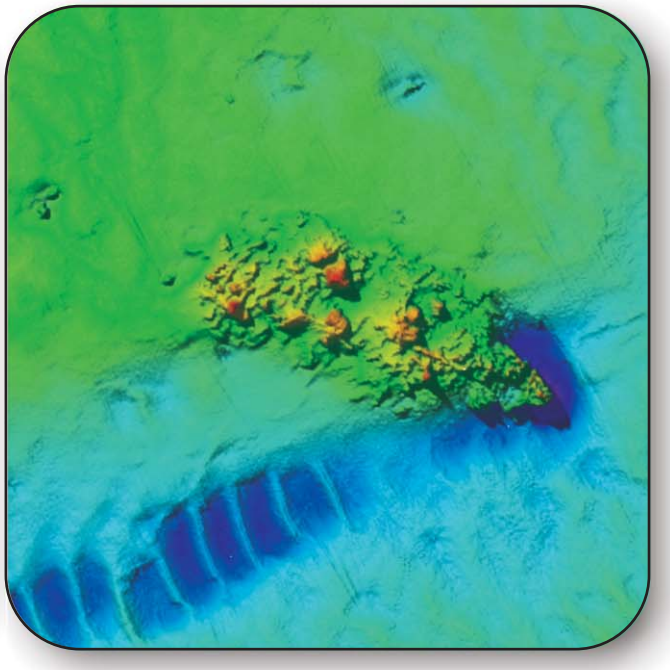
London Gateway
A Maritime History



DP WORLD

London
Gateway

Preface

London Gateway, the UK's first new deep sea container port for over 20 years, is taking London back to its roots as a major international port. For hundreds of years, the city's port was one of the biggest in the world and was the leading economic generator for the region. Now we are witnessing a new period in London's history with the development of a world class container port just 25 miles east of the former docks on the north bank of the River Thames.

The Thames estuary has been a major artery for communication and trade within south-eastern Britain and the wider world for most of human history. The remains of boats, ships and their former contents are important evidence of past societies and their ability to organise and operate systems of economic, trade, social and military contact at every scale from local to global.

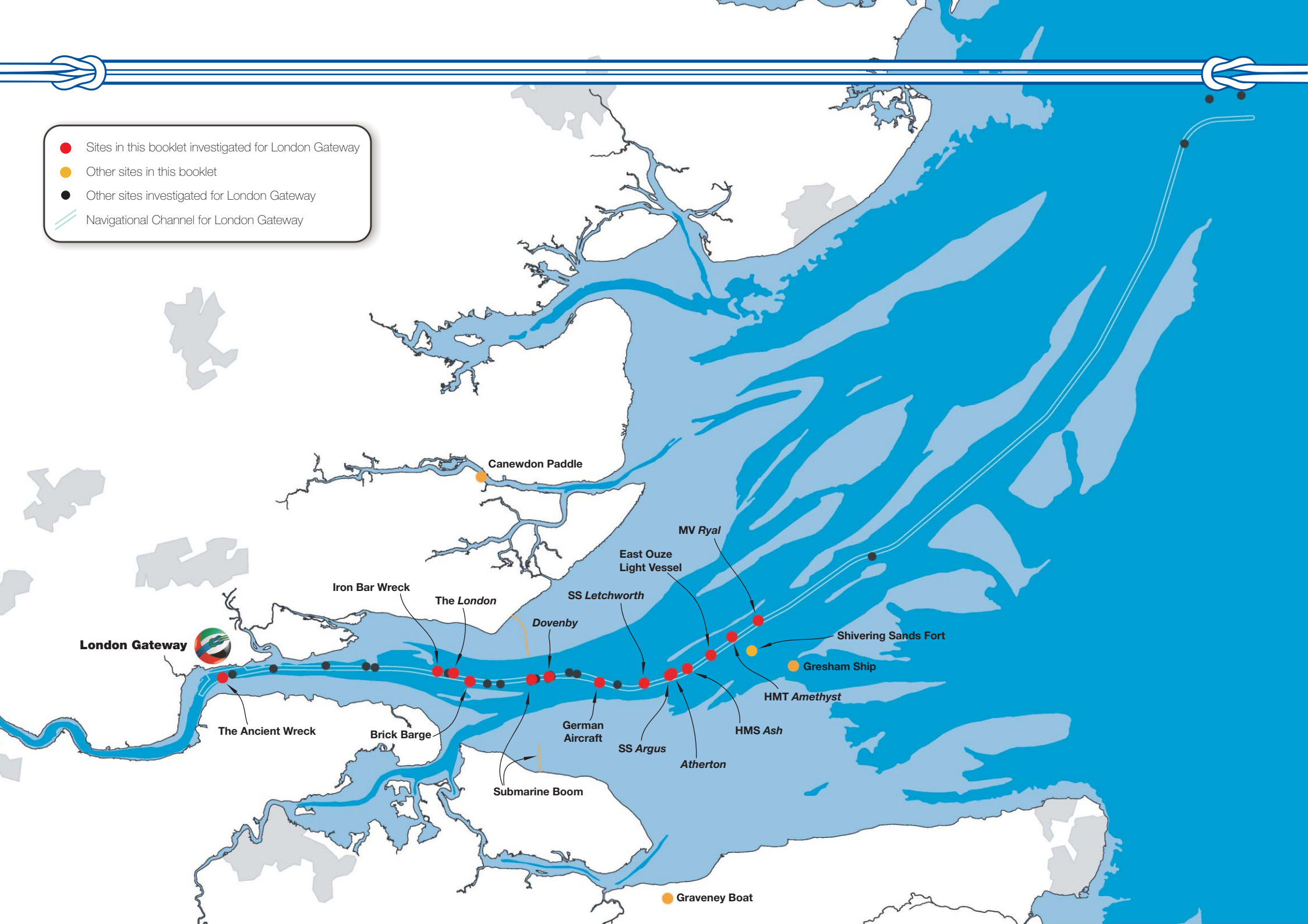
From the outset of planning for London Gateway, it was recognised that construction would have implications for the historic marine environment. In anticipation of the dredging needed to deepen the approach channels to London Gateway, an extensive programme of marine archaeological work was undertaken to ensure that historic remains were identified, studied and protected. This work accompanied the largest ever post-war navigational clearance operation in the Thames. A number of locations are considered so significant that the design of the channel has been amended to enable their preservation *in situ.*

The discoveries made by DP World's marine archaeologists Wessex Archaeology are described in this booklet, which aims to capture this new information about the Thames and ensure that it is publicised and recorded. The findings have made a significant contribution to our understanding of the history of the Thames estuary and vividly illustrate past lives and events, from 17th century flagships to World War II minesweepers.

