

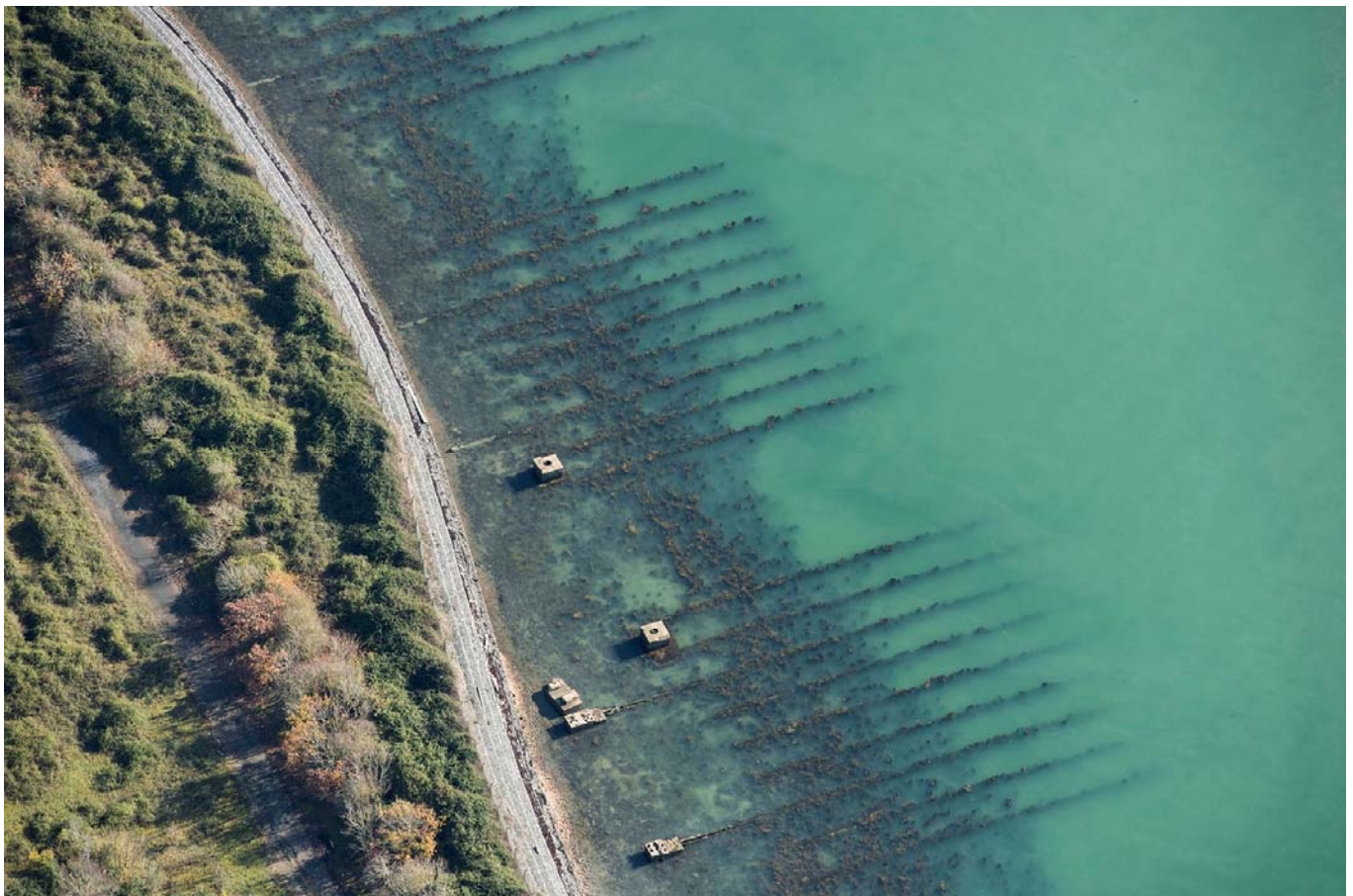


Historic England

Horsea Island Second World War Landing Craft Slipways Portsmouth, Hampshire

Fiona Small

Discovery, Innovation and Science in the Historic Environment



Research Report Series no. 177/2020

Horsea Island Second World War Landing Craft Slipways Horsea Island, Portsmouth Hampshire

Fiona Small

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SUMMARY

The Horsea Island landing craft slipways are surviving remains of the infrastructure created to support D-Day on 6th June 1944, arguably the start of the final phase of the Second World War. D-Day was the culmination of two to three years of preparations for the assault phase of Operation Overlord. Codenamed Neptune, this landed over 850,000 men, 150,000 vehicles and 570,000 tons of supplies on the beachheads of Normandy. In the build-up to the offensive a number of sites were established for the building, repair and maintenance of landing craft and ships for the fleet to deliver Winston Churchill's 'great plan'. One such site, believed to be the largest, was constructed on Horsea Island, Portsmouth.

This report summarises the results of the analysis of aerial photographs and airborne laser scanning data (lidar) images focused on D-Day landing slips. Contextual information is provided from maps and aerial photographs on the history of Horsea Island, the Admiralty installations and other Second World War features.

CONTRIBUTORS

This report was written and researched by Fiona Small. All aerial photographic analysis and mapping was carried out by the author.

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Luke Griffin of the Historic England Archive managed and delivered the aerial photography loan. The author would also like to thank the National Archives for permission to include a contemporary photograph from their collection, and Stephen Fisher for advice and information on Second World War landing craft and maintenance sites. National Library of Scotland maps have been Reproduced under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC-BY-NC-SA) licence with the permission of the National Library of Scotland; <https://maps.nls.uk/index.html>. Helen Winton edited the report.

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CONTACT DETAILS

fiona.small@historicengland.org.uk

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INTRODUCTION

D-Day on 6th June 1944 defined the start of the final phase of the Second World War. This was the culmination of two to three years of preparations for the amphibious assault phase of Operation Overlord. Codenamed Neptune, this landed over 850,000 men, 150,000 vehicles and 570,000 tons of supplies on the beachheads. In the build-up to the offensive, a number of sites were established for the construction of specialised landing and docking structures, Mulberry Harbours, which were constructed at secret sites around the British Isles. Vast numbers of vessels were also required and sites were selected for the building, repair and maintenance of landing craft and ships for the fleet to deliver Winston Churchill's 'great plan'.

