dartford Borough Council at St. Vincent's Home, for Northfleet in London Road and in rural areas south of Dartford at The Croft, Farningham. Strood's centre was transferred from Hollywood House to a new building in a chalk pit at Higham. Decontamination centres

increased in number, with a surviving one at King's Farm, Gravesend, a surface blockhouse, designed with confidence about the outcome of the war for use later as sports changing rooms, in which role it continues today. Others were added to council depots at The Hill and Brookvale, Northfleet, to St. George's Hall and St. James church grounds, Gravesend. There was a cleansing shed at Cobham and various laundries at Dartford were designated for the decontamination of clothes.⁶⁶

Fire services were expanded, with additional action stations and emergency water supplies, utilising swimming pools and model boating lakes at Gravesend and Swanscombe, the Ebbsfleet stream, ponds and circular or rectangular fabricated tanks. There were over a dozen First Aid Posts across Kent Thameside, in a variety of civilian buildings and in new structures. Rest and feeding centres were established for those displaced by bombing. Records suggest that there were over 40 of these at schools, parish and church halls as well as at other premises, all of which were given cooking equipment and utensils. Both paid staff and volunteers operated them. Among the survivals of host buildings are Cecil Road, Gordon and Wrotham Road Schools in Gravesend and Northfleet, as well as the Factory Club at Northfleet. Dartford County and Gravesend and North Kent Hospitals were designated for provision of care beds under an Emergency Hospital Scheme.⁶⁷

The air raid warden post network was extended, with a proliferation of posts, displaying an eclectic structural signature, from a room in a public house or private residence with a telephone, to purpose-designed rectangular concrete or brick blockhouses, and to dugouts, tunnels or timber sheds faced with sandbags. In Gravesend, at least, there were 'shadow' or reserve posts. No purpose-designed post is known to have survived but several public houses so used do as well as a tunnel at Gad's Hill, Higham.⁶⁸

Government provided a means for shelter to the population, expressed in the ubiquitous prefabricated garden Anderson Shelters, with over 15,000 issued across Kent Thameside, followed by concrete and brick 'Gravesend' and other garden shelters and later by indoor Morrison table shelters.⁶⁹ These were free to people below an income threshold and at cost to others. This approach to sheltering minimised casualties by dispersal across the community. Shelters of opportunity were to be provided in town centres for people away from home. Others, both trench and surface, were also built in the community. Protection was therefore a balance of domestic and communal, with emphasis on the former. Within this general context, most of the Munich period trench shelters were strengthened and others cut, with flat-roofed brick and concrete surface shelters built in some streets and cellars of houses and shops converted, for example in Dartford and Gravesend town centres. Under London Road between Northfleet and Stone were several tunnel shelters, including a

large one for over 1000 people under The Hill, Northfleet. Many had bunks for sleeping as well as canteens.⁷⁰

Businesses were required to provide shelters for their staff, most importantly in industry, which had them close to working areas and sometimes in blockhouses inside the premises. Cut into cliffs for the workers of the Henley Electrical factory at Northfleet was a massive grid pattern tunnel complex for over 2,000 workers, complete with gas decontamination and power plant for light and air filtration (**Fig. 5**). Railway stations had also to provide shelter for travellers and all hospitals and schools protection for patients and staff.⁷¹

Though sometimes modified locally, designs were promulgated by government for all types of shelter, including protection of the occupants against war gases.

The chalk tunnel shelters survive, although with locked or blocked entrances. Cellars or basements used as shelters remain but with their adaptations removed. There are several surviving school shelters.

To cope with expected mass deaths from air raiding, buildings at public houses in Shorne, Higham and Meopham and cemetery chapels at East Hill and Swanscombe, were adapted for use as mortuaries, with a still surviving specially designed one next to a public cemetery in Old Road West, Gravesend. This had bays for storage of corpses and a viewing place for relatives to identify bodies.⁷²



Fig. 5 Entrance to Henley Second World War industrial air raid shelter, Northfleet (Victor Smith 2008).

