



## London Gateway Clearance Programme

Anti Submarine Defence Boom Further Documentary Research

Technical Report





**LONDON GATEWAY CLEARANCE PROGRAMME**

**ANTI SUBMARINE DEFENCE BOOM FURTHER DOCUMENTARY RESEARCH**

**Technical Report**

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## ANTI SUBMARINE DEFENCE BOOM FURTHER DOCUMENTARY RESEARCH

### Technical Report

### Summary

Wessex Archaeology Limited was commissioned by the Port of London Authority to undertake documentary research into the anti submarine defence boom that was put in place across the Thames estuary during the Second World War. The Defence Boom is located between Shoeburyness in the north and Minster on the Isle of Sheppey in the south.

This project was commissioned in response to the recovery of components of the Second World War boom as part of the London Gateway wreck clearance programme. It forms part of the mitigation undertaken before the channel is cleared of obstructions prior to the channel being dredged to allow access for deep drafted vessels to the new DP World container terminal at Shellhaven, Essex.

Booms have been used for centuries to prevent access by surface and submerged vessels into estuaries, harbours and inlets. Henry VIII ordered the deployment of booms at the entrance to Southampton Water, and there is also a report of a boom running from Gravesend on the Thames in the 16<sup>th</sup> century.

The requirement for booms to guard against submerged vessels and torpedoes became apparent in the First World War but was further developed in the Second World War, particularly during the Seawolf trials where a number of different designs of boom were tested against the submarine HMS *Seawolf*.

The design of the Thames boom was taken from the results of the Seawolf trials. It comprised a double layer of netting anchored to the river bed with three gate sections; two gates to allow access to the Thames and one gate to the south to allow access to the Medway.

Parts of the Thames boom have been recovered by the Port of London Authority. These sections are part of the ground tackle that secured the netting to the riverbed. Lengths of chain were also recovered with spiked balls, designed to attach to intruding vessels.

Interest in Second World War material remains has increased in recent years with the implementation of several projects by English Heritage and the Council for British Archaeology to record Second World War defensive structures.

The Thames defensive boom fits into this category and the scale of its construction and operation is little reflected by the small amount of material that has been recovered from the riverbed but this hopefully addressed by the findings of this report.

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Wessex Archaeology would like to acknowledge the help and advice from the staff of the various institutions from where research material was sourced.

Dr. Dietlind Paddenburgh and Kevin Stratford undertook the research. The report was written by Kevin Stratford and Stuart Leather. The project was managed for Wessex Archaeology by Stuart Leather.

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- Digital use of Chart 1185 (2003 Edition)

A copy of the report will be sent to UKHO.

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# LONDON GATEWAY CLEARANCE PROGRAMME

## ANTI SUBMARINE DEFENCE BOOM FURTHER DOCUMENTARY RESEARCH

### Technical Report

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#### 1. INTRODUCTION

- 1.1. Wessex Archaeology Limited was commissioned by the Port of London Authority to undertake documentary research into the anti submarine defence boom that was put in place across the Thames estuary during the Second World War.
- 1.1. This project was commissioned in response to the recovery of components of the Second World War boom as part of the London Gateway wreck clearance programme.
- 1.1. This document forms part of the mitigation for the removal and discard of the archaeological material as set out in the Clearance Mitigation Statement (CMS) (Wessex Archaeology 2008; WA Ref 61209.5195.02).

#### 2. PROJECT AIM

- 2.1. The aim of the investigation is to contextualise the recovered material and contribute to a broader appreciation of this phase of the defence of the River Thames.

#### 3. SOURCE INFORMATION

- 3.1. Additional documentary evidence was sourced in order to facilitate the investigation, these sources include:
  - UKHO Records;
  - The National Archives of the UK;
  - MoD;
  - Geophysical data;
  - Historic and contemporary Charts and Maps;
  - Legislation and Policy;
  - Existing Wessex Archaeology Archive.

#### 4. LOCATION

- 4.1. The Defence Boom is located between Shoeburyness in the north and Minster on the Isle of Sheppey in the south (**Figure 1**).