One such site, believed to be the largest, was constructed on Horsea Island, in the sheltered waters of Portsmouth Harbour (Fig 2). Already owned by the Admiralty, Horsea was the site of a 19th-century gunpowder re-stoving (drying) facility, a torpedo-testing range and three successive telegraph stations. In the 1940s, a total of five slipways and a repair facility were constructed on the southern side of the island. These slipways are examples of Broadside Slips, three further examples of which have been recorded in the south-west of England (Historic England 2001 and Historic England 2003).



Figure 1: Horsea Island viewed from the south-east down the length of the former torpedo testing pond with Portsmouth Harbour and Portchester Castle beyond. The remains of the slipways are submerged by the tide in this view, visible as a dark smudge in the water along the beach in the foreground HEA 33943_013 04-NOV-2020 © Historic England Archive.

Following the war, the site at Horsea Island was decommissioned and abandoned. The buildings were removed and the area underwent large-scale land reclamation and is no longer an island. However, components of the slipways on the beach remain, including the ribs of the five massive slipways (Fig 1). Foundations of associated buildings and roads of the maintenance yard also survive above the shore.

This report describes the results of an assessment of all Historic England Archive aerial photographs, Environment Agency Lidar, and additional on-line sources of aerial photographs relating to the site of the Second World War naval workshop on Horsea Island, Portsmouth (SU6407 0384).



Figure 2: Location of Horsea Island within Portsmouth Harbour. © Crown Copyright 2020. All rights reserved. Ordnance Survey Licence number 100019088

HORSEA ISLAND PRIOR TO THE SECOND WORLD WAR

Horsea Island is located to the north of Portsmouth in the north-eastern corner of the tidal inlet that is Portsmouth Harbour. It was originally two smaller islands (Fig 3). The western was known as Little Horsea Island, the eastern and larger known as Great Horsea Island (Ripley 1982, 3).

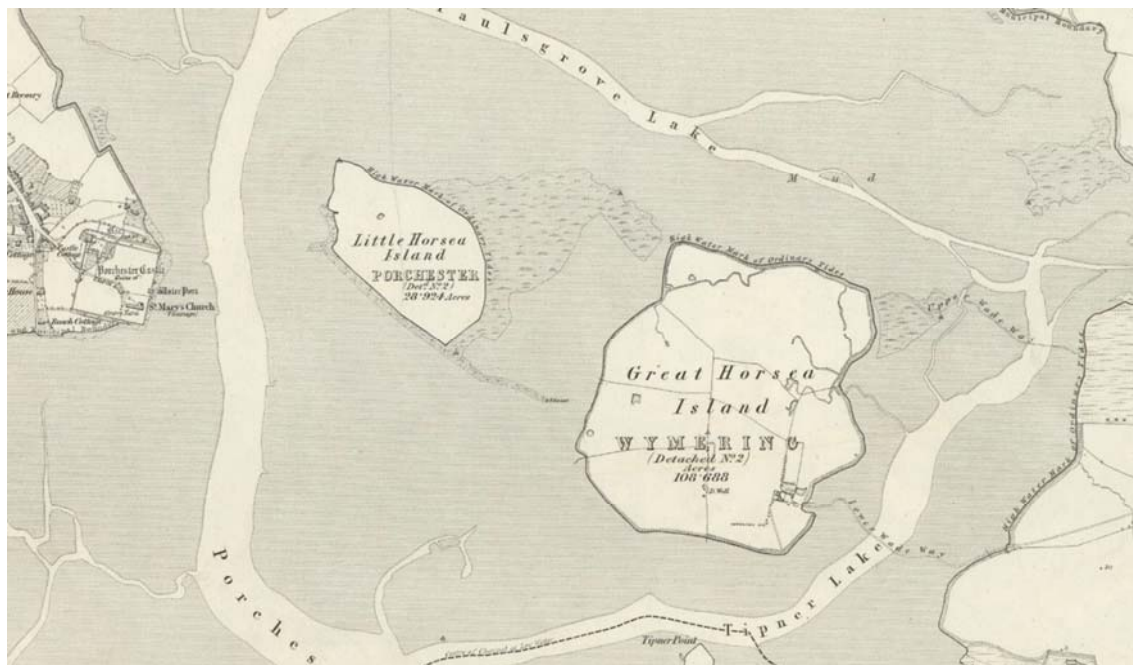


Figure 3: Map of Little Horsea and Great Horsea Islands in Portsmouth Harbour. Ordnance Survey six inch to the mile map surveyed 1856, published 1870 (National Library of Scotland). Portchester Castle is on the headland to the west of Little Horsea. Reproduced with the permission of the National Library of Scotland <https://maps.nls.uk/index.html>

Until the late 19th century the Horsea Islands were both grazed and cultivated, each supporting a single farm. The farm on Great Horsea comprised 108 acres, 58 acres of which was below high tide – embanked and drained with ditches and sluices. It had a brick-built farm from c1740 with outbuildings including two thatched barns (Ripley 1982, 4).

Little Horsea was considerably smaller, comprising 29 acres of land and 27 acres of marsh (Ripley 1982, 4). Historic maps (Ordnance Survey six inches to the mile scale maps 1870 and 1898) show that on Great Horsea there was a single farm located at the south-eastern corner of the island with four or five large fields divided by hedges. The remains of the boundaries are recorded on aerial photographs taken in 1929, as is some evidence of probable post-medieval cultivation ridges.

Access to both islands was via ‘wadeways’ or causeways exposed at low tide (Fig 4). The Great Horsea wadeways crossed the mud and the permanent channel known as Tipner Lake. Two of these, called the Upper (Hilsea) Wadeway and Lower (Stamshaw) Wadeway, respectively linked the north-eastern and south-eastern corners of island to the mainland. The third linked Great Horsea with Tipner Point to the south, but fell out of use in the 18th century. These were constructed of large

stones topped with fine gravel enabling crossing at low tide. This gravel was probably obtained from the large rectangular pit in the north of the island (Ripley 1982, 4). These routes appear long-established and are named on a map of Portsmouth Harbour of c1600 by La Favelure (White 1971, 4).

