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Stokes Bay, Gosport: Five Centuries Of Coastal Defence

Mike Williams and Olaf Bayer

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Cover image: Looking north east across the eastern end of Stokes Bay towards Portsmouth Harbour.
Image shows the eastern end of the Stokes Bay Lines from Battery 4 to Gilkicker Lake (33561_002
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Stokes Bay, Gosport: Five Centuries Of Coastal Defences

Mike Williams and Olaf Bayer

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SUMMARY

This report summarises the results of a programme of archaeological and architectural research undertaken by Historic England's Historic Places Investigation Team (West). Research focused on the development of Stokes Bay's coastal defences from the late 16th to mid-20th century. This includes the mid-19th century Stokes Bay Lines and associated forts, and structures created in 1943-4 in preparation for D-day.

CONTRIBUTORS

This report was researched and written by Mike Williams and Olaf Bayer. Fieldwork was carried out by Olaf Bayer, Mike Williams, Mark Bowden and Trevor Pearson. Aerial photographs were taken by Damian Grady.

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INTRODUCTION TO THE STOKES BAY DEFENCES AND RELATED DEVELOPMENT

Introduction

Stokes Bay overlooks The Solent at the south end of the Gosport peninsula, between Portsmouth Harbour to the east and Southampton Water to the west. It has long been recognised as a strategically-important position in the outer defences of Portsmouth Harbour and has seen an unusually wide range of defensive building, spanning the period from the Spanish Armada 1588 to the Second World War 1939-45. The defence of Stokes Bay was perceived to be vital to national security, so its redoubts, batteries and forts reflect four centuries of military planning. By the mid-20th century, the factors that had previously made the bay vulnerable to invasion also made it eminently suitable as an embarkation site for raids into occupied Europe, and the earlier defences were reused and extended in the large-scale preparations for D-Day in June 1944. In the late 20th century some of the defensive sites gradually disappeared while others were retained as prominent landscape features, but the area's military history continued to influence both residential development and its transformation into a seaside resort for visitors and tourists. This introduction outlines the historical context of defensive building in Stokes Bay and provides a chronology of its development (study area shown in Fig 11 and 12). Full use has been made of a variety of publications, reports and websites, notably the work of Moore (2010; 2011), Saunders (1989), Williams (1973; 1974; 1979) and Hind and Phimester (2014).

Location

The shoreline of Stokes Bay is a crescent-shaped south-west facing shingle beach, running from Browndown Point at its north-west end to Gilkicker Point in the south-east. Behind the beach is a low-lying open area that was formerly a tidal marsh. Located close to the historic military town of Gosport, Stokes Bay is now characterised by a mixture of suburban and seaside development but also retains evidence of an unusual variety of historically-significant coastal defences that were built between the late 16th and the mid-20th century (Fig 1).

The distinctive coastal topography, formed in part by the longshore drift of shingle from west to east, remained largely unaltered until the 18th century and was a significant influence on later development. The marsh behind the beach included the course of the River Alver and a lake, and was bounded on its inland side by a low natural cliff or bluff. The river initially flowed south to reach the north-west end of Stokes Bay, but was diverted south-eastwards by the shingle at Browndown Point. It meandered through the marsh and the lake before turning south again to reach the sea near Gilkicker Point. The Stokes Bay Marsh, the natural watercourse, the lake and the cliff to the north were all adapted in the construction of a succession of defensive earthworks. Upstream of Stokes Bay the river flowed through Gomer Marsh, which was also utilised as part of the defences (Fig 2).



Figure 1. Stokes Bay extends from Gilkicker Point (bottom left) to Browdown Point. The area was used for important coastal defence building from the late 16th to the mid-20th century (33561_023 26/06/2018 © Historic England Archive).

The Stokes Bay defences

The long history of defensive works in Stokes Bay was influenced by international politics, the perceived threat of invasion and by developments in military planning and weaponry. The nationally-important naval facilities at Portsmouth and Gosport were increasingly defended from the 16th century, but Stokes Bay was also close to a deep-water anchorage in one of the main shipping routes to Portsmouth Harbour. Together with its open shingle beach this made it a potentially valuable landing site for an invading force.

The early defences of the 16th and 17th centuries emphasised the construction of fortifications closer to Portsmouth and Gosport. By the 18th century, however, the increasing range of artillery and the threat of invasion led to the expansion of defences into the surrounding area, including Stokes Bay. From the late 18th to the mid-19th century the new forts and batteries reflected the latest thinking in military design, but they were continually updated to keep abreast of new technologies. In the second half of the 19th century further development at Stokes Bay formed part of a national programme of defence building fuelled by concerns about a possible war with France. Within a few decades, however, developments in the technology of warfare meant that the Stokes Bay defences were already becoming obsolete.

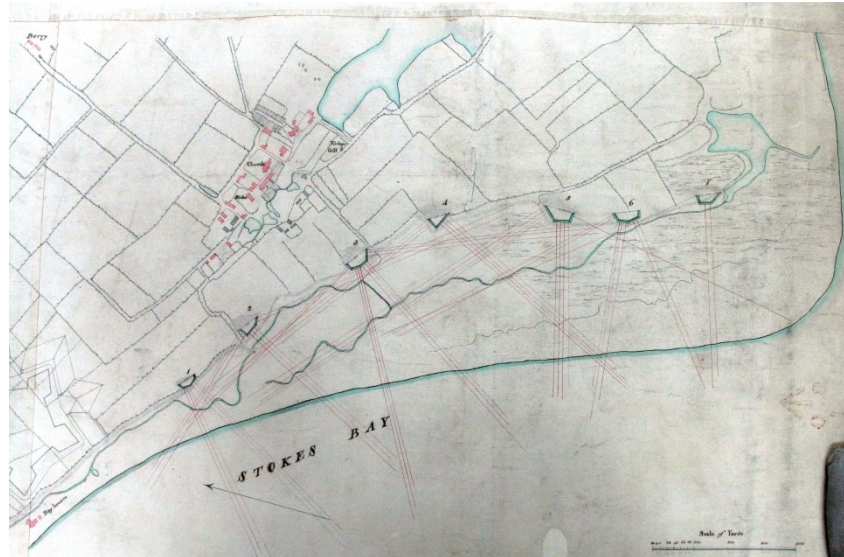


Figure 2. 1782 plan showing proposals for redoubts and a fort (Ground near Stokes Bay showing Batteries and proposed pentagon, 1782, The National Archives MR1 1173).

The earliest defensive structure was probably a tower named Haselworth Castle, built at the south-east end of the bay in the mid-16th century. In the 1780s Fort Monckton was built on this site, and a line of six redoubts established along the low cliff to the north of the marsh. In the early and mid-19th century Gosport's outer defences were greatly improved as part of a national programme of defence building, which included several phases of development at Stokes Bay. The marsh behind the beach was drained by the early 19th century and acquired for military use. From the 1850s the first defensive works were built on Gilkicker point, initially comprising an outer redoubt of Fort Monckton but replaced between 1863 and 1871 by the surviving Fort Gilkicker. In the same period an outer defensive ring of five new forts, Gomer, Grange, Rowner, Brockhurst and Elson, were built to the north west of Stokes Bay to form the Gosport Advanced Line. This was defensive building on a huge scale. The forts and batteries were largely obsolete by the early 20th century, but most continued to be occupied by the military until at least the Second World War.

The largest defensive structure was the Stokes Bay Lines built in the 1860s, which replaced the earlier redoubts and was perceived to be a vital addition to the defences of Portsmouth Harbour. The Lines comprised an extensive rampart, moat and gun batteries that filled the gap between the forts at either end of the bay (see Fig 13 and 17). The strategic value of the defences declined in the early 20th century, but in the Second World War Stokes Bay was again used extensively for military purposes, including four embarkation hards, army and navy camps and a heavy anti-aircraft position. The methods and technology of warfare changed dramatically but the strategic position of Stokes Bay ensured that the area continued to play a significant role, notably in the preparations for D-Day and support of Operation Overlord, including two sites used for building components of prefabricated Mulberry Harbours. Some of these features were partly retained in the development of seaside and visitor facilities from the 1950s.

Settlement

Prior to the late 18th century Stokes Bay was sparsely populated. The main settlement was the village of Alverstoke, located about 500 metres north-east of the shore at the

head of Stoke Lake, an inlet of Portsmouth Harbour. From the mid-16th to the mid-20th century the growth of roads and settlement was closely related to the area's defences, which eventually dominated the landscape and limited the scope for other types of development. By the late 19th century the forts and other defences were connected by a series of Military Roads, most of which influenced the later growth of suburbs, and the extension of the Gosport railway to a pier in Stokes Bay provided further opportunities for defence building. Related developments included various naval experimental sites and engineering facilities used for the construction of the Solent Forts.

Suburban development took place on farmland around the village of Alverstoke to the north of Stokes Bay. Of particular interest was the new settlement of Anglesey, built from the early to the mid-19th century, with prestigious town houses and villas that were typical of the fashionable seaside architecture of the period. From the mid-19th century several other large detached villas with extensive grounds were built to the west along Stokes Bay for wealthy owners, most of which were later requisitioned for military uses. The area is now dominated by extensive mid- to late-20th-century residential development, absorbing the village of Alverstoke, the forts and the military roads.

CHRONOLOGY OF DEFENSIVE AND SUBURBAN BUILDING IN STOKES BAY

Mid- to late 16th century: the early defences

The earliest defensive structure in the area is a medieval motte and bailey earthwork near Apple Dumpling Bridge, about 1.5Km to the north-west of Stokes Bay, which may have guarded a crossing point on the River Alver where it joined Gomer Marsh (NGR: SU 58436 00100; NHLE 1008694; Williams 1974, 10). It was not related to the later defences, which were associated with the expansion of the navy and its Portsmouth base from the early 16th century. A number of key defensive positions around Portsmouth Harbour were already established by the mid-16th century, including those around Portsmouth itself and at Stokes Bay. The Cowdray Engraving of c1545-8, depicting the Battle of the Solent and the sinking of the Mary Rose, shows a tower or keep close to the site of Fort Blockhouse and a similar tower further west, on the site of later Fort Monckton, which is identified as Haselworth Castle (Williams 1974, 7, fig 3, 10-14). Between the two is shown a circular defensive earthwork, known as Lymden's Bulwark, close to the site of the later Haslar Hospital (Williams 1974, 10-14; Williams 1979, 8-11). The first statements regarding the need to improve the defence of Stokes Bay itself, and its potential use as an invasion site, date from 1587 and 1588. A proposal by the Earl of Sussex, followed by a Submission to the Privy Council (written about one month before the Spanish Armada attempted to anchor in the Solent) recommended rebuilding Haselworth Castle, adding a sea wall and modifying the cliff behind the Stokes Bay Marsh to form a defensive feature (Williams and Williams 1973, 12; 1979, 43-4). It is not clear if these works were carried out at that time, but later maps suggest that parts of the cliff had been straightened by the turn of the 19th century.

Mid- to late 17th century: the inner defences of Gosport and Portsmouth

The 17th century saw major improvements to the fortifications enclosing Gosport and Portsmouth but relatively little concern for the coastal defences in Stokes Bay. Between c1669 and c1679 the defence of Gosport was significantly improved by the construction of the Gosport Lines to the designs of Sir Bernard de Gomme (Fig 2). The new defences included Fort Charles on the north side of the town and, in 1667, a redoubt for about 20 guns on the site of Fort Blockhouse. This was the first permanent structure on the Fort Blockhouse site, overlooking the entrance to Portsmouth Harbour. The nearby 16th-century tower and Lymden's Bulwark were no longer extant by the early 17th-century (Williams 1974, 26-32; 36). Haselworth Castle was also in ruins by the early 17th century but was replaced by a navigation landmark (a tower or obelisk) known as the Gilkicker; when aligned with a second landmark in Alverstoke village it enabled ships to locate the entrance to Portsmouth Harbour (Williams 1979, 13-14).

18th century: expansion of defences into Stokes Bay

The emphasis on improving the fortifications of Gosport itself continued up to the mid-18th century. The construction of six gun platforms or redoubts in Stokes Bay was first proposed in 1707, but plans for defending Stokes Bay were not implemented until the threat of invasion increased in the wars of the late 18th century. At Gosport, Fort Blockhouse was built around the earlier battery between 1708 and c1714, and extended again in 1799 (Williams 1979, 22-25). The Gosport Lines were also substantially rebuilt in a major building programme between 1748 and c1802 (Williams 1974, 40-46). The

later expansion of defences at Stokes Bay was in part a response to the American War of Independence, 1775-83. The construction of gun positions and other defences was recommended by General Monckton in 1779 and carried out in 1782-3 (Williams 1979, 58). A map of 1782 shows seven redoubts, either built or proposed, on the edge of the cliff behind the Stokes Bay marsh; the cliff itself is also shown but does not appear to have been straightened at this date (Fig 3). The map also shows the ranges of the guns, suggesting it shows a proposed plan for the defences, including a seventh redoubt at the north-east end of the line.

The proposals for Stokes Bay defences included two new forts at opposite ends of the bay, one near Gilkicker Point, on the site of Fort Monckton, and the other near Browndown Point, although the latter was shown on the 1782 map but not built. The first temporary fort at the Monckton site was formed with an earthwork embankment, and had 24 guns in embrasures by 1782 (Williams 1979, 44-5). A 1779 plan shows a proposed fort of polygonal design, although a navigation chart published in 1801 shows a rectangular fort in this position with projecting bastions at each corner (Williams 1979, 44; Map 739, published 12-8-1801, Portsmouth History Centre). Work on a permanent Fort Monckton was completed by 1789-90, replacing the temporary structure with the triangular plan of the present site.

Comparison of Fort Monckton with late 18th century plans indicates that most of the original fort survives intact, with later alterations adding to the original structure rather than replacing it (Fig 4; Fort Monckton is not open to the public). Its design combined the established features of the bastioned fortress with some advanced new features. It was built to defend the main approach to Portsmouth Harbour from the west, with a main battery of 22 casemated guns housed in a straight curtain wall facing The Solent. Casemates were an advanced feature that became more common in mid-19th century defences. A single storey barracks block was built above the casemates; a pair of octagonal cookhouses were built to the rear of each end of the barracks block but do not survive. Officer's quarters were added to both ends of the barracks in the early 19th century. The main ramparts were built to a roughly triangular plan with bastions at the main apexes flanking curtain walls (Williams 1979, 45-7). An additional pair of bastions flanked the seaward-facing battery. All five bastions and the landward-facing ramparts were built in Purbeck stone and had top-mounted guns in embrasures, a more typical 18th century arrangement. The ramparts and bastions were enclosed by a dry moat. Another advanced feature was the use of two caponiers, projecting into the dry moat behind the bastions flanking the seaward-facing battery. The caponiers were strongly built in brick to a distinctive arrow-head plan and provided additional cover for the ends of the dry moat, which were open to the beach. The main entrance to the fort was a substantially-built two storeyed gatehouse in the centre of the north-facing curtain wall, flanked by the embrasures of the projecting bastions. The original magazine was of massive brick-vaulted construction and survives partly intact.

The fort was surrounded by an extensive system of defensive earthworks, originally more than double the area of the fort itself, most of which are well maintained in the same layout shown on the early plans (Fig 4). The dry moat was enclosed by a covered way and a glacis, defined by stone-walled embankments which conform to the polygonal plan of the bastions and ramparts. The lake in the course of the River Alver, which formerly entered the sea to the west of the fort, was adapted to form the western limit of the glacis (Williams 1979, 57). The covered way included two triangular ravelins projecting into the glacis, sited in front of the fort's curtain walls. It was spanned by ten traverses, low-



Figure 3. Part of the defensive rampart and moat built at Gosport in the late 17th century by de Gomme, running from mid-left to upper right of the image. Below is an early 20th century naval fuel depot (26941_003, 19/04/2011, © Historic England Archive).



Figure 4. Fort Monckton, completed in 1790 and still occupied by the MOD (26941_041, 19/04/2011, © Historic England Archive).

walled embankments intended to prevent flanking fire, one of which survives. The surface of the glacis is now occupied by a golf course, but remains open across most of its original extent. The road entering the fort from the north was defended by a detached triangular earthwork, referred to as redan or redoubt in contemporary plans, which partly survives by the golf clubhouse.

A related development near the north-west end of the bay was the establishment of two military brickworks from 1788, both sited above the cliff. They supplied bricks for local building and for export via a jetty on the beach. The current drive to the Alverbank Hotel may be on the site of the access road to the brickworks (Williams 1979, 63-5).

The open area between Fort Monckton and Fort Blockhouse saw further large-scale military development from the mid-18th to the early 19th century. This included the extensive Haslar Hospital, established between 1745 and 1798, which remains intact along with numerous 19th and 20th century additions. The adjoining site to the south-west was occupied by the Haslar Barracks from c1802. This was later modified for use as a hospital, a Detention Centre and an Immigration Removal Centre, but retains most of its original layout and is a rare partial survival of a small barracks dating from the Napoleonic Wars (Fig 42, 43 and 44).

Early to mid-19th century

Following the conclusion of the war in 1814 there was relatively little development of the Stokes Bay defences for several decades. From the late 1840s, however, renewed concern about a possible war with France led to a dramatic increase in defence building along the whole of the south coast, and new fortifications were built in Stokes Bay which fulfilled a vital role in the defence of Portsmouth Harbour. In Gosport, Fort Blockhouse saw further building from 1840 to 1863, including a new bastion and the extension of the earlier casemates (Williams 1974, 38), but in this period it was recognised that the outer defences needed considerable improvement.