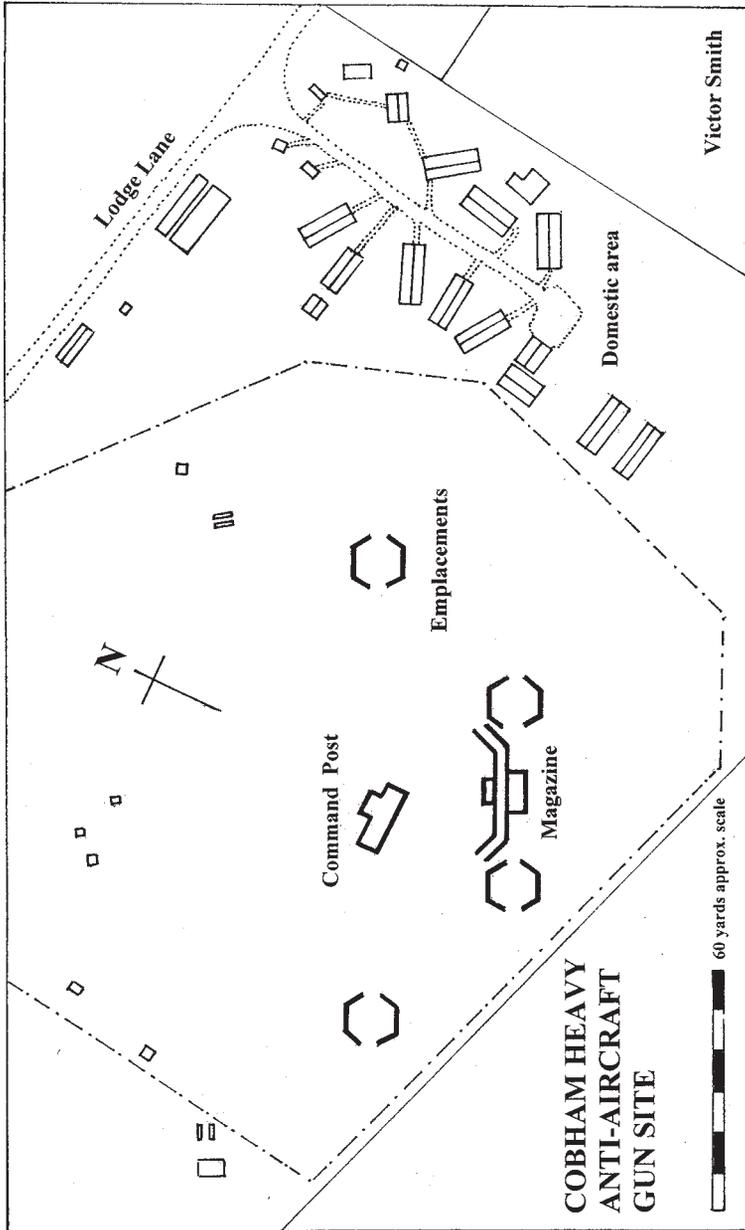


Fig. 6 Simplified plan of the Second World War heavy anti-aircraft gun site at Lodge Lane, Cobham, showing a typical battery layout (Victor Smith 2009).

Enlargement of gun and fighter air defence

Anti-aircraft gun defence was enlarged and strengthened, still to be seen in the four emplacements of a heavy battery at Lodge Lane, Cobham (TS 15) (**Fig. 6**) and six at Green Street Green (TS 18), with a command post and magazines at both, as well as slight ground traces of barracks at the former and some complete structures at the latter. There are traces of another battery on Dartford Heath (Z2).⁷³ These were elements of a network of batteries on either side of the Thames, to defend the way to London and to protect riverside assets (**Fig. 7**). There had also been a short-lived battery at the Princes Road Bypass, Dartford. TS17 and Z2, at least, were provided with gun-laying radar.⁷⁴ Another Territorial Army drill hall built in Springhead Road, Northfleet, in 1939 became a local anti-aircraft defence headquarters. There may be archaeological traces of several groupings of light anti-aircraft batteries armed with Bofors guns and pom-poms positioned for the protection of specific local targets.⁷⁵ During archaeological work by Oxford Archaeology at the A2/M25 interchange in 2005, several circular emplacements were found of one of six batteries (VD1-6) to protect the Vickers engineering works in Powder Mill Lane, Dartford. Similar archaeology may exist near the electricity sub-station at Pepper Hill, Northfleet (N1-3) and at the airfield in Thong Lane, Gravesend (VG 1-4). The latter had its headquarters at the still surviving 'Polperro' nearby in Rochester Road.⁷⁶ The fixings for a single Bofors gun survive on the roof of Shornemead Fort.

Some civilian buildings such as power plants and factories were camouflaged against observation from the air. There were balloon barrages as well as searchlights to illuminate the sky for night firing but these have left no definite traces. Some locations are known.

The airfield at Gravesend became a fighter satellite of RAF Biggin Hill, being in action during the Battle of Britain from July-October 1940. It graduated to an independent station in November. Crossing each other at an angle, its pair of grass runways were reinforced by steel Somerfield Track. Surviving archaeology is slight: a standby generator building and traces of tarmac perimeter tracks. All other surface traces have gone of the technical areas, hangars, the control tower and other buildings and facilities added for RAF operations but foundations may exist.⁷⁷ Archaeology survives of the five dispersed accommodation sites at Ashenbank Wood, Cobham and Laughing Water, Shorne. This takes the form of traces of tarmac roads, hut bases and spaces and, most visibly, seven air raid shelters, similar to the semi-underground 'Stanton' type.⁷⁸ Control bunkers for RAF Gravesend's two decoy sites also remain, outside Kent Thameside at Cliffe and Luddesdown.