There is a possible fourth wadeway between Little Horsea and Portchester Castle recorded on aerial photographs (Fig 5). Construction of a pier in the 1880s and 1890s along the course of the wadeway unearthed Roman remains suggesting the causeway could have early origins (Ripley 1982, 3).

In common with much of the area around Portsmouth Harbour, the Horsea Islands were incorporated into the spreading naval facilities. In 1804, gunpowder works were established at Portsmouth – split between Stamshaw Point near Tipner Point and Little Horsea Island – for restoring damp gunpowder offloaded from naval ships when they returned from their tours of duty. The main dusting houses, mixing houses and proof range were located at Stamshaw Point. Across the water on Little Horsea were the specialised re-stoving facilities for drying and restoring the damaged gunpowder (Cocroft 1997, 58-9; NRHE 1076712).

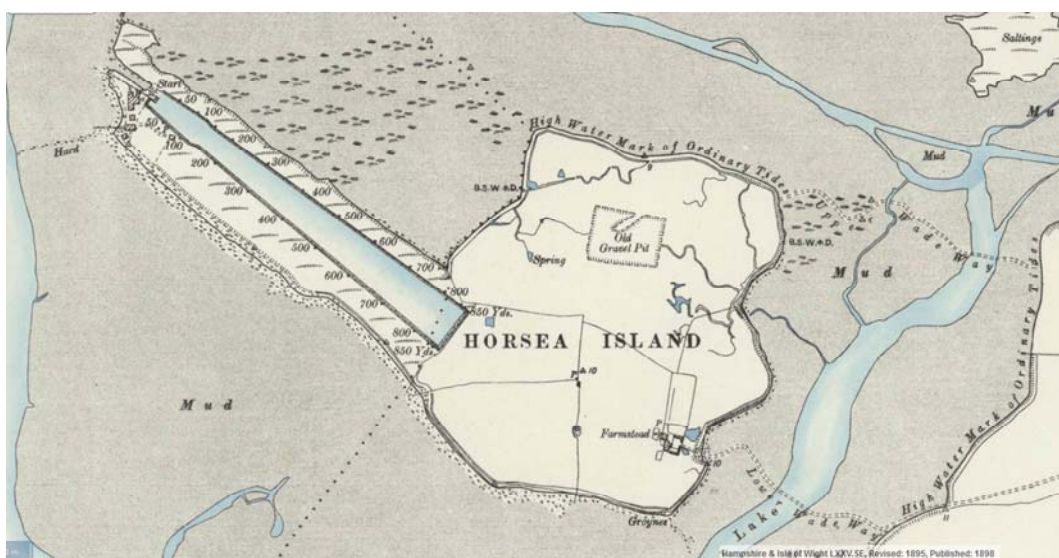


Figure 4: 1898 map showing Little Horsea and Great Horsea islands joined together during construction of the torpedo-testing pond. Ordnance Survey 25 inch to the mile surveyed 1895, published 1898 (National Library of Scotland). Reproduced with the permission of the National Library of Scotland <https://maps.nls.uk/index.html>

Little Horsea and Great Horsea Islands were united into a single island in 1885 to accommodate an 800-yard long torpedo-testing pond (Fig 4). This two-and-a-half-year project created a link between the islands using chalk and marl from excavation of the pond, with additional chalk brought in from Paulsgrove Chalk Pit on the mainland. The work was undertaken by convict labour, from the newly opened Kingston Prison, housed in huts on the northern side of Little Horsea Island (Ripley 1982, 6).

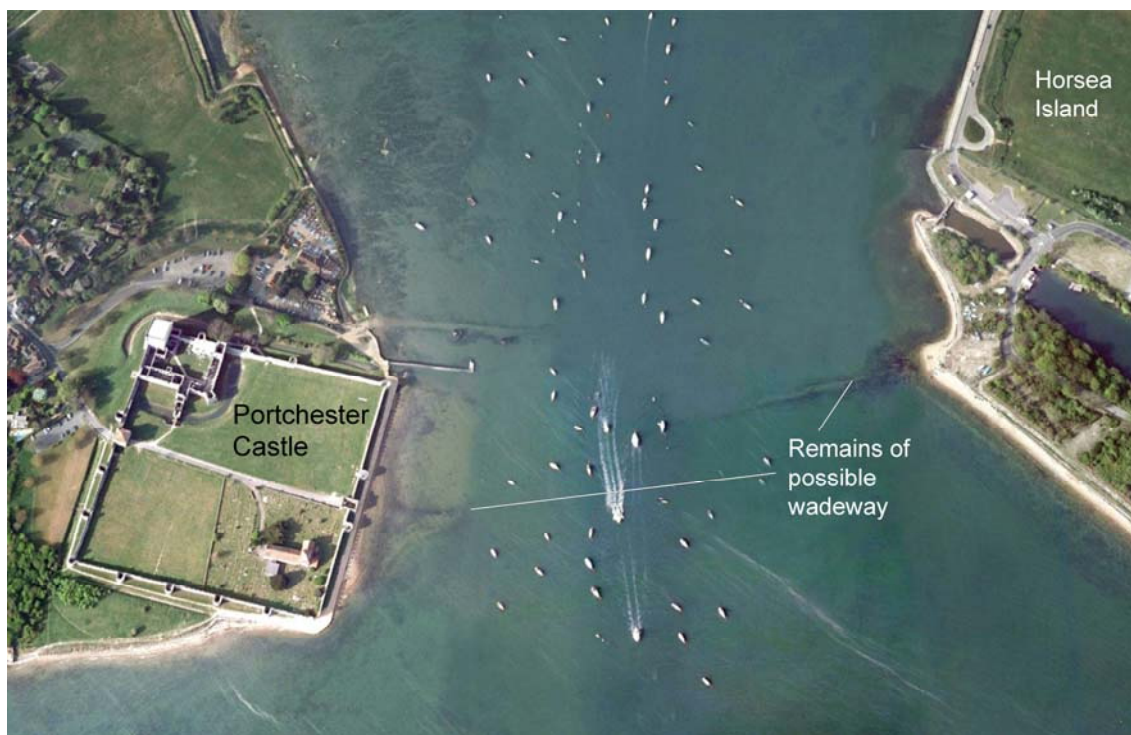


Figure 5: Aerial photograph showing the remains of the former wadeway between Horsea Island and Portchester Castle at high tide. EARTH.GOOGLE.COM 21-APR-2007 ACCESSED 04-Feb-2020.

