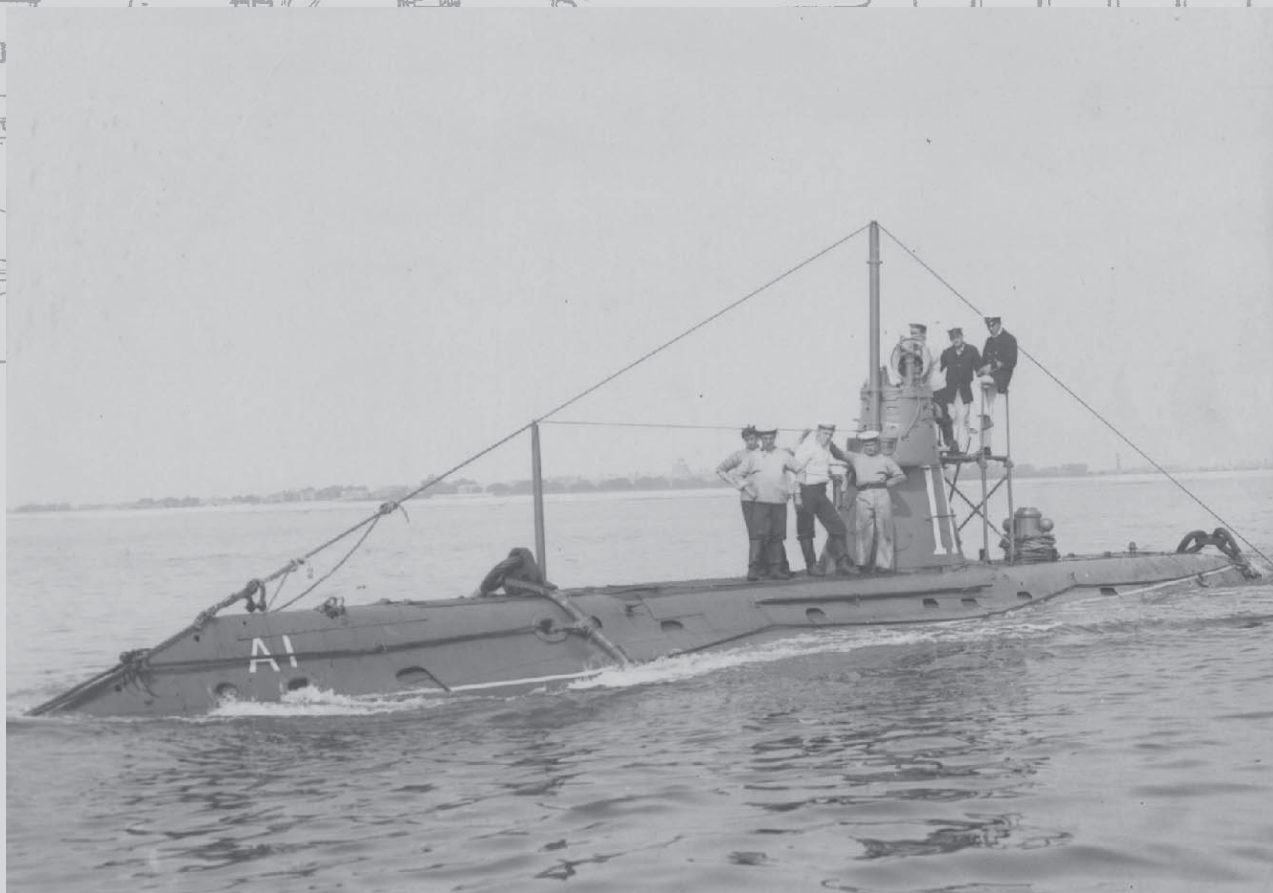




HMS/m A1, Bracklesham Bay

Designated Site Assessment

Archaeological Report



**ARCHAEOLOGICAL SERVICES IN RELATION TO THE PROTECTION OF WRECKS
ACT (1973)**

HMS/M A1, BRACKLESHAM BAY, WEST SUSSEX

DESIGNATED SITE ASSESSMENT: ARCHAEOLOGICAL REPORT

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HMS/M A1, BRACKLESHAM BAY, WEST SUSSEX

DESIGNATED SITE ASSESSMENT: ARCHAEOLOGICAL REPORT

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Summary

Wessex Archaeology was commissioned by English Heritage to undertake a Designated Site Assessment of the *HMS/m A1* site: a designated wreck located in Bracklesham Bay, West Sussex. The work was undertaken as part of the contract for Archaeological Services in Relation to the Protection of Wrecks Act (1973) (**Figure 1**).

Wessex Archaeology diving operations took place in September and October 2005. A total of 11 dives were conducted, achieving a total dive time of 680 minutes (**Appendix I**). Diving investigations concentrated on an assessment of the wreck itself, supported by a photographic and video survey. A measured plan of the remains was produced. Two anomalies close to the site were also investigated, with one proving to be a corroded metal buoy and the other being a metal object of unknown function but not considered to be a part of the vessel.

The hull structure was observed to be in and relatively good condition, despite areas of corrosion pitting along the outer casing on the top of the wreck. However, several years of systematic illegal diver recovery of artefacts from both outside and inside the wreck has had a serious and irreversible impact on the wreck.

As a direct result of this illegal diving activity practically all the removable fixtures and fittings from both the exterior and interior of the vessel have been removed. To gain access to the interior the two torpedo loading hatches have been ripped off the wreck, and are now missing. This has exposed the interior to increased corrosion and erosion processes that the wreck would not otherwise have suffered if it had been allowed to remain closed up.

HMS/M A1, BRACKLESHAM BAY, WEST SUSSEX

DESIGNATED SITE ASSESSMENT: ARCHAEOLOGICAL REPORT

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Acknowledgements

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Wessex Archaeology would also like to thank the following people:

- Martin Woodward from the Bembridge Maritime Museum;
- George Malcomson and Debbie Corner from the Royal Naval Submarine Museum, Gosport.

The fieldwork was carried out by divers Margaret Christie, Jennifer Black, Niall Callan, Jens Auer and Frank Mallon and boat skipper David Burden undertook the assessment. Frank Mallon supervised the fieldwork and Frank Mallon and Jens Auer supervised the diving. The report was compiled by Frank Mallon and edited by Steve Webster. Paul Baggaley processed and modified the multibeam data and Kitty Brandon prepared the illustrations.

Data Licences

The material derived from the UKHO is subject to licence 820/020220/11 and the conditions on End-Users and Third Parties contained therein. The following charts and wreck requests have been added to Schedule 1 Annex A:

- Digital use of Chart 2045

A copy of the report will be sent to UKHO.

HMS/M A1, BRACKLESHAM BAY, WEST SUSSEX**DESIGNATED SITE ASSESSMENT: ARCHAEOLOGICAL REPORT**

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Contents

1. INTRODUCTION	1
2. OBJECTIVES	1
3. EXISTING SITE DATA	2
4. METHODOLOGY	2
5. SURVEY RESULTS.....	3
5.1. Site Position	3
5.2. Summary Site History	3
5.3. Assessment of the Site Environment	4
5.4. Assessment of the Wreck.....	5
Bow	5
Forward.....	6
Hull Interior	6
Midships	7
Aft	8
Stern.....	8
Outlying Anomalies.....	9
6. DISCUSSION	9
6.1. The Wreck	9
6.2. Vulnerability of the Site	9
Unlicensed Diving	9
Corrosion	9
6.3. Documentary Records	10
7. REFERENCES.....	11
APPENDIX I: DIVE DETAILS.....	13
APPENDIX II: HISTORY AND CHARACTERISTICS.....	14

Figures

Figure 1	Site location
Figure 2	Multibeam image
Figure 3	Engineers' plans
Figure 4	Plan showing areas of damage
Figure 5	Section drawing showing sediment levels

Plates

Plate 1	The launch of <i>HMS/m A1</i> , courtesy of Royal Naval Submarine Museum
Plate 2	<i>HMS/m A1</i> steaming on the surface, courtesy of Royal Naval Submarine Museum

Front cover illustration:	<i>HMS/m A1</i> steaming on the surface
Back cover illustration:	Underwater still showing detail of conning tower

HMS/M A1, BRACKLESHAM BAY, WEST SUSSEX

DESIGNATED SITE ASSESSMENT: ARCHAEOLOGICAL REPORT

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1. INTRODUCTION

- 1.1.1. This document constitutes a Designated Site Assessment: Archaeological Report for a programme of archaeological work undertaken as part of the contract for Archaeological Services in Relation to the Protection of Wrecks Act (1973). The document has been prepared by Wessex Archaeology (WA) for English Heritage (EH). It constitutes an assessment of *HMS/m A1*: a designated wreck located in Bracklesham Bay, West Sussex (**Figure 1**).
- 1.1.2. The work was conducted in accordance with a Written Scheme of Investigation (WSI) prepared by WA, which was in turn produced as a response to a brief provided by EH (WA 2005). The fieldwork was carried out during September and October 2005. All diving took place off the diving support vessel *Xplorer*. Divers Frank Mallon, Niall Callan, Margaret Christie, Jennifer Black and Jens Auer and boat skipper David Burden undertook the assessment. Frank Mallon supervised the fieldwork and Frank Mallon and Jens Auer supervised the diving.