## 5. RESULTS

### 5.1. INTRODUCTION

- 5.1.1. A defence boom can be defined as a floating structure that spans across an entrance to an enclosed waterway but that can be opened to allow passage. Early booms comprised ropes or chains that prevented surface vessels from passing across them. With the advent of submerged craft, i.e. submarines, booms increased in sophistication and were extended down into the water column.
- 5.1.2. Defence booms have been used to control access to estuaries and coastal inlets for centuries. A part of the coastal defences commissioned by Henry VIII in the 16<sup>th</sup> century a floating boom was constructed across, what is now known as, Southampton Water between Calshot Castle and Warsash. The aim of this boom was to stop Spanish sailing vessels sailing up Southampton water and attacking the prosperous medieval town of Southampton.
- 5.1.3. In the Thames the first reference to a boom defence also dates back to the sixteenth century. A boom was described running across the river from Gravesend to control access to Gravesend Reach (Gravesham Borough Council, 2007).
- 5.1.4. A defence boom can be defined as a floating structure that spans across an entrance to an enclosed waterway but that can be opened to allow passage. Early booms comprised ropes or chains that prevented surface vessels from passing across them. With the advent of submerged craft, i.e. submarines, booms increased in sophistication and were extended into the water column.

### 5.2. BOOM DEVELOPMENT IN THE SECOND WORLD WAR

- 5.2.1. With the technological development of submarines in the inter war years, particularly on the side of the German Navy, there was a realisation by the British Admiralty that boom defences had to be improved and developed so that they would be effective against this new threat.
- 5.2.2. At the beginning of the Second World War, German Submarines, or U boats were destroying large numbers of vessel in the open ocean, and carrying out daring missions in shallow water. The most famous shallow water raid was the sinking of the *Royal Oak* in 1939, just six weeks from the start of the war, while she was at anchor in Scapa Flow in the Orkney Islands. The German U boat *U-47* navigated its way through the shallow waters and sank the *Royal Oak* with the loss of 833 lives.
- 5.2.3. As a result of the German U boat threat the Royal Navy commissioned trials into the effectiveness of submarine nets or booms. These were known as the Seawolf trials and they took place between 1938 and 1939 to establish the most efficient design of boom defence systems to combat the threat of the modern submarine. They took their name from the submarine HMS *Seawolf* that was used to test the various prototypes by steaming straight for the defences to try and break through. She was equipped with mechanical cutters to test the effectiveness of different configurations (Franklin, 2003:70).
- 5.2.4. Defence booms were designed to work in one of two ways: either as barrier to prevent passage or to signal that an intruder had passed through the defence. The type of defence that was deployed depended on a range of factors; the fixed barrier was more suited to larger expanses of water. Booms that acted as a signal that a



sub-surface craft had passed through required surface craft equipped with ASDIC to pursue and render the intruder inoperable.

- 5.2.5. Both types of boom required gates to allow friendly craft to pass through them. The gate became the weakest part of the defence as German U boats could follow surface vessels through them. In 1938 it was declared policy that all gate defence vessels were fitted with ASDIC to detect enemy submarines adopting this tactic.
- 5.2.6. Defence booms were deployed across the world throughout the Second World War. The major ports and harbours of Edinburgh, Scapa Flow and Plymouth all had a defensive boom all varying in design. There was also and boom defence system deployed in the Solent between Horse Sands, No mans and St Helen's Forte.
- 5.2.7. Boom defences were brought into readiness at the start of the war as ships were ordered to their war stations. This can be seen from the following communication:

*'that when a general signal was given ordering ships to their war stations, it should include an order to bring the boom defences to immediate readiness'* (ADM/1/10198, 24/8/39).