The torpedo-testing range opened in March 1889, but rapid advances in torpedo range and speed made it necessary to extend the pond. Work was completed in 1905 and the excavated material used to repair erosion on the south shore and reclaim 3.5 acres of marshland on the northern side of the island (Ripley 1982, 10). The torpedo-range pond also served as an experimental centre for a range of Naval projects and trials and as a training area for naval diving and swimming from 1918 (Ripley 1982, 11; 17-18).

Routine torpedo testing ceased in 1939, but the pond continued to be used by the Admiralty Experimental Laboratory at Haslar for various marine experiments including submersible two-man chariots in 1942 and some of the tests for the Mulberry Harbour project for Operation Overlord (Osborne 2011, 209).

Horsea Wireless Telegraphy Station

Wireless telegraphy (W/T) communications were developed in the late 1890s. Initially two types of equipment were developed and utilised by the Royal Navy. 'Jackson' was developed by Captain H B Jackson of the Royal Navy and 'Marconi' by Guglielmo Marconi to communicate with ships (and later aircraft) operating in the English Channel (portlandhistory.co.uk 2020). By 1899 it was decided to adopt Marconi's system which was subsequently trialled aboard ship and at a number of shore-based low- and then medium-powered wireless stations.

By 1906 three high-powered Marconi W/T stations were planned: one at Gibraltar, one at Cleethorpes and a third at Horsea Island. Four 150ft-high masts surrounded

by eight spreader masts were erected on the north side of the torpedo pond. The site was upgraded and four new wooden 'Ewell' masts erected between 1913 and 1921 (Ripley 1982, 11). Other activities on the island included fire fighting, underwater weapons testing and amphibious-tank trials.

By 1931 advances in wireless telegraphy required updating the station and equipment. The old wooden masts were replaced with unsupported steel towers 30m (100ft) and 50m (180ft) in height, located on the northern and eastern parts of the island (Ripley 1982, 18; Osborne 2011, 135). Further developments in telegraphic communications came through the Second World War rendering most of the steel towers obsolete, but the W/T station remained operational until 1960.

The Portsmouth Harbour Reclamation scheme undertaken in 1967 reclaimed the northern marshes and linked the island to the mainland (Pitt 1970). Considerable land-moving has raised the height of the eastern side of the island, but the torpedo tank still remains along with a handful of the 19th- and 20th-century buildings associated with the torpedo range and wireless stations which survived the heavy bombing the island and its military sites received during the Second World War.

THE AIR PHOTOGRAPHIC EVIDENCE

All available aerial photographs held by Historic England Archive, Environment Agency airborne laser scanning data (lidar) and online aerial photographs were assessed. Aerial photographs consulted included vertical and oblique prints ranging in date from 1929 to the present day. Geo-referenced and rectified digital images were produced from a number of key aerial photographs using the AERIAL 5.36 rectification programme. Environment Agency 1m and 2m lidar was processed using the RVT 1.1 programme (Relief Visualisation Software Toolbox software) to generate a number of visualisations of the data.

The earliest aerial photographs of the island are a set of good quality vertical images taken in 1929 by the RAF (Fig 6). These photographs show the island dominated by the (already obsolete) torpedo-testing pond and associated buildings from the various phases of naval use clustered around the north-western end. The four wooden Elwell masts of the second phase Admiralty W/T station can also be seen. Two masts cast shadows to the north of the pond and the southern two are just visible on the southern side, casting their shadows across the water. The control buildings were located on the northern edge of the torpedo pond close to the north-western mast. The positions of probable masts stays and additional mast arrays can be seen as a grid of white dots around the buildings of the wireless station. Three separate lines of white dots can be seen extending out from the base of the eastern mast, likely to be the tether points for the supporting stays of the mast.

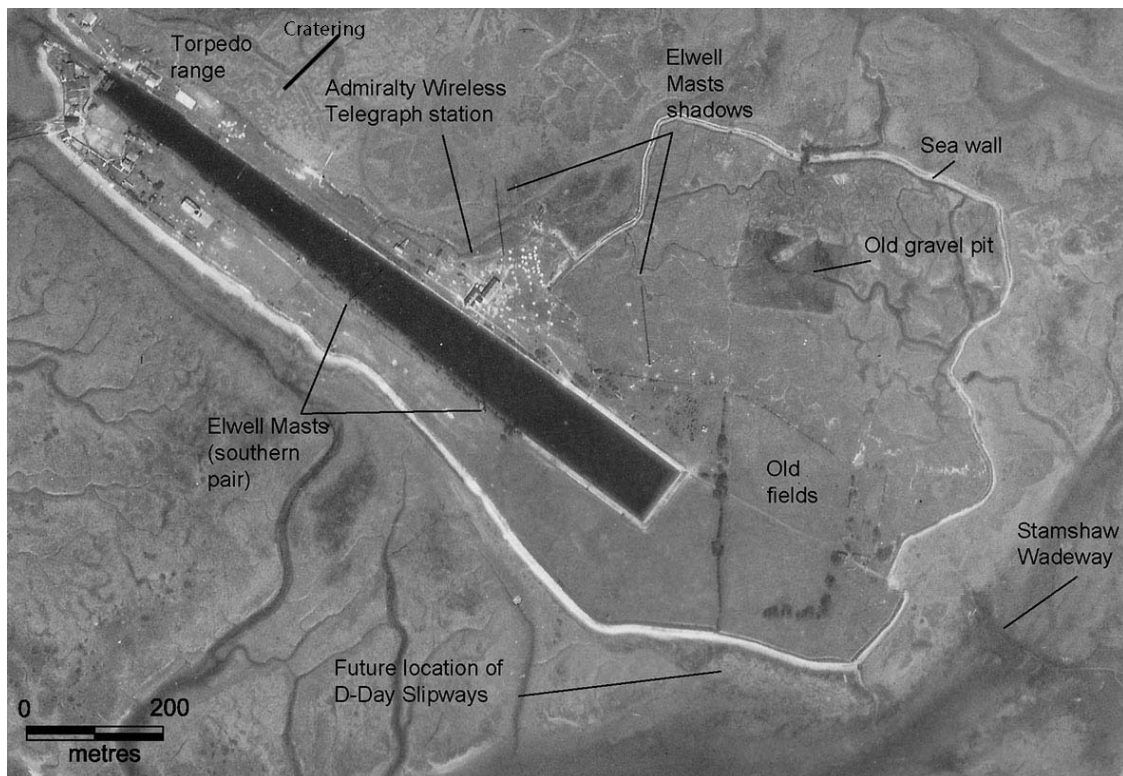


Figure 6: Extract of RAF vertical photograph showing an accumulation of pre-Second World War Naval installations and other features of Horsea Island. North is to the top. RAF/SOP/FV/61639 19-APR-1929. Historic England Archive RAF photography.