Throughout this programme of work, we have benefited from discussions with the Port of London Authority (PLA), English Heritage and Essex County Council. We believe this has allowed us to deliver best professional practice and that we have set a benchmark for similar work in marine historic environments.

I hope you find this booklet an interesting insight into the history of the Thames.

Simon Moore
Chief Executive Officer
DP World London Gateway


Sites in this booklet investigated for London Gateway
Other sites in this booklet
Other sites investigated for London Gateway
Navigational Channel for London Gateway
Canewdon Paddle
MV Ryal
East Ouze
Light Vessel
Iron Bar Wreck
The London
SS Letchworth
Dovenby
London Gateway
Shivering Sands Fort
Gresham Ship
HMT Amethyst
The Ancient Wreck
Brick Barge
German
Aircraft
SS Argus
HMS Ash
Atherton
Submarine Boom
Graveney Boat

Follow the timeline
in the text using the icons

Canewdon Paddle
Bronze Age

Blackfriars Ship
Roman

Graveney vessel
Saxon

Blackfriars Ship 3
Medieval

Gresham Ship
16th century

The *London*
1657 - 1665

Dovenby
1891 - 1914

SS *Letchworth*
1924 - 1940

Argus
1909 - 1940

German Aircraft
WWII

Brick Barge
Late 19th century

Atherton
1918 - 1921

HMT *Amethyst*
1934 - 1940

East Oaze Light Vessel
1888 - 1940

HMT *Ash*
1939 - 1941

Shivering Sands Maunsell Forts 1943 - 1958

London Gateway: a maritime history

Archaeological evidence found in the estuary tells the story of the Thames from ancient times to the present day. Investigations have been carried out before the shipping channel is deepened to enable the largest modern ships to use the new port. The investigations have focussed on the main shipping channel to identify shipwrecks and archaeological sites that may be affected by deepening works in this corridor.

Investigating archaeology submerged on the bed of the Thames is challenging. A range of techniques has been used to record our hidden heritage. Since 2001, divers, geophysical surveys and intensive desk-based research have all played their part in trying to understand evidence of the Thames' maritime history.

The results of these investigations have safeguarded information about the past of the river Thames for future generations. Join us as we take you on a journey along the Thames, from prehistoric times to the present day.

Aerial view of London Gateway port site (DPW). Inset: Wessex Archaeology team prepares to dive (WA)

Investigation Methods

Gathering Information

Underwater archaeology can be extremely challenging - unpredictable conditions, poor visibility and bad weather are just some of the problems facing archaeologists working in the Thames. To combat this, a variety of methods were used to help us to understand our submerged heritage.

Desk-Based Research

Whilst perhaps not the most glamorous task undertaken by archaeologists, desk-based research is an important tool for identifying and understanding features in the Thames. A number of sources are consulted, such as PLA and UK Hydrographic Office records, the National Monuments Record, and historical sources such as photographs, documents and shipping registers. These may help to identify known sites of archaeological interest in the estuary, or they may shed light on a newly discovered site.

Desk-based research can be illuminating – revealing the story of a wreck and the names of those lost on board or who survived the sinking. This research can also provide tantalising glimpses into our past which require further investigation.

Geophysical survey

Geophysical surveys were used to map the floor of the Thames. Archaeologists used three different types of geophysical equipment to gain a full picture ahead of port construction: sidescan sonar, multibeam sonar and magnetometry. Sidescan sonar and multibeam sonar use sound waves to map features, whilst magnetometry measures slight variations in the Earth's magnetic field. A change in the magnetic field may indicate the presence of metal from a wreck.

These techniques allow archaeologists to study a wide area for evidence that may indicate where archaeological features might be found. Geophysical signals, known as 'anomalies', may represent wrecks of ships or aircraft, debris lost overboard or they could be entirely natural in origin.

Geophysics team deploying survey equipment (WA)
Inset: Recording survey data (WA)

Diving

Archaeological divers working in the Thames study sites that are suspected to be important features connected with our past. Diving duties vary from site to site but they can involve recording and drawing features, searching for artefacts to work out the age of a site, or excavating small areas to better understand the character and extent of buried remains.

Wessex Archaeology's divers worked alongside divers from the PLA using surface-supplied diving equipment. At all times the diver is connected to the dive boat by an umbilical of tubes and cables which deliver air and allow constant communication and video linkage between the diver and the surface support team. In addition to this, the diver's position is tracked in the water using submerged beacons linked to GPS.

Diver entering the Thames (WA)
Inset: Surfacing from a dive (WA)

The Early Maritime History of the Thames

Archaeologists have always been aware of how important the river was to the development of London, but evidence from the ancient estuary is very rare.

The earliest direct evidence hinting at the river's use for maritime activity comes from Essex, where the discovery of a Bronze Age paddle shows that the Thames was being used and navigated nearly 3,500 years ago. During the Bronze Age, trade routes existed between Britain and the Continent, and people used boats to travel and trade along rivers and around the coast. The paddle, found in 1984, provides us with a precious insight into ancient seafaring.

The city went into decline when Roman rule ended in the 5th century but its position on the river meant that it revived in the Anglo-Saxon period. In the 1970s, work in Graveney, near Faversham in Kent, unearthed the remains of an Anglo-Saxon trading vessel. The vessel undertook voyages to the Continent and was carrying hops and quern stones from the Rhine valley when it sank. The position of the vessel so close to the mouth of the Thames tells us that ships like this one were serving the city, which at this time was a thriving market for imported goods.

The city of London developed into a prominent port during the Roman period. Notable examples of Roman boats and ships have been unearthed within the city - including the Blackfriars ship found in 1962. This vessel sank whilst on a local journey, carrying stone from the estuary into the city, but was sturdy enough to sail the open sea to the Continent. Fragments of imported Samian pottery and quernstones from the Rhine discovered at the Roman salt making site at DP World's Stanford Wharf Nature Reserve demonstrate the ancient maritime links between London Gateway and the wider world.

Clockwise from right:
Graveney Saxon Boat (NMM)
Quernstone recovered from Stanford Wharf Nature Reserve (OA)
Bronze Age Paddle, Canewdon, Essex (ECC)
Samian Pottery recovered from Stanford Wharf Nature Reserve (OA)

The Thames continued to be a vital thoroughfare throughout the medieval period. Numerous remains of boats and ships have been found in London, including a river barge from about 1400 AD known as 'Blackfriars Ship 3' that would have carried heavy loads along the Thames and its tributaries. Archaeological investigations for the access road at London Gateway indicate creekside activity in the 14th-16th Centuries, including possible landing places for estuary craft.

