
# MULBERRY 70


Report on investigations of the remains of the artificial harbours code-named ‘Mulberry’ which assembled along the south coast of England prior to Operation Neptune and D Day.

By

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NEPTUNE 70

# Mulberry 70 Project Report

## Contents


1. Introduction
2. Diving activities and survey findings
3. Historical research
4. Outreach and conclusions

# Part 1 Introduction

1. Southsea Sub-Aqua Club, one of the earliest Branches of the British Sub-Aqua Club[1], has a fantastic history of locating and investigating the many historic wrecks along the south coast and in particular the Tudor warship Mary Rose. In recent years members of Southsea Sub-Aqua Club (SSAC) have been successful in investigating wreck of World War 2 and Operation Neptune, the maritime phase of Operation Overlord; 'The invasion of Normandy by sea and the liberation of France'. These investigations have revealed new details of the historical events. This latest project, coinciding with the Branch's 60th anniversary and the 70th anniversary of D Day, was to investigate the remains of elements of Mulberry Harbours which assembled along the South Coast of England before being towed across the Channel to France and has been another ambitious project which has revealed a number of surprises along the way. What became apparent is that this was much more than 'lumps of concrete' – each piece of Mulberry wreckage has a place in our history and should be recorded for future generations.
2. Throughout our investigations we have been extremely fortunate in receiving support from a number of organisations and individuals and our sincere thanks go to the British Sub-Aqua Jubilee Trust, the D Day Museum Portsmouth, the UK Hydrographic Office, and many more. Without the generous financial support from the Jubilee Trust and the substantial amount of data freely given by many people our project would not have achieved so much.
3. Our investigations have been centred in the area around Selsey and Pagham, where components of the Mulberry Harbours gathered in preparation for the Invasion of Normandy. However it soon became apparent that the Mulberry story was far bigger than we had imagined and extended much further around the British Isles. The Mulberry story is one of the most challenging of the Normandy campaign and at the time was the largest ever construction contract undertaken in Britain – and even more remarkable was that it was in the height of a war and conducted in complete secrecy.
4. Two harbours, each the size of Dover harbour, were designed and built at various places around the UK in a matter of months. The component parts were towed across the English Channel and within just 9 days of D Day began functioning as an artificial harbour. Re-provisioning and supporting the initial Allied forces was essential to the success of Operation Overlord and the Mulberry Harbours design had to overcome numerous problems and issues in order to provide an essential stepping stone for the Allied forces as they moved into France.
5. Whilst there are a number of Mulberry remains which are visible to the general public and local communities we in the diving community have the opportunity to record those elements which are beneath the wave that for many are completely unknown. In working with UKHO and Historic England is has become apparent that much of the current information surrounding the Mulberry Harbours is incomplete and we hope this report will help inform the historical record for the future.

[1] Branch no 0009 established April 1964.

**6.** The Mulberry 70 project was also Southsea Sub-Aqua Club's contribution to 'Neptune 70', a BSAC Southern Region initiative to encourage branches to research and dive a wreck associated with Operation Neptune as part of the 70th Anniversary commemorations of the Normandy Campaign in 2014. The Neptune 70 initiative attracted much interest including from overseas. Following a kind invitation from the leader of an English speaking multinational, French resident dive group we joined our 'Allies' in a joint expedition to dive the Normandy WW2 wrecks. This unexpected turn of events gave us the fantastic opportunity to dive the Mulberry B harbour at Arromanches but also to share the experience with new friends all with a passion for diving and a keen interest in WW2.

7. In conducting our project we have met with a high degree of interest from people we have met and/or corresponded with. It is clear to us that there is still much to learn and that whatever we can add to the information and knowledge available will be of interest and value to many people including divers.