Non-military features include the sea wall around the two amalgamated islands, the old gravel pit used to build and maintain the wadeways and traces of the Stamshaw wadeway extending south-east from the island.

There is a record of the marshland on the north-east side of Little Horsea being used for explosives testing in the 19th century (Ripley 1982, 11). Clusters of craters seen on the 1929 RAF aerial photographs between the Torpedo range and Wireless station on the north side of the torpedo range may be the remains of some of these explosions (Fig 6).

Two sets of RAF aerial photographs were taken of the Portsmouth harbour area in 1941 and 1942 prior to the construction of the slipways (Figs 7 and 8). Both are high level and therefore small scale, making detail difficult to discern. Cloud also obscured the eastern half of Horsea Island on the 1941 aerial photographs and most of the island on the 1942 photographs. However, it is just possible to make out the south-eastern end of the island on the 1942 photographs where the pale circular embankments around three of the masts of the third phase of wireless station, which were installed in 1932-3, can be seen (Ripley 1982, 18).



Figure 7: The north-west end of Horsea Island seen through cloud showing the torpedo pond. Extract of RAF/FNO13C 6265B/V/635 14-MAR-1941. Historic England Archive RAF photography.

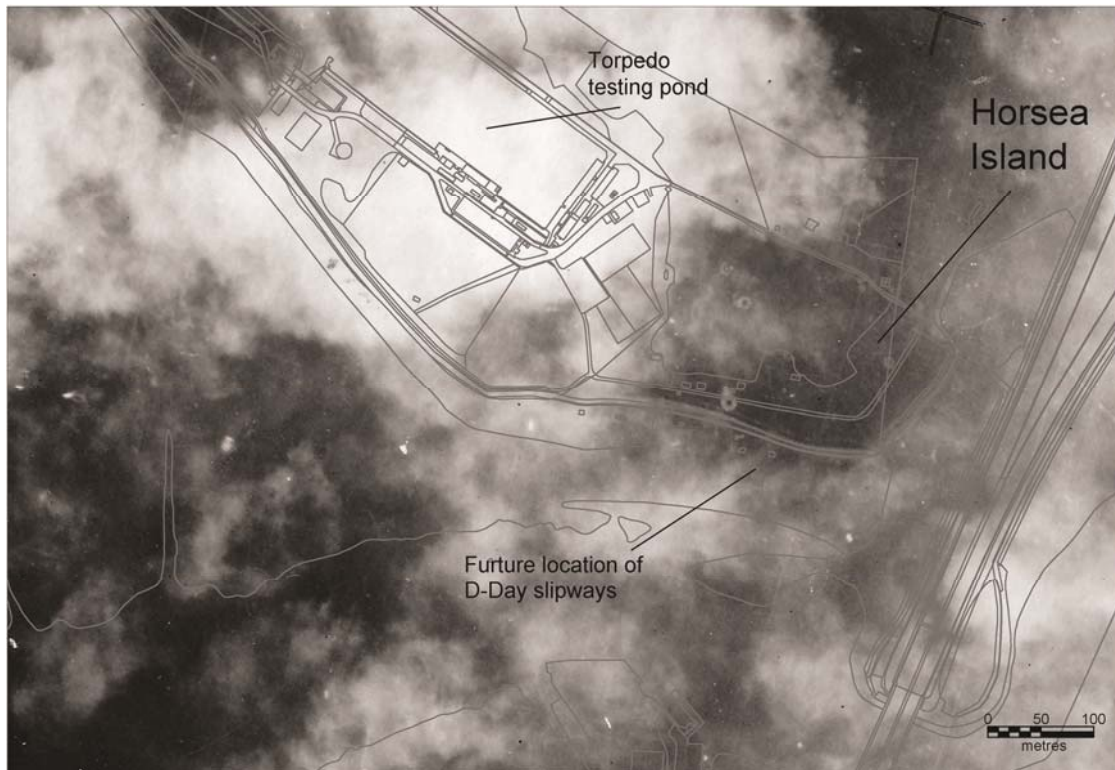


Figure 8: Aerial photograph of the southern end of Horsea Island, mostly obscured by cloud, overlain with modern mapping. The 1930s embankments associated with the wireless-station masts are just visible at the south-eastern tip of the island between the clouds. Extract of RAF aerial photograph RAF/FNO/13C/V/636 04-JUN-1942. Historic England Archive RAF photography. Base map © Crown Copyright and database right 2020. All rights reserved. Ordnance Survey Licence number 100019088.

The Horsea Slipways

The decision to carry out a cross-channel assault on occupied Europe was taken by the Combined Chiefs of Staff in May 1943 and proposed for May of 1944 (Harchup 1977, 12). This required the selection of numerous construction sites for the Mulberry Harbour structures and also sites to refit and repair ships, particularly landing craft in preparation for the D-Day landings. The sheltered waters of Portsmouth Harbour and the virtually uninhabited island of Horsea, already in Admiralty hands, provided an ideal location for one such repair site.

Three other surviving landing-craft-maintenance sites have been identified, on tidal rivers in Devon, and have been provided national protection through scheduling (National Heritage List for England (NLHE) 1021076, 1020053 and 1020912). These are listed as Gridiron Slips, but based on morphology are all thought to be the more complex Broadside Slips (Fisher, pers comm). These were characterised by a series of parallel concrete ribs running on a slight gradient into the water allowing flat-bottomed boats to be floated in sideways on the high tide, secured to a cradle which was then winched to above the high-water mark for maintenance.