Survey team record the remains of the Gresham Ship (WA)
Inset: Thomas Gresham's initials on a cannon (WA)
Right: Plan of the Gresham Ship (WA)

We have new evidence from the 16th Century of how ships were used to transport bulky goods close to the cities where they were used and traded. In 2003 the Port of London Authority investigated an Elizabethan merchant ship in the Princes Channel. The wreck included large sections of the ship's hull. On board was a cargo of iron bars and other metal ingots and several cannon. The well-known grasshopper symbol of Thomas Gresham – a leading Elizabethan financier and international merchant – was visible on one of the cannons, hence the wreck has been dubbed the 'Gresham Ship'.

The remains of the Gresham Ship were raised from the Thames in 2004 before dredging took place. Sections of the ship's hull were re-submerged in Horsea Lake, Portsmouth, where they continue to be studied by archaeologists. The initial results of the investigation were published in 2007 and detailed work is ongoing.

The Thames in the 17th Century

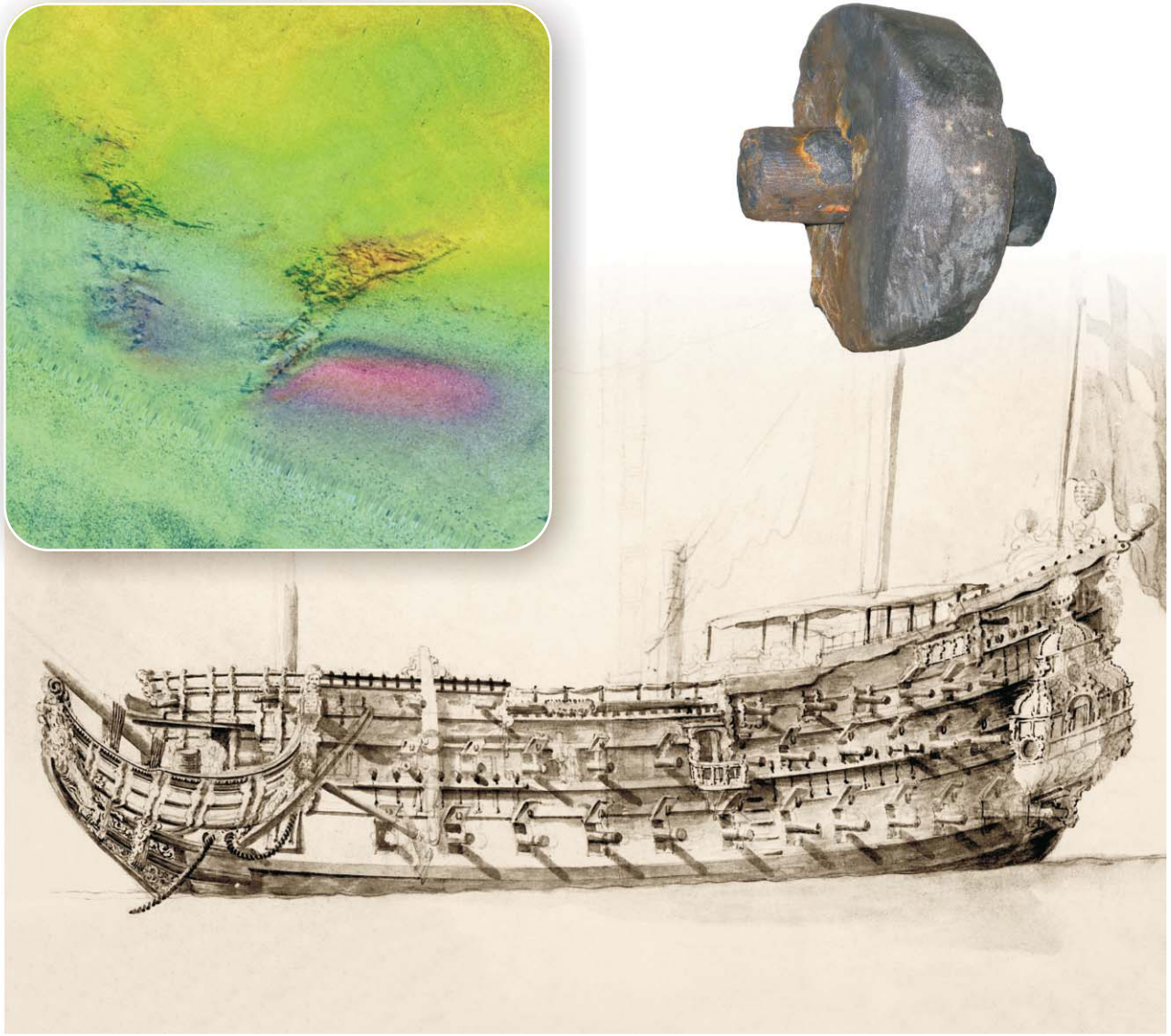
During the post-medieval period the Thames thrived, bringing trade and travellers to and from the heart of the city.

The *London*

The *London* was built in Chatham for the Commonwealth navy and launched in 1657. In 1660 the *London* formed part of the squadron tasked with returning the future King Charles II to England to restore the monarchy.

On 7th March 1665 the *London* exploded on the Thames, taking the lives of over three hundred people on board. The cause of the explosion is not clear although the ship was built to hold many guns and would have carried a great deal of gunpowder.

The remains of the *London* are split into two main areas about 400m apart. A series of geophysical and diver-based investigations have been carried out to understand the wreck.



Portrait of the *London* by Willem van de Velde, the Elder (NMM)
Inset left: Combined Multibeam and Sidescan sonar image from the *London* wreck (WA)
Inset right: Wooden truck wheel from the *London* (WA)

The wreck reveals fascinating glimpses of a post-medieval vessel – broken timbers, concreted rope still coiled as it would have been on board, leather and bricks that are likely to have come from the galley. Cannons from the wreck include a bronze gun recovered in 1962, identified as a rare French naval demi-culverin. Intriguingly, the weight of the gun was incised upon it in English, suggesting that it was captured and remounted on board an English vessel.

The *London* is located just to the north of the shipping channel. The remains will be safeguarded during dredging and have been designated under the Protection of Wrecks Act 1973.