## Part 2 Diving Activities and Survey Findings

## General

8. Our research into potential dive sites began from 2 main sources of information, UKHO data available from the internet site Wrecksite.eu[2] and the popular Diver Guides, 'Dive Sussex'[3] and 'Dive Hampshire and Isle of Wight'[4]. This supported with historical research and information supplied by others has been invaluable in identifying wrecks and obstructions which were believed to have a Mulberry connection. We have had a few surprises, one or two disappointments but as tends to be the case with our projects... lots of fun.
9. Our main focus was the area to the East of Selsey, and marked as obstructions on the UKHO chart 1652[5] as 'The Park'. In this area component sections of Mulberry harbours were brought together in preparation for Operation Neptune. The area is very close to the shore and very shallow (general sea bed depth of 6 to 10m). This meant that all grades of diver could participate in the project. Only one site required more qualified divers (sports diver and above) due to the depth and conditions.
10. Other sites examined featured to the west of Selsey identified on chart 2027, Eastern Approaches to the Solent and chart 2045 Outer Approaches of the Solent.
11. The majority of dives were conducted over a 10 day period in August though additional dives were also undertaken whenever possible. Over 110 individual dives were conducted in addition to many hours of searching the seabed using our sonar equipment. We were fortunate with the weather with only one day lost to high winds and rain.
12. As a mark of respect for one of Southsea Sub-Aqua Club's longest serving members one day was cancelled so that many of the survey team could attend his funeral.
13. We found that the tidal information on the chart was not in line with our own (and other divers) experiences. It emerged from discussions with Chris Howlett and his colleagues at the UKHO that the tidal diamond data for the area near the Park had been based on a 25hour monitoring in 1937. The last UKHO official survey of the area was conducted in 1955. It became clear that the UKHO data was not as reliable as we had hoped. Further out from the coast the tidal stream data appeared to be much more reliable.
14. By coincidence Chris Howlett has a great interest in Mulberry Harbours and has lead UKHO surveys on the Normandy coast including Mulberry B. We also met with the Channel Coast Observatory team at the National Oceanography Centre in Southampton to better understand the coastline and associated geophysics. It is clear that the coastline between Selsey and Pagham has changed significantly over the years. We intend to make all our information available to these organisations,
15. Locally divers plan their dives in 'the Park' area based on slack water calculated as 4 hours before and 3 after High Water Portsmouth and this proved to be a good guide from our experiences.

[2] www.wrecksite.eu is licensed by the UKHO to make available UKHO survey data.
[3] Dive Sussex, a Diver Guide, by Kendall McDonald Publisher: Underwater World Publications; 3rd Revised edition (Mar. 1999) ISBN-13: 978-0946020287
[4] Dive Wight and Hampshire: A diver guide – 2001 ISBN
[5] Chart No 1652 Selsey Bill to Beachy Head

16. All diving was conducted in accordance with BSAC Safe Diving practices and overseen by the Branch Diving Officer. The project also provided a number of opportunities for divers to undergo training or demonstrate skills required to progress their diver grades. In particular the skills concerned with dive planning and dive managing.

**Figure 1 Most dive sites were reached from Selsey East Beach slip way.**

## Selection of Sites

17. Using both the UKHO records and Diver Guides books for Sussex and Hampshire the following sites were selected for investigation. Many of the UKHO and Diver Guide records were clearly the same wreck site though there were several anomalies. Unfortunately plans to dive or use ROVs to survey some longer distance, deeper sites were not possible for a combination of weather, equipment issues and boat unavailable. However as can be seen there was still a significant number of sites to investigate.
18. The table below sets out those sites that were either dived or surveyed using sonar equipment. Where possible the appropriate data reference is given. In some cases we found no wreckage and this has also been recorded. The pages that follow provide more detail for our findings at site. All position based on WGS84.
19. A total of 23 different sites were investigated by Southsea Sub-Aqua Club divers. This comprised of 110 individual dives carried out by the team of 24 divers from newly qualified Ocean Divers to First Class Divers. This was also a great test for our new boat 'Southsea Explorer which had undergone a complete refurbishment in the months preceding the survey project.
20. In addition to the diver resources sonar equipment made available from Raymarine near Southampton was used to survey the seabed when attempting to locate obstructions/targets. A traditional 'fish-finder' echo sounder, an enhanced 'down vision' sonar and side-scan equipment were all used to great effect during the survey. Where available images are included in the report.
21. Although a number of wrecks/obstructions were not located it was clear that some of these were as a result of errors in the chart data or inaccurate position marks.
22. We visited Chris Howlett at the UKHO offices in Taunton where we shared the results of our initial work. Chris confirmed that much of the data was quite old and based on older technologies. The last survey records he had obtained from the archive were from 1957. Chris has a great interest in the WW2 Mulberry project and had arranged UKHO training expeditions to survey the Normandy beaches. His work on Mulberry B at Arromanches has been widely published. Chris was particularly interested and supportive of our work in completing this survey albeit with much less sophisticated equipment and resources than available to the UKHO.
23. This report will be made available to the UKHO, Historic England, D Day museum and other interested organisations in order to assist in any further surveys/investigations. It is hoped that the findings of this report will be of interest to others as well as the diving community