### 5.3. BOOM DEFENCES IN THE THAMES

- 5.3.1. The Port of London at the time of the Second World War was the major artery for trade, not only to the Capital, but the country as a whole. Maintaining access to the dock facilities for shipping was imperative for the survival of the nation through this dark period.
- 5.3.2. The admiralty decided to construct a defence boom in the Thames between Shoeburyness and the Isle of Sheppey. This was the first point where the deep water channels running from the outer estuary converge, and, at this location, the boom would also serve the Medway (ADM/1/18128, 10/2/44).
- 5.3.3. The boom comprised three main components: in the shallow areas a fixed permanent structure piled into the seabed was constructed; in the deeper sections that were navigable by large vessels and possibly submerged craft, a floating boom with netting was put in place; and finally floating gate sections also with netting were placed in several positions along the deeper sections of the boom to allow vessels to pass through (**Plate 1**).
- 5.3.4. The construction of the permanent structure in shallow water comprised a staggered row of wooden piles that extended from above the mean high water mark out into the river, over the sandbanks to a depth of approximately zero metres Chart Datum, where it was connected to the floating section (**Figure 1**).
- 5.3.5. The piles protruded 10 feet (3.33 metres) above the riverbed and had a width of 15 inches (0.381 metre). Sections of heavy-gauge angle iron measuring 4.5 inches (0.1143 metres) x 5.5 (0.1397 metres) inches were placed in between the tops of the piles to form a barrier.
- 5.3.6. These sections were designed in accordance with the results of the Seawolf trials and comprised a double layer of 'nets' constructed of steel mesh sections hung from surface cables between barges known as lighters. The surface cables were fitted with a double layer of cross shaped spikes to entrap vessels attempting to run through the defence (**Plates 2 & 3**). The ends of the surface sections were attached



to fixed anchor points or a boat to hold them in place. They were secured to the riverbed by chain to large weights, known as sinkers.

- 5.3.7. The opening sections of the boom, known as gates, were constructed in the same way as the floating sections but were smaller in size and could be disconnected from the main boom and pulled to one side by a surface vessel, creating an opening in the defence. This can be seen in **Plate 1**.
- 5.3.8. The gates were placed at the entrance to the shipping channels. In the south a single gate was positioned to allow access to the Medway and to the north to allow access to the Yantlet Channel and the Port of London. In the north a double gate arrangement was installed for inward and outward bound vessels (**Figure 1b**). Each gate had a boom vessel at either end. So at the entrance to the Medway two vessels were on station and at the entrance to the Yantlet channel three vessels were on station, the middle vessel operating both gates.
- 5.3.9. Specialist boom defence vessels were used to deploy and operate defence booms. In the build up to war many new vessels were commissioned in a number of yards in Britain. There were at least two classes of vessel: the Bar Class vessels of between 730 to 959 tons and Bayonet Class vessels at c. 780 tons. In 1940 the Bar class vessel HMS *Barcliff* was launched (<http://homepage.ntlworld.com/andrew.etherington/1940/05/10.htm>). Boom defence vessels continued to be built throughout the war to replace vessels that sank. As late as 1945 HMS *Barkis* was built and launched by Ferguson shipbuilders of Port Glasgow with a lifting capacity of 70 tons. She was stationed at Sheerness to tend the Thames defence boom (<http://www.clydesite.co.uk/articles/28feb.asp>).
- 5.3.10. A number of other vessels were involved in boom operations. These included requisitioned trawlers: HMS *Sarba*, HMS *Collena*; and the tugs HMS *Scythe* and HMS *Dromedary*. Specific boom defence vessels included the gate vessels HMS *BV2*, HMS *BV10*, HMS *Moorgate* and HMS *James M*. Harbour patrol vessels included the Motorboats: *Silvern*, *Queen of the South I*, and *Queen of the South II*. In total 20 vessels were involved in the operating and maintaining the boom (ADM/1/20862, 17/7/45).
- 5.3.11. Before the outbreak of war the care and maintenance of defence booms was in the hands of the civilian authorities under the title of 'The Boom Defence Service'. However, at the outbreak of war the Boom Defence Service was assimilated into the Royal Navy and the personnel awarded Naval rank. Due the low pay for naval personnel at that time the boom service personnel pay had to be upgraded to civilian rates. The requirements for skilled labour were high and riggers and seamen were recruited from the mercantile marine, or specially trained within the Navy. There was also a need for blacksmiths and shipwrights to repair buoys and manufacture and maintain the many different components that formed the boom.
- 5.3.12. The Boom Defence Service was considered a separate manning division within the Navy, and by 1945 9000 ratings were employed in the service. They were given a specialist cap badge showing a shackle overlain with a marlin spike. **Plate 3** shows the badge worn by those of Petty Officer Rank, note the crown at the top of the badge and **Plate 4** shows the badge worn by those of Seamen rank. The Thames boom alone employed 400 personnel (ADM/1/20862, 17/7/45).
- 5.3.13. Following the end of the war the strategic decision was made not to totally disassemble the Thames boom but to retain the permanent fixed features and put