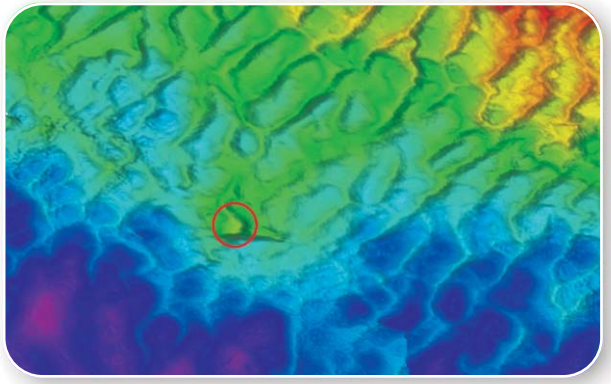
Samuel Pepys recorded the sinking of the *London* in his diary:

"… This morning is brought to me to the office the sad news of the *London*, in which Sir J. Lawson's men were all bringing her from Chatham to the Hope, and thence he was to go to sea in her – but a little a-this-side the buoy of the Nower, she suddenly blew up. About 24 and a woman that were in the round house and coach saved; the rest, being 300, drowned – the ship breaking all in pieces – with 80 pieces of brass ordinance. She lies sunk, with her round house above water. Sir J. Lawson hath a great loss in this, of so many good chosen men, and many relations among them."

Cannon and deadeye from the *London* (WA)

The 'Iron Bar Wreck'

As the name of the ship wrecked here is currently unknown it is referred to by the cargo that it was carrying when it sank. The age of this vessel is also not known, but the cargo seems similar to that carried by the Gresham Ship. Like the *London* the wreck lies to the north of the shipping channel and is being protected from dredging by an exclusion zone.



Multibeam image of the 'Iron Bar Wreck' - circled in red (WA)

The 'Ancient Wreck'

This wreck is mentioned in PLA files which state simply that in 1968 an 'ancient wreck' was removed from the shipping channel. Nothing else is known about this wreck. Despite multiple searches, no clear trace of this vessel has yet been found. It is possible that some of the material still lies on the riverbed and in the future we may learn more about this enigmatic site.

Estuary Trade in the 19th and 20th Century

The Port of London expanded significantly from the 18th century onwards, especially with the introduction of enclosed docks further down the estuary. Evidence lying on the bed of the Thames reveals the importance of maritime trade as well as the variety of vessel types, as ship technology advanced rapidly in the Victorian period and early 20th Century.

A large number of wrecks are recorded as having been lost in the Thames and the Thames Estuary. In many cases the name and details of the vessel are known but the actual location of the ship's remains are not, so they are referred to as 'casualties' rather than 'wrecks'. The National Monuments Record maintained by English Heritage stores information about these losses and assigns them to a placename so that they can be recorded. There are over 400 casualty records listed for the Thames, many of which are commercial shipping vessels. Some casualties may be present within the area to be dredged so measures have been put in place to ensure that any new discoveries are reported to archaeologists and investigated.

Some of the trade that passed along the Thames was comparatively local, having come from other parts of the estuary or from elsewhere in Britain. Wrecks relating to this trade not only hold information about maritime history, but may also have special significance for the places where they were built and the towns and cities that they served.

By studying them archaeologically, we can conserve the information so that their significance can be understood now and in the future.

Preparing to dive in the Thames (WA)

The Brick Barge

The Brick Barge was first recorded by the PLA in 1922, lying in the estuary between Shoeburyness and the Isle of Sheppey. Diving work conducted in 2007 revealed a mound of bricks surrounded by wooden and metal remains. The bricks, with their distinctive yellow colouring, are likely to have been produced by one of the Kent clayfields. Bricks traded along the river from Kent were a common building material in London during the late 19th and early 20th Centuries, when one of their uses was for building warehouses to store goods transported along the river.

The bricks removed from the barge site are thought to date from the latter half of the 19th Century and bear a stamp that appears to read 'DK B'. This has not currently been traced to any particular clayfield or manufacturer.

Barges were a common sight on the Thames in the early 20th Century. Travelling west, they brought bricks to the city. On their return to Kent they would carry rubbish from London, largely consisting of fire ash, which would then be used in the brick-making process.

DK B brick recovered from the Brick Barge in the Thames (WA)

International Trade

International trade has played a large role in the growth and development of London, as foreign goods and people brought wealth and influence into the capital. A number of vessels that now lie on the bed of the Thames reveal information about international trade during the 19th and 20th Centuries.

The *Dovenby*

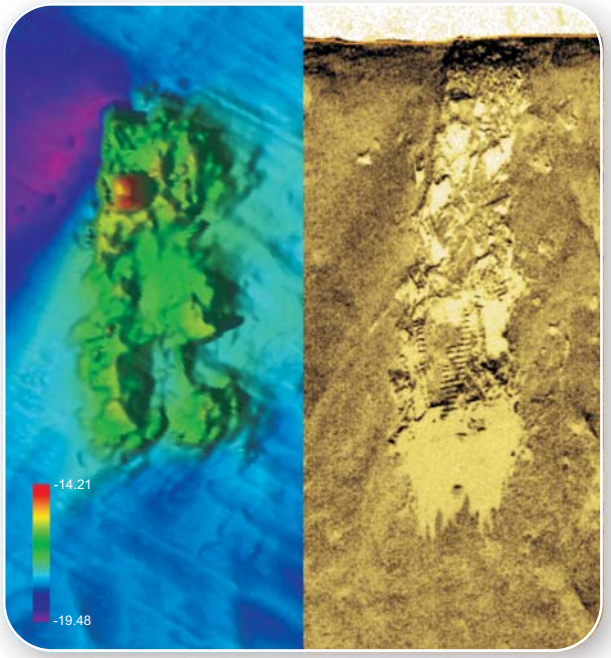
The site of the *Dovenby* has been investigated by divers, geophysicists and through desk-based research. Lying beneath the water is the wreck of a steel barque, a type of sailing vessel, built in 1891.

The steel sailing barque *Dovenby* (SLV)

The *Dovenby* undertook her first major voyage in 1892 – sailing first to Sydney and then to San Francisco – and represents a common form of late 19th Century sailing vessel. At this time, vessels like the *Dovenby* would have crossed the globe, undertaking long distance voyages to transport goods and people.

In 1914 the *Dovenby* was completing a journey to deliver a cargo of guano from Peru. The ship was being towed into London behind a tug when they encountered heavy fog. The tug had slowed to around 3 knots when the *Dovenby* was struck by the Dutch steam ship *Sindoro,* which was carrying a general cargo from London to Jakarta in Indonesia. One man lost his life aboard the *Dovenby.* The accident was reported in The Times as the officers of the *Sindoro* tried to doctor evidence to alleviate blame.

The *Dovenby* was a shipping hazard so explosives were deployed on the wreck in 1915 - one of several methods used over the ensuing years to disperse the wreckage.



Multibeam (left) and sidescan sonar (right) images of the *Atherton* (WA)

The *Atherton*

Another vessel used in both coastal and international trade that ended its days lying on the bed of the Thames was the steamer *Atherton*, built in 1918 in the Netherlands. The *Atherton* was lost on Christmas Day 1921 after the cargo on deck shifted, causing the ship to list to one side. The crew were rescued and the vessel sank beneath the waves. On its final voyage, the *Atherton* was travelling to Antwerp carrying what was described as a general cargo.