The great expansion of the Stokes Bay defences in the mid-19th century took place in two main stages. The first was short-lived, comprising three new batteries built in the 1850s, one at Gilkicker and two at Browndown, along with Fort Gomer to the north-west and Fort Elson to the north of Gosport (none of these structures survives intact). This was a major expansion of the earlier defences but was soon criticised for being wholly unsuited to the level of threat. Public criticism, by James Fergusson in particular, led to the formation by Lord Palmerston of a Royal Commission on the Defence of the United Kingdom in 1859. (James Fergusson was a Treasury official, archaeologist and military expert; he published a series of critical papers on national defences and represented the Treasury on the Royal Commission (Saunders 1989, 161,164,171)). The Royal Commission's general report in 1860 led to a massive expansion of the defence-building programme, with the construction of Palmerston-era forts and related defences along the whole of the south coast. The recommendations included replacing the existing Stokes Bay defences with the Stokes Bay Lines and completing an outer ring of forts to protect Gosport and Portsmouth Harbour from the landward side.

The new scheme recognised the strategic importance of Stokes Bay by treating the whole area as a defensible landscape, with a range of connected features built between c1860 and c1869 that reflected current thinking in military planning. (The original form of the Stokes Bay Lines and later alterations are shown on a series of War Department plans

dated 1892: Historic England Archive WD670 (Fig 17), WD671, WD675, WD676, WD677 and WD678). It was designed by Colonel WFD Jervois, Assistant Inspector General of Fortifications, but was heavily influenced by the earlier recommendations of James Fergusson. The largest feature of the Stokes Bay Lines is an earthwork rampart fronted by a ditch, which extended for 2.7 Km (1.7 miles) along the full length of the bay. Five new batteries were built into or immediately behind the rampart, which were of varied designs to defend either the area behind the beach or the Lines themselves. The layout of the moat and rampart was partly determined by military requirements and partly by the coastal topography, comprising a series of angled straight sections built on the low-lying area between the beach and the higher ground to the north. Most of the batteries projected forwards to enable guns to fire parallel with the rampart, along the moat, and were close to the positions of the earlier redoubts and batteries built in the late 18th and the mid-19th century. The angled plan ensured that flanking fire from the batteries could cover the full length of the Lines while avoiding each other's range of fire (Fig 5).



Figure 5. The angled design of the Stokes Bay Lines had a marked influence on later development (33560_027 26/06/2018 © Historic England).

The natural drainage of Stokes Bay was altered considerably during the construction of the Lines. The lower course of the River Alver, which formerly meandered through the area behind the beach, was filled in and the river diverted into the moat. Sluices were installed later to better control the water level in the moat and divert excess river water directly into the sea. Upstream of the Lines, to the north of Battery 2, the river was straightened and additional sluices could be used to flood the tidal marsh as an additional defensive measure.

The batteries constructed with the Lines were numbered 1 to 5 from north-west to south-east. They included magazines, shell stores and a variety of ancillary buildings in addition to the gun positions. The smaller batteries were the same height as the adjacent

sections of the main rampart with guns in open embrasures. The outer ends of the Lines were defended by the much larger Batteries 2 and 5, which were built above the level of the rampart to cover a larger area; both survive intact as prominent features of the Stokes Bay landscape. Battery 2 was built with casemated guns but these were later replaced by larger guns in concrete emplacements on the parapet. A full-height embankment was built at the same time to provide additional protection, blocking most of the casemates. The battery was originally completely enclosed by an extension of the moat and could only be entered via a bridge. Battery 5 was built behind the main rampart of the Lines on top of the natural bluff, probably on the site of one of the late 18th century redoubts. It was a different design, more typical of the gun positions that pre-dated the Lines, with splayed earth ramparts containing magazines and guns mounted in embrasures on the parapet. The batteries were disarmed before the First World War, but re-occupied for a variety of military uses in the Second World War. In the 1950s Battery 5 became a noted centre for naval research, carrying out important experiments in diving and submarine rescue (British Pathe website film clips *Deep Diving Trials Unit* 1965 and *Deep Dive Simulator* 1966 show deep diving experiments at the Royal Naval Physiological Laboratory, Battery No.5).



Figure 6. Fort Gilkicker was built in the 1860s to defend the western approach to Portsmouth Harbour (33561_015 26/06/2018 © Historic England).

Another major addition to the Stokes Bay defences was the construction of Fort Gilkicker, which still dominates the headland at the south-east end of the bay (Fig 6). The first defensive position on this site was an Auxiliary Battery of Fort Monckton built in 1858, comprising earthwork ramparts built to a splayed three-sided plan similar to that of Battery 5. It was connected to the fort by a long rampart. The battery had embrasures for eleven guns and faced south-west to defend both the western approach to Portsmouth Harbour and Stokes Bay beach. It was one of the defences to be criticised as inadequate in the late 1850s, and it was replaced by a south-facing fort whose primary role was to cover the approach to the harbour; Stokes Bay itself would be defended by the

newly-built Stokes Bay Lines. The extant Fort Gilkicker was built in granite and redbrick between 1863 and 1871. It was a semi-circular two-storeyed design containing an array of twenty two casemates, below which were the magazines and shell stores. The semi-circular yard to the rear was enclosed by a straight range containing officer's accommodation, peacetime barracks for the gun crews and stores, in the centre of which was the arched main entrance. The fort was designed to accommodate a complement of five officers and 220 men. The casemates originally contained 9-inch to 11-inch smooth-bore guns, with an additional four 12-inch guns mounted in embrasures on the parapet. Each casemate included a small heated barracks for the crew behind the gun. Fort Gilkicker represented the state of the art in coastal defence building when designed, but its armament was soon made obsolete by the introduction of rifled breech-loading guns from the late 1850s. It was partially re-armed in 1888, along with Browndown Battery to the north-west of Stokes Bay, in a scheme to improve the defences of major ports, and in c1906 the casemates were blocked and modern guns installed in new positions on the rampart. At this time the outer face was protected by the addition of an earth embankment, similar to that added to Battery 2.

Suburban Development

The suburban development of Stokes Bay began in the late 1820s with the prestigious new settlement of Anglesey. Built on the higher ground overlooking the eastern half of The Lines, Anglesey is arguably the finest grouping of Regency and early-Victorian seaside architecture in the Gosport area. Its distinguished centrepiece is the Crescent, a sweeping terrace designed by Thomas Ellis Owen in 1828. Described as a "noble range of mansions", the Crescent is of three storeys with attics and basements, distinguished by a Doric colonnade running along the front between the end and central pavilions, which are decorated with Ionic columns (Anon 1841, 92). Ornamental gardens across the road in front of the Crescent originally contained a Bathing Station in classical style, since demolished (Fig 7). The development continued to the west and north of the Crescent with four detached villas and St Mark's Church, which was added in 1840 (demolished 1911; graveyard intact). Many of the residents of the Crescent were military personnel, especially naval officers, though it is unclear if they were active or retired. In 1913-14 the local directory revealed that it was still occupied by military officers, though by this date they were senior officers including a Rear Admiral and a Major General (Kelly 1913, 39).

Further west, several notable grand villas, some with extensive gardens, were built overlooking Stokes Bay for wealthy owners in the mid-19th century (summarised from www.fortgilkicker.co.uk/houses). Most were built on land that was purchased from the Ordnance Board, and later influenced the development of roads and suburbs. The largest was Bay House, designed by Decimus Burton for Lord Ashburton (Alexander Baring, financier) in 1840-42 and built just north of Battery 2. It was occupied by the Sloane-Stanley family before being requisitioned in the Second World War and used for the development of amphibious vehicles (see below). Following acquisition by Gosport Borough Council it has been used as a school and the extensive grounds converted into Stanley Park. Alverbank was built to the east in 1840 in Romantic Tudor style for the Rt Hon John Wilson Croker, former Secretary to The Admiralty, with high profile visitors including Queen Victoria, Prince Albert and their son Prince Alfred. It was extended in 1912 and survives as a hotel. Further east, adjoining the Anglesey development, Monckton House, described as a Late Regency villa, was built in 1850 for James Biden, a prominent Gosport brewer. It was also requisitioned in the Second World War and from 1951 has been used as the Royal Naval Medical School and Physiological Laboratory.



Figure 7. The Crescent was designed by Thomas Ellis Owen in 1828 (Photograph Mike Williams, 16/07/2015, © Historic England).

Late 19th century

Within a few decades of their construction the Stokes Bay Lines and nearby forts were already being superseded by the increasing range and accuracy of new types of artillery, and no major additions were made to the defences in the late 19th century. From the 1880s the earlier casemated guns were replaced with new types of guns mounted on the ramparts, including rifled breech-loading guns, which required new concrete gun positions and alterations to magazines, shell stores and fire control equipment. The larger sites were increasingly used as barracks, notably for the Royal Engineers who were stationed at Fort Monckton from the 1870s, and the open areas used for additional camps, known as “hutments”. Non-military development increased in the area, including the construction of a railway and pier in 1862-3. The railway was a branch of the main London and South Western Railway line to Gosport, and the pier offered direct connections to Isle of Wight ferries. Stokes Bay continued to be largely occupied by the War Department and the Admiralty, however, including the establishment of important research and engineering facilities in support of coastal defence and the navy.

A major addition from the mid-1860s was the yard, buildings and a private pier built by the engineer John Leather for the construction of the Solent Forts; the same firm had completed the building of Fort Gilkicker. The four sea forts, one of the recommendations of the Royal Commission, were built between 1865 and 1880. Their construction was a major feat of engineering which was supported by extensive onshore facilities. The site at Stokes Bay, west of Fort Gilkicker, included a branch of the Stokes Bay railway and was used for preparing the stone and concrete blocks, which were transported from the pier to the construction sites in the Solent. Following the completion of the sea forts the yard and buildings were acquired by the Royal Engineers and used as a Submarine Mining Establishment and a School of Electric Lighting. A narrow-gauge military railway was built in the 1880s to connect the site with Forts Monckton and Blockhouse.

Early 20th century

The Stokes Bay Lines and forts that had been at the forefront of military planning in the 1860s were less relevant to coastal defence by the end of the 19th century. In the first years of the 20th century new breech-loading guns continued to be installed in the batteries and forts, but they were soon recognised as superfluous and the Stokes Bay Lines were disarmed by 1907 (Moore 2010, 12). At Fort Gilkicker, new guns with range finders, position finders and associated alterations to shell-handling were installed between 1902 and 1906. In 1904 electric generators were installed in two of the casemates to power searchlights mounted on external platforms. Fort Monckton continued to be used as a Royal Engineer's barracks and was also used for anti-aircraft searchlights in the First World War. New guns with modifications to ammunition handling, fire control and accommodation were added to the Browndown Battery. By the First World War, however, the Stokes Bay defences were still extensively occupied by the army and navy but were fulfilling mainly ancillary roles, such as the Royal Navy Camp that was established at Battery 5. A notable example was the Torpedo Experimental Station, established by the Admiralty near Stokes Bay Pier. The Admiralty purchased the pier in the early 1920s, rebuilding it and adding a small complex of buildings close to the School of Electric Lighting on the site of the former John Leather building yard.

Civilian uses of Stokes Bay increased as the strategic value of the defences declined, in particular with the construction of suburban villas along Fort Road and the further development of seaside facilities for visitors. The disused moat of the Stokes Bay Lines was used for boating and by the 1920s parts of a concrete promenade had been built close to the pier. In 1923 a Bathing Station and Tea House, with changing cubicles for bathers, was built to the west of the pier by Gosport Borough Council.

Mid-20th century

The mixed civilian and military use of the area continued into the 1930s, but the 19th century defences remained intact as prominent features of the landscape. Forts Gilkicker and Monckton were partly used as barracks and Battery 5 as a Navy Camp, which included the addition of two barracks blocks. Battery 2 was acquired by Gosport Borough Council in the 1930s and the area enclosed by the adjacent Battery 1 was used as a caravan park. With the start of the Second World War, however, civilian buildings were requisitioned and the military occupation of Stokes Bay greatly increased. New types of defensive features were added, such as anti-aircraft guns, radar, and communications, but the most important role of Stokes Bay was supporting the embarkation of troops heading across the Channel, notably during the preparations for D-Day. Ironically, the factors that had made the area a potential site for invading forces in earlier centuries now presented advantages for Allied military planners, so Stokes Bay was dominated by a variety of military infrastructure and construction sites and remained strategically-important throughout the war.

An early addition was the construction of four concrete slipways, known as hards, built at intervals along the beach in May and June 1942 (Dobinson 1996, 6). By 1944 hards had been built at numerous strategic sites along the coast between the Thames estuary and South Wales, but those at Stokes Bay were part of an earlier building programme to support exploratory raids. Hards were built to a standard design which only varied to suit the angle and composition of the beach. They comprised a solid concrete apron, built between an access road and the high tide line, beyond which a flexible mat of connected concrete slabs continued down to the low tide line (Fig 8). The sides were splayed out in

a distinctive radius where they met the access road. The width of the hard enabled four large LCTs (Landing Craft Tanks) to be loaded side by side. Each hard had a central jetty for loading, which terminated in a “dolphin”, a steel structure to which the landing craft were moored. The four hard at Stokes Bay were identified as G1, close to Battery 2, to G4 which was sited west of the pier. Parts of the concrete aprons survive, later converted to car parks, and fragments of the flexible matting remain embedded in the shingle.



Figure 8. Valentine tanks, with modifications for amphibious landings, on one of the Stokes Bay Hards (copyright Imperial War Museum, H 35177).

The expansion of hard building in 1943-4 was associated with a variety of related infrastructure, which often extended some distance inland from the shore (Dobinson 1996, 10). This included improvements to existing roads, bridges and junctions, together with the construction of new roads where necessary together with camps for troops and marshalling areas for equipment. At Stokes Bay several of the earlier military roads were utilised and connected with new roads parallel with the beach (The National Archives WO 199_2266). The facilities included a parking area for tanks to the east of Battery 2. 1940s OS maps also show other temporary facilities associated with the hards, including oil tanks for refuelling landing craft, offices and maintenance buildings. The Hardmaster's Office was located in the former Bathing Station, along with a telephone office (information from www.friendsofstokesbay.co.uk). A tower was added to the west end of the building to serve as the main control centre for the D-Day embarkation. The Bathing Station was demolished in the 1970s, but the tower is intact.

The main defensive position in Stokes Bay in the Second World War was the Gilkicker Heavy Anti-Aircraft (HAA) site, which comprised four guns in emplacements with related magazines and barracks; it was located some distance away from Gilkicker Fort, behind the beach and south of the disused Battery 4. Built to a 1938 pattern that was widely used, it comprised four 4.5-inch guns arranged in an arc facing Portsmouth, with

two forward facing guns in the centre and the outer guns covering the flanks. Twenty HAA sites were located in the Portsmouth, Isle of Wight and Southampton area in World War Two (Dobinson 2001, 143-7 and 578). The emplacements were concrete platforms enclosed by octagonal walls and earth embankments, with six ammunition stores projecting inwards from the walls. A small command post in the centre of the site would have included a Predictor and Height Finder. A cluster of wooden huts to the west of the guns may have accommodated up to eighty personnel that were required for each HAA site, although air photographs indicate that it was significantly extended later in the war. All the above ground structures have since been removed, but parts of the concrete gun platforms survive along with archaeological evidence of the command post.

One of the most dramatic aspects of the preparations for D-Day in 1943-4 was the construction of Mulberry Harbours, a system of massive floating caissons, piers and roadways that was towed across the Channel and quickly deployed to provide the essential supplies needed for the advancing armies. The components of the Mulberry system were constructed by private contractors from December 1943 to mid-1944, employing up to 45,000 workers in docks, estuaries and carefully-selected beach sites in England and Wales (Hartcup 1977, 77). At Stokes Bay two private contractors were established behind the beach, to either side of Hard G3, and employed 1,400 workers for the construction of the massive Phoenix B2 caissons (ibid, 91,94-5). Built in reinforced concrete, the caissons measured 61.87 metres long (203 feet), 13.41 metres wide (44 feet) and 10.66 metres high (35 feet), and displaced 2724 metric tons (2,681 tons) when afloat (ibid, 70). Fourteen were constructed at Stokes Bay, of the 147 made nationally. The caissons were towed across the Channel and sunk *in situ* to form the main breakwater of the Mulberry Harbours.



Figure 9. Phoenix caissons under construction at Stokes Bay, 1944 (copyright Imperial War Museum, H 35554).

Archive photographs show the main stages of Phoenix construction, and aerial photographs taken shortly after the war show the huge scale of the project (Fig 9, 56 and 57). The building sites included engineering facilities and storage yards for materials, and completely dominated Stokes Bay by early 1944. The caissons were built on low sleeper walls and moved around in sequence using powered winches. They were launched down steel slipways for completion when afloat, then towed to “parking” areas along the coast ready for deployment after the D-Day invasion. The construction sites were cleared in the 1950s but archaeological evidence survives of the sleeper walls and the foundations of the launching slips.

Stokes Bay was also used for the development of “Duplex Drive” amphibious tanks for D-Day (see Fig 8, above). In 1943 a Training Wing of the 79th Armoured Division was set up with offices and accommodation in Bank House and Alverbank. Facilities included the construction of a complex of temporary structures near Hard G1, including four maintenance huts, external fuel tanks, improvements to local roads and the construction of a water-filled concrete wading pit, for testing the waterproofing of amphibious tanks. 1200 troops were trained at the site, including loading tanks onto LCTs at Hard G1 and disembarking at sea to land on a beach across The Solent (<http://www.duplexdrivetanks.co.uk/DUPLEXPAGES/TRAINING1.html>).