The Devon sites all comprised one or two slipways in comparison to the five at Horsea. Lower Noss Point, Devon (NHLE 1021076) had two slipways (Historic

England 2003), Saltash Pier, Devon (NHLE 1020053) had a single slipway (Historic England 2001), and Maypool Cottage on the River Dart, Devon (NHLE 1020912) had one slipway (Historic England 2003a).

There were three types of slipway; Broadside slips and Gridirons and Standard Hauling slips. Broadside and gridiron sites receive the craft side-on to the shore, requiring sites wide enough to accommodate the full length of a ship. At broadside slipways craft are attached to a cradle and winched up the slipways above high-water mark. Gridirons, not strictly a slipway, are tidal dependent sites where the craft is secured at high-water above the grid structure which is exposed as the tide drops, supporting the stranded vessel for repairs. Standard hauling slipways winch craft end-on out of the water and are therefore much narrower structures than the other two types of site (Stephen Fisher pers comm).

The site at Horsea Island comprised five broadside slipways, by far the largest of these purpose-built landing craft maintenance yards. Though no contemporary description of the Horsea site has been found, they appear morphologically similar to the Devon sites, so are likely also to be Broadside slips. The slipways were constructed on the beach in the south-east corner of the island with a complex of workshops and yards set behind the existing embanked sea defences.



Figure 9: Aerial photograph overlain with mapping of key features of the slipways. Also see Fig 12 for detail. Purple = structure, red = bank, green = ditch and orange = extent of feature. Extract of RAF aerial photograph RAF/106G/UK/955/RVp3/6246 30-OCT-1945. Historic England Archive RAF photography.

The five slipways were arranged along the shore, each consisting of a series of nine parallel ribs approximately 85m long and 0.5m wide, set between 4m and 4.5m apart. Each slipway had two platforms on which the landing craft were winched out of the water to be serviced. These pairs of platforms were unequal in size due to the odd number of ribs making up each slipway (one platform sitting across five ribs and the other across four, separated by the gap between the ribs). The platforms had an open framework with a lattice or meshed infill which can be seen on aerial photographs to cast a shadow on the beach below (Figs 9 and 12). Each platform had a triangular frame extending up the beach, and one or two square concrete blocks at one or both of the landward corners with a central post. These were set on concrete bases measuring about 4m square, most of which still remain today.

A low bank, probably the remains of the former sea wall, separated the beach from the maintenance yard. This had a number of causeways aligned with the gaps between each slipway, presumably for access. Set into this bank were a number of concrete blocks measuring 2.5m square with a central bollard for tethering and winching the ships onto the slipway.

Contemporary ground photographs of the slipways taken in 1944 held at the National Archives, Kew (not included in this report) show the ribs, probably constructed from concrete, surmounted with a steel rail, and the winch cables from shore-based winches attached to the triangular extension on each platform. These ground photographs also reveal other details of structures noted on the aerial photographs, such as the large concrete blocks at the corners of the platforms (function uncertain) and the large mooring bollards set in concrete blocks above the shore. Also visible were several free-standing oil generators positioned beyond the low sea wall which powered the winch drums set on concrete footings with steel cables extending out to the slipways.

These photographs also show evidence of the day-to-day working at the site which had ceased by the time the site was photographed from the air in 1945, such as repair crews working on moored landing craft and scattered material such as loops of cables, piles of timber, machine parts and the network of telegraph poles and telegraph/electricity wires going to each slipway. Also noted was the beach around the slipways which had been built up with broken bricks and rubble, presumably to consolidate the fine marine mud exposed at low tide. This is thought to be rubble from bomb damage elsewhere on the island, used to build up the beach and to consolidate the mud (Ripley 1982, 18).

A line of four free-standing mooring dolphins can be seen to the south in the deeper water (Fig 12), for mooring and positioning the craft laterally before drawing them sideways onto the slipways on the rising tide. Once in position they were secured to the platforms on the slipways and hauled out of the water. Three of these mooring dolphins remain and are visible on aerial photographs taken in 2020 (Fig 1).

Although it is not entirely clear from the historic RAF aerial photographs, it is likely that landing craft at Horsea were winched up the slipways and secured above the high water mark to allow for continual, unhindered access clear of the water even at

high tide, rather than only being clear of the water at low tide as is the case with gridiron slipways.



Figure 10: Horsea Island slipways with three landing craft (LCT889, LCT 1165 and LCT 790) in place, probably receiving running-repairs following D-Day. Photograph title: 'Horsea Island – view of slipways at low tide looking north-east 12th June 1944' ADM 1/17813 P.248/44 © National Archives. Reproduced with the permission of the National Archives, Kew

In the weeks leading up to D-Day as troops and resources were gathered and the fleet was readied. The landing craft which would transport them to France were moored in ports close to embarkation points. One such gathering point of massed Landing Craft (Tank) (LCTs) in the Solent area is recorded on photographs taken in early June 1944 at Southampton which are held by the Imperial War Museum.

Over 800 LCTs took part in Operation Overlord. Each LCT was capable of carrying 10 tanks or other heavy armoured vehicles, and troops (National Museum of the Royal Navy 2020). Following the initial offensive, a continual supply chain of craft was established from ports along the south coast to maintain the Allied forces through the beachheads at Normandy. These ships were frequently under attack in transit, and many were lost or severely damaged. Throughout this period vessels returned to the established maintenance yards such as Horsea for running repairs. Photographs held by the National Archives, Kew show the Horsea Island slipways on 12 June 1944, six days after D-Day and the start of Operation Neptune with three such returned landing craft (LCT889, LCT 1165 and LCT 790) in position on the slipways, probably for repairs (Fig 10).



Figure 11: Imperial War Museum photograph of massed LCTs moored in Southampton in early June 1944 awaiting deployment to embarkation points along the Solent. Reproduced under IMW Non-Commercial Licence © IWM A 23731.

RAF aerial photographs taken in October 1945 (Fig 12) and April 1946 (Fig 13) record the repair yard just after the end of the war. The site was abandoned (presumably decommissioned or mothballed) by this time, but appears intact and is still littered with discarded construction materials such as piles of timber and large loops, probably coils of salvaged winch cable (Fig 13). There are no vehicles present and portable items such as generators and oil drums seen on the ground photographs have been removed. On aerial photographs taken in April 1946 the site still looks churned up with exposed chalk and worn paths between buildings from the intensive pre-D-Day activity, and much of the debris seen in the previous October is still in evidence across the site, but the moving platforms have been removed from the slipways leaving the ribs exposed.