Merchant Losses in World War II

During World War II it was crucial that trade routes remained open despite the grave dangers facing vessels supplying the country. Enemy aircraft, submarines and mines all contributed to the loss of vessels in the Thames. Studying these wrecks reveals a cross-section of merchant shipping vessels from the 20th Century.

SS *Letchworth*

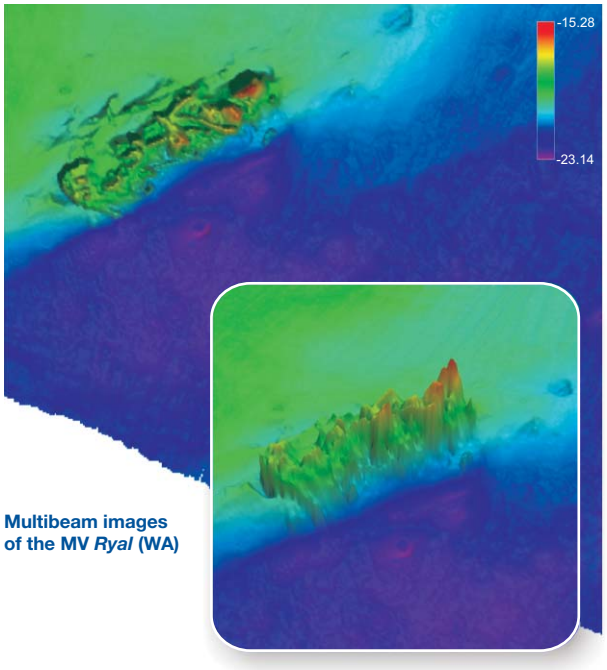
The *Letchworth* was built in Newcastle in 1924 and at the time of her sinking – following an attack from a German plane – was carrying coal into the city from coalfields in the North-East. This was a dangerous route as enemy aircraft, ships and mines sought to deprive London of resources that were needed to fuel the war effort.

Seventeen men were successfully rescued from the stricken craft, although one man is known to have lost his life.

An eyewitness account of the sinking of the *Letchworth* was found in the Admiralty damage report files:

"At 2.30pm…10 to 12 enemy planes made dive bombing attack on wreck and ships in vicinity. S.S *Letchworth* of Newcastle 1317 tons, astern of *King Lear* sustained direct hit in engine room sinking immediately one cable's length E.S.E. West Oaze Buoy... Picked up 12 survivors including master, mate, and second mate. Five survivors picked up by S.S. *Hundvaag* of Stavanger. One member of crew, presumed to be chief engineer believed missing. All survivors transferred to Southend Lifeboat."

The collier SS *Letchworth* (NMM)



Multibeam images of the MV *Ryal* (WA)

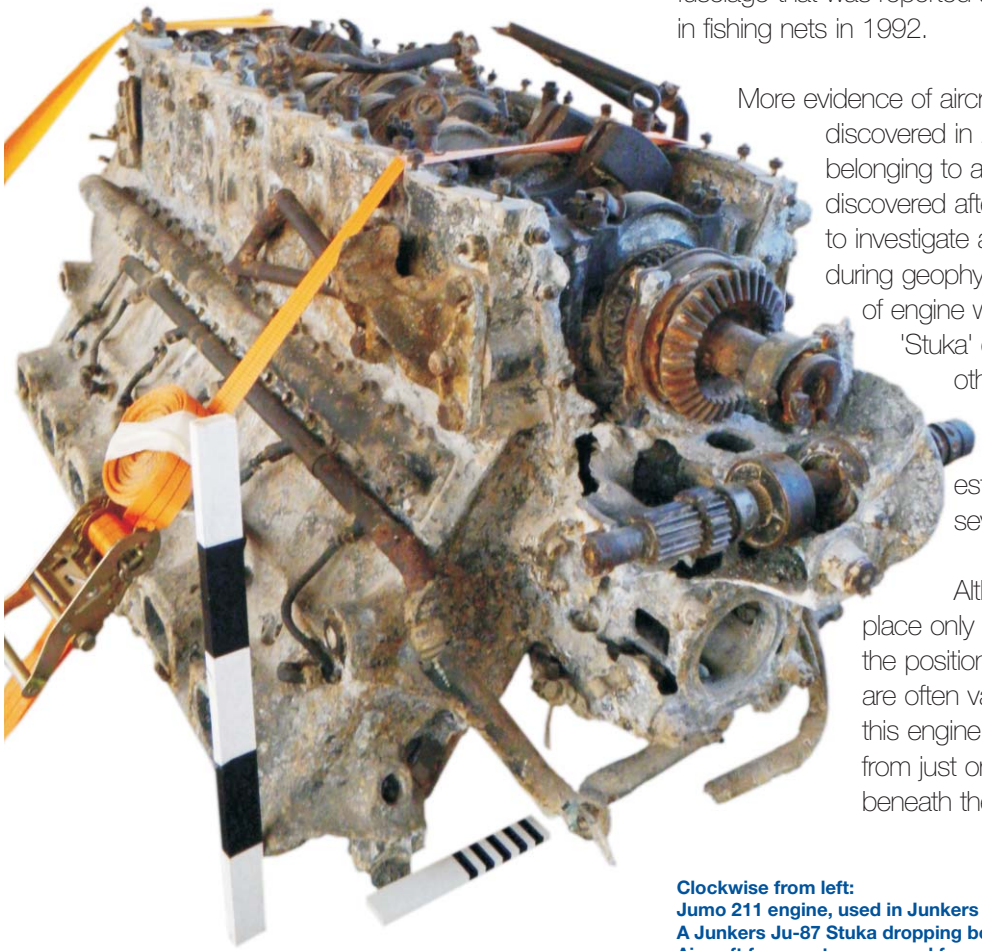
The MV *Ryal*

The MV *Ryal* left London in 1941 bound for Middlesbrough with a cargo of steel and was lost after striking a mine in the estuary, taking the lives of nine members of the crew.

The wreck was swept with a wire several times in the years following the loss to prevent the *Ryal* becoming an obstruction to shipping. Despite this the remains seen on geophysical images reveal a relatively coherent wreck.

Military Archaeology in the Thames

In the course of investigations several sites were encountered that tell the story of the defence of the Thames during World War II.



Military aircraft

Several aircraft have been reported from the estuary. One example is a 40-foot long section of aircraft fuselage that was reported after becoming caught in fishing nets in 1992.

More evidence of aircraft in the Thames was discovered in 2006 when an engine belonging to a German aircraft was discovered after divers were deployed to investigate an anomaly recognised during geophysical surveys. This type of engine was used in Junkers 87 'Stuka' dive bombers, among others. Stukas are known to have targeted shipping in the estuary in 1940, and several were reported lost.