2. OBJECTIVES

- 2.1.1. The overall objective for the site as defined in the Brief received from EH was for recording to Levels 2a, which is outlined in the table below:

Level	Character	Scope
2a	Non-intrusive	A limited record based on investigations that might include light cleaning, probing and spot sampling, but without bulk removal of plant growth, soil, debris etc.

- 2.1.2. The Brief also specified the following tasks:

- Liaise with Martin Woodward;
- Undertake survey of the vessel externally, identifying and recording in detail any vulnerable elements of the structure;
- If possible, undertake assessment of the vessel internally, recording sediment levels and assessing the vulnerability of objects/features inside;
- Produce a structured record of field observations; including a photographic record of the site and/or a site plan;
- Address whether the site is vulnerable, based upon field observations. Relate this to questions of long-term monitoring needs and future management issues, addressing specifically the question of how to resolve the inherent vulnerability of an open submarine. Look at the options of sealing up the vessel and/or recording (and excavating, if it is possible) internally. When

considering re-sealing the vessel, look at the question of how it could be undertaken in a way sympathetic to the vessel and nature of structure.

2.1.3. Secondary tasks included in the Brief:

- Produce an inventory/catalogue of any material in Martin Woodward's collection/at the Bembridge Museum, including documentary material;
- Establish the suspected locations of any other material from the wreck.

3. EXISTING SITE DATA

3.1.1. The position of the site as given in the Brief was as follows:

Lat.	50° 44.5511' N
Long.	00° 55.2792' W
WGS 84	

3.1.2. The Statutory Instrument (SI) number for the site is 2004/2395. From the centre point (given above) the designated area consisted of a circle with a radius of 100 metres (**Figure 1**).

3.1.3. The current Licensee is Martin Woodward of the Bembridge Maritime Museum (survey licence). Throughout this report the term 'Licensee' refers to Martin Woodward. S.K. Lovell obtained a survey licence in 2001.

3.1.4. Other information available prior to the assessment was as follows:

- The UK Hydrographic Office record for the site;
- The National Monument Record of England entry for the site;
- Original engineers plans and sheer drawings supplied by the National Maritime Museum and by the Royal Naval Submarine Museum, Gosport (RNSM);
- ADU report 02/03;
- ADU report 02/02;
- ADU report 99/30;
- ADU report 98/25;
- ADU report 97/21;
- Various books and web sites.

4. METHODOLOGY

4.1.1. The survey methods employed on this site consisted of diver examination of the wreck and surrounding environment using video and digital stills photography. The geo-referenced multibeam image (**Figure 2**) of the wreck was found to be extremely accurate when correlated with diver observations. The multibeam data was collected by the ADU, St Andrews University and modified by WA. The image was used as a background map for the diver tracking display to navigate the diver around the site and to investigate nearby anomalies.

- 4.1.2. The majority of video footage was collected using a hat mounted digital video camera. To obtain video footage of the interior of the bow and conning tower a second video unit was mounted on an extendable pole to lower into these free spaces. Diver entry was attempted in the bow area and some video footage was obtained, but movement was restricted due to the high sediment levels. Entry through the conning tower was not attempted.
- 4.1.3. Details of the methodologies used during the 2005 PWA survey are detailed in a separate document (WA 2003).

5. SURVEY RESULTS

5.1. SITE POSITION

Bow	
Lat.	50° 44.549' N
Long.	00° 55.285' W
WGS84	

Stern (as it enters the seabed)	
Lat.	50° 44.538' N
Long.	00° 55.273' W
WGS84	

- 5.1.1. The above position is the position for the bow and stern. It was obtained by tracked diver survey using the acoustic tracking system. The position given for the stern is the position where the stern enters the seabed.

5.2. SUMMARY SITE HISTORY

- 5.2.1. A summary history of activities on the site follows:
- **1989:** A fisherman snags his net on the wreckage and reports this to Martin Woodward who then dives and identifies the site as *HMS/m A1*;
 - **1994:** Martin Woodward of Bembridge Shipwreck Museum buys the submarine from the Ministry of Defence (MoD). Mr Woodward recovers the bronze conning tower hatch cover sometime between 1994 and 1995 in an effort to make the wreck less attractive to divers;
 - **1996:** The ADU are made aware of the submarine by a local diver whilst inspecting another site close by;
 - **1997:** The ADU conduct diving operations on the site and report the submarine as generally being in a good condition. The hull casing however is badly corroded and there is evidence of diver interference. The torpedo loading hatch cover is open and it is possible to penetrate the wreck. The original rubber seal around the hatch is still intact. The ADU recommend the site for designation under the Protection of Wrecks Act 1973;

- **1998:** Martin Woodward obtains a survey licence. Mr Woodward reports that recreational divers continue to remove pieces from the wreck. Mr Woodward asks Chichester BSAC to replace the forward hatch cover to prevent further damage inside the wreck by divers. The ADU conduct diving operations on the submarine and on an unidentified anomaly near by. They report lower sediment levels by the base of the conning tower since their previous visit. Both torpedo loading hatches in the bow section are now closed. Pipe work is exposed particularly aft of the conning tower. Evidence of diver penetration of the submarine is visible and a porthole has been removed since the ADU's last visit. Martin Woodward reports that some material from the wreck resides with a diver who has not declared it to the Receiver of Wreck and that other pieces have been scrapped. The ADU carry out detailed bathymetry and side-scan operations. The pressure hull is noted as being intact. The wreck is designated under the Protection of Wrecks Act 1973;
- **1999:** The ADU conduct diving operations inspecting the submarine internally and externally. Recreational diver interference is again noted; both torpedo loading hatches previously secured by Chichester BSAC club have been opened presumably to allow penetration, the ADU shut one but the other is now missing. Five deadlights have been removed since the ADU's last visit. The interior of the submarine is in good condition but some fittings have been removed. The ADU dive the anomaly again but are unable to identify it. The ADU recommend increasing the radius of the designated circle from 100 metres to 300 metres;
- **2000:** Clearance divers from Southern Diving Unit Two (SDU2) RN Portsmouth report sealing access to the wreck;
- **2001:** S.K. Lovell obtains a survey licence;
- **2002:** The ADU carry out a multibeam sonar survey; both torpedo hatches clearly missing;
- **2003:** WA carries out a magnetometer and multibeam sonar survey of the site;
- **2005:** ADU (ALSF) conduct detailed multibeam survey using dual head Reason 8125, producing excellent results. WA conducts diving operations on the site to assess the condition of the wreck.

5.3. ASSESSMENT OF THE SITE ENVIRONMENT

- 5.3.1. The seabed was found to consist of a fine, highly mobile silt overlying a medium to firm clay. Patches of gravel and small stones were also observed in isolated hollows during seabed searches for the missing torpedo hatches.
- 5.3.2. The wreck is orientated roughly north east (bow) by south west (stern), with the bow standing proud of the seabed by around 1m. The stern section from the hydroplanes, rudder and prop to the stern lifting rings is buried in the seabed, a distance of around 6m to 7m.
- 5.3.3. There is a small scour toward the bow of the wreck which exposes the under side of the bow cap. This scour is evident on the multibeam image in **Figure 2** and on the section drawing with multibeam insert in **Figure 5**.
- 5.3.4. There is a small scour roughly 1.5m to 2m in width which runs along the starboard side from the bow aft to where the wreck enters the seabed at the stern lifting rings.

A similar scour was observed along the bow of the wreck which terminates midway between the torpedo loading hatch and the leading edge of the conning tower. Both scours are varied in depth but reached a maximum of around 0.5m.

- 5.3.5. The dominate fish species observed on the wreck was tompot blenny (*Parablennius Gattorugine*). No other fish were observed on the wreck, due most likely to the lack of visibility during most dives.

5.4. ASSESSMENT OF THE WRECK

- 5.4.1. All observations were compared with the original engineers' drawings (**Figure 3**) and with various contemporary photographs (e.g. **Plate 1**) for areas of missing external features and/or damage. Contemporary photographs of *HMS/m A1* were studied and comparisons made with the visible wreck remains.

- 5.4.2. The wreck was visually inspected for areas of damage and/or corrosion. It became immediately apparent that the wreck site had suffered from extensive salvaging over a long period. Practically all easily removable external fittings are now missing, including the two torpedo loading hatches, allowing free access into the pressure hull interior.

- 5.4.3. The outer casing is suffering from severe corrosion pitting along the entire exposed section of the outer, upper casing. This pitting is even visible from the multibeam images of the site, as shown in **Figure 2**.

- 5.4.4. The following paragraphs outline the main diver observations on the status of the wreck and which form the basis of the assessment. For the purposes of clarity the assessment is divided into seven separate sections:

- **Bow:** The forward section of the wreck which includes the torpedo tube and associated bow cap with opening mechanism;
- **Forward Section:** This section is contained between the conning tower and the bow cap. The torpedo loading hatches on top of the hull are located here;
- **Midships:** The main feature in the midships section is the conning tower, which is both the high point and centre point of the wreck site;
- **Aft and stern:** The aft and stern section of the wreck contains the exhaust system. This area is located directly behind the conning tower and runs aft toward the stern lifting ring, at which point the wreck becomes buried in the seabed;
- **Hull interior:** As a result of the illegal removal of the torpedo loading hatches it was possible to make a brief internal inspection. The hatches are located midway between the bow and the leading edges of the conning tower.