The site appears again on high-level RAF vertical photographs taken in April 1949 (Fig 14). The buildings appear to be extant, but the scale of the photographs make discerning any details of the state of the remaining facilities difficult.



Figure 11: Extract of RAF aerial photograph RAF/106G/UK/955/RVp3/6246 30-OCT-1945 showing detail of the slipways with the raised trellis or platform with the possible winch housing and tether points at the top of the beach. Historic England Archive RAF photography.

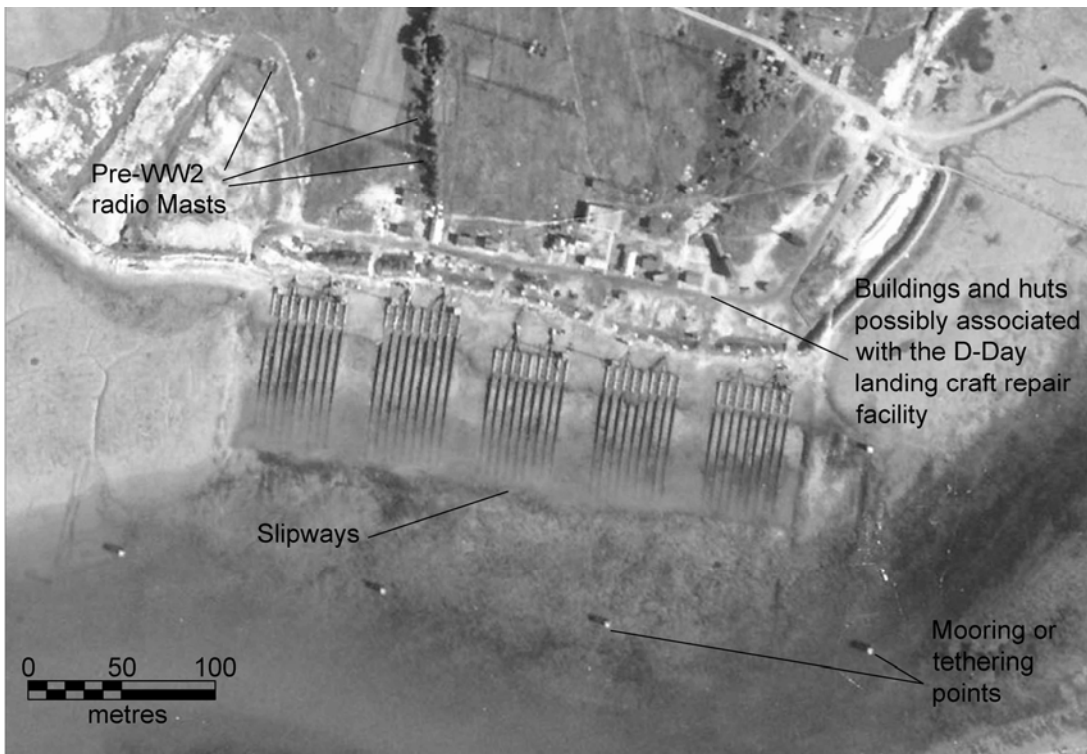


Figure 12: The slipways and associated features in 1946. Extract of RAF/3G/TUD/UK/156/V/5008 19-APR-1946. Historic England Archive RAF photography.



Figure 14: High-level vertical aerial photograph showing Horsea Island at low tide with the slipways visible on the bottom end of the island. Extract of RAF/540/177/5075 09-APR-1949. Historic England Archive RAF photography.

After the Second World War there was considerable reclamation, infilling and development of Horsea Island, eventually joining it to the mainland. However, the torpedo testing pond has survived and the south-eastern corner has remained relatively untouched. 1999 Google Earth aerial photographs (Fig 15) reveal the continued presence of the slipway ribs and some of the associated concrete structures on the beach. A service road follows the course of the wartime access road through the maintenance yard, but the rest of the depot site has not been developed and is now overgrown with vegetation. The remains of some of the Second World War maintenance yard buildings survive at foundation level in the vegetation above beach. There are several rectangular concrete hut bases and paths or roadways in the western half of the depot site on the northern side of a later service road. Parchmarks of buried foundations relating to the site are clearly visible in the grass in the eastern half of the site. Aerial photographs taken in 2017 show the continued presence of the Second World War buildings surviving as buried or semi-buried foundations (Fig 16). They also show the slipways at low tide, with between 20m and 30m of their seaward ends covered with marine silt.



Figure 15: Extract of Google Earth aerial photograph dated 01-JAN-1999 (though vegetation suggests a summer date) showing surviving steel and concrete remains of the D-Day slipways. It also shows the remains of the concrete hut bases and parchmarks of further buried foundations, hard-standings and roads of the Second World War maintenance yard located above the beach on Horsea Island. EARTH.GOOGLE.COM ACCESSED 04-FEB-2020.



Figure 16: Extract of APGB mosaic aerial photographs taken in 2017 showing the slipways partially covered by silt and the sites of former Second World War buildings above the beach. 21-JUN-2017 ©Bluesky International/Getmapping.



Figure 17: The slipways, partially submerged, taken in November 2020 by Historic England. The vegetation inland of the beach appears matured since photographs taken in 2017. HEA 33943_022 04-NOV-2020 © Historic England Archive.