Although World War II took place only 70 years ago, records of the positions of aircraft lost at sea are often vague or incomplete, and this engine is likely to have come from just one of many aircraft lying beneath the water.

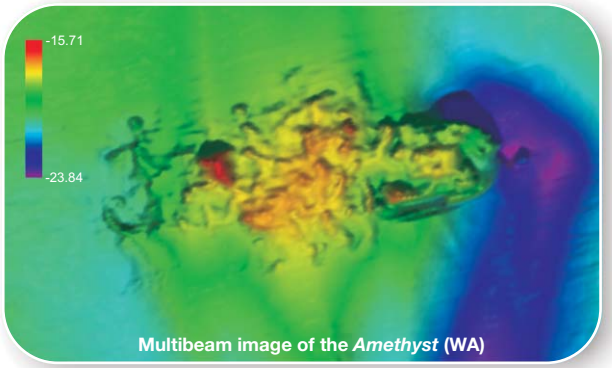
Clockwise from left:
Jumo 211 engine, used in Junkers and Heinkel aircraft (WA)
A Junkers Ju-87 Stuka dropping bombs (IWM)
Aircraft fragments recovered from the Thames estuary (WA)

Ships Defending the Estuary

A variety of civilian and commercial vessels were bought and adapted by the Admiralty prior to and during World War II to help protect the country. These vessels worked in treacherous conditions and several were lost in the river whilst defending the estuary.

The *Amethyst*

HMT *Amethyst* was built in 1934 as a trawler named *Phyllis Rosalie*. Originally built as a fishing trawler for the Boston Deep Sea and Ice Fishing Company, Fleetwood, in her early career the *Phyllis Rosalie* won awards for record-breaking fishing hauls. In 1935 the vessel was purchased by the Admiralty and converted into an anti-submarine trawler. The trawler was fitted with a form of sonar known as ASDIC and armed with a gun on the bow and depth charges at the stern. HMT *Amethyst* sank after being struck by a mine in November 1940. Although seven men were injured, everyone on board was rescued.



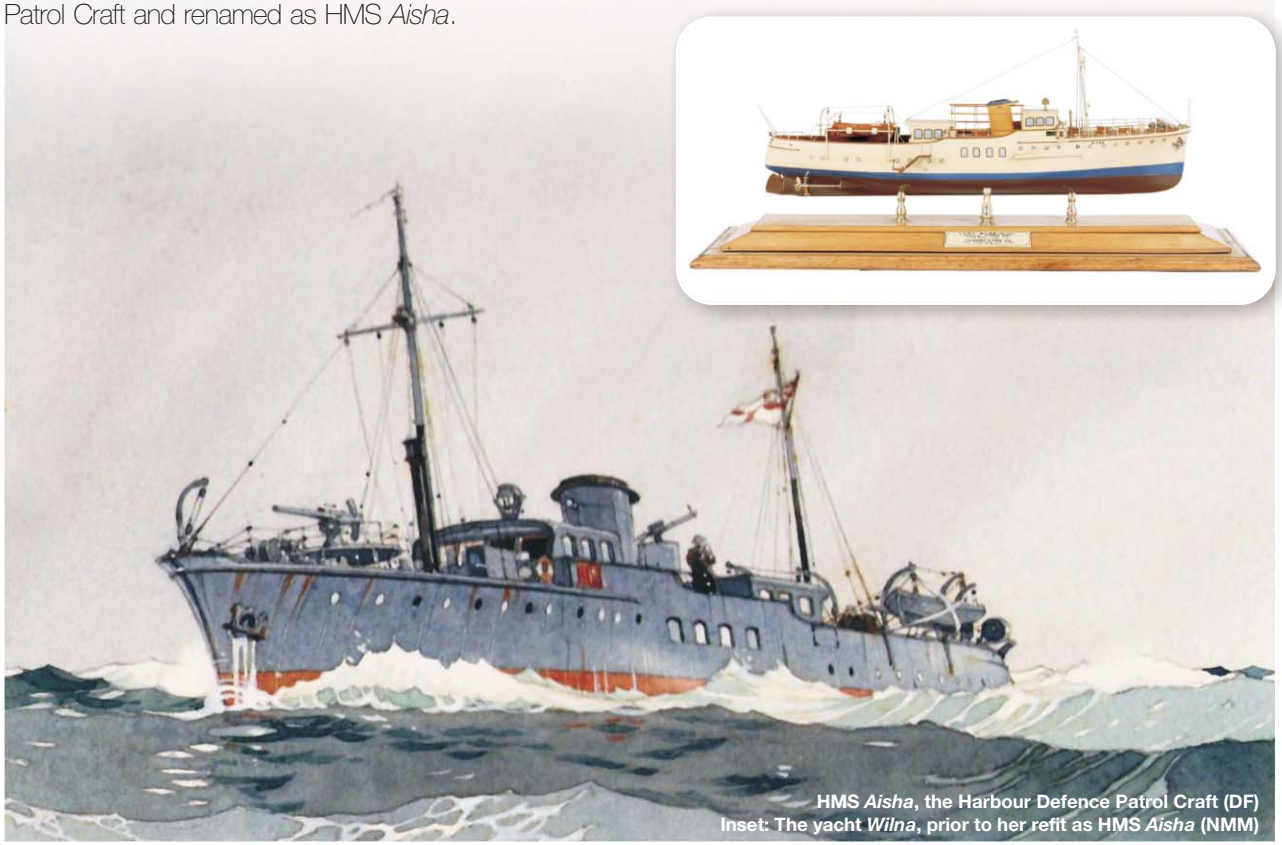
Multibeam image of the *Amethyst* (WA)

The trawler *Phyllis Rosalie* before her refit as HMT *Amethyst* (LCCIS)

HMS *Aisha*

The *Aisha* started life as a pleasure craft; a steel motor yacht built in Selby in 1934 and originally called the *Wilna*. She was sold in 1939 to Robert H. Turner of Guildford in Surrey and in 1940 she was hired by the Admiralty. The *Wilna* was armed and refitted as a Harbour Defence Patrol Craft and renamed as HMS *Aisha*.