Bow

- 5.4.5. The bow cap of the torpedo tube is still in position but is heavily concreted. It appeared to be closed and does not exhibit any signs of damage. The bow area is sitting proud of the seabed by around 1m. This gap between the underside of the bow runs aft for about 2m where the turn of the bow meets the seabed.

- 5.4.6. A large amount of the upper casing on top of the hull is missing and as a result the bow cap opening mechanism is now visible, **WA 01** in **Figure 4**.

- 5.4.7. Also in this area a small amount of corrosion pitting was observed during the diving investigation. These small holes on top of casing are visible in the multibeam images, as shown in **Figure 2**. Diver measurements of these areas of corrosion match measurements taken from the geo-referenced images.

Forward

- 5.4.8. Immediately behind the area of corrosion pitting in the bow area there is a large break in the upper casing, which has corroded away. There is a small recess under where the casing would originally have been located. Due to the presence of some concreted lengths of chain this feature has tentatively been identified as a small storage locker.
- 5.4.9. Moving aft toward the conning tower the next feature observed was the forward lifting rings – a unique feature and found only on *HMS/m A1* as a result of her use as a submerged target. They are located 1m forward of the forward torpedo hatch and appear to be intact, with the associated cables that run underneath the hull still in position. The rings are depicted in **WA 02** in **Figure 4**.
- 5.4.10. The front cover illustration depicts both the forward and stern lifting rings with associated cables. Earlier archive stills of *HMS/m A1* do not depict this feature on the vessel.
- 5.4.11. Behind the lifting rings the two torpedo loading hatches are the next feature on top of the hull. Both hatch covers have been removed and are no longer associated with the wreck. Seabed searches on both the port and starboard sides of the wreck were conducted, reaching a distance of 6m from the hull, but the hatches were not relocated. It can therefore be assumed that the hatches have either become completely buried in the sediment close to the wreck or have been completely removed.
- 5.4.12. If buried they are unlikely to be relocated without a systematic search using underwater metal detectors, followed by excavation of target areas.
- 5.4.13. A careful inspection of the hatch coamings and adjacent hull structure was undertaken. It was immediately apparent that the coamings have suffered damage during the illegal removal of the hatch covers, with sections damaged, and in some cases even detached. Fragments of hatch cover and coaming were observed close to the open hatches on top of the hull.

Hull Interior

- 5.4.14. As access to the interior is now possible it was decided to send WA divers into the wreck to conduct a condition survey of internal fixtures and fittings. However, it was not possible to conduct a detailed diver survey as movement was severely restricted. The volume of silt that has built up inside the wreck since the hatch covers have been removed is the main impediment, which restricts movement and reduces visibility when disturbed.
- 5.4.15. A secondary means of investigating the hull interior through the open torpedo hatches was then devised. A second underwater video camera and light was mounted on an extendable pole which was then given to the diver. The diver was then sent to the open hatches and began a video survey of the interior using this camera probe,

with direction from the surface. Using this method the sediment was not disturbed and visibility remained consistent, with the resulting video footage being of good quality.

- 5.4.16. A number of high pressure lines, presumably for compressed air were observed running along the sides and ceiling of the hull interior. At least two quarter turn valves fitted to these pressure lines were also observed, with an example of one being depicted in **WA 03** in **Figure 4**.
- 5.4.17. Also observed in this internal survey were the remains of a pressure gauge. **WA 04** in **Figure 4** shows this gauge, but it is apparent that the glass cover and graduated backing to the gauge are no longer in position. This is probably a result of illegal diving activity.
- 5.4.18. Just aft of the aft torpedo loading hatch is another area of corrosion to the uppercasing. 1m aft of this corrosion on the port side a break in the casing exposes the remains of the surface steering gear linkage. This is depicted on the contemporary elevation drawing, just forward of the leading edge of the conning tower, **Figure 3** and **WA 05** in **Figure 4**.

Midships

- 5.4.19. The conning tower is the high point and is roughly the centre point to the wreck. An initial survey of the exterior surfaces of the tower was quick to show that all the glass deadlights are now missing, leaving empty voids in the tower, **WA 06** in **Figure 4**.
- 5.4.20. Some of these deadlights were in position at the time of the first ADU visit in 1997. On their second visit to the site in 1998 they reported that at least one of these deadlights had been removed, but others were still in position. Consequently, all the remaining deadlights that were removed after this date were removed illegally as the site was designated in that year.
- 5.4.21. On the port side of the tower on the forward edge of the tower close to the pressure hull a large hole was observed. This irregular hole measured roughly 0.45m by 0.6m and is in the approximate position of an access hatch that is seen bolted on the base of the tower in contemporary photographs, see **Plate 2**. It is possible that this was removed by illegal diving activity to attempt access to the interior of the conning tower.
- 5.4.22. All brass ventilation tubes have been removed from the wreck and this is illustrated in **WA 07** and **WA 08**, **Figure 4**.
- 5.4.23. The periscope mount is also missing; all that remains of any periscope fittings are the four brass bolts that would have attached the mount to the top of the conning tower. This was either removed prior to the vessel being used as an unmanned target or removed by illegal diving activity, **WA 09** in **Figure 4**.
- 5.4.24. On top of the conning tower itself the hatch is now missing. This was removed by the Licensee to prevent its theft. The hinges for the hatch are still in position and are shown in **WA 10** in **Figure 4**. As the hatch cover is missing it is possible to look into the tower, but given the amount of loose pipe work that is contained within the tower diver access is impossible.

5.4.25. Using the camera probe described in 5.4.16, this document, it was possible to conduct a video assessment of the interior of the conning tower. This was put into the tower from the top of the hatch and slowly extended into the wreck, taking 360° views as the camera went lower. As the camera was lowered footage was taken of the six rungs for the ladder inside the tower and of the internal exposed pipework. When the camera hit the top of the second hatch (fitted after the vessel first sank after being rammed by SS *Berwick Castle*) footage was taken of the gears for the periscope training gear. This training gear looks to be in good condition, and has only a slight covering of concretion.

Aft

5.4.26. Immediately behind the conning tower are the two fuel filling points for the petrol engine. As is clear from **WA 11** in **Figure 4** the caps for these fuel filling tubes are now missing, probably illegally removed by divers. During a recent visit by WA divers to the designated wreck HMS/m Holland 5 a similar fuel filling point was observed, but in this instance the fuel filling cap is still in position.

5.4.27. Less than 0.5m to starboard from these fuel points more evidence of diving activity is apparent. Corrosion pitting to the upper casing has exposed a small area of the exhaust piping, which at some point a diver has tied off a length of man made rope, possibly as a down line to guide divers from the surface to the wreck or as a ground line, **WA 12** in **Figure 4**. Other fragments of rope tied off to various structures were observed in several locations.

Stern

5.4.28. Moving aft of the fuel filling points by about 1.5m a 'D' shaped hole in the upper casing exposes an interesting feature. Inside this hole a circle base plate is bolted to the pressure hull with four large bolts. This is probably the remains of the compass binnacle that has either been removed by illegal diving activity or was removed from the vessel prior to its use as a submerged target.

5.4.29. Moving 1m aft of the remains of the compass binnacle a large hole has corroded into the upper casing. It is roughly oval in shape and measures 3m by 2.2m. Within the hole the exhaust piping becomes exposed again, with both pipes being exposed along the length of the hole. Within this hole and between the exhaust pipes another small circular flange, similar to the flange or base plate observed in the compass binnacle area, was observed. The exact function of this feature is unknown.

5.4.30. Roughly 0.2m aft of this large hole in the casing a series of smaller holes were observed on top of the hull casing. A total of eight were observed and measured, with dimensions for the holes ranging from 0.1m by 0.15m to 0.5m by 0.6m. In four of these holes it was possible to trace the exhaust pipes back toward the stern of the wreck.

5.4.31. Immediately behind these holes the stern lifting rings are located. These substantial lifting rings are still in good condition and are almost identical to the forward lifting rings. The lifting cables are likewise still attached.

5.4.32. About 1m aft of the stern lifting rings the remainder of the wreck is buried in the seabed sediment. Seabed searches were conducted aft of this point to ascertain the extent of the burial to the stern section. It became immediately apparent that the

wreck is completely buried past the stern lifting rings, no evidence of the rudder or hydroplanes being observed.

Outlying Anomalies

- 5.4.33. Given the proximity to the wreck of the two outlying anomalies recorded on the multibeam image it was decided to investigate each one.
- 5.4.34. Anomaly One is located c.14m to the north east of the bow of the wreck. It is a heavily concreted metal object and is roughly oval in shape. It measures 1.02m long by 0.8m wide and is upstanding by 0.6m. It has a round object attached underneath it but this could not be fully investigated as it was largely buried in the seabed. This anomaly may be the remains of a moored sea mine, or may be associated with the towing configuration of the boat.
- 5.4.35. Anomaly Two lies 8.5m to the south east of the buried stern of the wreck. It was possible to identify this feature as a heavily corroded metal buoy, and is probably the buoy/mine casing mentioned in ADU report 99/30.