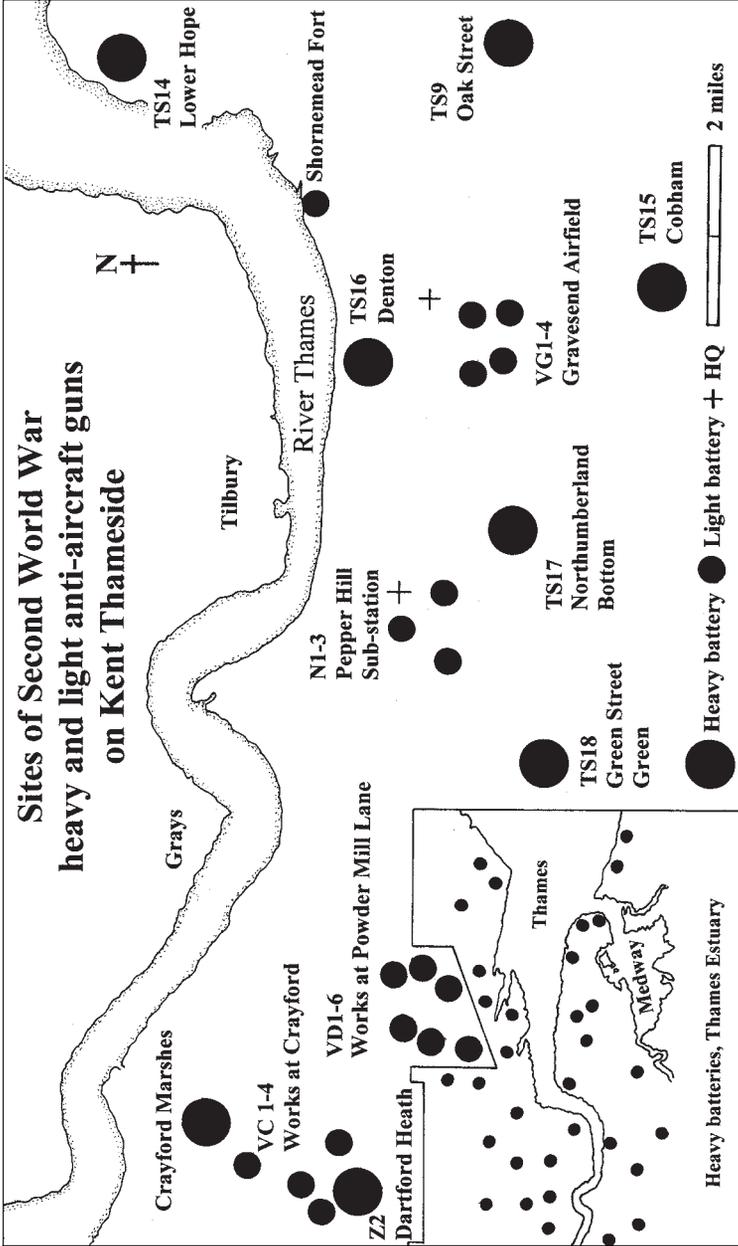


Fig. 7 Map of fixed Second World War air defences on Kent Thameside. There may have been other temporary sites (Victor Smith 2009).

River and anti-invasion defence

With Germany opposed by Franco-British forces on the Continent, in November, 1939 the Chief of Staff assured that with air cover and the navy at sea 'full-scale invasion was not a serious danger'.⁷⁹ Confidence was eroded by the German occupation of Norway and Denmark in April 1940 and of Holland in early May, from which an invasion might be launched. It was shredded by the allied defeat in France and the evacuation from Dunkirk in late May/early June. Invasion then seemed more likely. Steps by General Kirke, Commander and Chief of the Home Forces, to provide guards for Britain's airfields, railway bridges and tunnels were succeeded by comprehensive national measures. These, on a vast and unprecedented scale, were introduced by General Ironside, who succeeded Kirke on 25 May and was himself replaced by General Alanbrooke in July. Within Kent Thameside, these measures have left a modest signature. Defences were against a landing on the banks of the lower Thames and to counter an overland thrust by forces which reached the area by penetrating the more distant coastal crust defences (**Fig. 8**). In either case a drive on London would have been their objective. Defending forces were both Regular army and the new Home Guard.⁸⁰