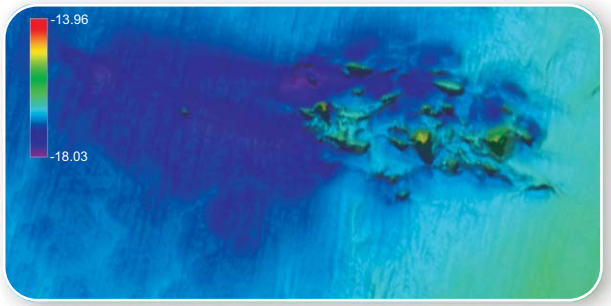
As a Harbour Defence Patrol Craft, HMS *Aisha* patrolled the Thames Estuary and was one of the 'little ships' that crossed the Channel to assist in the evacuation of Dunkirk in 1940. However, her life as a patrol craft was short-lived and she sank in October 1940 after striking a mine, sharing the fate of many other wartime vessels in the Thames.



HMS *Aisha*, the Harbour Defence Patrol Craft (DF)
Inset: The yacht *Wilna*, prior to her refit as HMS *Aisha* (NMM)

HM Trawler *Ash*

HMT *Ash*, like HMT *Amethyst*, has been investigated by geophysical survey. *Ash* was built as an Admiralty trawler in Selby, North Yorkshire in 1939 before being adapted to conduct minesweeping duties. In summer 1941 the *Ash* and another Tree Class trawler, HMT *Birch*, were sweeping for mines ahead of a convoy when an explosion rocked the starboard side of the *Ash*. In the dangerous conditions of the estuary, the *Ash* had hit a mine. The *Birch* came alongside and the crew, arms and fittings such as the compass were transferred to the waiting vessel.



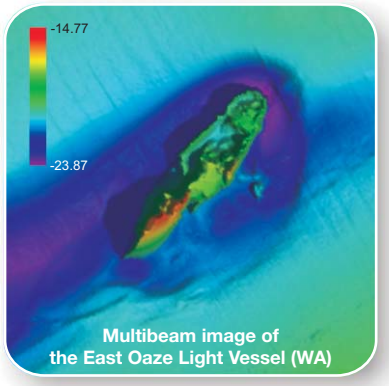
Multibeam image of the *Ash* (WA)

Attempts were made to keep HMT *Ash* afloat, with both the *Birch* and HMS *Mammouth* assisting in leading the vessel towards Sheerness whilst using pumps to reduce the level of water within the *Ash*. Sadly, one of the pumps failed. As water flooded in, the *Ash* was untied from the *Mammouth* and sank to the bed of the estuary.

East Oaze Light Vessel tribute on the Tower Hill Memorial (WA)

The East Oaze Light Vessel

Light vessels were stationed in the estuary to mark a safe passage for ships navigating the shipping channel through a defensive minefield. Little information is known about the sinking of the East Oaze Light Vessel other than it sank in 1940. Common reasons for the loss of light vessels included mine, aircraft strafing or accident. Six people died and are commemorated at Tower Hill.

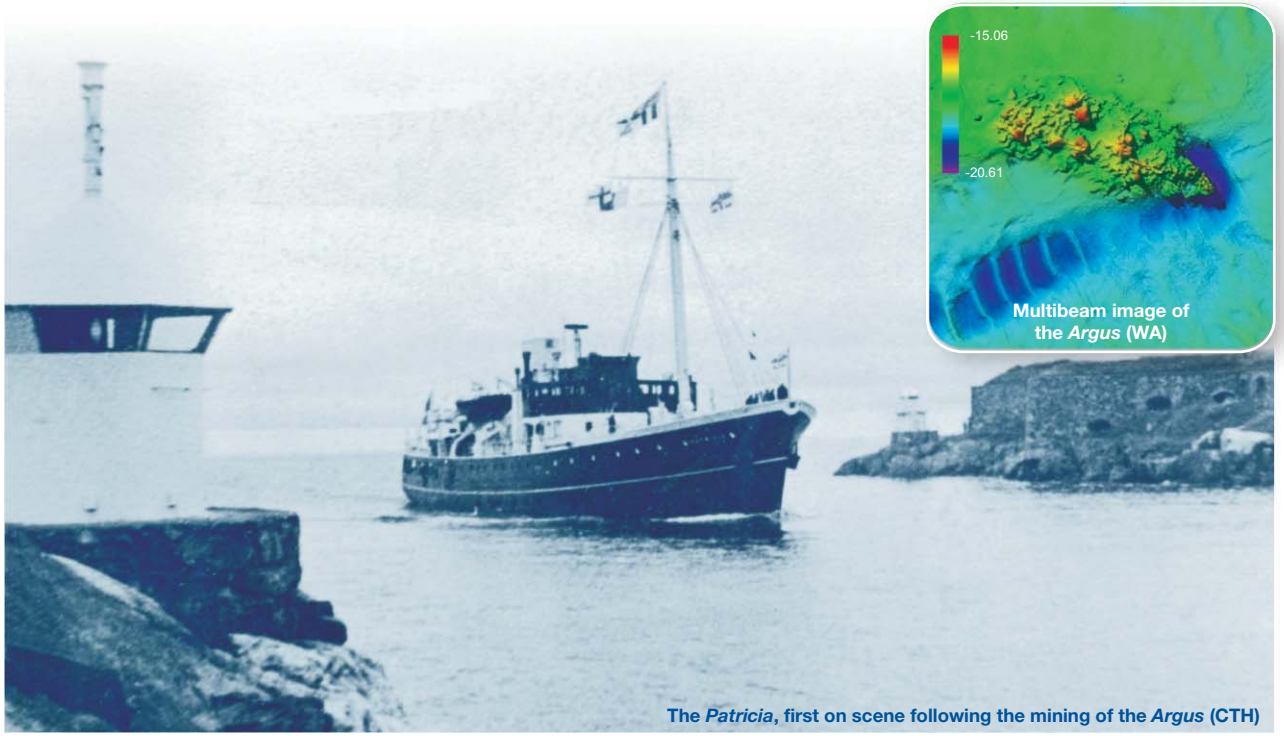


Multibeam image of the East Oaze Light Vessel (WA)

The *Argus*

The *Argus* was investigated by geophysical survey and by desk-based research. The former revealed the shape of the wreck in the estuary; the latter revealed the story of the sinking of the *Argus*.

On 12th November 1940 the *Argus* was stationed alongside the Mouse Light Vessel, relieving the crew who had been bombed several nights in a row. Most of the crew of the *Argus* were below stairs whilst Archie Smith, 18 year old quartermaster, took the helm. Suddenly Archie found himself hurled into the sea, the only survivor of a mine which sank the *Argus*. After the vessel sank, the *Patricia* was dispatched to lay a buoy, marking the position of the wreck as an obstruction. Reports from the crew describe it as a harrowing experience, as bubbles of air brought personal effects from the *Argus* to the surface. No bodies of the crew were recovered by the *Patricia* and the navigational channel has been modified to avoid disturbing their grave.