into storage the floating sections where they would be maintained in case they needed to be redeployed. On the 17<sup>th</sup> July 1945 there was a communication between the boom defence officer for the Thames, Dover and Harwich to the Commodore responsible for all naval activities in the area based at Sheerness, requesting that there is no reduction in personnel, Naval or civilian, until the recovery of the boom is complete (ADM/1/20862, 1/10/45).

- 5.3.14. With the on set of the 'Cold War', as a result of the new threat from the Soviet Union, military technology continued to rapidly advance. Boom defences were still thought to be an important component of coastal defences and in the 1950s it was decided that the Second World War structures of the Thames boom should be upgraded and rebuilt. The wooden piles that formed the permanent structure in the shallow waters were replaced with concrete piles. Further information on the post war boom is sparse.

#### 5.4. ARCHAEOLOGICAL EVIDENCE

- 5.4.1. Three sections of boom have been recovered by the Port of London Authority Marine Services Division. They were recovered from sites **5025a**, **5025b** and **5193**, located in the line of the boom defence between the existing piles (**Figure 1 and Plates 3, 4 and 5**).
- 5.4.2. The sections that have been recovered comprise the remnants of the floating sections. From site **5025b (Plate 3)** chain with spike components and a large piece of metal structure were recovered. From site **5025a** a concrete sinker, which was originally clad in steel, part of the steel still survives, and chain were recovered. Site **5193** comprised a series of large concrete blocks chained together. These most probably formed the ground tackle from the trot sections labelled in **Figure 1**.

#### 5.5. ARCHAEOLOGICAL INTEREST

- 5.5.1. The archaeological interest in the boom debris within the channel arises because this debris is part of a very major defensive structure that crossed the entire Thames from Shoeburyness to Minster, built in 1939-40. As such, the remains of the boom are both a monument to the momentous events of WWII as it affected the Thames, and also to the tremendous efforts of the engineers who designed and constructed the boom, and of the service personnel who guarded it. Elements of this structure survive at Shoeburyness, and are also likely to survive at other locations across the estuary. Anti-submarine booms were installed across several other estuaries and port entrances around the world in WWII, and other examples are likely to survive. There is considerable heritage interest in defensive structures from Second World War, including among local and national heritage agencies as well as the population at large (Wessex Archaeology 2008).
- 5.5.2. Interest in Second World War material remains has increased in recent years with the implementation of several projects by English Heritage and the Council for British Archaeology to record Second World War defensive structures. It has been recognised that 'certain 20<sup>th</sup> century military sites may be as important to future generations as medieval castles are today' (Thomas 1994, 55). In 1994 it was pointed out that 'fifty years, in many countries, the arbitrary age at which the material present becomes the archaeological past, now places the monuments of the Second World War into the domain of archaeology' (Chippindale, 1994, 478). There has since been an initiative by English Heritage's Monument Protection Programme and Listing Team to provide 'a first full overview of England's 20th-century defence heritage' (Dobinson *et. al.* 1997, 288). One aspect of this work is an archival study

undertaken by Dr Colin Dobinson of the Council for British Archaeology at the Public Record Office. This work is producing reports on a variety of monument classes (for example, Bombing Decoys). The CBA 's Defence of Britain Project is aiming to record the surviving remains of the 20th century defence by involving amateur groups and individuals (Schofield and Lake 1995, 12). There has also been a recent upsurge in public interest in military remains. A number of recently published introductions and guides to defences, and airfield architecture confirm this growing public concern and interest (for example, Brown *et. al.* 1995, Buchan Innes 1995 and Francis 1996).

- 5.5.3. The story of the Thames Defence Boom is an example of the ingenuity and effort that was brought to bear during the Second World War. The scale of the operation is not reflected in the material remains that have been recovered however without these artefacts there would be little to remind us that it existed.