Mid- and late 20th century suburbs

Residential development of the farmland immediately north of Stokes Bay had continued in the early to mid-20th century, initially in areas adjoining Alverstoke and along the main roads near the 19th-century villas. The former military roads and other defensive features continued to influence suburban development. In the 1920s and 30s detached houses were built along Fort Road, south west of Anglesey, and Palmerston Way, which was laid out parallel with The Lines to the west. The growth of seaside facilities in that period included the addition of the “Tennis Courts and Putting Green”, built alongside the Stokes Bay Moat and still extant (OS 1933). The areas between the main roads were finally infilled with housing estates and related development from the 1960s to 1980s.

Many of the buildings and structures dating from the Second World War remained intact until at least the mid-1950s, and some were not removed until the mid-1970s. The first proposals to remove the Stokes Bay Lines were made in 1949, and the work was carried out in stages between 1954 and 1969 (www.fortgilkicker.co.uk, citing Gosport BC Minutes regarding filling in the moat). Air photographs indicate that the Hards and the Phoenix caisson sites were still clearly visible in the mid-1950s, and OS maps show the hutment adjoining the HAA site until the late 1960s. To the north of Stokes Bay, the site of the former Grange Airfield, which was located to the west of Forts Grange and Rowner from the First World War until 1958, also had a major influence on residential development. Its perimeter and runways partly determined the layout and naming of roads and cul-de-sacs, while four of its hangers, dating from the 1920s to the 1940s, are still in use in the present-day HMS Sultan site.

CONCLUSION: STOKES BAY IN THE EARLY 21ST CENTURY

Stokes Bay now has the appearance of an open and diverse coastal landscape, including areas of managed semi-natural habitat alongside seaside facilities and suburban development, and has little resemblance to the military and industrial activities shown on air photographs of the 1940s and 50s. In spite of the clearance and landscaping of the 1960s, however, large fortifications still dominate the area and extensive archaeological evidence survives of former defensive features. The largest site, Fort Monckton, is well-preserved but occupied by the Ministry of Defence and not accessible. The other historic sites have been adapted for a wide variety of new uses, some in-keeping with their original function but others effectively disguising their military past.

Most of the temporary military buildings have been removed, including the barracks alongside the HAA position and buildings associated with the hards and Second World War construction sites, but some of the earlier structures survive with good preservation of historic details. Of the Stokes Bay Lines, Battery 2 is well preserved and in use as the Historical Diving Society's Museum of Diving (Fig 10), while Battery 5 and its later buildings, most of which were associated with the Royal Naval Physiological Laboratory, are intact but vacant. Fort Gilkicker still dominates the east end of the bay and is also vacant but completely intact, currently awaiting redevelopment. Further to the north-east the former Haslar Barracks retains much of its early and mid-19th century fabric, with many alterations from its later use as a hospital, borstal and Immigration Removal Centre, alongside the much larger and architecturally distinguished Haslar Hospital. Both sites are currently vacant. Among the notable smaller buildings in the area, the control tower used during the embarkation for D-Day is now incorporated into the later buildings of a sailing club and restaurant.

Landscape features associated with military history are also widespread, some identified by recent interpretation panels and memorials. Most of the earthworks associated with the Stokes Bay Lines and later features were removed in the 1950s and 60s, but extensive archaeological evidence remains of the rampart, moat and parts of the former course of the River Alver (see archaeological descriptions in Part 2). The footprint of the Lines is mostly still visible and has continued to influence the development of roads, suburbs and other land uses. The entrances to two of the Second World War embarkation hards survive as car parks, and the former parking area for tanks is another car park to the east of Battery 1. Large sections of the flexible concrete matting, now dismantled, survive in the shingle. The Phoenix construction sites are open grassland and are divided by later roads, but the parallel walls that supported the caissons during construction are still discernible and visible in air photographs. Other notable landscape features include the HAA gun positions and the concrete platforms for searchlights alongside Fort Gilkicker.



Figure 10. Battery 2 has been re-used as the Historical Diving Society's Museum of Diving (Photograph Mike Williams, 14/04/2016, © Historic England).

HISTORIC SITES AND ARCHAEOLOGICAL FEATURES OF STOKES BAY

Locations and extents of features recorded during a Level 2 survey (Historic England 2017) of Stokes Bay are presented as three principal drawings at the end of this report (Fig 13, 14 and 15). For ease of reference all features associated with the Stokes Bay Lines are illustrated in Fig 13 and are referenced with numbers starting with a '1' prefix. All features associated with Second World War activity are illustrated in Fig 14 and have a '2' prefix. All features at the east end of Stokes Bay, between Lifeboat Lane and Fort Monckton, are illustrated in Fig 14 and have a '3' prefix. During the course of this project access was not gained to Forts Gilkicker or Blockhouse and this account excludes detailed descriptions of these forts. Fort Monckton was visited briefly and its scheduling description revised (NHLE 1001844).

The Stokes Bay Lines

Location: Stokes Bay Road and Fort Road
NGR: West end (west of Battery 1) SZ 58374 99144
Centre (Battery 3) SZ 59695 98577
East end (at Gilkicker Lake) SZ 60842 97837

Summary

The Stokes Bay Lines are a mid- to late 19th century linear defensive earthwork running the full length of Stokes Bay from Gilkicker Point in the south-east to Browndown Point in the north-west, a distance of 1.7 miles (2.7 km). They originally comprised a substantial earth rampart, a system of moats and five batteries, and were built to fill a defensive gap between Forts Gilkicker and Monckton to the south-east and the forts of the Gosport Advanced Line to the north-west. The batteries were carefully sited along the rampart to defend the entire area of the beach and the Lines themselves. An additional battery, Browndown Battery, was located in a detached position to defend the beach to the north-west. The main rampart and moat were gradually demolished in the 1950s and 60s, but their locations are discernible and had a marked influence on later development. Parts of the north-west end of the moat remain intact, the batteries survive in various levels of preservation and the rampart and moat are clearly defined by archaeological evidence.

Landscape and Settlement Context

Stokes Bay beach and the adjoining anchorage were recognised as a potential invasion site as early as the 17th century. The Lines were built to fill the gap between the large forts of the Gosport Advanced Lines and the coastal forts of Gilkicker, Monckton and Blockhouse to the east. The forts were either built or rebuilt at the same time as the Lines. The rampart and moat of the Lines were built in front of the natural bank or cliff that formerly overlooked an area of marshland behind the beach. The batteries were sited on or close to the positions of earlier redoubts, built on the natural bank in the late 18th century, at least one of which partially survives. Map evidence suggests that parts of the natural bank were straightened, possibly as a defensive work, prior to the construction of the Lines. Parts of it survive near the north-west and south-east end of the Lines. The higher ground immediately north of the Lines was used for residential development from the mid-19th century, initially with a number of prestigious detached villas. From

the mid-20th century the area was characterised by general suburban expansion on farmland and land previously owned by the War Office.

History and description of the site

Defensive positions and related structures were built in the Stokes Bay area from the 17th century, but the first co-ordinated programme of building was begun in the late 18th century. Despite the conclusion of the American Revolutionary War by the Treaty of Paris in 1782, the new Master-General of Ordnance the Duke of Richmond embarked on a campaign to improve the defences around Portsmouth Harbour (Saunders 1989, 126). In 1782-3 seven redoubts were built along the low natural bank overlooking the bay, and their positions were to influence the later construction of the Lines and associated batteries (Moore 2010, 2; Williams 1979, 42-4, 58-60). A large-scale plan of the area dated 1782 shows the positions of the redoubts, identified as “Batteries” 1 to 7, and the natural bank (The National Archives MR1 1173, 1782 – see above, Fig 3). Comparison with archaeological evidence suggests parts of Battery 6 were later converted into a golf course green and survive as an earthwork, and that the extant Battery 5 may have been built on the site of a late 18th century redoubt. Other contemporary small-scale maps suggest that the bank may also have been modified; a straightened embankment is shown a short distance to the north of the redoubts which may have formed a part of the late 18th-century defences (1 inch to 1 mile map of Hampshire, surveyed by Thomas Milne, 1791, Hampshire CC Museums Service, HMCMS: FA1998.124; OS 1 inch map, 1810).

In the first half of the 19th century the course of the River Alver was modified to enable the draining of the marsh behind the Stokes Bay beach. In the 1840s and 50s three new earthwork batteries were built at opposite ends of the bay, two at Browndown Point and one at Gilkicker Point. These defences were criticised as inadequate in papers published by James Ferguson in the late 1850s. In 1857 a much improved system of moats, ramparts and batteries was proposed by Major Jervois and supported by the Royal Commission on Defence Fortifications of the United Kingdom in 1860. Named the Stokes Bay Lines, the new defences included five batteries and were built between c1860 and c1869 at a cost of £75,120 (Moore 2010, 4-7). Of the three earlier batteries, Browndown East was abandoned but the nearby Browndown West Battery was rebuilt in 1888 (renamed Browndown Battery) to defend the nearby beach and deep-water anchorage. The third was replaced with the construction of Gilkicker Fort in the 1860s.

The batteries of the Stokes Bay Lines were frequently re-armed and altered, with the original guns replaced in the 1890s, including alterations to gun positions, magazines and other buildings. In the early 20th century most of the guns were replaced by fixed machine guns. The main rampart and moat were not substantially altered. The Lines were disarmed prior to the First World War, although the batteries remained in mostly military use and were partially re-armed during wartime. In particular, the larger batteries (2, 5 and Browndown, see below) were occupied for a variety of military uses until after the Second World War. In the early 1940s the whole area enclosed by the Lines, including the beach, saw a variety of industrial and military construction programmes associated with the preparations and embarkation for D-Day in June 1944.

The layout of the moat and rampart was determined by military requirements with their disposition influenced by coastal topography, comprising a series of angled straight sections built on the low-lying area between the beach and the higher ground to the

north. Most of the batteries projected forwards from the rampart to enable guns to fire along the moat, and were close to the positions of the earlier redoubts and batteries built in the late 18th and the mid-19th century. Public access to the area behind the beach seems to have been limited when the Lines were in active use. Narrow bridges serving Military Roads were built across the moat alongside Batteries 2, 3 and 4, and at the east end of the Lines beyond Battery 5. An additional narrow bridge, the only one to survive, crosses the earlier course of the river to give access to Alverbank Hotel. This bridge may pre-date the construction of the Lines and is possibly associated with a c1788 brickworks which formerly stood on the higher ground to the north (Williams 1979, 63-5).

The overall plan of the Lines was determined by the need to organise defensive fire from the batteries, using similar principles to those seen in mid-19th century coastal forts. The angled design of the moat and rampart ensured that flanking fire from the batteries could cover the full length of the Lines while avoiding each other's range of fire. The western section of the Lines, west of Battery 3, was angled south to a position immediately behind the beach, which reflected the location of the earlier natural bank. To the east, the rampart and moat were built further inland where the open area behind the beach reached its maximum extent. Between Batteries 4 and 5 an extension of the moat branched off to the south in the form of a loop, probably to defend the extensive area behind the beach; this loop of the moat was in a similar position to a meander in the former course of the river, shown on the First Edition 1-inch OS map.

In both extent and cross-section the moat and the rampart were conspicuous features. The moat was 18.3 metres wide by up to 3 metres deep (60 feet by 9 feet), built with sloping banks that were lined with concrete. A glacis extended along most of its southern bank. The rampart, which overlooked the north bank of the moat, was of similar width, with sloping sides and a 6m wide (20 feet) parapet. The parapet sloped gently to the south and a firing step and parallel roadway were built on its rear (north) side. Late 19th century section drawings indicate that its dimensions varied but its height was typically about 4.57 metres (15 feet; Fig 7, HE Archive WD670).

The moat replaced parts of the former course of the river, which included Lake Gilkicker; 18th century maps show the river flowing southwards to a position just north of the beach at Browndown Point, then turning parallel with the beach for about a mile to the south-east until it turned south again near Gilkicker Point. The western section of the Lines, between Batteries 2 and 3, was built alongside the former course of the river, which survives in modified form as a wooded gully and footpath (Moore 2010, 2, 5).

The moat required a water-management system which influenced details of its design and its connections with natural water supplies at each end. Original drawings indicate that the height of the moat was determined by the maximum range between the high and low spring tides (HE Archive Drawings WD670-678). The level in the moat was maintained using water from the River Alver at the west end and from Lake Gilkicker at the east end (Moore 2010, 30-31). The drawings also indicate that the course of the river upstream (north) of Battery 2 was straightened during the construction of the moat.

A western extension for the moat and rampart, which continued about 335m to the west of Battery 2, was built as a dam which could be used to flood the River Alver to the north as an additional defensive measure. It included a covered way to defend the rear of the Browndown Batteries, and was itself covered by the west-facing guns in Battery 1 (HE Archive, WD670, WD671; Moore 2010, 7). The floodable area was a former marsh

named *Gomer Pond* on the 1st edition 1-inch OS map. The dam was replaced by the present coast road and does not survive.

The method of controlling the water level was altered a decade after the Lines were completed. The river probably originally flowed directly through the moat, but in 1878 sluices were added at the west end, alongside Battery 2, which together with a culvert beneath the beach enabled water to be directed either into the moat or the sea (HE Archive WD678). The water level was further controlled by additional sluices located along the length of the moat and at Gilkicker Lake (Moore 2010, 7-8). The only sections of the moat to remain intact and filled with water are those on the west and north sides of Battery 2, the modified river course to the north, the adjoining part of the west extension and the culvert beneath the beach.

The Batteries of the Stokes Bay Lines

The mid-19th century batteries constructed with the Lines were numbered 1 to 5 from north-west to south-east. They included magazines, shell stores and a variety of ancillary buildings in addition to the gun positions. The smaller batteries were the same height as the adjacent sections of the main rampart with guns in open embrasures, but the largest, Batteries 2 and 5, were built higher to defend a larger area.

Battery 2 was the largest, built alongside the earlier Browndown East Battery to defend the west end of the Lines and the adjoining beach; the earlier battery was demolished after the Lines were completed. Battery 2 was roughly rectangular in plan and higher than the main rampart to accommodate casemated guns. It was originally fully enclosed by an extension of the moat, which remained intact until the early 1960s. The east-facing rampart was positioned to cover an extensive area of the moat and beach. Battery 1 was located close-by to the north, comprising a detached section of angled rampart with gun positions facing east, west and north, covering the entrance to Battery 2 and the west extension of the moat.

Battery 3 was located roughly in the middle of the Lines, on a short section of the rampart running north-south, to provide west-facing covering fire along the adjoining section of the moat. It was designed with four gun embrasures mounted on the rampart, served by a shell store and a cartridge store. This section of the main rampart partly survives but is heavily overgrown, with no visible evidence of the battery itself.

Battery 4 was located at an angle in the Lines and was formed by a forward projection of the main rampart and moat. Like Battery 3 its main function was to defend the Lines themselves, with two pairs of outward-facing gun embrasures covering the moat to the east and west. The four guns were served by a central cartridge store and shell store. The site of the battery and adjoining section of moat are heavily overgrown; the gun positions and magazine have been removed but remains of the rampart may survive and the outline of the battery is still discernible.

Battery 5 was built at a higher level, on top of the natural bank, in a detached position just to the north of the main rampart. It was built to a splayed U-shaped plan, overlooking the rampart and a large area of beach to the west of Gilkicker Point. Comparison with the maps of 1782 and 1820 map suggests that the southern and western ramparts may have been built on the remains of an earlier redoubt (see Fig 3 and 16). Its guns were mounted in embrasures on the parapet. Along with Battery 2, at

the opposite end of the Lines, it was intended to provide intersecting cover across the area behind the beach.

Browndown Battery is not attached to the Stokes Bay Lines but remains mostly intact to the north-west of Battery 2. It is located in the Browndown firing range and is not accessible. It was built in 1889-90 on the site of an earlier battery (Browndown West), and equipped with two large guns, magazines and accommodation blocks to defend the deep water anchorage off the adjoining stretch of beach. It was modified for new guns in 1899 and later used as an observation post (Moore 2010, 21-3).

Archaeological evidence:

- a) Battery 2 to Palmerstone Road (centre SZ 59015 98770)
Immediately to the west of Battery 2 the Stokes Bay Lines survive as a water filled channel (Fig 18 and 38) carrying the River Alver south to the sea (1.1). No surface traces survive of the moat surrounding Battery 2 (1.2, Fig 13). The Lines were substantially flattened and/or infilled between Battery 2 and Palmerston Road in the mid-1950s (Moore 2014, 20) (Fig 19). In this area (1.3) traces of the moat survive as a very faint linear depression c22m wide with a maximum depth of c0.2m. A short length of c0.1m high earthwork (immediately to the east of Battery 2) is the only possible surviving remnant of the southern bank of the defences in this area (1.4).

Traces of the northern bank of the defences survive to the east of the footpath linking Stokes Bay Road with Bay House School. Here a pronounced drop of up to 1.5m (Fig 20) runs parallel with the northern side of the moat (1.5). This feature corresponds closely with the line of the northern bank shown on historic mapping (OS 1933), and is likely to represent the truncated remains its outer (northern) face. The top of the bank, including the firing step and the inner (southern) face no longer survive as surface features, having been removed during the levelling and infilling of the moat. The southern edge of the bank is visible as a parch mark in dry weather (Fig 21).