Against a Thames landing, a battery for two 5.5-in. coastal guns was added in late 1940/early 1941, near the river's edge, just east of Shornemead Fort (**Fig. 9**). Crossing its fire with Coalhouse Fort on the north bank, this was part of a national emergency battery programme.⁸¹ Demolished in c.1970, photographs show it to have been a pair of steel-reinforced brick and concrete casemates with overhead protection, against the threat of strafing and dive-bombing, and with surrounding barbed wire. Nearby survive a pair of pillboxes let into the riverbank. There were other pillboxes on either side of the river. The defences in Gravesend Reach would have come into action on failure of defending naval forces at the Nore and of the advance gun defences and booms in the stretches of river below the Lower Hope. The Thames was repeatedly visited by German mine laying aircraft. At Northfleet is a surviving brick post, one of a sequence of places at which to observe and report falling mines (**Fig. 10**). Chemical attack on shipping was feared and a decontamination anchorage was established off Gravesend.⁸² Barrage balloons, often tethered to barges, were a distinctive feature of the Thames. Defensively Armed Merchant Ships with anti-aircraft guns, were moored either side of the river.⁸³

Defending against an overland attack from the south and east was the GHQ Stop Line. This crossed southern Britain from the Bristol Channel to the River Medway, then over the Hoo Peninsula to the Thames at Higham Creek, resuming on the north side of the river and up the east side of England.⁸⁴ Within the study area is a 100-yard length of its

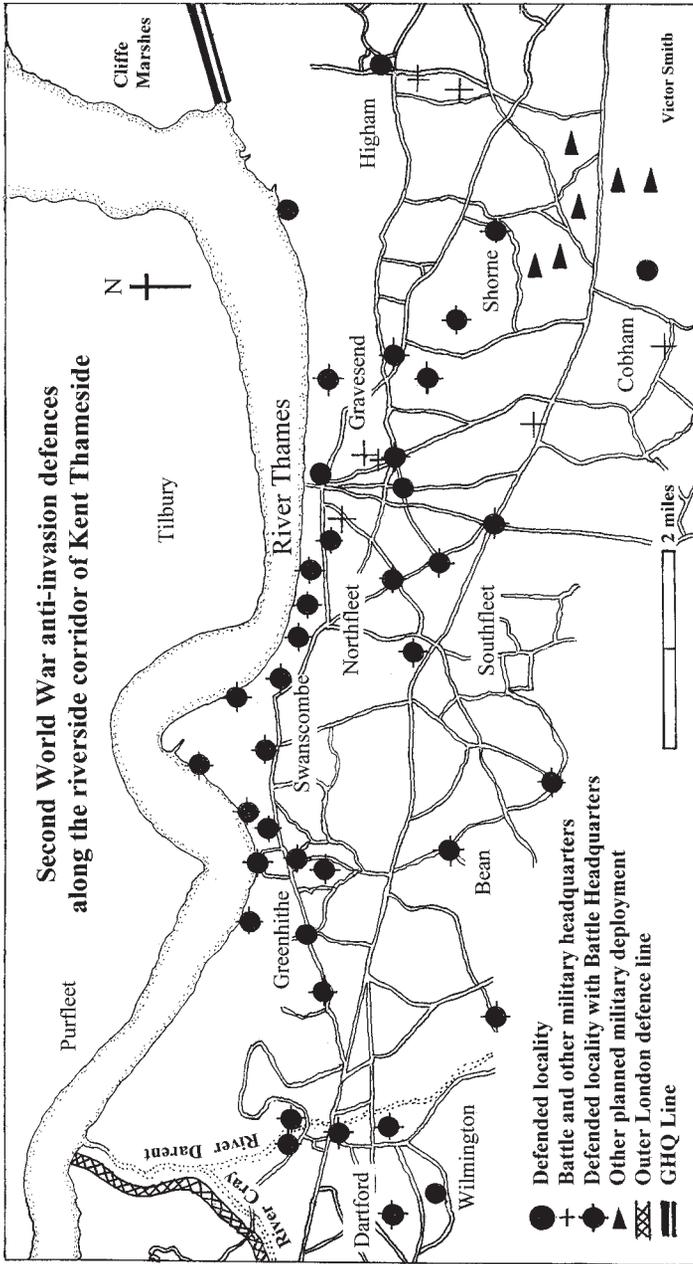


Fig. 8 Documented anti-invasion defences in Kent Thameside during the Second World War. Subsidiary to these was a proliferation of other points of resistance (Victor Smith).



Fig. 9 Second World War emergency battery at Shornemead Fort (Victor Smith 1969).