The *Patricia*, first on scene following the mining of the *Argus* (CTH)

Multibeam image of the *Argus* (WA)

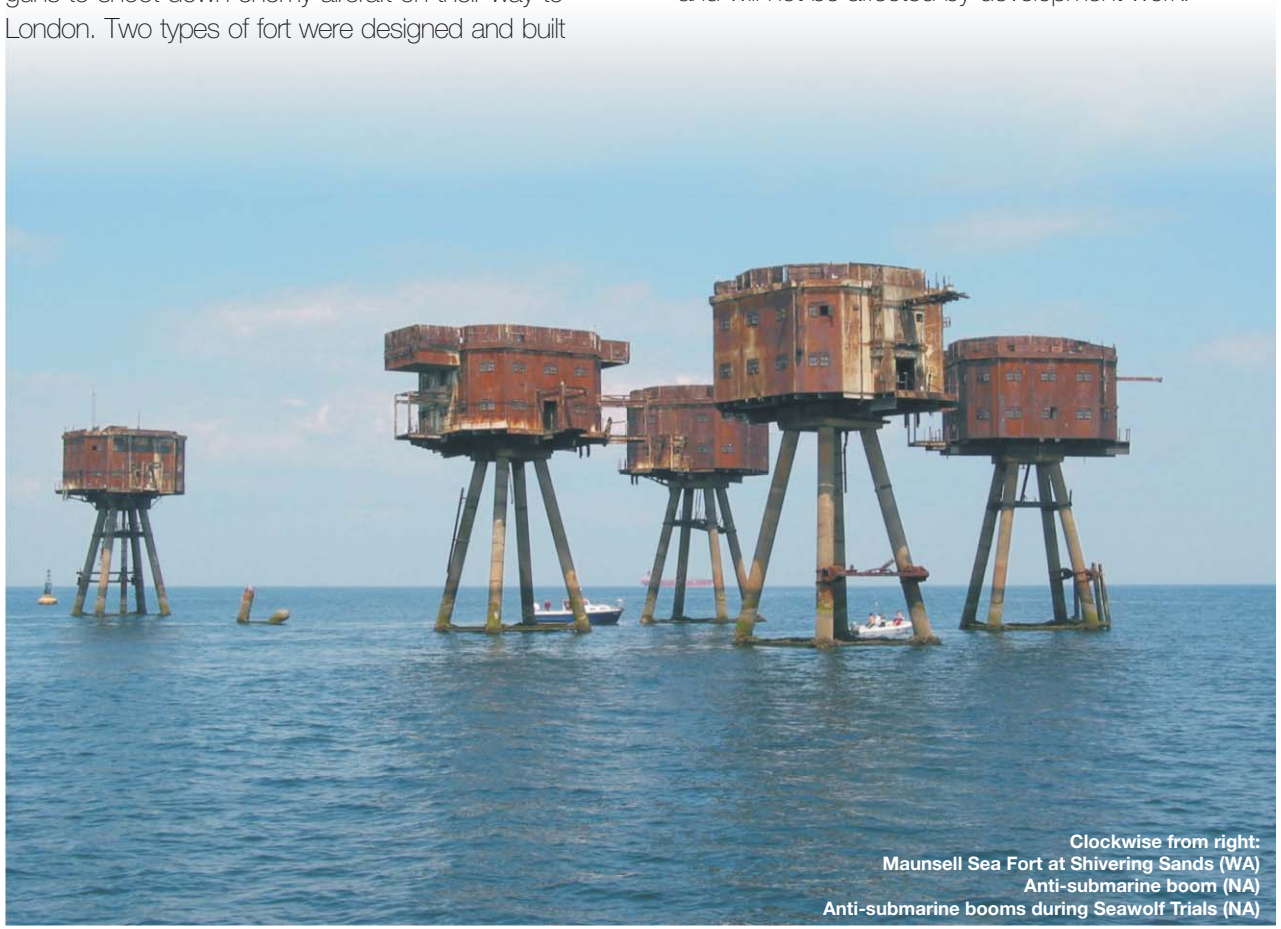
Other Defences in the Estuary

Submarine Boom

One of the largest structural engineering defences protecting the country in the Second World War was the boom laid across the Thames to prevent U-boats threatening the estuary. It lay between Shoeburyness and the Isle of Sheppey and consisted of embedded piles in shallower areas, and a floating netted boom secured by sinkers in deeper areas. Strategically-placed gates were manned by purpose-built vessels which marked safe passages through the boom. Some parts of the submarine boom have been recovered from the main navigation channel, but many other elements are known to extend across the estuary.

Maunsell Sea Forts

One of the most striking and best-known forms of Second World War military defence in the Thames are the Maunsell forts, which housed anti-aircraft guns to shoot down enemy aircraft on their way to London. Two types of fort were designed and built by Guy Maunsell – navy forts, consisting of a concrete barge sunk to the seabed supporting two gun platforms, and army forts such as Shivering Sands, shown here. Although dilapidated, the forts are a prominent and popular feature of the estuary and will not be affected by development work.



Clockwise from right:
Maunsell Sea Fort at Shivering Sands (WA)
Anti-submarine boom (NA)
Anti-submarine booms during Seawolf Trials (NA)

What happens next?

The archaeological work described in this booklet has been carried out to safeguard information about vessels, artefacts, aircraft and structures that reveal the history of the river. The investigations have been used to inform details of the dredging plan, presenting a striking case of environmental stewardship. Many of the sites described here had been partially dispersed in the past by the use of wire sweeps or explosives. Several more have now been removed from the seabed by the PLA during the course of work to deepen the shipping channel.

Not all will be affected by this work though – the *London* is protected by the Protection of Wrecks Act 1973 and others, like the *Ryal*, lie far enough from the shipping channel to be preserved where they lie. Wrecks where there is evidence that human remains or ordnance are present are being protected *in situ* wherever possible.

Despite the removal from the estuary of some of the archaeological evidence discussed here, it will be protected and preserved through the records that have been created throughout the course of ten years of intensive studies. The results of all the maritime research carried out for London Gateway is also being set out in a book devoted to the archaeology of the Thames.

Recovering wreck material prior to dredging (WA)

As a result London Gateway is adding to the future prosperity of maritime trade on the Thames whilst also contributing to the evidence of its past.

Container ships on the River Thames (WA)

For more information on work in the Thames please visit:
londongateway.com

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CTH Courtesy Trinity House
DF Courtesy of David Fletcher
DPW DP World
ECC Essex County Council
IWM Imperial War Museum
LCCIS Lancashire County Library and Information Service
(FLOAT: http://float-trawlers.lancashire.gov.uk/index.php)
NA National Archives (ADM244/17)
NMM National Maritime Museum, Greenwich, London
OA Oxford Archaeology
SLV State Library of Victoria
WA Wessex Archaeology

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