At approximately SZ 59080 98770 and SZ 59260 98700 two pronounced landward kinks (1.6 and 1.7) in the northern bank correspond with features shown on historic mapping (OS 1933). These features frame a slight change in orientation in the lines at the point where they are crossed by Alverbank Road (SZ 59160 98695). A small platform (1.7) survives behind the main bank in the landward angle of the eastern kink (Fig 22). This platform is likely to have held guns covering the bridge carrying Alverbank Road over the lines. The change in angle shows clearly as a parch mark in dry weather (Fig 23).

- b) *Possible Stokes Bay Line outfall (SZ 59164 98646)*
A 13m length of c0.5m diameter iron pipe (1.8) emerging from the beach and discharging into the sea was recorded on the foreshore to the south of Alverbank Road (Fig 24). This is potentially the outfall from one of the culverts used to control the water level in the Stoke Bay Lines moat (<https://www.fortgilkicker.co.uk/lines.htm>).

c) *Palmerston Way to Battery 3 (centre SZ 59447 98650)*

The best-preserved segment of the Stokes Bay Lines (1.9) is between SZ 59275 98675 and the site of Battery 3 (SZ 59720 98595). In this area although the moat has been partially filled and grassed over, its line is clearly visible and survives to a depth of approximately 1m (Fig 25). The 0.75m high bank (1.10) immediately to the south of the moat, and forming the northern boundary of tennis courts/crazy golf course may preserve part of the Lines' southern bank. The northern bank survives as a substantial earthwork to a height of between 2.5 to 3m (Fig26). This feature was deliberately retained in the 1950s to provide a barrier between the gardens on Palmerston Way to the north and the open ground of Stokes Bay to the south (<https://www.fortgilkicker.co.uk/lines.htm>).

The Lines turn south through 90 degrees at Battery 3. In this area, whilst the base of both the western and eastern banks are visible, their full extent is hidden by thick vegetation. No attempt was made to access Battery 3 which lies in a private garden immediately to the east.

d) *Battery 3 to Lifeboat Lane (centre SZ 59892 98485)*

Between Battery 3 and Lifeboat Lane the Stokes Bay Lines survive as a very slight earthwork and show as parch marks in dry weather (Fig 27). The moat is visible as a shallow linear depression between 0.1 and 0.2m deep. The northern edge of the moat was identified between Battery 3 and the causeway leading from Stokes Bay Road to the beach close to embarkation hard G4. Only a short length of its southern edge was identified close to Battery 3. No trace of the southern bank of the lines was observed. It is likely that the approximately 1m drop topped by a c 0.5m high bank (1.11) along the southern edge of Stokes Bay Road is in part formed by the Lines' northern bank (Fig 28). No traces of the Lines were identified between the causeway and Lifeboat Lane.

e) *Lifeboat Lane to East of Battery 4 (centre SZ 60218 98200)*

Little surface expression exists of the loop in the Stokes Bay Lines to the south of Battery 4. No surface expression of the moat was recorded on the western part of the loop; however, its inner bank (1.12) survives underlying Lifeboat Lane (Fig 29). An area of very slight and amorphous earthworks coincides with the southern part of the loop (1.13); here the edges of the moat show clearly as parch marks in dry weather. No surface expression of the eastern side of the loop (1.14) was observed.

f) *Battery 4 and area (centre SZ 60220 98370)*

The area from Lifeboat Lane to west of Battery 5 is partially obscured by vegetation. No surface traces of the Stokes Bay Lines were observed between Lifeboat Lane and Battery 4. Extant elements of the northern edge of Battery 4 were recorded (1.15). This consisted of a single storey, brick built, slate roofed building, measuring approximately 12m by 4m (Fig 30). This building is not shown on 19th century mapping and first appears on historic mapping in 1933 (OS 1933). The building sits on top of a low earthen bank approximately 0.5m in height, which appears to form the northern edge of the platform on which Battery 4 was constructed (Fig 31). To the east of Battery 4 elements of both the northern edge of the moat were observed as low earthworks (1.16) approximately 0.25m in height. A short length of the northern edge of the moat's concrete lining is visible.

- g) Battery 5 and area (centre SZ 60435 98075)
 Although substantially levelled some traces of the Stokes Bay Lines survive within the fenced area surrounding Battery 5. The truncated remains of the Lines' southern bank survive to a height of up to 0.75m. The junction between the eastern side of the southern loop surrounding Battery 4 and the main line of the defences is marked by a c15m wide gap (1.17) in the Lines' southern bank (SZ 60365 98145). A significant length of the southern edge of the moat's concrete lining (1.18) is visible to the south of Battery 5 (Fig 32). No surface expression of the northern edge of the moat was observed.
- h) Stokes Bay Golf Course (centre SZ 60600 97900)
 Running east across Gosport and Stokes Bay Golf Course from the fenced area surrounding Battery 5 to their eastern end at Gilkicker Lake the Lines have been substantially levelled (Fig 33 and 34). Tree planting along some of their length has also compromised their visibility. In open areas of the golf course the Lines' southern bank (1.19) survives to a height of up to 1m. No traces of the northern bank were observed. Landscaping and golf course features have removed all surface traces of the very eastern end of the Lines.
- i) Redoubt (centre SZ 60605 97980)
 A series of small fortified positions or 'redoubts' were constructed along the bluff overlooking Stokes Bay in 1782-3 (Moore 2010, 2). Historic mapping (Fig 16) shows redoubt 6 south-east of Battery 5 of the Stokes Bay Lines. A semi-circular earthwork was recorded in approximately the same area (1.20, Fig 35 and 36). The earthwork encloses an area measuring c20m (north-west to south-east) by c35m (south-west to north-east). It consists of a curving bank measuring c0.5m high by 5m wide which forms its north-eastern edge, and a sight bank c0.3m high by 0.25m wide on top of the bluff forming its south-western edge. The same area was also used by the former green 8 of the Gosport and Stokes Bay Golf Course and can be seen as an extant feature in 1950s aerial photography (Historic England Archive: RAF 1950b *RAF/SFFO/540/317 O 0054 22-APR-50*). It is considered likely that the surveyed features primarily represent the remains of late 19th or 20th-century golf course features rather than those of an 18th-century redoubt.
- j) Trackway (centre SZ 60580 98015)
 A c9m wide trackway (1.21) cuts through the natural scarp between Battery 5 and possible redoubt (Fig 37). This feature is first shown on historic mapping in 1966 (OS 1966), it is not shown on equivalent mapping from 1951 (OS 1951) or on immediately post-war aerial photography.

Batteries 1 and 2

Location: Stokes Bay Road, Gosport
NGR: Battery 1: SZ 58757 98988
Battery 2: SZ 58699 98924

Summary

Batteries 1 and 2 are located at the north-west end of the Stokes Bay Lines. They were built in a strategic position at Browndown Point, which marks the north-west end of Stokes Bay beach; the opposite south-east end was defended by Fort Gilkicker. Batteries 1 and 2 were intended to cover the beach, in combination with Battery 5, and the adjoining deep-water anchorage, in combination with Gilkicker Fort. They comprise a connected group of ramparts, casemates, gun emplacements, buildings and related structures which together formed the largest of the Stokes Bay batteries. Unlike the other batteries in the Lines, Battery 2 was built with casemated gun positions that were designed to complement those at Fort Gilkicker at the opposite end of the bay. Batteries 1 and 2 were used for military purposes until after the Second World War. They saw several major phases of modification for new armaments, but their long history of military use has ensured that they are now the best-preserved batteries in the Stokes Bay area.

History and description of the site

Batteries 1 and 2 were built in the 1860s as part of the extensive programme of defence building in Stokes Bay and the surrounding area. Their location was partly determined by two earlier batteries, Browndown West and Browndown East, which were built in the early 1850s but soon recognised as inadequate. Browndown West was rebuilt and later extended, and now survives largely intact as Browndown Battery, within the Browndown firing range. Browndown East was located immediately west of Battery 2 and was demolished in the 1880s. Batteries 1 and 2 were re-armed on several occasions, including modifications to gun positions, magazines and soldiers' quarters. They were owned by Gosport Council in the 1930s, when a caravan park was established nearby, but requisitioned to return to military use during and after the Second World War. They reverted to council ownership in 1951 and in 1956 most of the surrounding moat was filled in. Battery 2 was used as the council's nuclear bunker in the 1980s (Moore 2010, 20). It is currently in use as the museum of the Historical Diving Society, which includes historic equipment salvaged from the former naval experimental station at Battery 5.

Battery 2 was the largest defensive position in the Lines, comprising three casemated ramparts projecting forwards from the main rampart and moat in a roughly rectangular plan (Fig 38). The *left flank* (east facing) and *right face* (west facing) were built at right angles to the main rampart, which formerly continued parallel with the beach to the south-east (names of ramparts from HE Archive Drawing WD671). The *left face* (south facing) was built at an angle to be parallel with the adjoining section of beach. At the north end of the Battery, the *right flank* was a short extension of the west rampart angled to face north-west. The entire battery was fully enclosed by a moat connected to the main moat. When the moats were intact the battery could only be accessed via a fixed bridge, while a nearby drawbridge across the main moat gave access to the area to the south of the Lines (HE Archive Drawing WD670). An extension of the main moat continued to the north-west where it connected with the River Alver, which supplied water for all of the moats in the Stokes Bay Lines. Another branch of the moat formerly extended about

335m to the west of Battery 2 and was defended by a covered way to its rear; this originally formed a dam to enable flooding of the River Alver as a defensive measure. The only parts of the Stokes Bay moats to remain intact and filled with water are those adjoining the north and west faces of Battery 2 and the canalised section of the River Alver to the north. OS maps indicate that the sections of moat to the east and south of Battery 2 were filled in between 1962 and 1965.

Battery 2 was originally equipped with up to fifteen smooth-bore 8-inch muzzle-loading guns mounted in casemates facing west, north-west, and south, with just two guns in the angled north-west rampart and the south face. The structure retains evidence of several phases of alteration and re-armament (Moore, 2010, 7-14). In the early 1890s the original guns were replaced with rifled breach-loading 7-inch guns, including three additional casemates in the east face. At this time the casemates in the south face were replaced with two open positions for 7-inch muzzle-loading guns on the parapet. The latter comprised semi-circular concrete emplacements for Moncrieff disappearing gun carriages. The guns and carriages in these positions were replaced again in c1901, with 6-inch rifled breach-loaders, requiring the concrete emplacements to be infilled and raised. Both phases of the concrete emplacements survive as prominent features (Fig 39). The later guns may have been withdrawn as early as 1902 (Moore 2010, 12). A contemporary concrete command post remains on the parapet between the two emplacements. In the late 1890s the other guns were replaced with fixed Maxim machine guns, mounted in the west- and east-facing casemates, but these were withdrawn in 1907.

The south and west faces of Battery 2 are largely hidden by an earth embankment, which was either an original feature or an early alteration. The embankment is shown on drawings of 1892, but these suggest that it originated before the modifications of that date (H E Archive, drawings: WD670, WD671, WD672 and WD673). The embankment gave additional protection, and included splayed embrasures in front of the casemates of the west and south faces; the embrasures were later infilled to create the current form of the embankment, presumably when the casemates were no longer used as gun positions. A similar embankment was added to Fort Gilkicker in c1902-6 (Moore, 1988, 27).

Battery 2 was equipped with numerous shell stores, cartridge stores and other storage and maintenance buildings, which were added or modified to suit the alterations to the main armaments. The magazines comprised five original stores located between the casemates of the west face, two on either side of those in the east face and two more in the centre of the south face. They included two shell stores, a small armaments store and six cartridge stores; in 1892 the total capacity of the magazines was 1,170 7-inch RBL shells, 300 7-inch RML shells and 372 barrels in the cartridge stores (HE Archive Drawing WD670). All were accessed from the central yard enclosed by the parapets. In the 1890s an additional storage building was added in the yard and the northern casemate in the west face was adapted to provide married quarters (HE Archive Drawings WD672 and WD674,).

Battery 1 was built immediately north of Battery 2 and was of quite different form. It comprised a detached angled rampart with seven straight sections which housed nine gun positions facing west, east and south. In 1892 the rampart included a small cartridge store and a shell store for 153 7-inch RBL shells (HE Archive Drawing WD670). Battery 1 was designed to protect the rear of Battery 2 and complement its gun positions. The seven sections were angled to cover the entrance to Battery 2, the main moat to the east

and the extension of the moat to the west. The 7-inch guns were replaced with Maxim machine guns at the same time as those in Battery 2. Battery 1 also provided access to the covered way which defended the western extension of the main moat. The west extension of the moat, the covered way and parts of the Battery 1 ramparts have all been removed.

Battery 5

Location: Fort Road, Gosport
NGR: SZ 60486 98109

Summary

Battery No 5 was one of the largest batteries of the Stokes Bay Lines. It was disarmed in 1904 but remained in military and related uses until the late 20th century. Built on the site of a late 18th century redoubt, parts of which may survive as earthworks, it comprises three straight ramparts built to a splayed U-shaped plan, orientated to cover the beach to the south and south-west. Guns were mounted on the parapet until the battery was disarmed, after which the site was used as a Naval Camp and a small complex of single-storeyed buildings built in the gorge. From the 1960s to the 2001 it was used as the Royal Naval Physiological Laboratory, a pioneering experimental facility, when larger buildings were added outside the gorge.

Landscape and Settlement Context

The battery, and its 18th century predecessor, was built on the top of a low cliff marking the inland boundary of an area of marsh behind Stokes Bay beach. Parts of the natural cliff survive to the east of the battery, possibly including the site of an earlier redoubt. The location of the battery was partly determined by the large coastal forts to the east of the Stokes Bay Lines. The edge of the moat alongside the Lines was in the position of the boundary of Battery No.5, and the rampart occupied the south west part of the site. The moat terminated at Gilkicker Lake to the south-east, which itself served as a moat for Fort Monckton and survives largely intact. To the south, the landscape around Fort Gilkicker is similar to the appearance of the former marsh, comprising dunes and heathland, but the rest of the marsh is now a golf course and playing fields. In the 19th and 20th century the area behind the beach was used by a considerable variety of defence-related sites, notably those associated with the construction of the Solent forts in the late 19th century and the preparations for D-Day in the 1940s.

The higher ground inland of the battery was used for residential development from the mid-19th century, initially with a number of prestigious detached villas (notably Monckton House and the nearby houses on Crescent Road), and from the mid-20th century with the general suburban expansion of suburban on land previously owned by the War Department.

History and description of the site

An earlier battery or redoubt was located close to the site from the 1780s, apparently built on top of the natural cliff on the edge of Stokes Bay marsh. The extant structure was mostly built in the 1860s but may have incorporated parts of the earlier earthworks. It was positioned to give intersecting fire with the other batteries to the west, in particular Battery No. 2, which was built at the west end of the Lines. The intervening sections of the Lines were covered by the smaller No 3 and No 4 Batteries. After the Battery was disarmed in 1904 a group of single-storeyed buildings and huts were added inside the gorge, named Naval Camp on the 1930s maps, and these remained largely unaltered until the 1950s. Additional one- and two-storeyed buildings were added outside the gorge in the 1960s, 70s and 80s, when the site was used as the Royal Naval Physiological Laboratory, where important advances were made in the development of deep diving techniques.

The site comprises three groups of structures (Fig 40)

1. The late 19th century battery, with earthworks, adjoining expense stores and related structures.
2. Complex of single storeyed buildings to the north of the earthworks, probably added after the battery was disarmed. Not marked on 1901 War Department plan; named “Royal Naval Camp” on 1933 25-inch plan.
3. Mid and late 20th 1- and 2-storeyed buildings located immediately west and south of the battery, associated with the use of the site as the Royal Naval Physiological Laboratory.

1: The late 19th-century battery was built in a splayed plan with three earthwork ramparts enclosing the gorge (yard) to the rear. The longer central rampart was parallel with the moat of the Stokes Bay Lines, which was formerly located about 35m to the south-west; 19th -century maps indicate that the plan remains largely intact, but a later roadway has been cut through the western rampart to give access to the later buildings. This first appears in air photographs from the late 1940s. The sectional form may have seen greater alteration, and is currently heavily overgrown; the gorge is level with the access road but at a higher level than the area in front of the battery, suggesting the ramparts may have been close to the line of the natural cliff. The outer face of the ramparts included narrow terraces at mid-height, shown on late 19th century plans and mid-20th century air photographs, which may survive beneath the undergrowth. A detached Mortar Battery, an earthwork platform, was built alongside the moat to the south of the main rampart in the late 1880s but later removed (Moore 2010, 6, 17). The parapet of the ramparts was flat and included gun embrasures, but these do not appear to survive.

The battery included four expense stores, comprising rectangular brick-vaulted structures projecting to the rear of the main ramparts, two to the central rampart and one each to the flanking ramparts (Moore 2010, 17-18; WD Plan 1890; 1892 plan of battery No 5). Air photos of the 1940s show the roofs of the stores to be higher than the parapet; the floors are below ground level, entered by steps descending from the yard. The stores appear to survive largely intact in their original form but with later modifications, including replaced door fittings and additional concrete and brick walls in the yard.

The late 19th-century battery also included a detached Small Arms Store, located in the centre of the yard, which is shown on air photographs of c1950 but does not survive (see Moore 2010, 17).

Armament: originally 9x8-inch smooth bore guns (Moore 2010, 17); probably converted to 9x7-inch rifled breach-loaders in 1886, reduced to 4 by 1898 (Saunders 1998, 54). Parts of the racers are said to survive (Saunders 1988, 55). 4 machine guns were installed in 1901 but the battery was disarmed in 1904 (Moore 2010, 17). Plans of 1890 and 1892 show low embrasures on the parapet, each with curved racers to the rear.