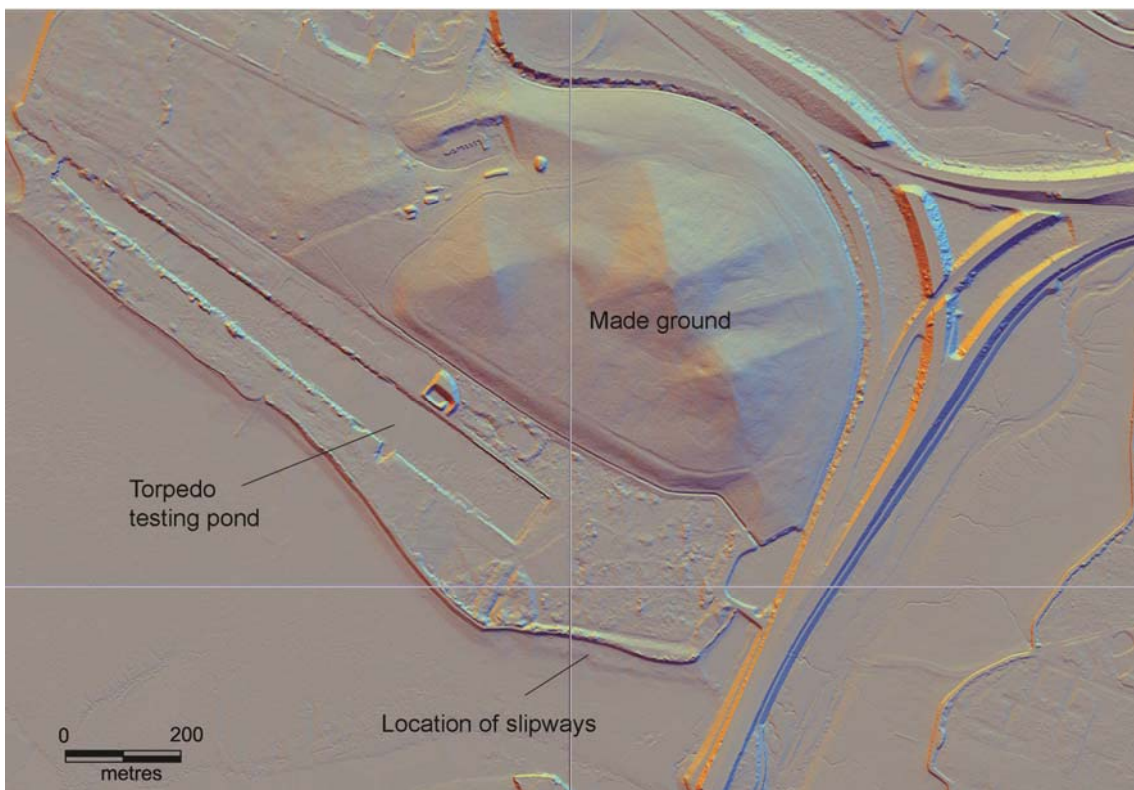


Figure 18: Extract of processed lidar data for Horsea Island and surrounding area highlighting the torpedo pond and a large area of made ground to the north. LIDAR (SU6303, 6304, 6403 and 6404). © Historic England; source Environment Agency.

The most recent photographs taken in November 2020 by Historic England show the site unchanged, but the vegetation behind the beach more mature and traces of building foundations obscured (Fig 17).

The evidence from maps, aerial photographs and lidar suggests much of the original island has been altered and enlarged, perhaps with the exception of the south-east facing edge (Figs 18 and 19). It is thought that there was reuse of debris from earlier bomb damage elsewhere on the island incorporated into the D-Day landing craft maintenance yard (Ripley 1982, 18).



Figure 19: Google Earth aerial photographs showing the extent of reclamation and enlargement of Horsea Island. EARTH.GOOGLE.COM 11-Sep-2016 ACCESSED 10-MAR-2020.

CONCLUSION

Analysis of historic and recent aerial photographs record the remains of a short-lived Second World War site established to repair and prepare part of the fleet of landing craft destined to play a major role in the D-Day landings on 6 June 1944. The repair facility with purpose-built slipways and workshops was established on the south-eastern corner of a small island already owned and used by the Admiralty since the 19th century. Following the end of the War, the facility was decommissioned. All portable equipment was removed and the site abandoned; buildings were partly removed and the slipways stripped of their frames and metalwork. Today the main concrete rib structures of the slipways and concrete tethering blocks remain plus some of the bases for the associated buildings and structures. The current road running along the top of the beach follows the original service road through the wartime facility. Traces of the bases of huts and buildings along with some of the metalled or concrete spurs off this road and yards associated with buildings can still be seen within the vegetation to the north of the road.

The exceptional survival of the remains of this historically significant site which played such a key role in Operation Overlord and the D-Day Landings underlines the importance of preserving these slipways.

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BGS (British Geological Survey)

<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

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<https://maps.nls.uk/index.html>

AERIAL SOURCES

Historic England Archive

Relevant Historic England Archive vertical aerial photographs.

Sortie	Library No.	Camera position	Frame	Date
RAF/UK/SOP(Y)	4986D	FV	61638-61641	19-Apr-29
RAF/HLA/137	6265A	V	632-635	04-Mar-41
RAF/FNO13C	6265B	V	635-636	04-Jun-42
RAF/FNO/13	8785	V	6035-6036	24-Jun-42
RAF/106G/UK/955	121	RVp2	6163-6164	30-Oct-45
RAF/106G/UK/955	121	RVp3	6245-6246	30-Oct-45
RAF/3G/TUD/UK/156	207	V	5007-5009	19-Apr-46
RAF/106G/UK/1566	394	V	5005	19-Apr-46
RAF/540/177	2121	V	5018-5020	19-Apr-46
RAF/540/177	2121	V	5074-5076	19-Apr-46
RAF/CPE/UK/2234	8063	V	5015-5016	16-Aug-47
RAF/CPE/UK/2234	8063	V	5046-5048	16-Aug-47
RAF/540/7	3300	V	5016-5018	07-May-48
RAF/540/7	3300	V	5023	07-May-48
RAF/541/155	2696	RP	3019-3020	05-Sep-48
RAF/541/155	2696	RS	4045-4046	05-Sep-48

Air Photography for Great Britain (APGB)

The APGB Mapshop is a web portal managed and operated by Bluesky International Limited.

12.5cm vertical aerial photographs, 50cm infra-red vertical aerial photographs 21-06-2017, 2.5cm vertical aerial photographs 19/04/2007 and 21/04/2007, and vertical aerial photographs 01/08/2007

2m and 5m digital surface model 21-06-2017

Google Earth

23-7-2019, 6-8-2017, 11-9-2016, 11-6-2015, 22-4-2015, 22-9-2014, 21-4-2007, 31-3-2005, 31-12-2004 (default date not necessarily actual day/month), 11-12-2004, 31-12-2001 (same imagery as 1999), 31-12-1999 (default date not necessarily actual day/month)



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