Fig. 10 Burch Road Second World War minewatchers' post, Northfleet (Victor Smith 2008).

anti-tank ditch terminating on the riverbank in an echelon of 5ft square concrete blocks (**Fig. 11**), with a supporting Type 24 pillbox. West of this line were a succession of defended localities to delay the progress of an enemy. There were road blocks and fire positions at intervals along



Fig. 11 Higham Second World War obstacle blocks (Victor Smith 2006).

the main roads which the enemy was expected to use, notably the lower road and Watling Street connecting to Rochester Bridge, and at numerous junctions in feeder roads and the wider road network, defended by firing positions and roadside bombing pits. Two surviving Type 24 pillboxes at the junction of Gore Green, Lillechurch and Buckland Roads at Higham are examples. At various places may be seen the conical concrete buoys to be rolled out into the road to impede the way. Other defended locations are known or implied from contemporary military reports and one or two surviving local maps, such as of the Westwood position, Betsham.⁸⁵ Usually, there were related Battle Headquarters in nearby public and private houses. Gravesend and Northfleet had extemporised defensive positions on access roads.⁸⁶ The River Darent itself, where the road passed over it in Dartford, was an anti-tank ditch. As in Northfleet, key industries in Dartford had their own defence forces.

Most of these defence positions were to be fought by the Home Guard, which had 4 battalions and parts of 2 others, totalling over 5,000 men, in Kent Thameside.⁸⁷ As well as operating conventionally, they were increasingly also trained in elements of a partisan form of warfare. For destroying tanks they were armed with improvised weapons such as the Blacker Bombard, Smith Gun, Northover Projector, Molotov and 'sticky' bombs.⁸⁸ They also had the other normal infantry weapons such as rifles and machine guns. Some Home Guard were integrated with units of the regular army, a force of manoeuvre for counter-attacks. The regular army had access to field artillery and anti-tank guns, with the reinforcement

of armoured units and support of bomber aircraft from outside the area. Regular army units at Milton Barracks in Gravesend and concealed in Shorne and Cobham woods were available as forces of immediate counter-attack. Mobile 4-in. guns, based out of the area at Halstow, were also available.⁸⁹ Special measures, including installation of retractable Picket Hamilton Forts, were made to protect RAF Gravesend against seizing by paratroopers.⁹⁰ Had it been known that Gravesend was to have been a right flank objective of the German Operation Sea Lion, it might have been more strongly defended.

To the west, the lower courses of the meandering rivers Darent and Cray, which partly defined the western extremity of Kent Thameside, were elements of the outer of triple concentric lines of anti-tank defences protecting the nearer approaches to London.⁹¹

Plans were made to destroy or disable wharves, cranes and local industry, denying their use to the enemy.⁹²

Fields and open spaces suitable for the landing of troop-carrying aeroplanes and gliders were obstructed with poles and other barriers. Some roads were erected with poles and anti-landing wires. Anti-aircraft batteries were also incorporated within anti-invasion defence: with the barrels of their guns depressed, they could be used against land targets of opportunity.⁹³

Under invasion conditions, many communities were to be controlled by 'Triumvirates', of civil, military and police representatives, working with their respective councils. Within Kent Thameside, these were established for Dartford, Stone, Swanscombe, Northfleet, Gravesend, Shorne, Higham, Wilmington, Sutton at Hone, Darenth, Southfleet and Longfield.⁹⁴

Latter stages of the Second World War 1942-5

Britain had been at its lowest ebb until 1941, following defeat in France, threat of invasion, devastation of the Blitz and starvation threatened by the German U-boat blockade. Matters improved from 1942 with the victory at El Alamein, and the home defences reached a strong condition. Northfleet was a centre of innovation in 1942-3 with the building at Red Lion Wharf of two types of naval and army concrete anti-aircraft forts, towed downstream to fill a gap in gun defence and radar cover in the estuary.⁹⁵ Designed by Guy Maunsell, they were lowered on to the seabed by flooding their hollow pontoon bases. Several remain. Archaeology survives in woods at Vigo of the need to expand the army for fighting back, in the remains of a vast area of five camps and training areas for pre-officer cadet selection, with provision for 20,000 cadets annually. Roads, hut bases and semi-buried structures and a trench system need investigation and survey.⁹⁶

Civil defence saw strengthening of some existing air raid shelters,

provision of further static water tanks and relocation and addition of air raid sirens. A replacement control centre was built at a new police station in Windmill Street, Gravesend, with a reserve centre at St Mary's School, Echo Square, in 1942.⁹⁷

By 1943 Germany was preoccupied with the war against Russia and the tempo of Allied raids on Europe. It had fewer resources to mount air raids on Britain, although attacks were still made. The days of German supremacy were over as she retreated west from Russia and as the Allies invaded Sicily. The threat of German invasion receded and defences against it were at lesser readiness. Even before 1944 some were abandoned as thoughts turned more to planning for the liberation of Europe, culminating in the Operation Overlord landings of 6 June 1944. An example of the preparation for this is the concrete shoreline hard in front of Shornemead Fort, on to the missing front section of which landing craft were to be loaded with supplies brought along a new cross-marsh road from a depot near Hoo junction.⁹⁸ At the Henley's Works at Northfleet was made part of Pipe Line Under the Ocean (PLUTO) for cross-channel petrol supply to the liberating armies. Aircraft from RAF Gravesend flew ground attack sorties during Operation Overlord but it was perceived as becoming a hazardous place from which to fly, being on the flight path of the new German V1 weapons being launched at London.⁹⁹ Hazards diminished by around October, following allied bombing or capture of launching sites, after which the V2 offensive predominated. Even this was much reduced by January, 1945.