2: The single-storeyed buildings which now dominate the site were probably built after it was disarmed in 1904. The larger buildings are shown on the 1933 OS map, which identified the site as “Royal Naval Camp”. Most of the buildings shown on the map are intact but modified; some may have been completely rebuilt, as is indicated by the partial use of late 20th-century brick, albeit with lintels and roof trusses which appear to be earlier. Two smaller buildings shown on the map do not survive, one the Small Arms

Store, also shown on late 19th-century plans, and the other a probable entrance lodge, to the east of the main gate. Various small extensions and other structures were added to these buildings in the mid- and late 20th century. The main gate is located in the centre of the north perimeter fence on Fort Lane.

The intact buildings are all single storeyed, built in red brick to long narrow plans with wide-gabled slate roofs. They are lit by rectangular windows with splayed stone lintels, suggesting an early 20th century date. Interiors are not accessible, but timber king-post roof trusses are visible which suggest a similar date. The original doors are in the ends, protected by a small vestibule.

Four buildings are located to the east of the main gate, in two rows; the northernmost pair, of 9 and 11 in-line bays, are shown to be separate on the 1932 plan but are now connected by a 3 bay infill block. The gabled roof of the 11 bay eastern section has been removed; the 9 bay western section appears to have been rebuilt in late 20th-century brick. The two smaller buildings to the south are on a slightly different alignment but of similar form and details. The area between these buildings is shown with pathways on the 1932 plan.

Three other buildings are of similar form and details and probably the same period, two located to the west of the main gate and one parallel with the central rampart. A low concrete platform at the east end of the site may have been the foundation for other buildings of similar plan, although none are marked on the 1932 map and the concreted area is shown to be open on air photographs of the late 1940s.

3: The later buildings to the west and south of the battery were added in the second half of the 20th century; none are shown on oblique air photographs of 1950, although a road or path had already been cut through the western rampart. The southernmost buildings are on the site of the earlier moat and roadway and therefore post-date the removal of this section of the Stokes Bay Lines.

An RAF air photograph of 1946 indicates that circular structures, possibly foundations, were located to the west and east of the battery in the Second World War period (Fig 63; Historic England Archive RAF/106G/UK/1322 V 5037 28-MAR-46). That to the west was accessed by the path cut thorough the western rampart. The eastern structure was larger, comprising two concentric circles in the adjoining field, with no obvious means of access from the battery site.

Two main groups of buildings were later added outside the ramparts, including brick, concrete and clad structures of the 1960s, 70s and 80s. 1:10,000 OS maps give a general indication of the phasing of post-war building (Fig 41). The new buildings were all added after 1962; by 1978 one new building had been built in the gorge, parallel with the central rampart, one to the west of the ramparts and two more to the south. The building to the west of the ramparts formerly contained a deep decompression chamber and CCTV control panel used for deep diving experiments in the 1960s (see reference to British Pathe film clips). Between 1978 and 1991 the final form of the site was completed with three further buildings to the west and two to the south.

D-Day Embarkation Hards

Locations: Stokes Bay Road, Gosport
NGRs: G1: SZ 58903 98773
G2: SZ 59286 98612
G3: SZ 59638 98383
G4: SZ 59927 98116
(To approximate centres at the high tide line)

Summary

The remains of four rectangular concrete launching slips, or *hards*, built in 1942 lie at intervals along the shingle beach of Stokes Bay. Though originally built for troop embarkation they later formed part of an extensive hard building programme during the preparations for D-Day, for which facilities were added to enable their use by specific types of heavy landing craft. As such the hards were associated with an extensive infrastructure of related buildings, roads and other features that were planned to enable the efficient transport of vast numbers of troops and heavy military equipment and supplies. They were identified as G1 in the west to G4 in the east (G = Gosport).

Landscape and Settlement Context

Stokes Bay beach and the adjoining area were extensively used in the preparations and embarkation for D-Day, dominating the landscape from 1942 until the wartime features were removed from the early 1950s. The former hards also influenced the late 20th-century development of seaside facilities. They represented a continuation of the military importance of Stokes Bay from the 17th century.

History and description of the site

The four hards in Stokes Bay were built in May and June 1942, along with seven others in the Portsmouth area, and were initially used as embarkation points for exploratory raids into occupied Europe (Dobinson 1996, 6). They were designed to be used by the larger types of landing craft, LCTs (Landing Craft Tanks) and LSTs (Landing Ships Tanks), which required the construction of roads and other facilities for handling heavy military equipment. The method of construction became a standard design which was the forerunner of a more extensive hard building programme associated with the preparations for D-Day in 1943-4. In this later period hards were built at 68 sites from the Thames Estuary to South Wales (Dobinson 1996, 9-10). The hards included temporary buildings used for maintenance, offices, fuel supplies and electricity generators (ibid, 14). They were also associated with extensive improvements to infrastructure, including the construction of new roads, camps, marshalling areas and improvements to roads and bridges. At Stokes Bay new infrastructure included a tank park, now a car park near Battery 2, and improvements to the existing military roads (*Approach Roads to Sites G1, G2, G3, G4, 17-4-1943, The National Archives: WO199 2266, WO199 2267*).

The hards were typically 200 feet wide with a 10% incline and were built alongside an access road. They were intended to withstand regular use by tanks and other heavy equipment and comprised two parts. A fixed concrete slab connected the access road to the high tide line, beyond which a flexible concrete mat which extended to the low tide line (ibid,14). The sides of the solid section curved outwards where they met the access

road, possibly matching the turning radius of the vehicles using the hard. The flexible matting consisted of rectangular tiles with a square tread pattern moulded into the upper surface. The edges of the tiles were joined by iron or steel hooks. The hards originally included a central jetty, the eastward end of which was connected to a substantial framework of steel columns fixed to the seabed, known as a dolphin. The width of the hards was intended to allow two LCTs to berth to either side of the jetty.

At Stokes Bay significant parts of Hards G1 to G4 are visible in the beach area, and were closely associated with the nearby sites used for the construction of Phoenix caissons. The solid concrete aprons of G1 and G2 have been converted to car parks, now connected by a concrete promenade. Comparison with 1940s air photographs indicates that the car parks closely match the outlines of the hards, suggesting that the earlier concrete survives beneath the tarmac surface. At Hards G2 and G3 the concrete aprons remain exposed, including the distinctive curved sections adjoining the access road, and are attached to slightly later concrete associated with the Phoenix construction sites. The lower flexible sections of all the hards have been dispersed due to natural movement of the shingle, but are partially visible at low tide. Very little is visible at Hards G3 and G4, but they may have been hidden beneath raised sections of the shingle beach. More of the concrete matting survives at G1 and G2, some pieces still *in situ* but mostly dispersed around the beach.

Archaeological evidence

a) *Embarkation hard G1 (SZ 58900 98750)*

At area of 'chocolate block' flexible concrete matting (2.1) measuring 75m wide (east-west) by 13m deep (north-south) was recorded in the area of embarkation hard G1 (Fig 45). Much of this matting appears to have been slightly displaced from its original location. A greater extent of surviving concrete matting is likely to survive in this area buried by beach deposits. Several iron posts (2.2), probably the foundations for a mooring dolphin, were identified at SZ 58893 98759 (Fig 47). The concrete apron is shown on post-war historic mapping (OS 1965) and on RAF vertical aerial photography from 1946 (Historic England Archive: RAF 1946d *RAF/3G/TUD/UK/163 V 5109 20-APR-46*). It is now covered by a Gosport Borough Council car park (Fig 46) on the southern edge of Stokes Bay Road (2.3). A 2.5m long (east-west) alignment of 4 timbers (2.4, Fig 48) was recorded approximately 50m to the east of G1 at SZ 58979 98739. The original purpose of these timbers and their relationship with landing hard G1 is unclear.

b) *Embarkation hard G2 (SZ 59260 98625)*

A smaller area of 'chocolate block' flexible concrete matting (2.5) measuring 15m wide (east-west) by 6m deep (north-south) was recorded in the area of embarkation hard G2 (Fig 49). Much of this material appears to have moved slightly from its original location. Observations made along the sea wall immediately inland from this location suggest that there is likely to be a much more extensive area of potentially in-situ concrete matting buried under shingle in this area. The hard's apron (2.6) is shown on post-war historic mapping (OS 1949a) and aerial photography (Historic England Archive: RAF 1946d *RAF/3G/TUD/UK/163 V 5109 20-APR-46*; RAF 1948b *RAF/CPE/UK/2463 V 5010 26-FEB-48*). It is now covered by a Gosport Borough Council car park on the southern side of Stokes Bay Road (Fig 50).

- c) *Embarkation hard G3 (SZ 59640 98380)*
 No 'chocolate block' flexible concrete matting was observed on the foreshore in the area of hard G3. Photographs on the Fort Gilkicker website (www.fortgilkicker.co.uk/Dday.htm) suggest that concrete matting is sometimes visible at the junction between the approach and the beach. A c8 x 30m area of concrete between the present-day promenade and the beach at SZ 59640 98410 is part of the apron for hard G3 (2.7, Fig 51). This area of concrete is visible on RAF vertical aerial photography (Historic England Archive: RAF 1946d RAF/3G/TUD/UK/163 V 5109 20-APR-46; RAF 1948c RAF/CPE/UK/2463 V 5012 26-FEB-48) and is shown on post-war historic mapping (O S 1949b). The eastern edge of the apron has been removed by recent landscaping. The area of concrete further east is the sailing club slipway and presumed to be later 20th-century in date (2.8). The former D-Day control centre building (2.9, Fig 52) survives as the eastern part of the Stokes Bay Sailing Club building to the east of hard G3.
- d) *Embarkation hard G4 (SZ 59640 98380)*
 No 'chocolate block' flexible concrete matting was observed on the foreshore in the area of hard G4. Conversations with staff at the lifeboat station and photographs on the Fort Gilkicker website (www.fortgilkicker.co.uk/Dday.htm) suggest that concrete matting is visible here at very low tides. An area of concrete (2.10) measuring c 75 x 12m at SZ 59955 98120 between the present-day promenade and the beach is the apron for hard G4 (Fig 53). This area of concrete is visible on RAF vertical aerial photography (Historic England Archive: RAF 1946d RAF/3G/TUD/UK/163 V 5109 20-APR-46; RAF 1948c RAF/CPE/UK/2463 V 5012 26-FEB-48) and post-war historic mapping (OS 1949b). The apron is contiguous with concrete associated with Phoenix construction site 1 (see discussion below); however, the apron can be distinguished by its curved landward corners.
- e) *Concrete slip way (SZ 58670 98805)*
 A c18 x 7m area of concrete (2.11, Fig 58) to the south of Battery 2 car park is a late 20th-century slipway first shown on historic mapping in 1982 (OS 1982). This is possibly the slipway built during the mid-1960s for the Stokes Bay Hovercraft Service (<http://www.friendsofstokesbay.co.uk/hovercraft/>).
- f) *Causeway (SZ 59985 98285)*
 A c1.5m high causeway carrying a tarmac road (2.12) runs south-west from the junction of Stokes Bay Road and Anglesey Road towards embarkation hard G4. The body of this feature is constructed from reinforced concrete slabs cleared from Phoenix caisson construction site 1 (Fig 59). It is shown under construction on oblique aerial photography from 1950 (Historic England Archive: RAF/SFFO/540/317 O 0054 22-APR-50).

Gilkicker Heavy Anti-Aircraft site

Location: Level ground between Fort Road and Stokes Bay beach.
Immediately south-west of the sites of Battery 4 and the moat of the Stokes Bay Lines

NGR: SZ 60230 98170 (approximate centre)

Summary

Archaeological evidence of a four-gun Heavy Anti-Aircraft (HAA) site associated with the intensive military use of Stokes Bay in the Second World War. All structures and buildings were cleared between the 1950s and 70s and the site landscaped, and is currently partly used as a playing field.

History and description of the site

The site was of typical early Second World War design, probably built in 1939 but extended and modified during the war. Twenty HAA sites were established in the wider Portsmouth, Southampton and Isle of Wight area, with Gilkicker one of three dedicated to the defence of Portsmouth (Dobinson 2001, 578; Moore 2010, 36). It comprised four 4.5-inch guns with a central command post and a group of huts to the west including the magazine, stores, maintenance building and barracks. The guns were arranged in an arc facing the entrance to Portsmouth Harbour to the south-east, with two forward facing guns in the centre and one to either side covering the flanks. HAA sites were typically manned by 80 personnel, who were probably billeted on site from c1939.

The fixed gun positions were of a 1938 pattern, comprising octagonal concrete platforms enclosed by low defensive walls and earth embankments. The design included six ready-use ammunition magazines projecting inwards from the walls, with each position entered by a double gate facing the command post (Dobson 2001, 143, 145). The guns were secured to the concrete foundation by a ring of holdfast bolts.

At Gilkicker the settlement of huts was doubled in size towards the end of the war, although the site always had four guns. The command posts typically comprised a small concrete structure containing gun aiming equipment, including a height finder and predictor, with information communicated to the guns by megaphone. In 1944 Gilkicker was supplemented by a Gun Laying Radar, comprising an octagonal wire mat supported on wooden posts, laid out on level ground to the west (www.fortgilkicker.co.uk/radar.htm).

After the Second World War the guns were removed but the huts were used by the Territorial Army and remained intact until the mid-1970s, when landscaping work removed the last above ground evidence of the HAA site (www.fortgilkicker.co.uk/AAGunsite.htm). Air photographs of 1946 indicate that the guns had already been removed.

Archaeological evidence

- a) Traces of Gilkicker Heavy Anti-Aircraft Battery survive within the southern loop of the Stokes Bay Lines to the south of Battery 4 (Fig 62, 63 and 64). The gun positions are arranged in a north-east to south-west curving arc. The northern most gun position (2.23) at SZ 60270 98205 is covered by a 1.2m high mound approximately 19m in diameter, possibly rubble from demolition. This mound is likely to be derived from material from the demolition of the other gun positions and structures associated with the battery. A similar mound (2.22) slightly to the north at SZ 60250 98220 is likely to have similar in origins. The remaining 3 gun positions (2.24, 2.25 and 2.26) are visible as parch marks (Fig 64) and areas of turf covered concrete at SZ 60270 98160, SZ 60240 98124 and SZ 60195 98125. The southernmost of these positions (2.26) survives as a very low mound c0.2m in height by c15m in diameter. An L-shaped area of concrete (2.27) measuring approximately 11m by 13m immediately to the east of Lifeboat Lane (2.27) at SZ 60145 98245 is likely to be a remnant of the road access to the hutted camp associated with the Anti-Aircraft Battery. The site has been converted to a playing field and no above ground structures survive. Slight undulations indicate the positions of some of the huts. The concrete bases of the four gun positions are partially exposed, including some of the holdfast bolts. Concrete fragments of the command post are also *in situ*.

Phoenix Caisson construction sites

Location: Stokes Bay Road, Gosport
NGR: Site 1 SZ 59785 98345
Site 2 SZ 59455 98525

Summary

Two large open sites close to the beach that were used for the construction and launching of Phoenix caissons, the largest components of the Mulberry Harbours used in the D-Day Invasion. The sites are mostly level but retain earthwork evidence of the system of parallel walls that supported the caissons, related temporary buildings and parts of a contemporary roadway separating the construction site from the beach.

History and description of the site

Mulberry Harbours were an innovative system of mobile breakwaters, piers and floating causeways that were designed to enable the vital delivery of supplies following the D-Day invasion. Existing harbours along the Normandy coast were heavily defended and would not support the huge quantities of supplies that were needed for the invading armies. Mulberry Harbours could provide a strategic advantage in the critical weeks following the invasion and were the preferred option for military planners. The largest components were floating *Phoenix* caissons of reinforced concrete, which were towed across the channel and sunk in-line to form the main breakwater for the harbour. Behind the breakwater, Pier Heads with extendable legs (*spuds*) were deployed and connected to the shore by a floating causeway (code named *whale*). The engineering was highly complex, with pier heads rising and falling with the tide and the causeway sections connected with special joints to withstand movement caused by wave action. In addition to the Phoenix caissons, outer breakwaters were formed by lines of scuttled ships (*Gooseberrys*) and by lines of floating steel breakwaters (*Bombardons*) which were anchored to the sea bed.

The large scale of the project meant that different components were constructed at widely-dispersed locations around the coasts of England and Wales. At Stokes Bay two sites were acquired for the construction of fourteen Phoenix caissons. The caissons were type B2, which were 203ft6inches long, 44foot wide, 35foot high and displaced 2,861 tons (Hartcup 1977, 70). The two building sites were operated by separate contractors, French and Holloway Brothers, who together employed 1,400 workers. They were located behind the beach to either side of Hard G3, with temporary buildings erected along the access road to the hard. The caissons were launched down steel slipways built on the beach. Additional Phoenix construction sites were established at Portsmouth and Southampton (Hartcup 1977, 94-5).

Most parts of the building sites remain open and converted to playing fields. The temporary buildings and launching slips are not extant, but some earthwork evidence survives of the parallel low walls that provided the foundations for the caissons. The concrete aprons of Hards G2 to G4 were extended for the Phoenix sites to form continuous level platforms, large sections of which remain intact parallel to the promenade.

Archaeological evidence

a) *Phoenix Site 1 (SZ 59785 98345)*

Traces of Phoenix caisson construction site 1 were recorded immediately to the

east of Stokes Bay Sailing Club centred on SZ 59785 98345 (2.13). This consists of a series of parallel grassed-over wall lines less than 0.05m high and spaced at c5.3m intervals (Fig 54 and 55). The walls are approximately 35m long, orientated south-west to north-east and are bisected by a single perpendicular wall 22m in length. These features correspond closely with elements of a grid of walls visible on vertical aerial photography (Fig 56) from 1946 and 1948 (Historic England Archive: *RAF/CPE/UK/2463 V 5012 26-FEB-48*).