## Mulberry 70 - List of Investigated Sites

| Site | Description | UKHO Ref | Diver Guide Ref | Latitude | Longitude | Dived Y/N | Scanned Y/N | Comment |
|---|---|---|---|---|---|---|---|---|
| 1 | Concrete Whale Float (Beetle) | N/A | Sussex 70 | 50° 44'.250N | 000° 43'.805W | Y | Y | Not found |
| 2 | Obstruction - 'Crumbly' Mulberry | 20111 | Sussex 66 | 50° 44'.534N | 000° 44'.391W | Y | Y | Found – very broken concrete & re-enforced steel structure. Likely to be smaller Mulberry unit (C1 or D1) |
| 3 | Obstruction - Unidentified (likely to be part of Mulberry) | 20081 | Sussex 96 | 50° 42'.523N | 000° 37'.794W | Y | Y | Remains of an old wooden sailing ship. |
| 4 | Obstruction - Inner Mulberry | 20131 | Sussex 63 | 50° 45'.619N | 000° 43'.647W | Y | Y | Located – Identified as an Intermediate pier-head pontoon. |
| 5 | Wreck - Whale Bridges x 2 | 19988 | Sussex 104 | 50° 37'.530N | 000 °34'.184W | Y | Y | Located – Confirmed as 2 whale bridges. Beetles not found. |
| 6 | Obstruction - Mulberry Unit | 20095 | Sussex 72 | 50° 43'.669N | 000° 43'.306W | Y | Y | Located – unidentified rectangular steel pontoon. |
| 7 | Stainless Steel Mystery | N/A | Sussex 73 | 50° 44'.320N | 000° 44'.530W | Y | Y | Not found |
| 8 | 2 x Beetle Whale Floats | N/A | Sussex 69 | 50° 44'.150N | 000° 43'.900W | N | Y | Not found |
| 9 | Obstructions - Concrete Puzzles | 20113 | Sussex 71 | 50° 44'.560N | 000° 43'.344W | Y | Y | Located (eventually). Believed to be a concrete Beetle. Very broken and scattered into 3 main sections. |
| 10 | Obstruction - Concrete Bumps | 20125 | N/A | 50° 45'.355N | 000° 41'.657W | Y | Y | Believed linked to UKHO 61917 (see 13 below) |
| 11 | Obstruction - Loading pontoon | 20102 | Sussex 75 | 50° 44'.141N | 000° 45'.034W | Y | Y | Located. Unidentified 60m long steel structure 1.2m high 4.3m wide. Long 'bridge' (?). |
| 12 | Obstruction – 'Far Mulberry' | 20116 | Sussex 59 | 50° 44'.742N | 000° 42'.223W | Y | N | Located. A1 phoenix unit – well known amongst diving community. See SCUBA 'wrecked' feature. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 13 | Obstruction | 61917 | N/A | 50° 45’.355N | 000° 41’.657W | Y | Y | Located, two small concrete dome structures 20m apart. Believed to be part of disused sewage outlet. |
| 14 | Obstruction - Reported as ‘Inner Mulberry’ | 20123 | N/A | 50° 45’.017N | 000° 43’.033W | N | Y | Not found. Believe this is a charted error and should be 20131 (Item 4 above). |
| 15 | Wreck - Langstone Mulberry | 19506 | | 50°47’.550N | 001°01’.240W | Y | N | Located. Well known landmark in Langstone Harbour. Partially finished Phoenix A1 unit that broke its back when launched. Wreck of fishing boat alongside. |
| 16 | Wreck - Barge or dumb lighter | 20244 | | 50°38'.367N | 000°52'.935W | Y | Y | Located. Beetle float (steel). Believed to be only steel beetle surviving. |
| 17 | Wreck - Barge or dumb lighter | 20245 | Sussex 39 | 50°38'.364N | 000°52'.454W | Y | Y | Located. 2 x Beetles and whale bridges. 2 intact concrete beetles upside down, plus two (possibly three) whale bridge sections (collapsed). |
| 18 | Wreck - Concrete Barge | 20141 | | 50° 46’.633N | 000° 41’.833W | N | N | Located – Aldwick Beach. Concrete Beetle dries completely at low water (springs). Incorrectly marked as ‘dead’ on UKHO record. |
| 19 | Whale Bridges | N/A | | 50° 38’.365N | 000° 51’.477W | N | Y | Not found - Marks from local dive skipper close to Tanks and Bulldozers site. Believed to be site 17 above. |
| 20 | Obstruction | 20112 | N/A | 50°44'.550N | 000°42'.083W | N | Y | Not found. Close to Far Mulberry (see 12 above) |
| 21 | Obstruction | 20114 | N/A | 50°44'.567N | 000°41'.884W | N | Y | Not found. Close to Far Mulberry (see 12 above) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22 | Obstructions – possible mooring blocks. | 62711 | Sussex 64 | 50°45'.710N | 000°43'.020W | N | Y | Not found. Very shallow. |
| 23 | Foul Ground / Obstructions | 58275 | N/A | 50°44'.500N | 000°43'.500W | Y | Y | Located – Two separate parts of a concrete beetle. Only one part dived successfully. Well broken up. |