6. DISCUSSION

6.1. THE WRECK

- 6.1.1. The wreck of the *HMS/m A1* represents the remains of the first truly British designed and built submarine, following on directly from the Holland Class design bought from America.
- 6.1.2. After the *HMS/m A1* was constructed it was decided to make major changes to the A class boats, such as increasing the firepower by adding a second torpedo tube (to lie side by side), therefore making the *HMS/m A1* a unique example of early British submarine design.
- 6.1.3. While the site itself has been subjected to the illegal removal of a considerable amount of internal and external fittings the main hull structure remains in relatively good condition for a wreck that has lain at the bottom of the Solent for nearly 100 years.

6.2. VULNERABILITY OF THE SITE

Unlicensed Diving

- 6.2.1. The site has clearly suffered from unlicensed and therefore illegal diving activities. The bulk of the easily removable fixtures and fittings have been removed from the exterior of the wreck, has have some from the interior.
- 6.2.2. The fact that the torpedo loading hatches have been removed means that the interior of the wreck is slowly beginning to fill with the fine grained, highly mobile silt that covers the seabed in the immediate vicinity of the wreck. This may protect the few remaining fixtures and fittings inside the hull from further theft.

Corrosion

- 6.2.3. Along the top of the pressure hull, both forward and aft of the conning tower, there are small to medium sized patches of corrosion, exposing elements of the exhaust

and ventilation systems. These patches are likely to grow in size and will slowly begin to expose further sections of piping.

- 6.2.4. The rate of corrosion of all elements of the wreck must be monitored annually, ideally using an underwater multiple echo ultrasonic thickness gauge. Using this gauge on selected areas of the wreck structure will show the thickness of metal at each selected point. This will provide an accurate and quantifiable record of corrosion rates on the wreck.

6.3. DOCUMENTARY RECORDS

- 6.3.1. The original engineering plans for the A Class boats was gratefully received from the National Maritime Museum, Greenwich, and from the Royal Naval Submarine Museum, Gosport. While these detailed technical drawings have proven to be very useful in identifying external fittings on the wreck site, they are not specific to any one boat. The A Class boats can be divided up into 4 separate divisions: A1; A2 to A4; A5 to A12; and A13 (diesel engines).

- 6.3.2. There are several websites and a number of books that deal with A Class boats. A brief selection includes:

- *The Garret Enigma and the Early Submarine Pioneers* by Paul Bowers;
- *Submarine Boats* by Richard Compton Hall;
- *The Submarine Pioneers* by Richard Compton Hall;
- *Damned Un-English Machines: a History of Barrow-Built Submarines* by Jack Hool and Keith Nutter;
- *Lost Patrols: Submarine Wrecks of the English Channel* by Innes McCartney;
- *Encyclopaedia of British Submarines* by Paul Ackerman
- The *Royal Naval Submarine Museum* website. <http://www.rnsubmus.co.uk/>.

- 6.3.3. Since the discovery of the site in 1989 there has been a limited amount of formal archaeological work conducted on the site. The following outlines the status of the record to date.

- 2005: WA conducts diving investigation of *HMS/m A1*. Detailed photographic and video survey undertaken. These photographs can be compared with ADU stills and those taken by the Licensee and show the amount of theft being conducted on the site. All external features shown in the early photographic record are now missing. A measured plan is produced for selected elements of the wreck and a section through the wreck is also produced, showing the sediment levels within the vessel;
- 2005: ADU (ALSF) conducts high resolution multibeam survey of the site. Results are of excellent quality. The images show pockmarks all along the outer hull and casing of the wreck, with concentrations at the bow and the stern. When these areas are investigated they are described as being small corrosion holes in the outer casing, measuring c.0.10-0.20m in diameter and up to a metre in some instances. There are concentrations in the bow and in the stern. Where the outer casing has been corroded away elements of the exhaust and ventilation systems are visible;

- 2003: Wessex Archaeology conducts sub bottom, magnetometer and multibeam survey;
- 2002: (August): ADU conducts multibeam survey on the site. Weather conditions during data collection are not ideal. The images show both torpedo hatches to be missing and much of the stern buried in sea bed sediment;
- 2002: (June): ADU conducts brief ROV inspection, no new archaeological features observed;
- 2001: S.K. Lovell obtains survey licence. Survey report in support of this licence not seen by WA;
- 1999: ADU conducts diving investigations on the site. One torpedo loading hatch missing, the other was open but closed by ADU divers. Internal fittings reported to have been removed;
- 1998: Martin Woodward obtains survey licence. Survey report in support of this licence not seen by WA;
- 1998: ADU conducts diving investigations on the site. Both torpedo hatches are reported to be closed;
- 1997: ADU conducts diving investigations on the site. One of the torpedo loading hatches reported to be open.

6.3.4. In addition to this archaeological record there has been a large amount of illegal diving on the wreck, with a large quantity of external and internal fittings having been stolen from the wreck site. The Licensee knows the identity of divers known to hold *HMS/m AI* artefacts in their possession and has given their details to the Receiver of Wreck.

6.3.5. The Licensee removed the conning tower hatch cover in 1994 (prior to the sites designation) to make the site less attractive to persons diving illegally on the site. Other fixtures and fittings taken from the wreck for safe keeping are on display in his museum at Bembridge.

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APPENDIX I: DIVE DETAILS

Date	Diver	Time in-out	Duration	Visibility	Depth	Current
28/09/05	F. Mallon	12:55 – 13:29	31mins	c.0.20m	12m	Slack
03/10/05	N. Callan	10:02 - 11:22	75mins	2-3m	14m	Slack
04/10/05	J. Auer	10:22 – 11:47	80mins	1-2m	13m	Slack - slight
05/10/05	J. Auer	11:08 – 12:31	78mins	Less than 1m	13m	Slight – slack
06/10/05	F. Mallon	11:41 – 12:20	38mins	0.5-1m	12m	Slack – slight
06/10/05	F. Mallon	12:29 – 13:11	40mins	0.5-1m	12m	Slight – moderate
07/10/05	F. Mallon	12:17 – 13:24	67mins	1-1.5m	12.5m	Slack – slight
10/10/05	N. Callan	14:49 – 15:50	58mins	2-3m	13m	Slack – slight
11/10/05	J. Auer	09:23 – 10:49	84mins	2-3m	11m	Moderate - strong
11/10/05	N. Callan	15:26 – 16:35	67mins	3-4m	13m	Slack – moderate
12/10/05	J. Auer	10:40 – 11:44	62mins	2-3m	11m	Moderate

APPENDIX II: HISTORY AND CHARACTERISTICS

Type:	A Class
Dimensions:	Length: 103 feet 3 inches, diameter: 12 feet 8 inches
Lost:	1911
Cargo:	None, not carrying torpedoes at time
Complement:	12 crew, none on board at time of sinking
Built:	Vickers Sons & Maxim Ltd at Barrow-in-Furness
Launched:	9 th July 1902
Length:	103 feet 3 inches
Length of remains:	24.5m
Beam:	12 feet 8 inches
Draught:	11 feet 6 inches
Displacement	165 tons surfaced/180 tons submerged
Lost:	1911
Cause:	Tow line parted
Armament:	One 18in torpedo tube in bow, with two reloads carried (total of three). The <i>A1</i> is not thought to have been carrying torpedos when it was lost.
Complement:	11 (not manned at the time of its loss in 1911). Two officers and nine ratings were lost when it first sank, when it was rammmed by SS <i>Berwick Castle</i> on 18 th March, 1904.

The *A1* was originally laid down as a Holland boat and was intended to be called *Holland No. 6*. Shortly after construction commenced it was decided to make significant changes to the boat, with the length being increased to accommodate the more powerful engines.