## 6. CONCLUSIONS

- 6.1. The history and archaeology of Britain's coastal defence effort during the Second World War is an area that has undergone little research. The scale of the boom defence operations within the Thames estuary was complex and included booms in Harwich and Ramsgate as well as across the estuary from Shoeburyness to Minster. This involved a large number of personnel and vessels and was coordinated through one officer and his staff.
- 6.2. The boom defence operation was only one aspect of the defences within the Thames estuary. There was also a network of towers that were constructed at Shivering Sands, Red Sands, Knock John, Tongue sand and Sunk head as anti aircraft batteries and as part of the air raid early warning network. These would have complimented the anti aircraft batteries on shore. There would also have been a number of coastal patrol vessels and vessels engaged in mine hunting. The estuary at this time would have been very busy in the effort keep the estuary open to shipping and hence maintain this vital supply line to London and the rest of the country. This is testified by the number of vessels that sunk in the area during this period.

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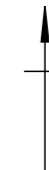
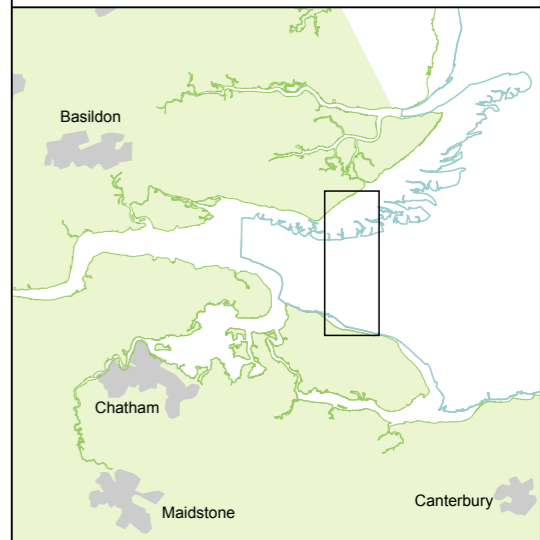
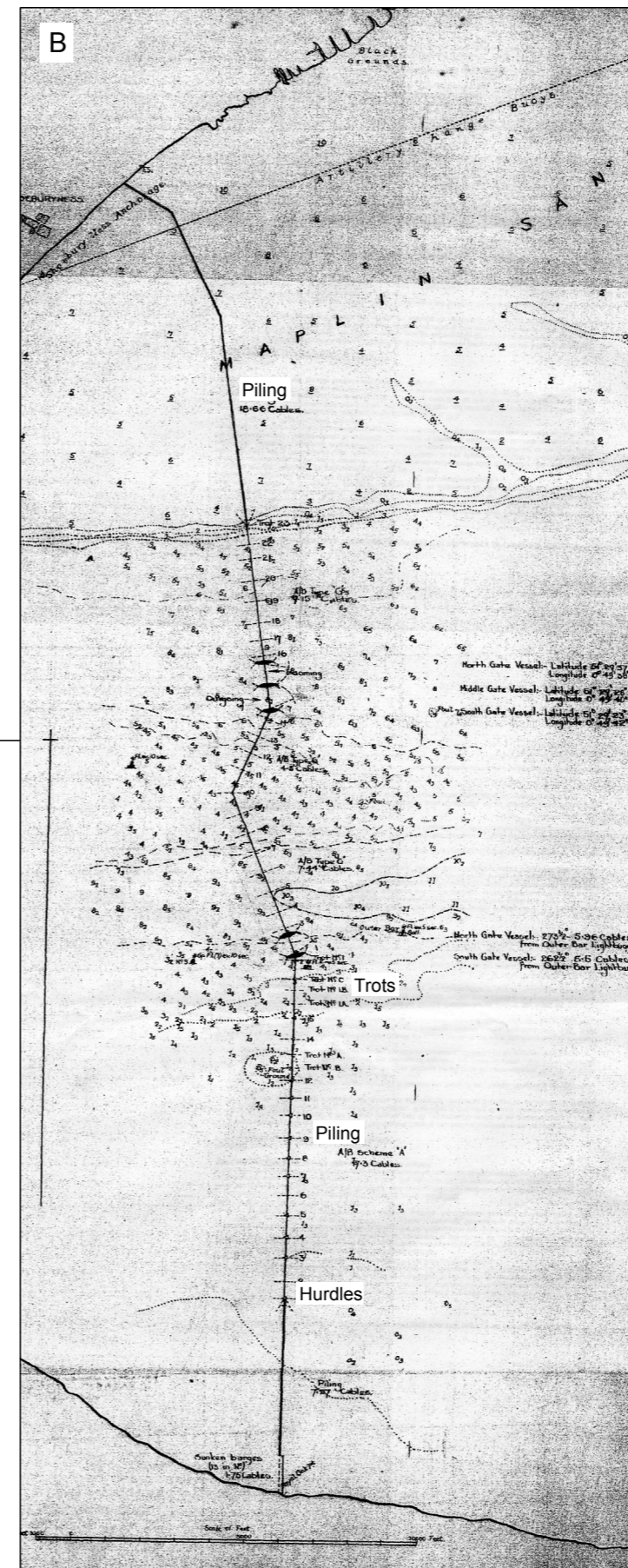
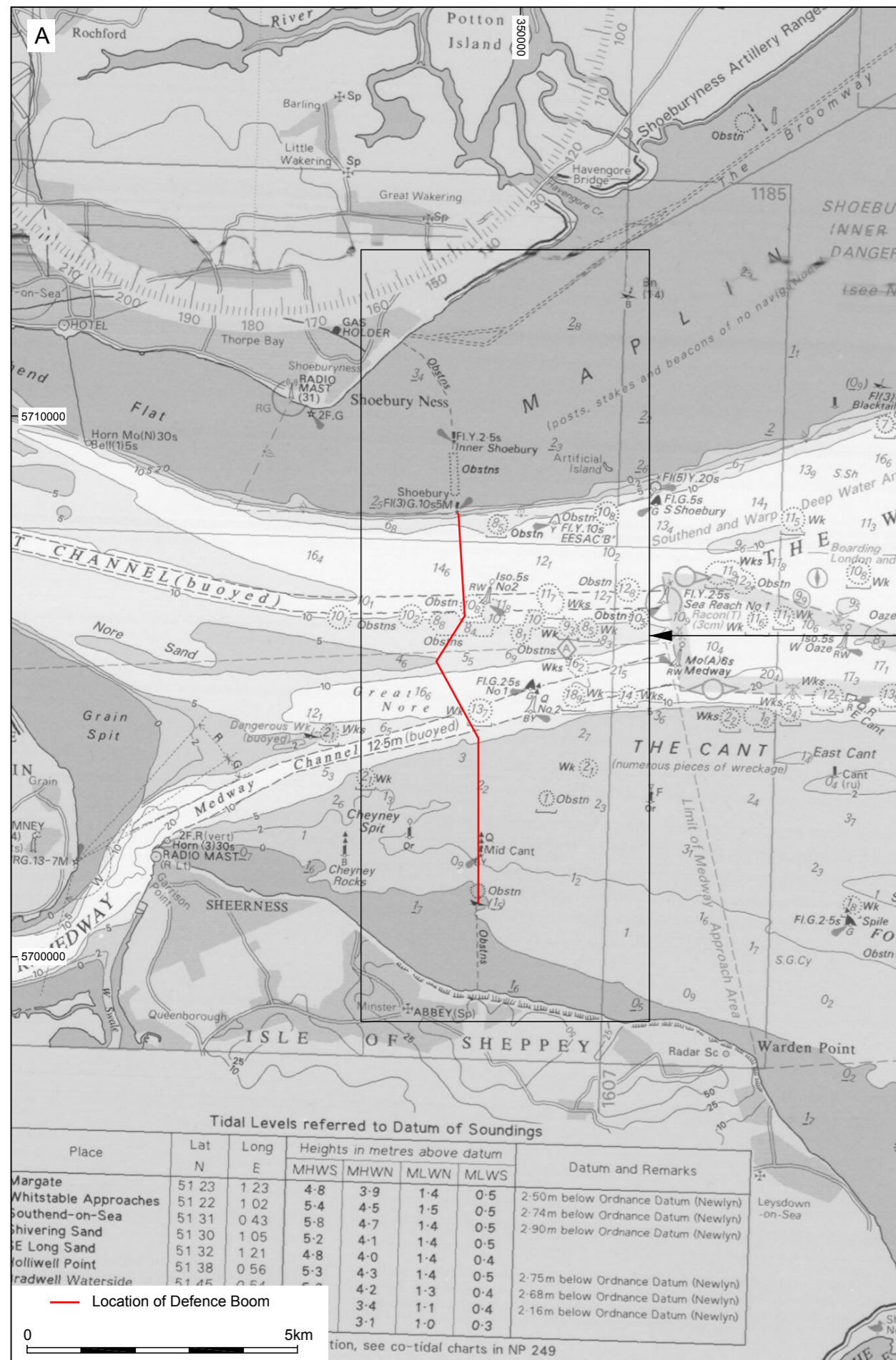
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Admiralty Chart 1183 (dated 2008)  
Drawing projection: UTM WGS84 Zone 31N