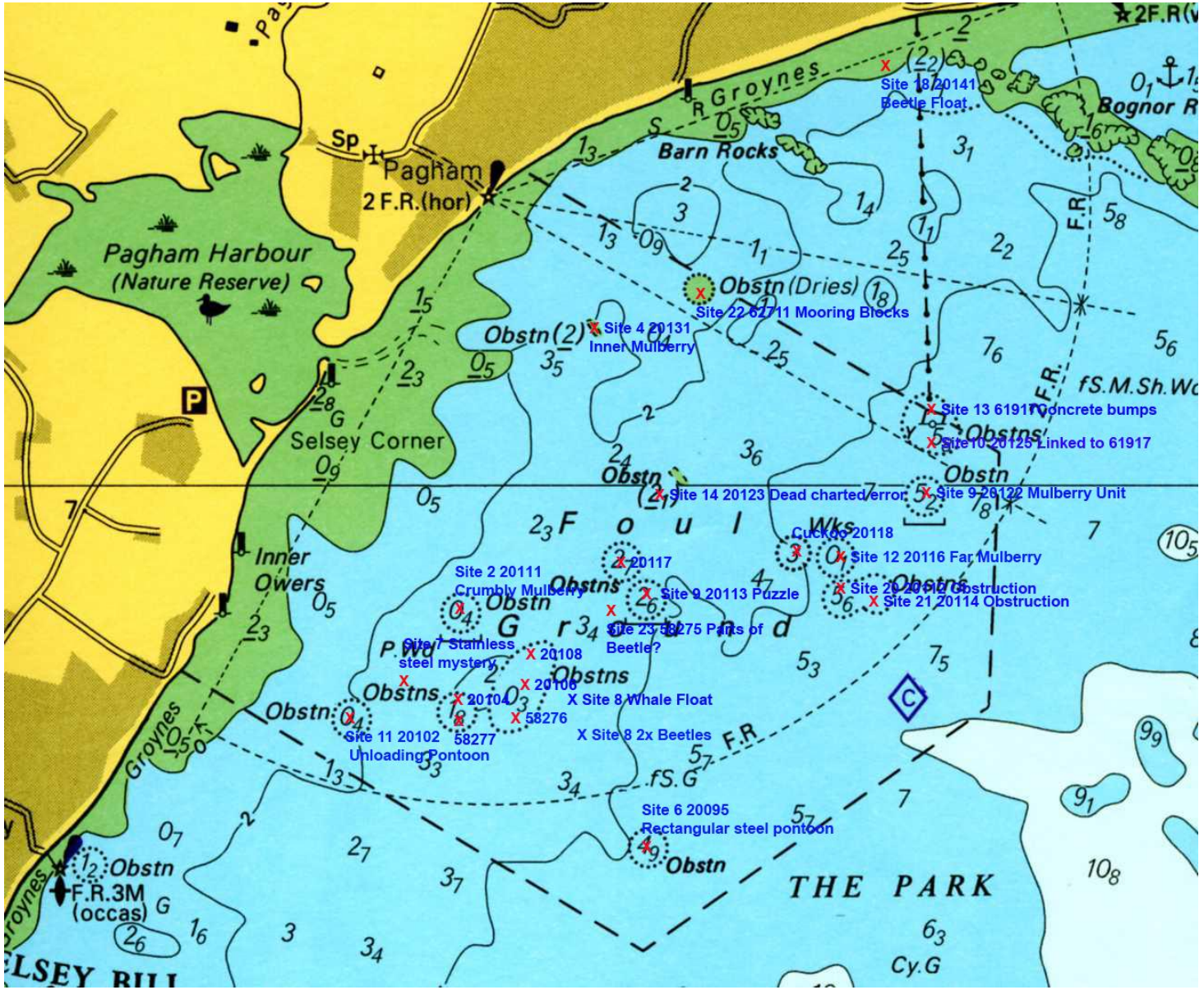


Figure 2 Extract from UKHO chart 1652 showing the sites in 'The Park'.