An area of concrete (2.14) measuring c120 x 13m centred on SZ 59890 98190 (and more fragmentary areas of concrete immediately to the west) between the present day promenade and the beach are the south-eastern corner of construction site 1. This area of concrete is visible on RAF vertical aerial photography (Historic England Archive: *RAF/106G/UK/1322 V 5025 28-MAR-46*; *RAF/CPE/UK/2463 V 5012 26-FEB-48*). Although the south-east corner of construction site 1 is contiguous with the apron for embarkation hard 4, it is possible to distinguish between the two areas of concrete. The construction site concrete is laid in a series of 5-6m wide blocks, whilst the embarkation hard apron is laid as two large areas with sweeping corners on its landward edge (Fig 55).

b) *Phoenix Site 2 (SZ 59455 98525)*

No surface traces of Phoenix caisson construction site 2 were recorded during the survey. The site is clearly visible on post-Second World War vertical aerial photography (Historic England Archive: *RAF/106G/UK/1322 V 5025 28-MAR-46*) (Fig 57). Traces of the construction site (2.15) are visible on 2013 vertical aerial photography on the grassed area between Stokes Bay Road and the promenade (SZ 59525 98520) and between the promenade and the beach (SZ 59545 98475).

c) *Pathways (SZ 60065 98285 and SZ 59980 98145)*

Two lengths of 2.3m wide concrete paths (2.16) were recorded to the west of the causeway (Fig 60). These paths would have linked the southern end of Anglesey Road with a now removed paddling pool at SZ 60010 98185, and the paddling pool with the beach. The northern path is first shown on pre-Second World War mapping (O S 1933). Both are seen in 1946 vertical aerial photography (Historic England Archive: *RAF/106G/UK/1322 V 5025 28-MAR-46*).

d) *Brick Structures (SZ 60005 98125)*

Two small (2x2m and 1.25x3m) grass covered brick structures (2.17) were recorded to the north-west of the lifeboat station and car park (Fig 61). Both structures are approximately 0.25m high. Neither structure is shown on historic mapping or aerial photography. As such, despite their close proximity to embarkation hard 4 and Phoenix caisson construction site 1, both structures are likely to be later 20th-century in date.

Archaeological features on the Stokes Bay foreshore (see Fig 13, 14 and 15)

Lifeboat Station to Fort Monckton

a) Stokes Bay Pier and Railway

No surface traces of Stokes Bay Pier were recorded during the survey. Similarly little trace of the Stokes Bay railway was recorded. It is possible that elements of an earthwork bund (3.1) on the south-east side of Stokes Bay Angling Club (SZ 60135 97985) is partly formed from the south-eastern end of the embankment that carried the railway to the pier (Fig 65). The line of the embankment is partly obscured by areas of thick vegetation. In open areas no surface traces of the embankment were observed.

b) Bank (SZ 60110 97945)

A north-west to south-east orientated bank (3.2) measuring 32m long by 10m wide by 0.7m high was recorded to the east of Stokes Bay lifeboat station (Fig 66). This feature is on the location of the landward end of Stokes Bay Pier. It is not shown on pre- or post-Second World War mapping or on aerial photography from 1976. As such it is considered to be post-1976 in origin and possibly relates to the construction of the road immediately to the south of Stokes Bay Angling Club.

c) Earthwork and concrete base (SZ 60165 97950)

A right angle of 0.5m high earthwork (3.3) was recorded to the east of Stokes Bay life boat station. A sub circular concrete pad c7.5m in diameter (Fig 67) is located on the eastern corner of this earthwork. The earthwork and concrete pad correspond with the location of a 'tank' or 'gas holder' associated with Stokes Bay Pier shown on pre- and post-Second World War mapping (O S 1933 and 1949c). Post-War RAF vertical aerial photography shows a circular tank on top of a low bank in this location (RAF 46e and RAF 48a).

d) School of Electrical Lighting (SZ 60300 97830)

A sub-rectangular mound (3.4) 155m long by 100m wide by 2.5m high was recorded immediately behind the beach between Stokes Bay lifeboat station and Fort Gilkicker (Fig 68). This feature corresponds with the location of the Submarine Mining Establishment/School of Electrical Lighting shown on historic mapping (OS 1933, 1949c). This location was previously occupied by Leather's Yard used during the construction of both the Spithead Fords and Fort Gilkicker in the 1860s and early 1870s (<http://www.fortgilkicker.co.uk/leathertown.htm>).

Historic mapping, post-War aerial photography (Historic England Archive: RAF/CPE/UK/2463 V 5006 26-FEB-48; RAF/SFFO/540/317 V 0052 22-APR-50) and terrestrial photography (<http://www.fortgilkicker.co.uk/school.htm>) show the school built on top of a substantial earthwork platform. It is suggested that this platform is a manmade feature constructed to raise the area above the surrounding marshy low-lying topography. The platform recorded during the current survey has a slightly larger footprint than that shown on historic mapping. This enlargement was potentially caused by material derived from the levelling of the school buildings in the 1970s (<http://www.fortgilkicker.co.uk/school.htm>). Truncated brick and concrete foundations on top of the platform (Fig 69) correspond closely with the position

of buildings shown on historic mapping (OS 1933 and 1949c).

e) Tramway (centre SZ 60500 97605)

Two converging tramway embankments (3.5) run east from the School of Electrical Lighting towards Fort Gilkicker (Fig 70). Immediately west of Fort Gilkicker the merged tramway curves to the north-east, crossing the southern edge of the Gosport and Stokes Bay Golf Course (Fig 71) to join the line of the access road running north-east from Fort Gilkicker. The embankments are up to 1.5m high and 3.5m wide at the top and between 8 and 8.5m wide at the base. The tramway is likely to have been constructed in the mid-1890s (<http://www.fortgilkicker.co.uk/mining.htm>) and is first shown on OS mapping in 1933.

f) Search lights

Positions for 4 early 20th-century searchlights were recorded to the east and west of Fort Gilkicker (<http://www.fortgilkicker.co.uk/searchlights1.htm>).

Position 1 (3.6) is constructed on top of a 14m diameter and 1.75m high mound approximately 35m east of Fort Gilkicker at (SZ 60790 97485). It consists of a 3.5 x 4.2m concrete slab with a single hole carrying a copper cable close to its northern edge (presumably for power supply), and 5 holes (presumably for the searchlight mounting) towards its southern edge (Fig 72). The western edge of the mound has been truncated by clearance work in 2017-18 (Fig 73).

Position 2 (3.7) is immediately to the east of Fort Gilkicker (SZ 60735 97470). It consists of a 3.5 x 4.2m concrete slab with a hole carrying a copper cable close to its northern edge (presumably for power supply), and 5 holes (presumably for the searchlight mounting) towards its southern edge (Fig 74 and 75).

Position 3 (3.8) survives as a 10m diameter and 1.5m high mound immediately to the west of Fort Gilkicker (SZ 60620 97475). No traces of a concrete slab were recorded.

Position 4 (3.9) is 160m to the west of Fort Gilkicker at SZ 60470 97570. It consists of a 2.5 x 3.45m concrete slab (Fig 76) with 2 holes carrying copper cables close to its northern edge (presumably for power supply) and 5 holes (presumably for the searchlight mounting) towards its southern edge.

g) Circular concrete slab and post hole (SZ 60445 97585)

A 2m diameter circular concrete slab (3.10) with a central square hole (c. 0.15x0.15m) was recorded 25m to the north-west of search light position 4 (Fig 77). This feature is not shown on historic mapping and is not visible on post-Second World War aerial photography.

h) Flag pole (SZ 60425 97630)

The concrete set base of a wooden flag staff (3.11) was recorded immediately to the south of the tramway (Fig 78). It is surrounded by 4 concrete-set iron rings (anchors for guy ropes). Its location is shown on 1933 historic mapping (OS 1933)

i) Measured mile marker (SZ 60745 97470)

The south-eastern of 4 'measured mile' markers (3.12) is located close to the eastern base of Gilkicker rampart. The marker consists of two iron uprights carrying a slatted black and white painted wooden marker (Fig 75 and 79). The uprights are set into a concrete base measuring c. 2.5 x 2.5 m. The marker was constructed by 1939

(http://www.friendsofstokesbay.co.uk/measured_mile_markers/) and is visible on post-War vertical aerial photography (RAF 46a).

Constructed to calculate ships' speed, the 'measured mile' system consists of 4 markers arranged in two pairs of markers exactly one nautical mile apart. Each pair consisted of a seaward 'foresight' marker and a landward 'backsight' marker. The western pair (now removed) were at the Browndown end of the bay and the eastern pair survive at the Gilkicker end of the bay. The landward marker (3.13, Fig 80) of the eastern pair survives approximately 550m to the north between Fort Road and the northern end of Gilkicker Lake SZ 60850 97995.

j) Concrete slab (SZ 60755 97465)

An unidentified concrete slab (3.14) measuring 1.8 by 1m was recorded 8m to the south-east of the measured mile mark (Fig 81). This feature is visible on post-Second World War vertical aerial photography (RAF 46a) but is not shown on pre-war historic mapping (OS 1933).

k) Brick foundations (SZ 60885 97515)

Three sides of a brick and concrete foundation (3.15) measuring 3.2 by 1.6m and appended to the western end of a length of sea wall were recorded to the east of Fort Gilkicker (Fig 82). The origin of this structure remains unclear. It corresponds approximately with a series of rectangular structures labelled 'position finding cells' (presumably relating to Fort Gilkicker) on pre-Second World War mapping (OS 1933) and also shown on a 1935 oblique aerial photograph of Stokes Bay (<http://www.friendsofstokesbay.co.uk/wp-content/uploads/2011/05/stokesbayaerial1935.jpg>). These structures have been removed by 1946 with only possible foundations visible on post-Second World War vertical aerial photography (RAF 46a).

Between Fort Gilkicker and Fort Monckton

- a) Trackways and gravel quarries (centre SZ 60780 97565)
A gravel quarry (3.16, Fig 83) and two trackways (3.17) were recorded between Fort Gilkicker and Gilkicker Lake. The quarry pits and elements of the tracks are visible on aerial photography from 1935 (<http://www.friendsofstokesbay.co.uk/wp-content/uploads/2011/05/stokesbayaerial1935.jpg>).
- b) Military Road (centre SZ 60780 97745)
First shown on O S mapping in 1862 (http://www.friendsofstokesbay.co.uk/wp-content/uploads/2017/04/StokesBay_1862.jpg) the access road (3.18) to Fort Gilkicker (Military Road) runs in a straight line south-west from Fort Lane to the entrance of the Fort. For much of its course it forms the western edge of Gilkicker Lake.
- c) Gilkicker Lake/Fort Monckton Moat (centre SZ 60860 97730)
Gilkicker Lake (3.19) was constructed in the early 19th century, forming the western defensive moat for Fort Monckton (Fig 84 and 85). Originally covering an area of approximately 5ha the lake formalised a wet area close to the former mouth of the River Alver, known previously as Alverstoke Marsh, Stokes Morass or Stokes Marsh (<http://www.friendsofstokesbay.co.uk/gilkicker-lake/>). From 1860 onwards the Lake was filled via the Stokes Bay Lines moat along which the River Alver was diverted (<https://www.fortgilkicker.co.uk/alver.htm>). Water levels are still controlled by a sluice at the south-eastern corner of the lake (Fig 86). A substantial area of the northern half of the Lake was infilled during the 1970s (<http://www.friendsofstokesbay.co.uk/fort-monckton/>). The lake, now bisected by a narrow causeway, has a combined area of about 3.5ha. Elements of the original eastern side of the lake are visible as a low earthwork and a hedgeline within the Gosport and Stokes Bay Golf Course.

A moat (3.20) ran from the north-west corner of the Lake, and wrapping around the north-western and northern edges of Fort Monckton. Between Gilkicker Lake and the access road to Fort Gilkicker the moat has been substantially backfilled, surviving to a maximum of 27m across by 1m deep (Fig 87). Further east beyond the access road the moat (3.21) is a more substantial feature, surviving to a depth of over 3m (Fig 88).

- d) Fort Monckton Entrance Redoubt (centre SZ 61245 98100)
The remains of a redoubt guarding the approach to Fort Monckton were recorded as an earthwork (3.22) within Gosport and Stokes Bay Golf Course immediately to the north of the moat surrounding the northern side of the Fort (Fig 89 and 90). To the west of the Golf Course access road the main body of the earthwork consists of an irregular crescent of bank up to 2m in height with a lower (c. 1m high) platform, probably a fire-step, on its inner edge. The earthwork is very similar in plan to that shown on late 19th century mapping of the site (OS 1892) (Fig 91) with once sharp corners having been softened by landscaping for the Golf Course. A substantial rectangular protrusion from the north-eastern edge of the redoubt is a late 20th century Golf Course feature. To the east of the Golf Course access road any surface traces of the redoubt have been covered by a golf green.

- e) Fort Monckton Glacis (centre SZ 60990 97770)
A glacis (3.23) exists between the outworks surrounding the western side of Fort Monckton and the eastern edge of Gilkicker Lake. The glacis consists of four spinal ridges with sloping sides which project the centre lines of the fort's two westernmost bastions and western ravelin, westwards to the edge of Gilkicker Lake (Fig 92 and 93). The glacis survives as a series of slight earthworks underlying the eastern side of Gosport and Stokes Bay Golf Course.

Adjacent to Battery 5

- a) Barrage Balloon Site (SZ 60655 98005)
A barrage balloon site (2.28) shows as two concentric circular features with associated tethering points on 1946 aerial photography (RAF 46c) to the south-east of Battery 5 (Fig 63). Elements of these features survive as very slight earthworks on 2015 lidar data but were not seen on the ground (Fig 36).
- b) Buildings (centre SZ 60550 98055)
The grass covered footprints of two small rectilinear buildings (2.29) were recorded immediately to the south-east of Battery 5. The buildings measure c. 9x4.5m and 10x6m respectively. Neither is shown on historic mapping or post war aerial photography.

Adjacent to Battery 2

- a) Amphibious Tank training area (centre SZ 58800 98835)
A saltwater training facility for amphibious 'Duplex Drive' tanks was established at the western end of Stokes Bay close to Battery 2 during the build-up to D-Day in 1943-44 (<http://duplexdrivetanks.co.uk/DUPLEXPAGES/TRAINING1.html>). Few surface traces of the facility survive. A slight linear earthwork recorded between the Stokes Bay lines and Stokes Bay Road immediately east of Battery 2 is probably the northern edge of an area of concrete hard standing (2.18) associated with the facility shown on 1948 aerial photography (Historic England Archive: *RAF/CPE/UK/2463 V 5032 26-FEB-48*) (Fig 57). A circular parch mark (2.19) seen on recent aerial photography (Fig 46) to the east of this is the base of a storage tank shown on 1948 aerial photography. To the north of the Stokes Bay Lines the configuration of Stokes Bay Mobile Home Park (2.20) and the Gosport Borough Council car park to its south (2.21), reflect the layout of tank parking areas associated with the facility.

Archaeological survey method statement

Where conditions permitted field data was mapped at a scale of 1:2500 using a Trimble Geo7 mapping grade GNSS. The position of each point was adjusted in real time to the National Grid Transformation OSTN02 via the Trimble VRS Now Network RTK delivery service. This uses the Ordnance Survey's GNSS correction network (OSNet) and gives a stated accuracy of 100mm per point. The survey data was downloaded into Korec K-Console software to process field codes and the data then transferred to ArcGIS 10.3.1 and Adobe Creative Suite 6 software for graphical completion.

Where vegetation prevented GNSS survey the extent of survival of the Stokes Bay lines was annotated in the field on printed extracts of pre- and post-Second World War 1:2500 OS maps. This information was then digitised in ArcGIS 10.3.1 and transferred into Adobe Creative Suite 6 software for graphical completion.

Further information was obtained from 0.5m resolution LIDAR Digital Surface and Digital Terrain Models (© Environment Agency copyright and/or database right 2015). This data was visualised in ArcGIS 10.3.1 and Quick Terrain Reader v8.0.5.2.

Earthwork features were digitised in ArcGIS 10.3.1.

The location and extent of parch marks relating to the Phoenix Construction Sites 1 and 2 and the Amphibious Tank Training Area was obtained from 2013 0.25m resolution vertical aerial photography (© Bluesky International/Getmapping PLC). Parch marks were digitised in ArcGIS 10.3.1.

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Gosport, Stokes Bay Lines, No 2 Battery, Casemated Battery, Right Face, Left Flank, 1892, Drawing WD672

Gosport, Stokes Bay Lines, Moncrieff Emplacements, No.2 Battery, 1892, Drawing WD673

Gosport, Stokes Bay Lines, Sling Wagon Shed and Artillery General Store, No 2 Battery, 1892, Drawing WD674

Gosport, Stokes Bay Lines, No.3 Battery, 1892, Drawing WD675

Gosport, Stokes Bay Lines, No.4 Battery, 1892, Drawing WD676

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RAF 1946c RAF/106G/UK/1322 V 5037 28-MAR-46

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British Pathe website film clips

Showing the Royal Naval Physiological Laboratory, Battery No.5
<https://www.britishpathe.com/video/deep-diving-trials-unit>

Deep Diving Trials Unit 1965; B&W, 1.19mins (exterior and interior scenes of mid-20th century building at Battery 5, with details of diving experiments)

<https://www.britishpathe.com/video/deep-dive-simulator>

Deep Dive Simulator 1966; colour, 2.40 mins (shows use of pressure chambers etc at RNPL) <https://www.britishpathe.com/video/deep-dive-simulator/query/Deep+Dive+Simulator>

Websites

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www.fortgilkicker.co.uk

www.friendsofstokesbay.co.uk

www.gosportheritage.co.uk

www.hampshireairfields.co.uk

www.victorianforts.co.uk

www.duplexdrivetanks.co.uk

SURVEY MAPS AND PHOTOGRAPHY



Figure 11. Stokes Bay location. Base mapping derived from 90m SRTM topography data courtesy of CGIAR <http://srtm.csi.cgiar.org>; and 2m photogrammetry ©Airbus Defence and Space Ltd; Bluesky International Ltd; Getmapping PLC. Rivers derived from OS data © Crown copyright and database right (2018).