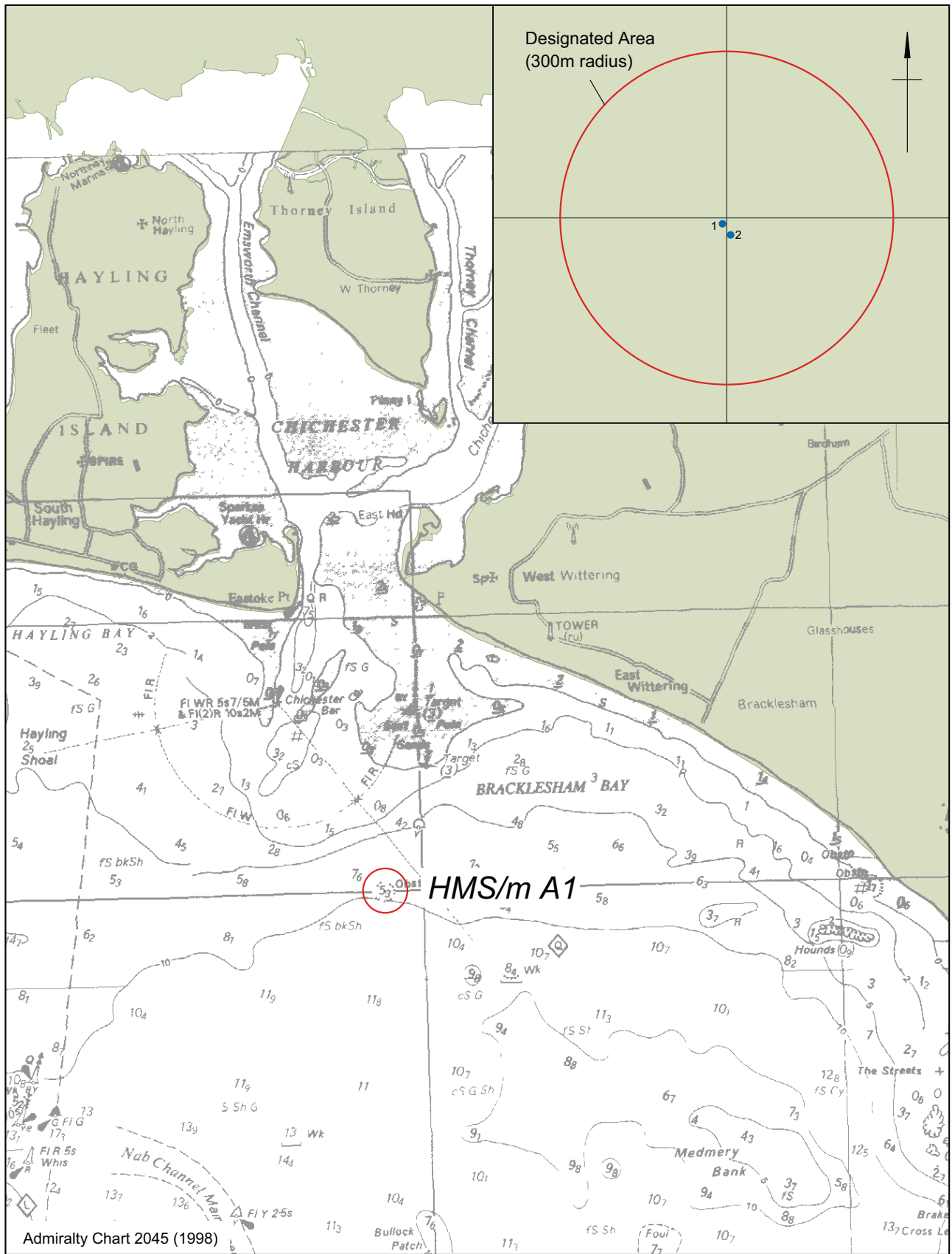
The *A1* can be considered unique, as after it was constructed significant changes were made to the A Class design, leaving the *A1* as the sole example of its kind.

The *A1*, in marked contrast to Holland boats, proved to be a very dangerous vessel. Before delivery a pocket of hydrogen gas exploded in the hull. When the boat was passing Land's End the crew had to abandon the boat as seawater had been allowed to come in contact with acid in the boats batteries, which filled the boat with chlorine gas.

In 1904 the *A1* was involved in manoeuvres with the fleet when she was accidentally rammmed by the SS *Berwick Castle*. The accident was not realised until the submarine failed to report that night. All eleven of the crew lost their lives, and are now buried in the Holy Trinity Church near the Royal Naval Submarine Museum, Gosport.

The wreck was relocated and salvaged. As a result of this accident it was decided to fit a second water-tight hatch at the base of the conning tower.

A1 was put back into service, but ended her days as a submerged target, and was lost for the final time whilst being used as an unmanned submerged target for anti-submarine warfare training.



Admiralty Chart 2045 (1998)

1 ● Tracked diver position for bow
 50° 44.549' N 00° 55.285' W
 (WGS. 84)

2 ● Tracked diver position for stern
 (as it enters the seabed)
 50° 44.538' N 00° 55.273' W
 (WGS. 84)

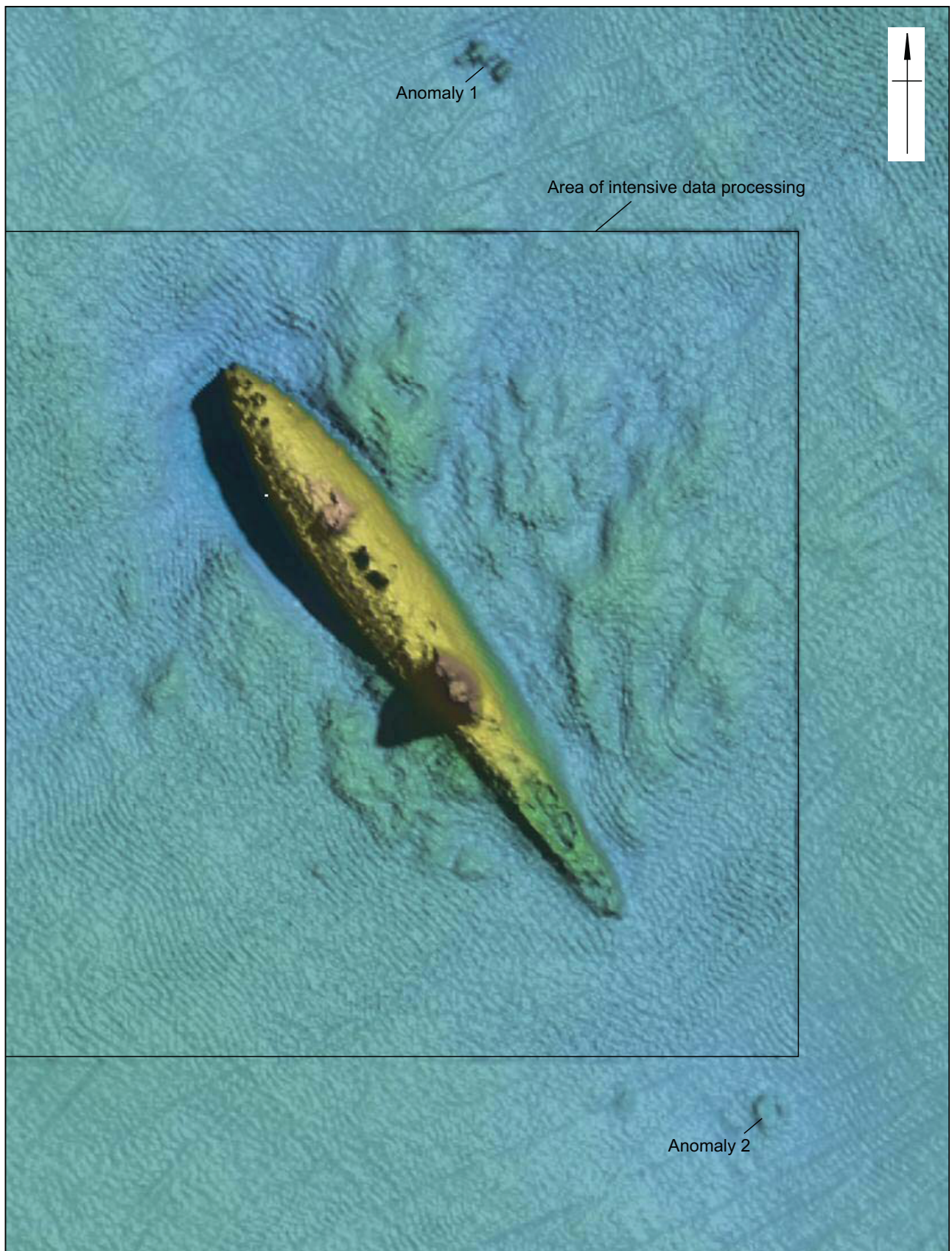
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Date:	07/04/05	Revision Number:	0
Scale:	1:75,000 & (inset) 1:10,000	Illustrator:	KJB
Path:	U:\Projects\53111\Drawing Office\Report Figures\2005\z30_HMS A1		