Towns and landscapes were visibly more militarised than in the First World War. This was seen in the vastly more extensive defences, anti-tank ditches, roadblocks and air landing obstacles, the ubiquitous sandbagging of buildings, tape protection of windows and the pervasive civil defences. The sights and sounds of bombing raids and battles in the air were regularly experienced. Throughout the war, 7,000 high explosive and 527,982 incendiary bombs fell on Kent Thameside, killing 300 people, injuring 1,300 others as well as destroying 500 houses, with major damage to 2,000 more and lesser damage to 33,000. Although industry in Kent Thameside was bombed, its operations had not been critically affected.¹⁰⁰

Decommissioning of military and civil defences began before the end of the war, with a start made to demolish structures, and vehicles and equipment of the civil defence corps being disposed of.¹⁰¹

The Cold War 1946-90

Yet there was a new imperative from 1946-7 to strengthen military defence and rebuild civil protection against the threat believed posed to the west by the Soviet Union. In time this became a stand-off between two power

blocs armed with nuclear weapons and was labelled the Cold War. By now RAF Gravesend had returned to civil use, fighter protection being based elsewhere. Under the reductions of the Nucleus Scheme of 1946 for anti-aircraft gun defence, the battery on Dartford Heath (Z2), as well as Green Street Green (TS18), were designated for continuation.¹⁰² A proposal of 1948 called for the earmarking of part of Brewer's Wood, Shorne as a reserve site for 8 guns (TS 39).¹⁰³ There was a further adjustment in the Igloo Scheme of 1950, under which Northumberland Bottom (TS17) continued. For part of this time there was an anti-aircraft headquarters at Milton Barracks. As well as the availability of target detection from Chain Home radar elsewhere, from 1952 two posts for ground aircraft spotters were established on the roof of a block of flats at Dartford (C2) and in a field at Cobham (R1).¹⁰⁴ In the same year the Home Guard was reformed, with 3 battalions in Kent Thameside.¹⁰⁵

Technological inadequacy of ground-based guns against the new fast and higher-flying aircraft and guided missiles was soon recognised. These were discontinued after the mid 1950s, in favour of defence by high performance fighters and, where appropriate, by guided missiles. Static coast defence artillery was also outmoded, any sea borne threat in future to be countered by the navy and air force and, if necessary, mobile artillery. The coast artillery arm was abolished in 1956, those guns still operational downstream of Kent Thameside being withdrawn.¹⁰⁶

Aside from retention of Territorial Army units (until 1968 in Gravesham and until 1999 in Dartford), with regular army troops at Milton Barracks, Gravesend (closed in 1971), the focus within Kent Thameside became civil defence against the threat of attack with nuclear weapons. This was similar to the infrastructure of the Second World War, with civil defence control centres, reactivated wardens posts, air raid sirens, rescue, first aid and welfare units as well as designation of premises for emergency feeding.¹⁰⁷ This is exemplified in the extant control centres (1954-69) at Woodlands Park, Wrotham Road, Gravesend and at Council Avenue, Northfleet. The Gravesend control centre is a 65 x 45 ft. underground reinforced concrete box, with 13 rooms, divided between power supply, command and control, communications and dormitories. Reactivated centres at Overy Street, Dartford and Knockhall Chase, Greenhithe, no longer exist. Neither do warden or siren posts. Auxiliary Fire Stations have vanished as has an open-air civil defence training centre at Northumberland Bottom but two roofed training centres survive at Church Road Swanscombe and Vale Road, Northfleet. Some telephone exchanges had protected basements for the continuation of communication. These may survive. Replacing the surface observation posts at Dartford and Cobham in 1965, was a new underground post (A1) at Swanscombe for plotting the location of nuclear bursts and the spread of radioactive fallout.¹⁰⁸

Until the mid-1950s a nuclear war could be fought and won or, at least,

survived. But with the increasing numbers of weapons and the appearance of the dramatically more powerful hydrogen bomb came the prospect of annihilation. By the mid-1960s government took the view that given the likely scale of attack, the level of affordable civil defence could not have coped. Against the background of a balance of payments crisis, the Civil Defence Corps stood down in 1968, with civil defence largely discontinued but with retained ability to maintain communications, subject to modified arrangements after Local Government Reorganisation in 1974.¹⁰⁹ Against a perceived revived Soviet threat in the later 1970s/early 1980s, civil defence was resurrected as the short-lived Community Volunteer Scheme. This utilised existing buildings earmarked as contingency community headquarters and rest centres but new control centres were established at the civic centres of Dartford and Gravesend, their accommodation now being in other use.