Figure 12. Stokes Bay detail. Base mapping derived from 1m lidar DSM and DTM © Environment Agency copyright and/or database right 2018.



Figure 13. Stokes Bay Lines and associated features. Base mapping derived from 1m lidar DSM and DTM © Environment Agency copyright and/or database right 2018.

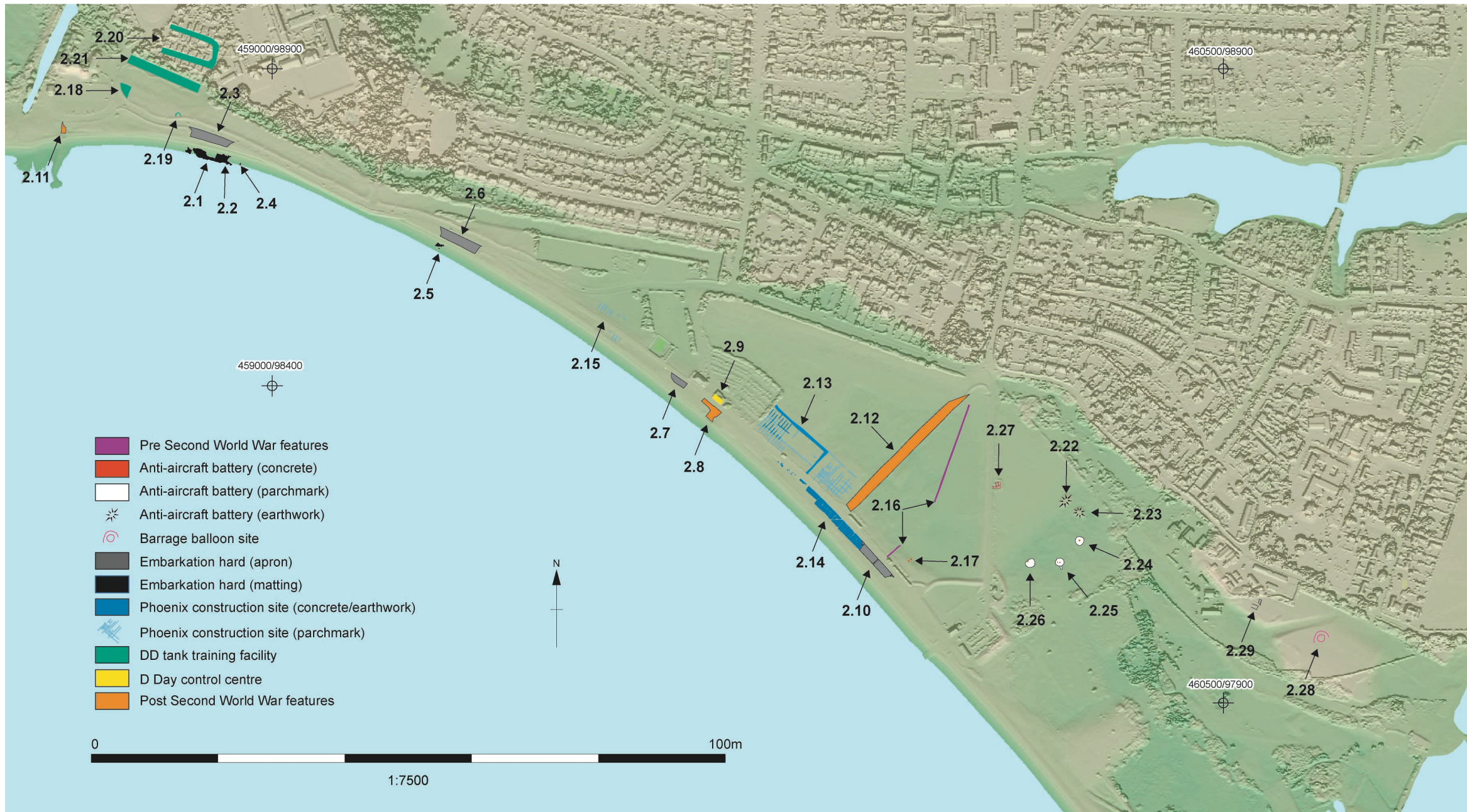


Figure 14. Second World War archaeological features at Stokes Bay. Base mapping derived from 1m lidar DSM and DTM © Environment Agency copyright and/or database right 2018.

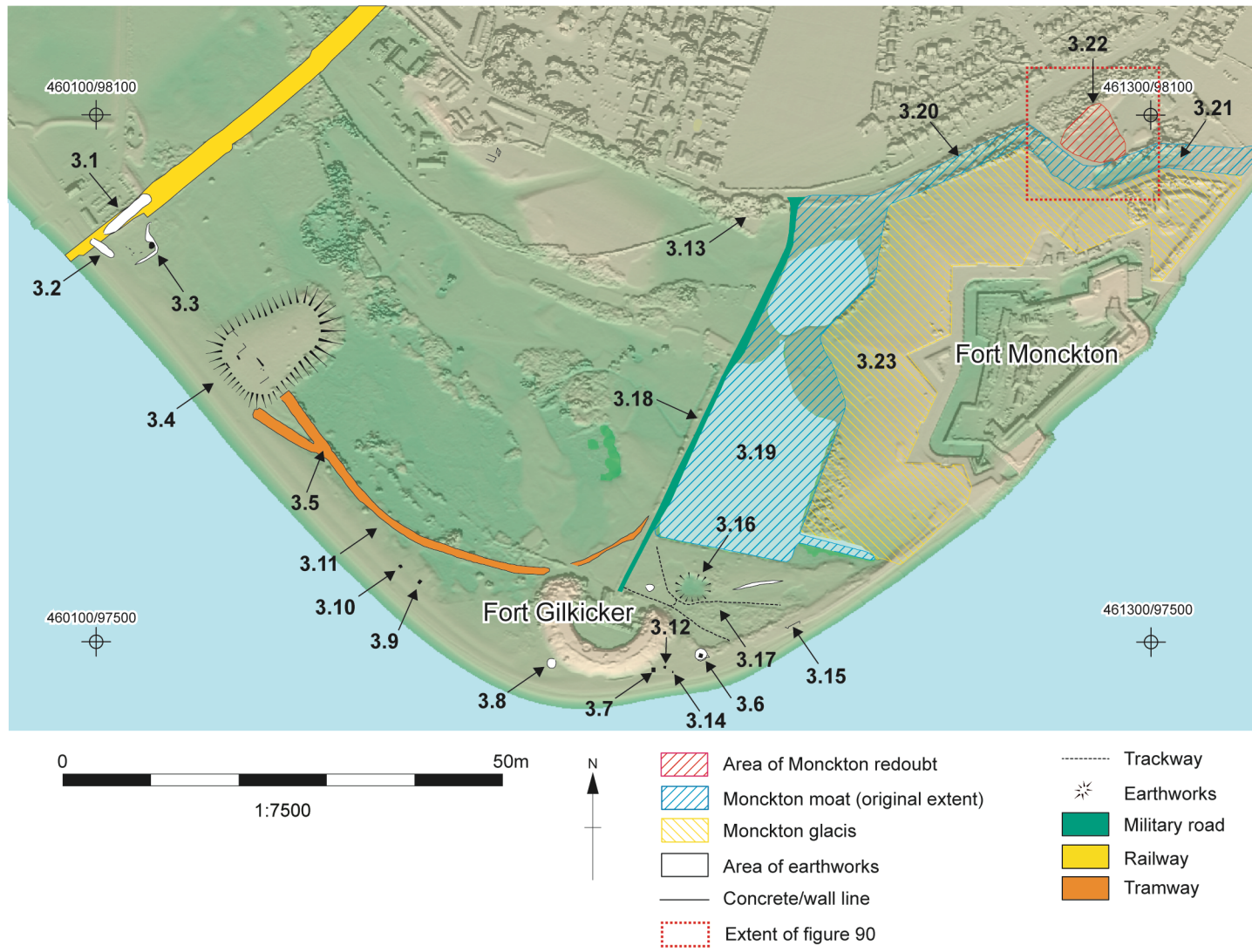


Figure 15. Archaeological features between Lifeboat Lane and Fort Monckton. Base mapping derived from 1m lidar DSM and DTM © Environment Agency copyright and/or database right 2018



Figure 17. War Department 1892 'General Plan of the Stokes Bay Defences' (Historic England Archive: WD/670)



Figure 18. The water-filled and concrete-lined Stokes Bay Lines immediately west of Battery 2 (© Historic England).



Figure 19. Western end of Stokes Bay looking west. Showing the course of the infilled Stokes Bay Lines from Battery 3 to Battery 2. Embarkation hard G3, G2 and G1 are visible at the back of the beach (33560_029 26/06/2018 ©Historic England Archive).



Figure 20. The rear of the Stokes Bay Lines between Alverstoke Road and Battery 2 (© Historic England, photograph Wayne Cocroft).



Figure 21. Parch mark showing the northern edge of the Stokes Bay Lines looking west towards Battery 2 (© Historic England).



Figure 22. Firing step at the rear of the Stokes Bay Lines, 1m scale (see figure 3 point 1.7). (© Historic England).



Figure 23. Parch mark showing kink in Stokes Bay Lines to the west of Alverstoke Road, scale 1m (see figure 3 point 1.6), (© Historic England).



Figure 24. Outfall from the Stokes Bay Lines (© Historic England).



Figure 25. The Stokes Bay Lines south of Palmerston Way looking east towards Battery 3. Buildings on the left side of this image are the first floors of houses behind the substantial northern bank of the Stokes Bay Lines, scale 1m (© Historic England).



Figure 26. Looking east along the top of the northern bank of the Stokes Bay Lines south of Palmerston Way (© Historic England).



Figure 27. Parch marks and slight earthworks looking west along the Stokes Bay Lines towards Battery 3, south of Stokes Bay Road (© Historic England).



Figure 28. The northern edge of the Stokes Bay Lines looking east along Stokes Bay Road, scale 1m (© Historic England).



Figure 29. Looking south along Lifeboat Lane. The slight earthwork underlying the lane is the remnant of the eastern bank of the Stokes Bay Lines (© Historic England).



Figure 30. Southern elevation of brick building on the northern edge of Battery 4 (© Historic England).



Figure 31. Eastern and northern elevations of brick building on the northern edge of Battery 4, and underlying earthwork, (© Historic England).



Figure 32. Looking east along the Stokes Bay Lines south of Battery 5. The southern edge of the moat's concrete lining is visible, 1m scale (© Historic England).



Figure 33. Looking north towards the southern bank of the Stokes Bay Lines east of Battery 5, scale 1m (© Historic England).



Figure 34. Looking north east across the eastern end of Stokes Bay towards Portsmouth Harbour. Image shows the eastern end of the Stokes Bay Lines from Battery 4 to Gilkicker Lake (33561_002 26/06/2018 ©Historic England Archive).



Figure 35. Looking north-west across potential Redoubt 6 towards Battery 5, scales 1m (© Historic England).

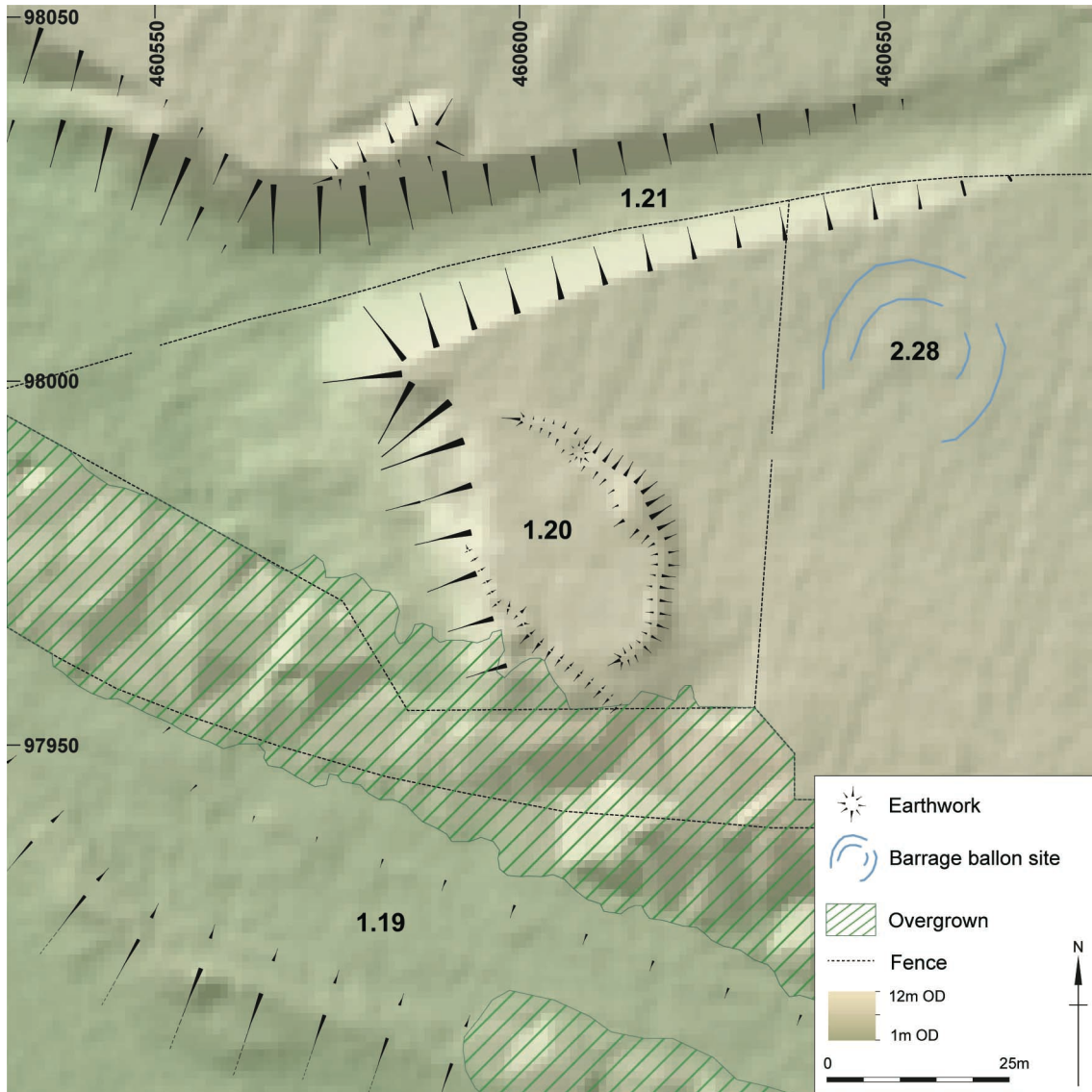


Figure 36. Archaeological earthworks in the area of Redoubt 6, scale 1:1000. Elevation data derived from 1m lidar DSM and DTM © Environment Agency copyright and/or database right 2018.



Figure 37. Trackway between Battery 5 and site of Redoubt 6, view to north (© Historic England).



Figure 38. Battery 2, with the surviving section of the moat to the left and Battery 1 ramparts to the rear. (33562_003 26/06/2018 ©Historic England).



Figure 39. Battery 2 modified gun emplacement, c1901. (Photograph Mike Williams © Historic England).



Figure 40. Battery 5, showing the original ramparts part hidden by vegetation, mid-20th century hutments and the later buildings of the Royal Naval Physiological Laboratory (33561_040 26/06/2018 ©Historic England Archive).



Figure 41. A building of the Royal Naval Physiological Laboratory, formerly used for decompression experiments. Part of the Battery 5 rampart visible to the right. (© Historic England, photograph Wayne Cocroft).



Figure 42. Haslar Immigration Removal Centre block plan. (Base mapping © and database right Crown Copyright (All rights reserved 2019) Licence nos. 000394 & TP0024).



Figure 43. Haslar Barracks originated in the early to mid 19th century. It was later used as a hospital and finally as an Immigration Removal Centre. (33563_011 26/06/2018 ©Historic England Archive).



Figure 44. Headquarters building at Haslar Barracks, later the Haslar Immigration Removal Centre. Early to mid 19th century building with later porches, used as Infectious Wards at the end of the 19th century, photographed in 1998. (© Historic England photograph AA98_08858).



Figure 45. Disturbed areas of 'chocolate block' concrete matting at embarkation hard G1, view to east, scale 1m (© Historic England, photograph by Wayne Cocroft).



Figure 46. Looking north towards the concrete apron (under car park) and concrete matting (under sea weed on the foreshore) at embarkation hard G1. The circular parch in the centre left of the image is from a storage tank associated with the amphibious tank facility. (33560_018 26/06/2018 ©Historic England Archive).



Figure 47. Detail of iron posts associated with embarkation hard G1 (© Historic England, photograph Wayne Cocroft).