HMS/m A1 site location

Figure 1



	<p>0 10m</p> <p>Data collected by ADU, St Andrews University, modified by WA. This material is for client report only © ADU and Wessex Archaeology. No unauthorised reproduction.</p>			
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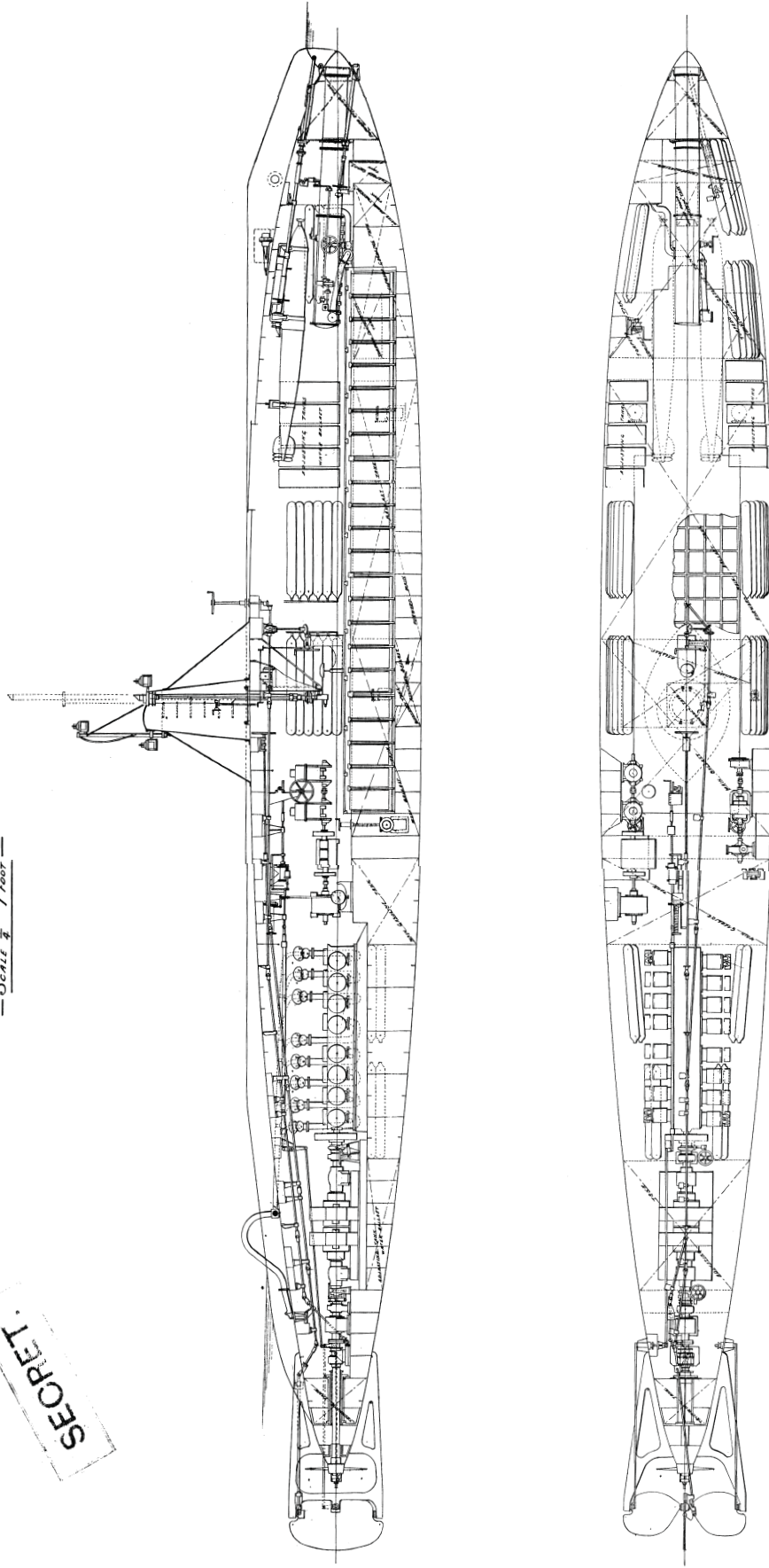
Multibeam image

Figure 2

PLAN B

— GENERAL ARRANGEMENT —
 — OF —
 — SUBMARINE BOAT A1 —
 — SCALE $\frac{1}{4}$ " / FOOT —

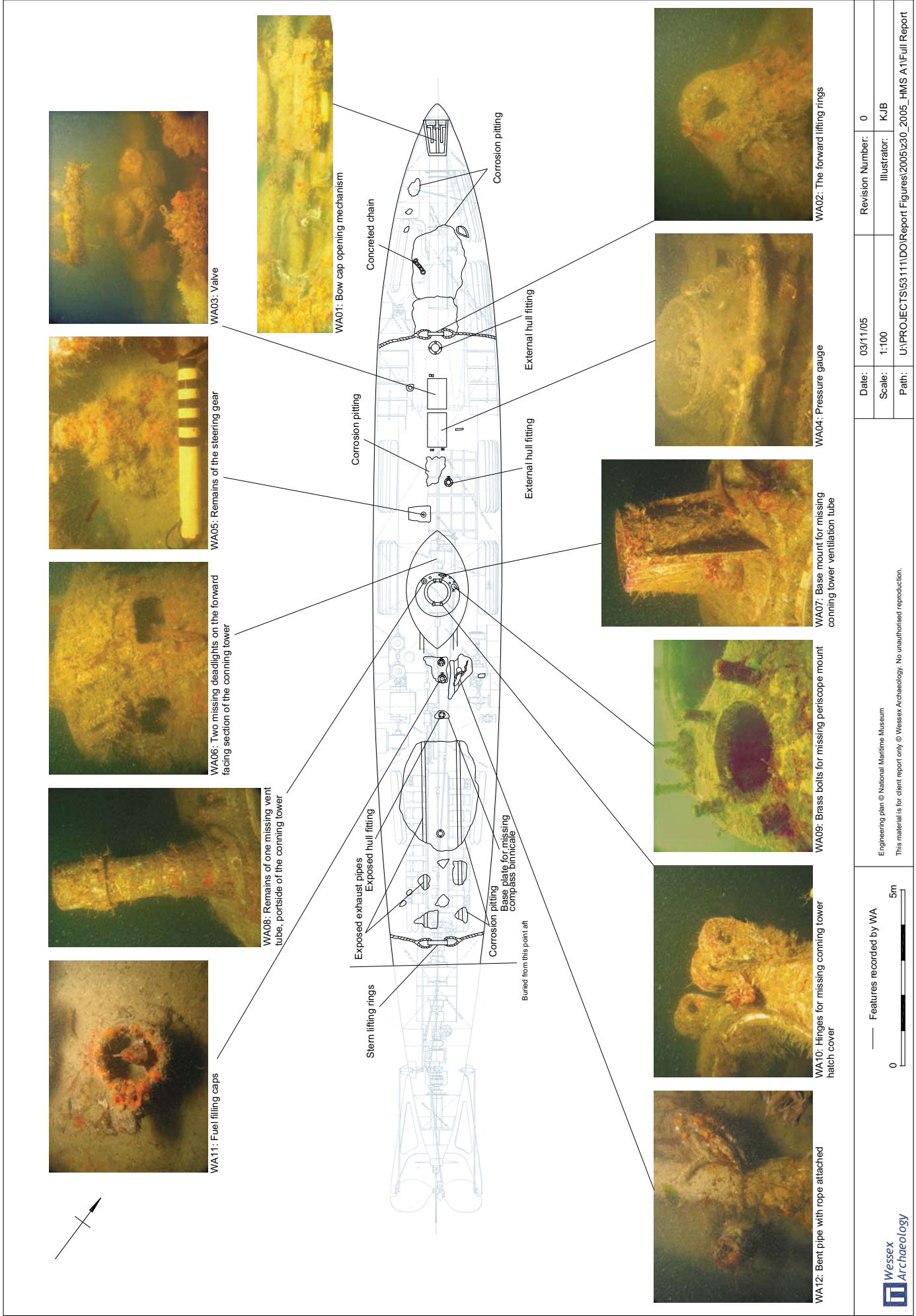
SECRET



FROM ORIGINAL DRAWING AT
 NATIONAL MARITIME MUSEUM
 LONDON
 285



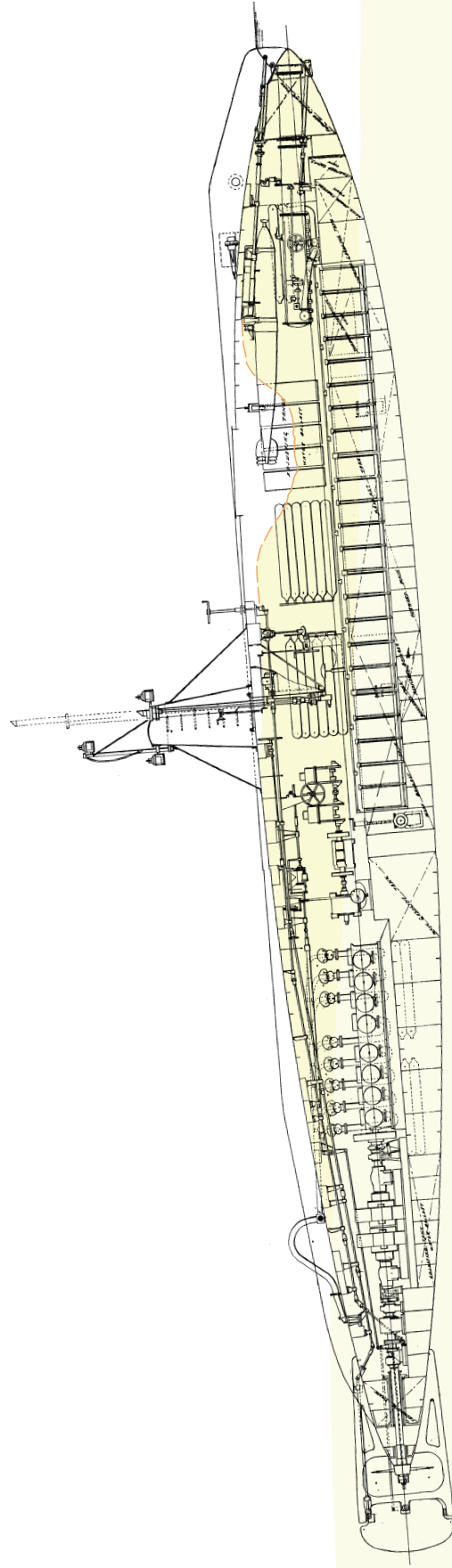
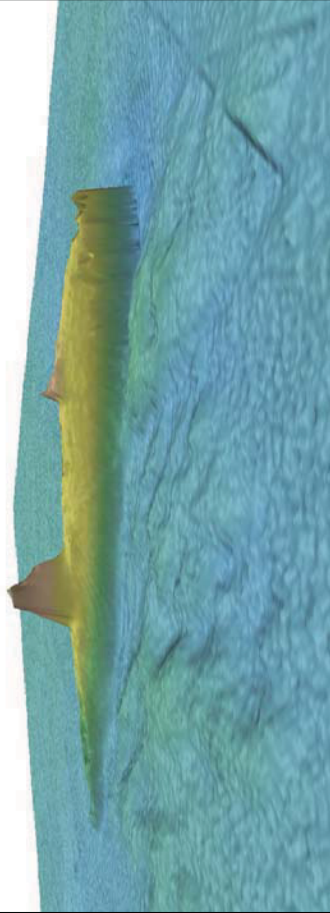
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<p>Engineering plan © National Maritime Museum This material is for client report only © Wessex Archaeology. No unauthorised reproduction.</p>		Date: 03/11/05	Revision Number: 0
<p>Scale: 1:100</p>		Illustrator: KJB	
<p>Path: U:\PROJECTS\5311\DO\Report Figures\2005\230_2005_HMS A11\Full Report</p>			