All was abandoned after the end of the Cold War in 1989/90. But against the new threat of international terrorism history has repeated itself in Kent Thameside, as elsewhere, with new contingency planning, centres for co-ordinating incident response, places at which to care for evacuees from elsewhere as well as a limited new structural signature.

Conclusion

By as early as 1908 increased ranges of artillery and its transfer downstream ended 400 years of Kent Thameside's inclusion within the permanent establishment of anti-shipping gun defence (with only temporary gun positions at Shornemead Fort during the Second World War). This has left a national exemplar of one of the new-pattern batteries for breech-loading guns at New Tavern Fort, built in 1904 on the cusp of that change. By the First World War the threat of aviation technology and air bombing led to military and civil defence counter-measures, part of larger strategic protective systems. This was the path on which Kent Thameside continued interwar, becoming part of a tract of a larger militarised landscape during the Second World War. Expressing a nation in arms, the large manpower of the Home Guard permitted development of the in-depth and delaying 'trip wire' strategy of home defence against invasion. Likewise the more serious air bombing threat led to the creation of the omnipresent infrastructure of civil defence. The Cold War saw locally based military defence removed and the area absorbed into a ubiquity of wider civil protection against the threat of nuclear Armageddon, now itself succeeded by new measures against terrorism.

Further research, especially archaeological investigation, offers prospects for learning more about the submarine mining establishment next to Shornemead Fort. The same applies to the air defence gun batteries during the First World War. The preparations for defence during

the Munich Crisis may be further elucidated. Exhaustive search in the War Diaries of military formations would allow collection of more detail of the anatomy of Second World War anti-invasion defence. There are perhaps other opportunities for archaeological work. The declining structural signature of the Second World War demands preservation in the record by survey including, most importantly, the Henley industrial air raid shelter tunnel complex at Northfleet, a gas decontamination centre, and a war mortuary in Gravesend, a mine watching post, a large public tunnel shelter and a Territorial Army drill hall, all in Northfleet, heavy anti-aircraft batteries at Dartford Heath, Cobham and Green Street Green, the pre-OCTU camp at Vigo and, from later years, a Cold War bunker at Northfleet. Knowledge of civil defence preparations during the later Cold War has yet to be fully revealed.

The facility to be able to see our twentieth-century defences, even if externally, is important and preparation of a trail leaflet would be a logical next step. Visual access has been compromised by recent demolition of two rare air raid warden posts at Northfleet and Gravesend but is possible along the riverside in respect of the mine watching post at Northfleet, the breech-loading battery at New Tavern Fort, Milton rifle range (from the riverbank), the Operation Overlord hard, road and pillboxes at Shornemead Fort, as well as the GHQ Line, obstacle blocks and a pillbox at Higham Creek. Inland may be seen further pillboxes at Higham, the air raid shelters and hut bases of RAF Gravesend's dispersed accommodation camp at Shorne Country Park and Ashenbank Wood, Gravesend's gas decontamination centre at Cedar Avenue as well as the Cold War bunker at Woodlands Park, which is open to visitors. Some traces may be seen of the anti-aircraft battery on Dartford Heath. The anti-aircraft battery at Green Street Green is a riding stable and currently access is not possible. An important omission from possibility of access is the Henley air raid shelter complex, at Northfleet. Another possibility for trail access is the Lodge Lane heavy anti-aircraft battery at Cobham. Improvements might be made to the interpretation of the pre-OCTU camp within the country park at Vigo. Even some of the pre-existing civilian buildings used for military and civil defence purposes might be included within a trail leaflet. A number of the sites merit statutory protection to ensure their survival.

This paper is in itself part of an initiative for educational access to this resource. The raw data on which this study has been based will be available through Kent County Council's on-line Historic Environment Record (www.kent.gov.uk/HER). Kent County Council's booklet *Gravesham at War* and the leaflet *Crossfire*, which contains twentieth-century elements, have already appeared. Other outputs are being considered.

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ENDNOTES

¹ This supplements A. Saunders and V. Smith, *Kent's Defence Heritage* (KCC, 2001), which included a sample of twentieth-century sites and which called for more extensive study.

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⁵ *Ibid.*

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¹² *Ibid.*

¹³ *Handbook for the London Defence Positions* (War Office, 1903).

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²⁴ Minutes of the General Purposes Committee of Dartford UDC, 26 February 1918.

²⁵ Readily apparent from a study of a variety of Ordnance Survey maps of the period.