Figure 48. Line of timber posts east of embarkation hard G1 (© Historic England, photograph Wayne Cocroft).



Figure 49. Looking south across 'chocolate block' concrete matting on the foreshore at embarkation hard G2 (© Historic England).



Figure 50. Looking west across the concrete apron (under car park) and concrete matting (exposed on the beach) at Embarkation hard G2 (33562_026 26/06/2018 ©Historic England Archive).



Figure 51. Looking north across the area of embarkation hard G3. Elements of the concrete apron survive between the promenade and the beach immediately to the south of the carpark. The D-Day control centre forms the eastern half of the two storey white building on the right edge of the photograph (33562_040 26/06/2018 © Historic England Archive).



Figure 52. The southern and eastern elevations of the D Day control centre (now Stokes Bay Sailing Club). The western third of this building (to the left of the step in the roof line) is a post war addition (© Historic England).



Figure 53. Looking north across embarkation hard G4. The two larger areas of concrete with sweeping landward corners in the centre and right of the image comprise the apron for the hard. The smaller slabs of concrete in the centre and left of the image comprise the south eastern corner of Phoenix caisson construction site 1 (33562_046 26/06/2018 ©Historic England Archive).



Figure 54. Looking west towards Stokes Bay Sailing Club with the second storey of the D Day control centre visible against the skyline. The slight parallel earthworks in the foreground are grassed over remnants of Phoenix caisson construction site 1, scale 1m (© Historic England).



Figure 55. Looking north across the areas of embarkation hard G3 and G4, and Phoenix caisson construction site 1 (showing as parch marks in the grassed areas and concrete slabs between the promenade and the beach). Elements of Gilkicker Heavy Anti-Aircraft Battery are visible as parch marks on the right edge of the photograph. Pre and post-war features including the Stokes Bay Lines between Batteries 3 and 4, the embankment and the bathing pool pathways are also visible (33560_036 26/06/2018 ©Historic England Archive).



Figure 56. Approximately the same area as figure 55 in March 1946. Mooring dolphins associated with embarkation hards G3 and G4 are clearly visible in the water and on the beach. Phoenix caisson construction sites 1 and 2 are immediately behind the beach. The hatted encampment associated with Gilkicker Heavy Anti-Aircraft Battery is visible on the right of the image. Pre-war features include the bathing pool and associated paths on the right of the image and the still water-filled Stokes Bay Lines zig-zagging from left to right across the centre of the image. RAF/106G/UK/1322 V 5025 28-MAR-46, Historic England Archive (RAF Photography).



Figure 57. The western end of Stokes Bay in February 1948. From left to right elements of the amphibious tank training facility, embarkation hard G1 and G2 and Phoenix caisson construction site 2 are visible on, or immediately inland from, the foreshore. The water filled moat of the Stokes Bay Lines between Batteries 2 and 3 is also visible. RAF/CPE/UK/2463 V 5032 26-FEB-48, Historic England Archive (RAF Photography).



Figure 58. Post-war concrete slipway at the western end of Stokes Bay, scale 1m (© Historic England).



Figure 59. 1950s causeway made from reinforced concrete fragments derived from clearing Phoenix caisson construction sites. Concrete is visible in the face of the embankment, scale 1m (© Historic England).



Figure 60. Looking south along the concrete path to the former bathing pool, scale 1m (© Historic England).



Figure 61. Two unidentified late twentieth century brick structures (see figure 4 point 2.17), (© Historic England).



Figure 62. Gilkicker Heavy Anti-Aircraft Battery showing as parch marks. The site is framed by the southern protrusion of the Stokes Bay Lines and Batteries 4 and 5. The causeway and elements of the bathing pool footpaths are visible on the left of the image (33561_037 26/06/2018 ©Historic England Archive).



Figure 63. Gilkicker Heavy Anti-Aircraft Battery and its associated hutted encampment in March 1946, framed by the southern protrusion of the Stokes Bay Lines and Batteries 4 and 5. A mooring dolphin associated with embarkation hard G4 and Stokes Bay Pier are visible on the foreshore. Barrage balloon site 2.28 is a circular feature in the top right of the image and the bathing pool is visible on the left of the image and the School of Electrical Lighting and associated tramway is on the right of the image. RAF/106G/UK/1322 V 5037 28-MAR-46, Historic England Archive (RAF Photography).



Figure 64. Parch marks of Gilkicker Heavy Anti-Aircraft Battery, scale 1m, (© Historic England).



Figure 65. Looking west towards potential remains of the embankment for the Stokes Bay railway line. (© Historic England).



Figure 66. Looking west towards a late twentieth century earthwork close to Stokes Bay Angling Club, scale 1m, (© Historic England, photograph Wayne Cocroft).



Figure 67. Circular storage tank pad associated with Stokes Bay Pier, scale 1m, view to north (© Historic England, photograph Wayne Cocroft).



Figure 68. Looking south east towards the platform for the School of Electrical Lighting, Fort Gilkicker in the background (© Historic England).



Figure 69. Wall lines from buildings associated with the former School of Electrical Lighting, view to north-west, scale 1m (© Historic England, photograph Wayne Cocroft).



Figure 70. Looking north-west towards the tramway running east from the School of Electrical Lighting (© Historic England, photograph Wayne Cocroft).



Figure 71. Looking south-west along the line of the tramway running north-east from the School of Electrical Lighting. Fort Gilkicker is in the background (© Historic England).



Figure 72. Concrete base for search light position 1, looking west towards Fort Gilkicker, scale 1m (© Historic England).



Figure 73. Mound and concrete base for search light position 1, looking south, scale 1m (© Historic England).



Figure 74. Concrete base for search light position 2, looking west towards Fort Gikicker, scale 1m (© Historic England, photograph Wayne Cocroft).



Figure 75. Looking south-east from Fort Gikicker towards search light positions 1 and 2, and the measured mile mark. (© Historic England, photograph Wayne Cocroft).



Figure 76. Looking south east towards the concrete base for search light 4 with Fort Gilkicker in the background, scale 1m (© Historic England).



Figure 77. Circular concrete slab with square post hole to west of Fort Gilkicker, scale 1m (© Historic England, photograph Wayne Cocroft).



Figure 78. Stub of wooden flag pole and anchor rings to west of Fort Gilkicker, scale 1m (© Historic England, photograph Wayne Cocroft).



Figure 79. Measured mile mark to the east of Fort Gilkicker, looking east, scale 1m (© Historic England).



Figure 80. Measured mile mark at the northern edge of Stokes Bay Golf Course, looking north (© Historic England).



Figure 81. Small concrete slab to the east of Fort Gilkicker, scale 1m (© Historic England, photograph Wayne Cocroft).



Figure 82. Looking north-east towards brick wall lines associated with former position-finding cell. Fort Monckton in the background (© Historic England).



Figure 83. Looking north towards a quarry hollow between Fort Gilkicker and Gilkicker Lake, scale 1m (© Historic England).



Figure 84. Looking north-east across Gilkicker Lake towards Fort Monckton (© Historic England).



Figure 85. Looking south-west across Fort Monckton glacia towards Gilkicker Lake and Fort Gilkicker (© Historic England).



Figure 86. Looking south-west towards the sluice gate in the south-east corner of Gilkicker Lake towards Fort Gilkicker (© Historic England).



Figure 87. Looking west along the partly infilled line of Fort Monckton moat (© Historic England).



Figure 88. Looking east along Fort Monckton moat (© Historic England).



Figure 89. Looking south across the interior of Fort Monckton redoubt towards Fort Monckton (© Historic England).

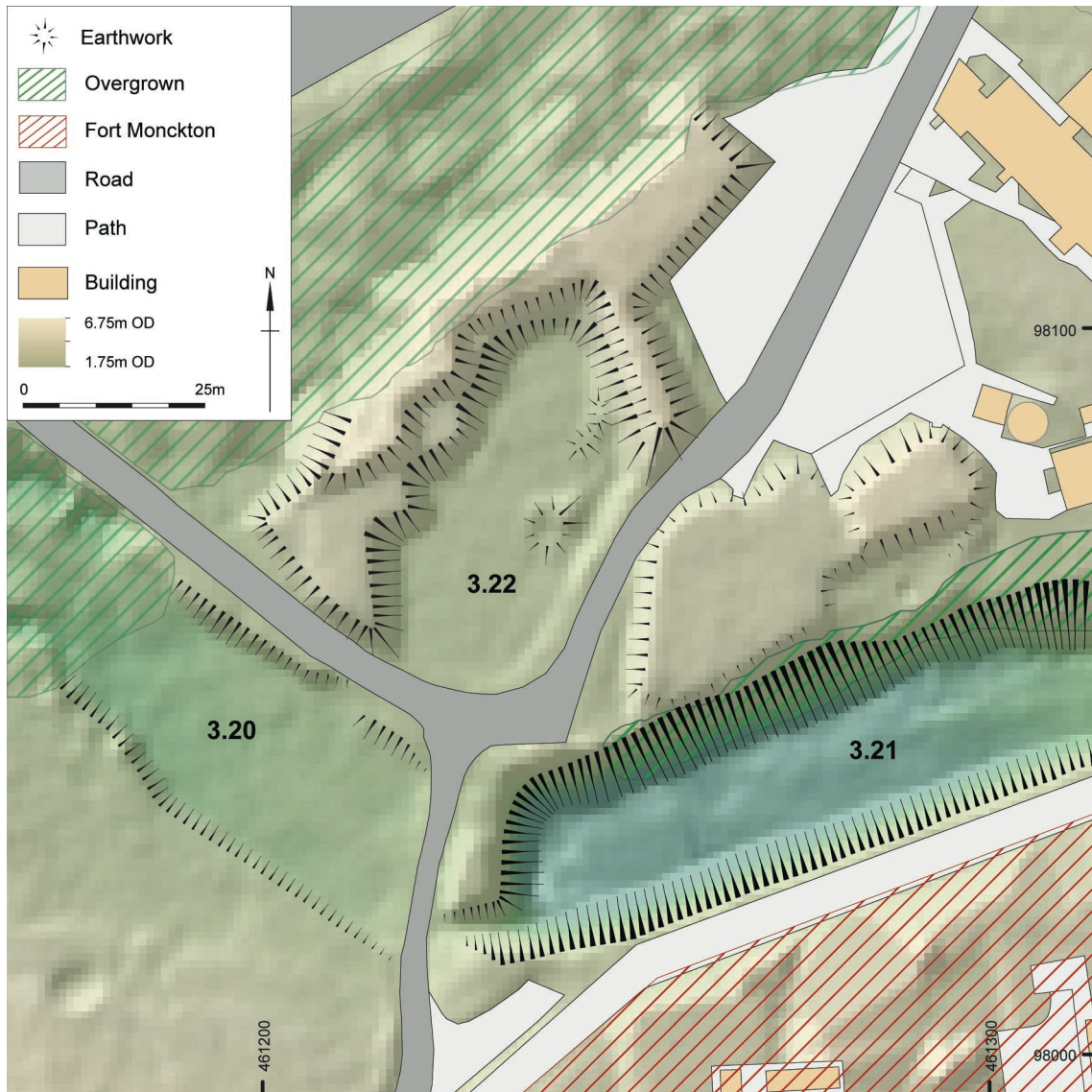


Figure 90. Earthworks in the area of Fort Monkton redoubt, scale 1:1000. Elevation data derived from 1m lidar DSM and DTM © Environment Agency copyright and/or database right 2018. Base mapping © Crown copyright and database right 2018. All rights reserved. Ordnance Survey licence 10050083.

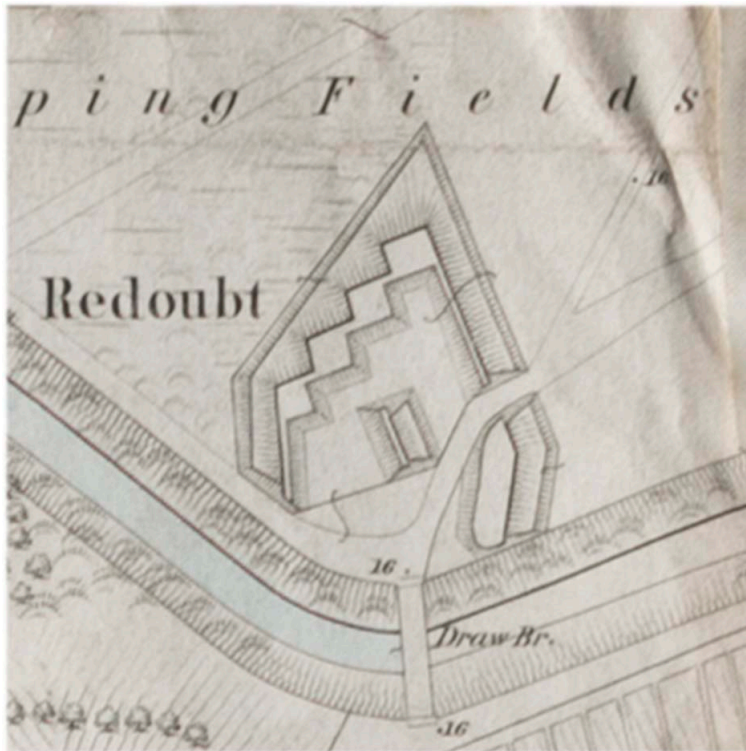


Figure 91. Extract of War Department 1892 'General Plan of the Stokes Bay Defences' showing Fort Monckton redoubt and moat (Historic England Archive: WD/670).



Figure 92. Looking east along one of the spines of Fort Monckton glacia towards Fort Monckton (© Historic England).

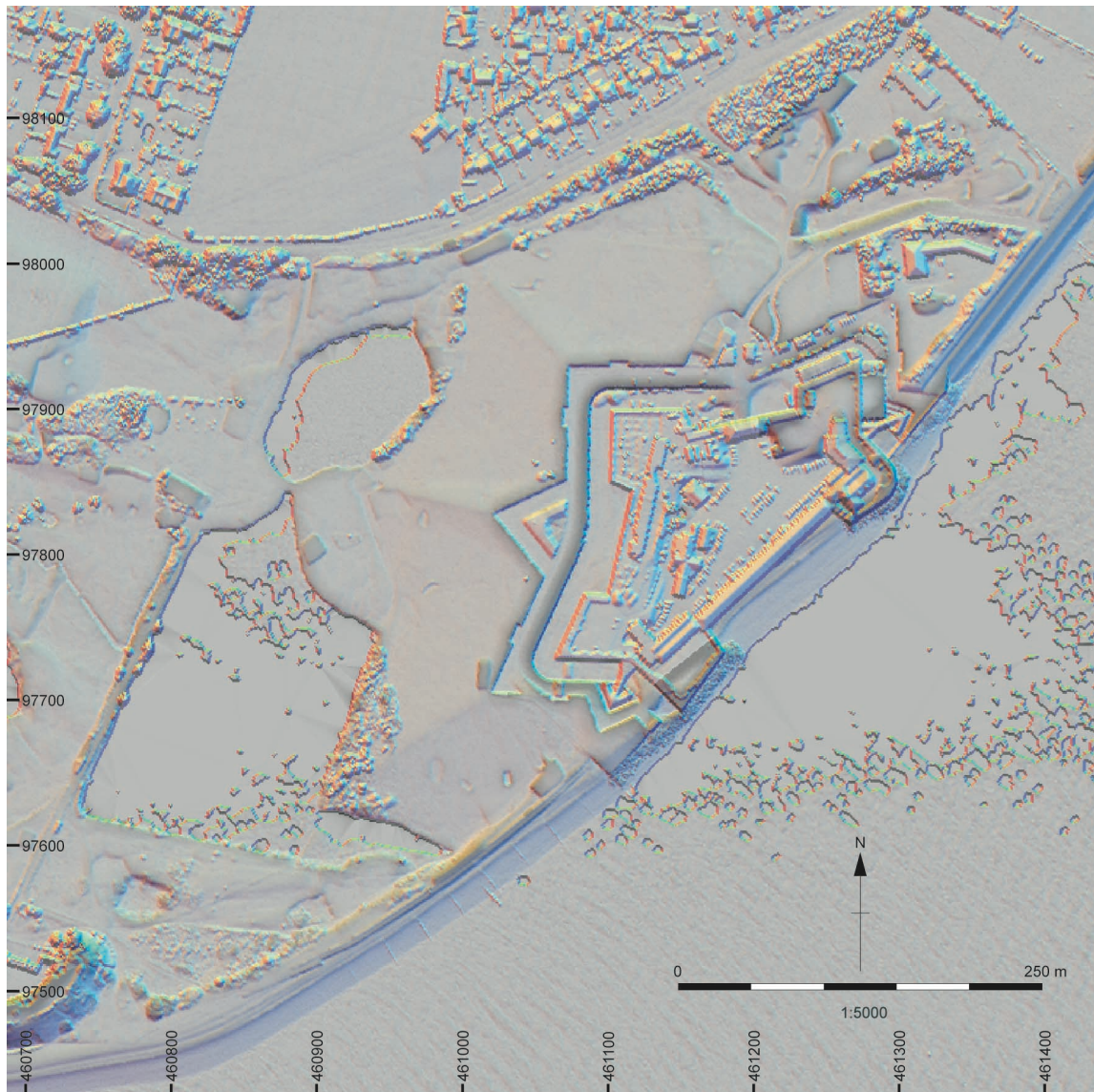


Figure 93. Multi-directional hillshade model of Fort Monckton glacia and surrounding area, highlighting the earthworks of the glacia. Height data derived from 1m lidar DSM © Environment Agency copyright and/or database right 2018.



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