Plan showing areas of damage Figure 4

Multibeam image showing starboard side



Seabed level
Sediment level within structure



Engineer plan © National Maritime Museum
Multibeam data collected by ADU, St Andrews University, modified by WA.
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Scale:	1:100	Illustrator:	KJB
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Section drawing showing sediment levels

Figure 5

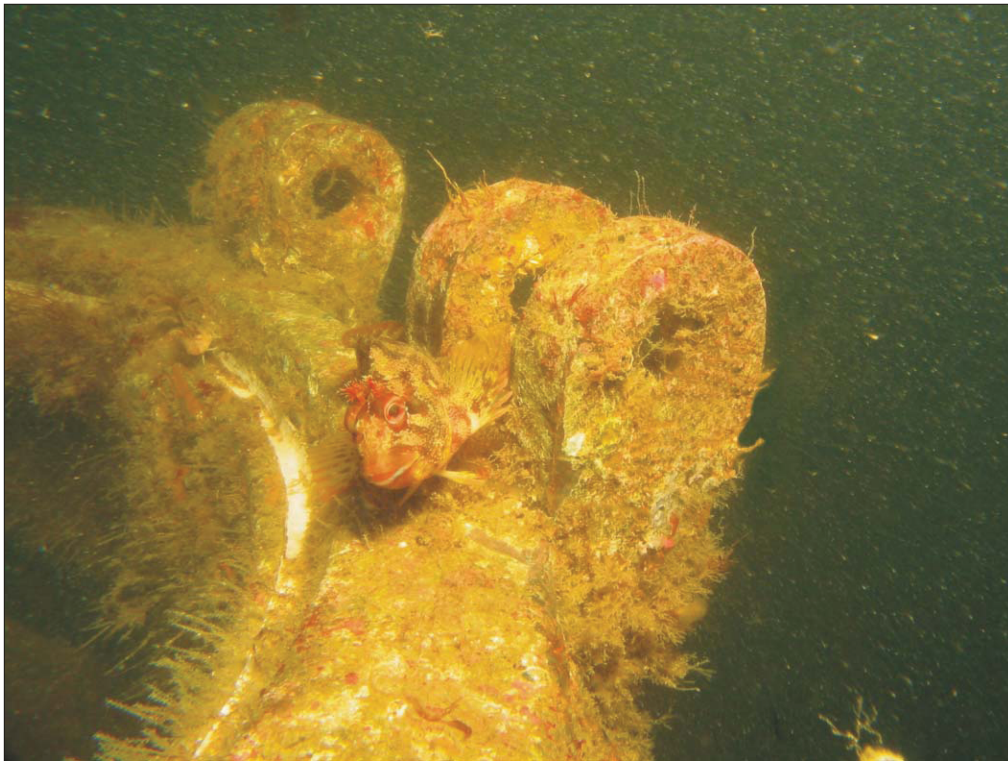


Plate 1: Hinges for missing conning tower hatch cover

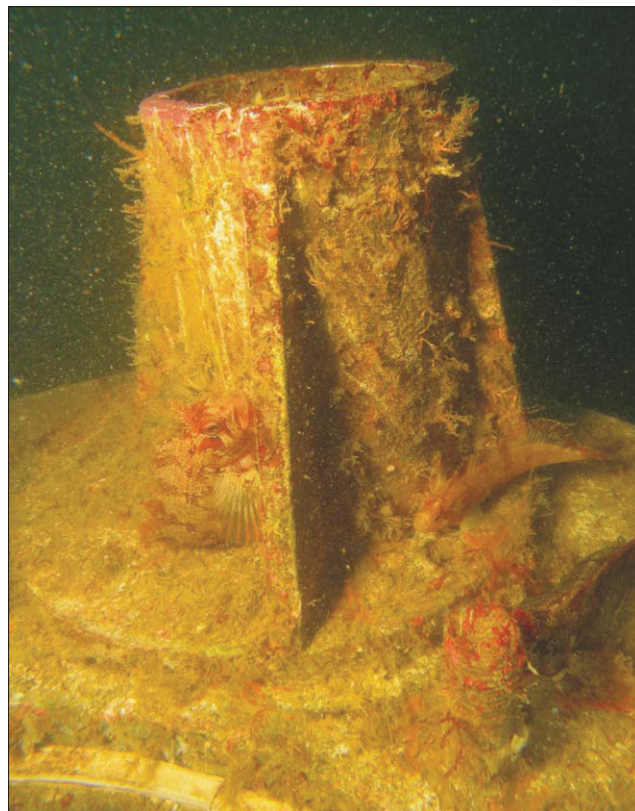