²⁶ S.K. Keyes, *op. cit.* (see note 14).

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²⁹ F.A. Mansfield, *History of Gravesend* (Gravesend c.1930), 157.

³⁰ V. Smith and J. Elford, *op. cit.* (see note 11).

³¹ V. Smith, *op. cit.* (see note 9).

³² NA WO33/311.

³³ F.A. Mansfield, *op. cit.* (see note 29), 133.

³⁴ NA CAB3/2/48.

³⁵ NA WO33/311 and 671.

³⁶ *Royal Engineers Journal*, September 1939, with a further description in V. Smith, *The Gravesend Blockhouse* (Thames Defence Heritage, 2000), 23.

³⁷ V. Smith, 'The Gravesend Volunteers 1914-18', *The Gravesend Historical Society Transactions* (1972), 12-16.

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- ⁵⁰ *Ibid.*, 16.
- ⁵¹ D. Wood, *op. cit.* (see note 20), 295.
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- ⁵³ F. R. Turner, *Gravesend Airport 1939 to 1945* (Gravesend, 2001), 3.
- ⁵⁴ W.L. Platts, *Kent – the County Administration in War, 1939-1945* (KCC, 1946).
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- ⁵⁶ J.B.S. Haldane, *ARP* (London, 1938).
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- ⁵⁸ P. Connolly *et al.*, *Gravesend Airport in Photographs* (Gravesend, 1997), 33.
- ⁵⁹ Minutes of Strood RDC, 4 November 1938.
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- ⁶² CKS *Air Raid Precautions – Vulnerable and Shelter Areas*, 1 April 1939.
- ⁶³ W.L. Platts, *op. cit.* (see note 54).
- ⁶⁴ Minutes of the Emergency Committee of Gravesend Corporation, 29 September 1939.
- ⁶⁵ CKS, untitled map of Kentish Nodal Points and Blitzemerge areas, 22 October 1941.
- ⁶⁶ Numerous mentions in the Emergency, Air Raid Precautions and other committees of the councils concerned, individually referenced in the on-line database.
- ⁶⁷ *Ibid.*
- ⁶⁸ *Ibid.*
- ⁶⁹ *Ibid.*
- ⁷⁰ *Ibid.*
- ⁷¹ W.L. Platts, *op. cit.* (see note 54).
- ⁷² See note 66.
- ⁷³ C. Dobinson, *op. cit.* (see note 52).
- ⁷⁴ *Ibid.*
- ⁷⁵ *Ibid.*
- ⁷⁶ Location statement for the 6th AA Division (Thames Defence Heritage archives).
- ⁷⁷ F. Turner, *op. cit.* (see note 53).
- ⁷⁸ V. Smith, 'The Camps at Ashenbank Wood', *Historic Gravesham 1999*, 16-17.
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- ⁸⁵ Undated contemporary manuscript map in the Thames Defence Heritage archives.
- ⁸⁶ From map references in RE Museum CHARE 9410.8, *Gravesend Sub-Area – Plan to Defeat Invasion* (War Office, 1 September 1941).

- ⁸⁷ K.R. Gulvin, *Kent Home Guard* (Rainham, 1980), 12-15.
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- ⁸⁹ NA WO199/2479.
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- ⁹⁴ See note 65.
- ⁹⁵ F.R. Turner, *The Maunsell Sea Forts* (Gravesend, 1994).
- ⁹⁶ P.G. Baylis, *The History of the Pre-Officer Cadet Training Unit at Wrotham (Vigo), 1942-6* (priv. published, undated).
- ⁹⁷ See note 66.
- ⁹⁸ C. Dobinson, *Twentieth Century Fortifications in England, V, Operation Overlord* (CBA, 1996).
- ⁹⁹ F.R. Turner, *The W.T. Henley Telegraph Works* (Gravesend, 2001), 7 ; F.R. Turner, *op. cit.* (see note 53), 16.
- ¹⁰⁰ W.L. Platts, *op. cit.* (see note 54).
- ¹⁰¹ See note 66.
- ¹⁰² C. Dobinson, *op. cit.* (see note 52).
- ¹⁰³ Annotated map in the archive of Thames Defence Heritage.
- ¹⁰⁴ D. Wood, *op. cit.* (see note 20), 295.
- ¹⁰⁵ K. Gulvin, *op. cit.* (see note 87).
- ¹⁰⁶ K.W. Maurice-Jones, *The History of Coast Artillery in the British Army* (London, 1959).
- ¹⁰⁷ A. Saunders and V. Smith, *op. cit.* (see note 1), 147-165 and 243-248.
- ¹⁰⁸ D. Wood, *op. cit.* (see note 20), 295.
- ¹⁰⁹ A. Saunders and V. Smith, *op. cit.* (see note 1), 147-65.