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Plan and location of Defence Boom

Figure 1





Plate 1: HMS Seawolf boom defence trials

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Plate 2: Seawolf trial on the Thames Boom

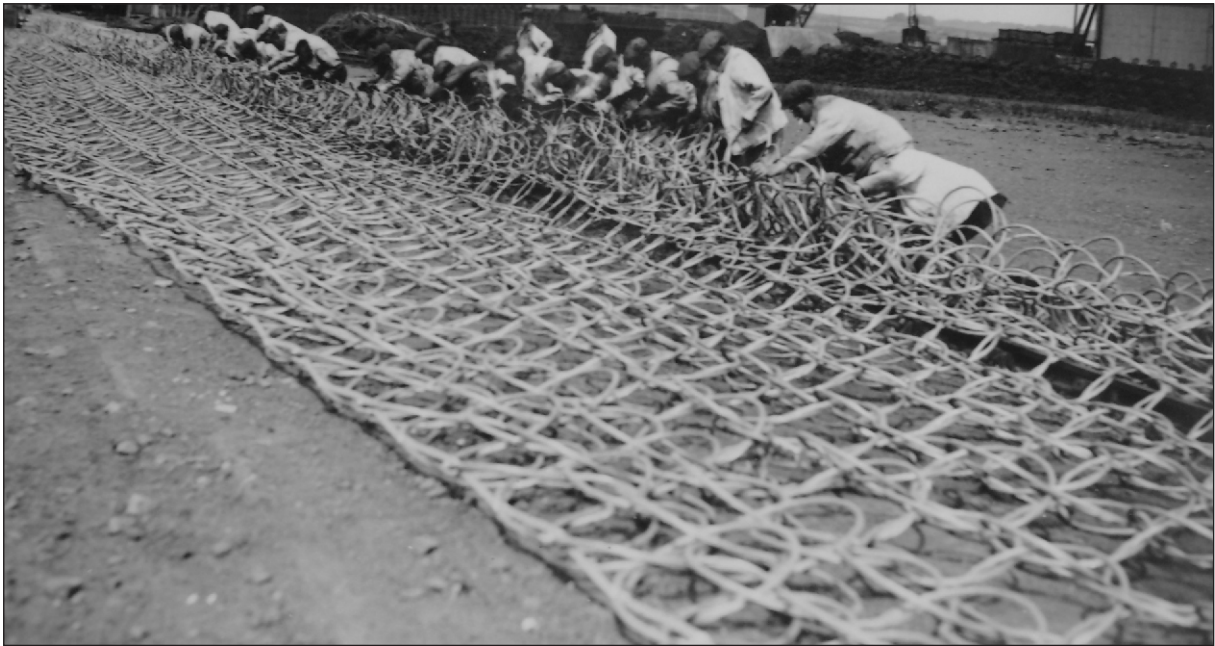


Plate 3: Anti submarine netting in preparation of Thames Boom



Plate 4: Petty Officer insignia  
Boom Defence Service



Plate 5: Rating insignia  
Boom Defence Service

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Plate 6: Site 5025b



Plate 7: Site 5025a



Plate 8: Site 5193

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