Plate 2: Base mount for missing conning tower ventilation tube



Plate 3: Brass bolts for missing periscope mount

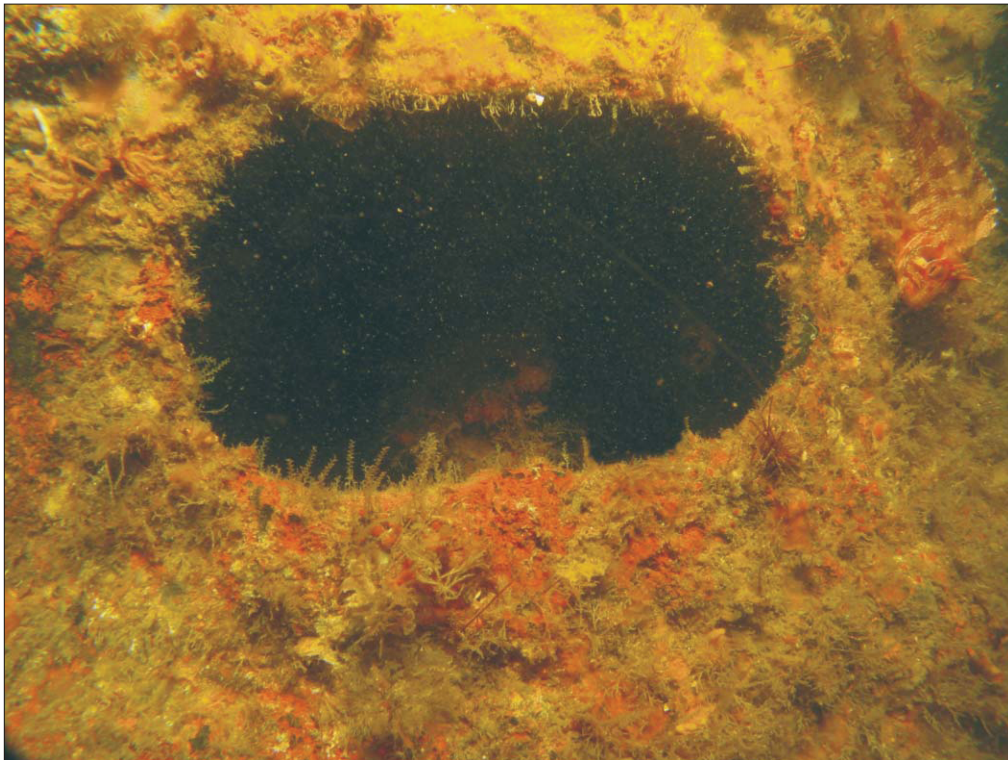


Plate 4: Missing deadlight

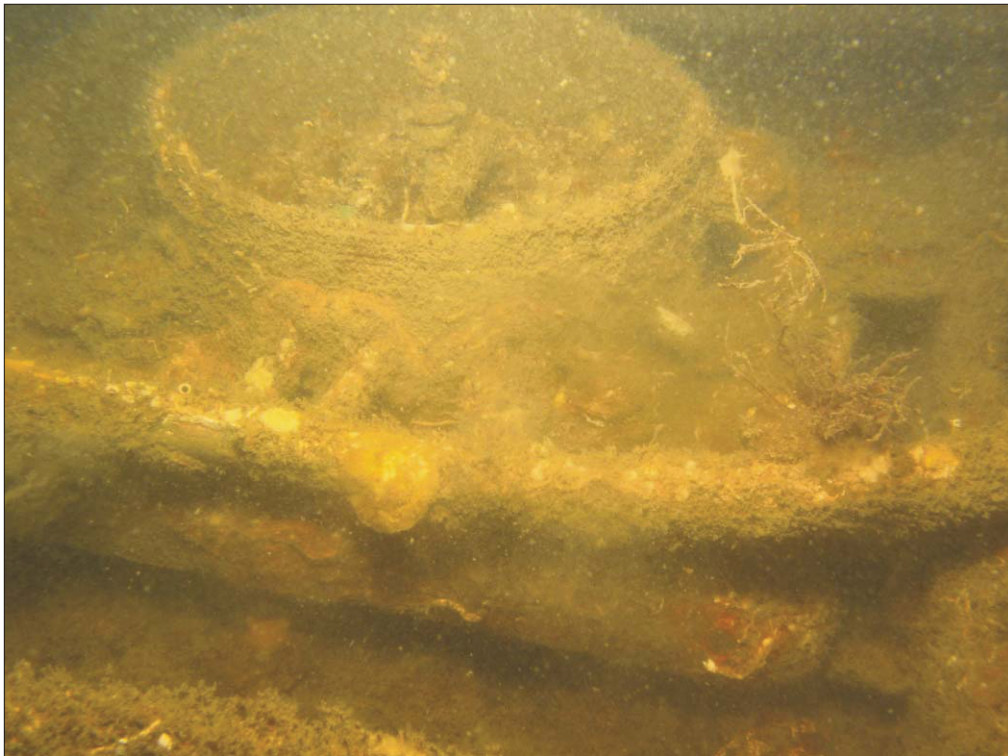


Plate 5: Pressure gauge

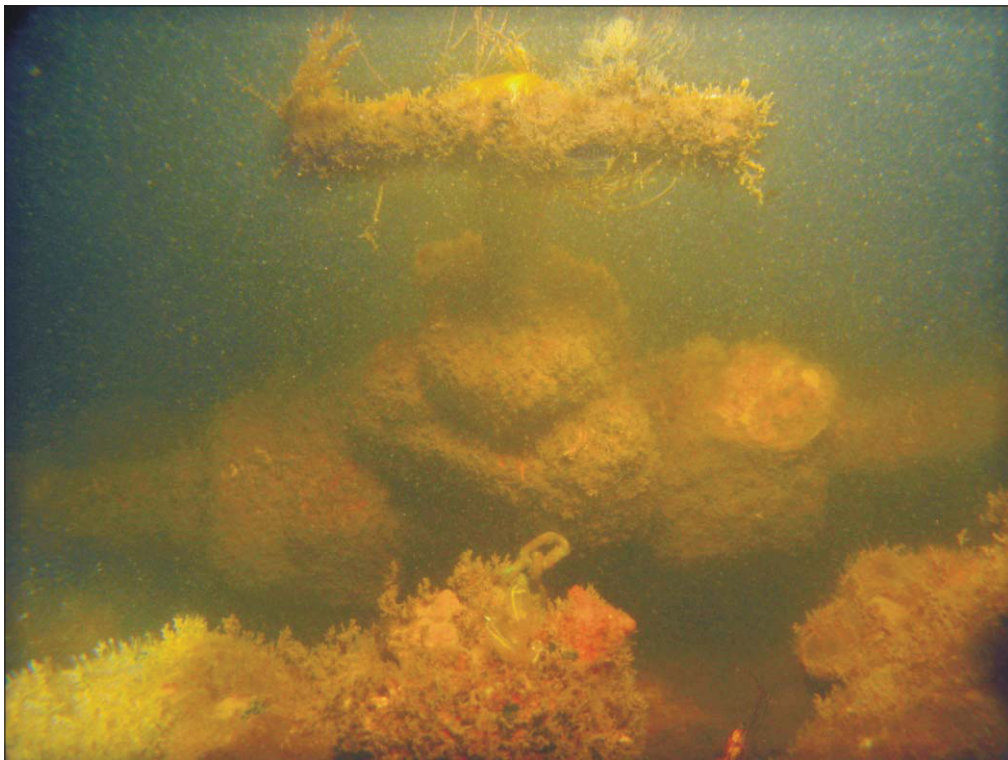


Plate 6: Valve

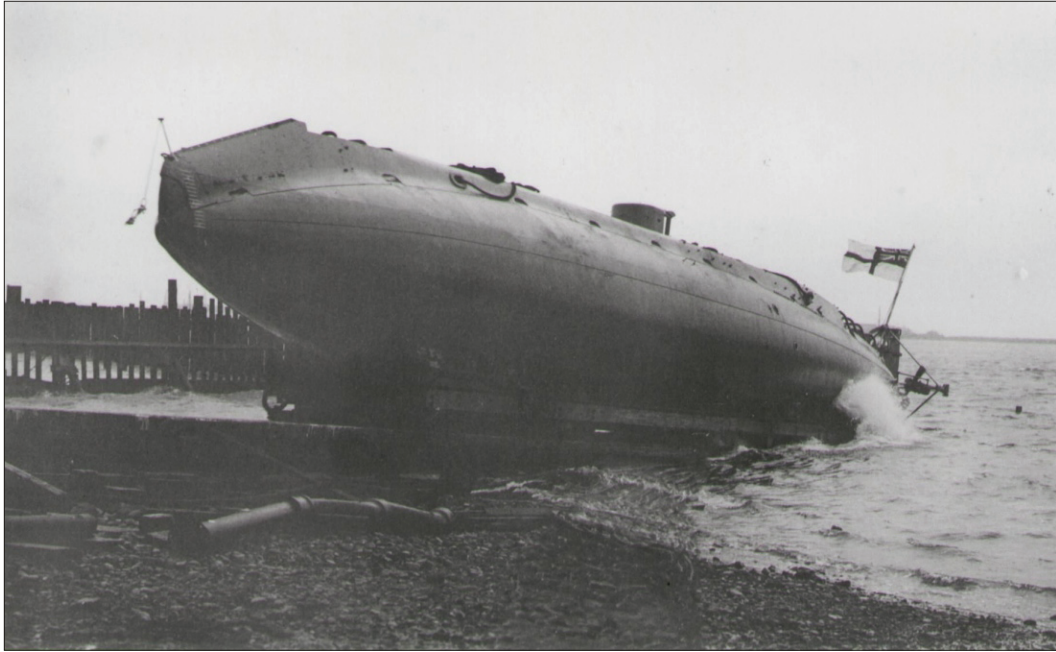


Plate 7: The launch of HMS/m A1 (© Submarine Museum)

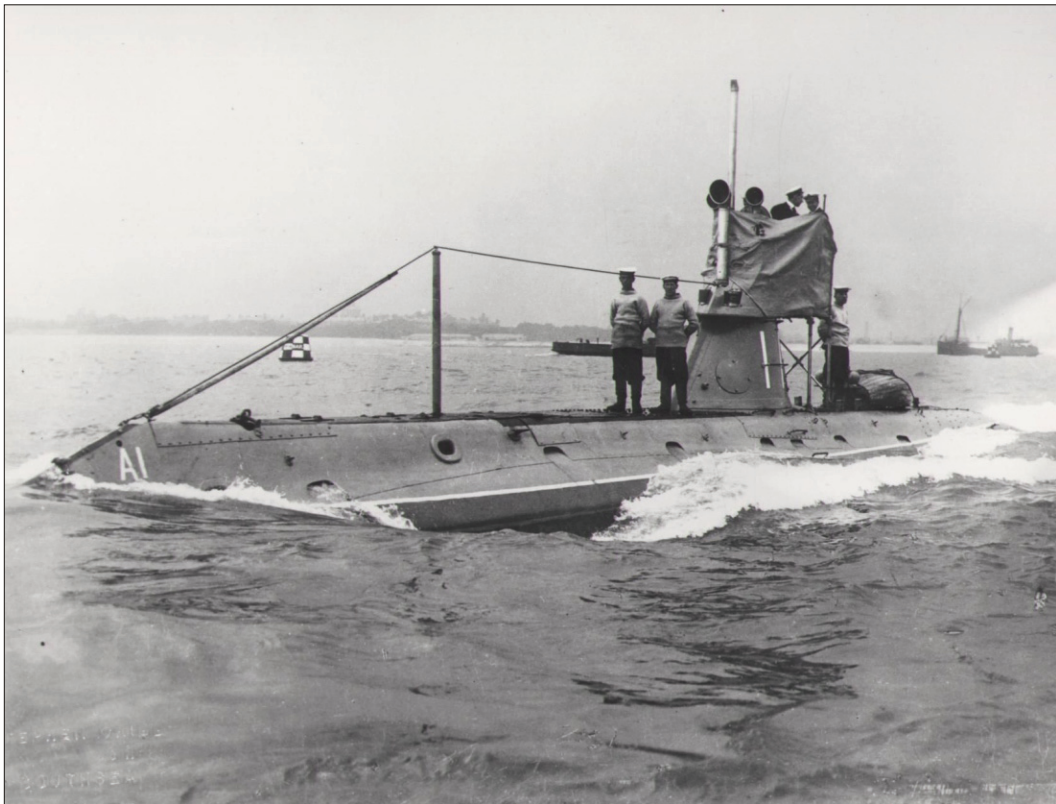


Plate 8: HMS/m A1 steaming on the surface (© Submarine Museum)



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