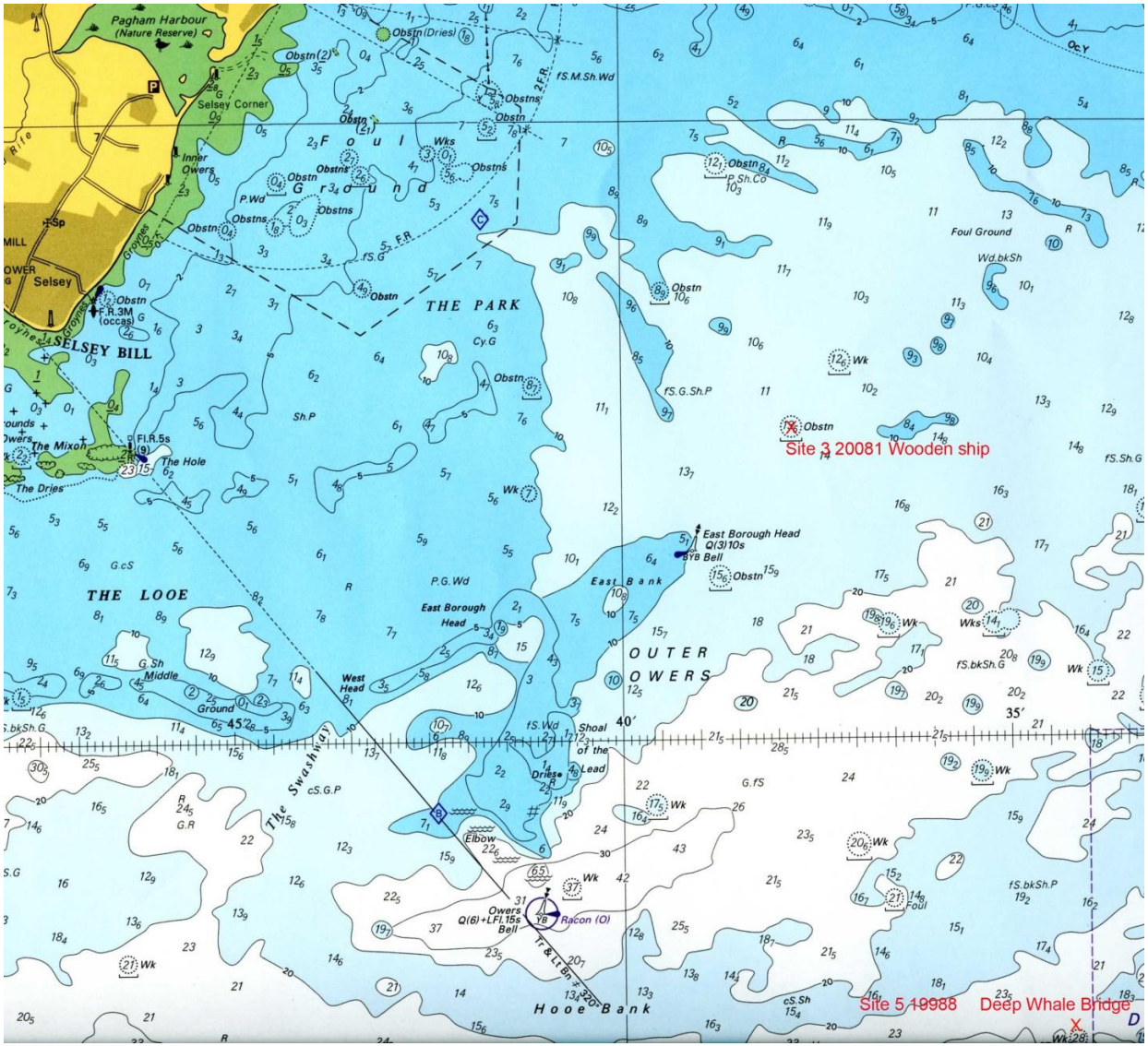


Figure 3 Extract from UKHO chart 1652 showing sites outside 'The Park'

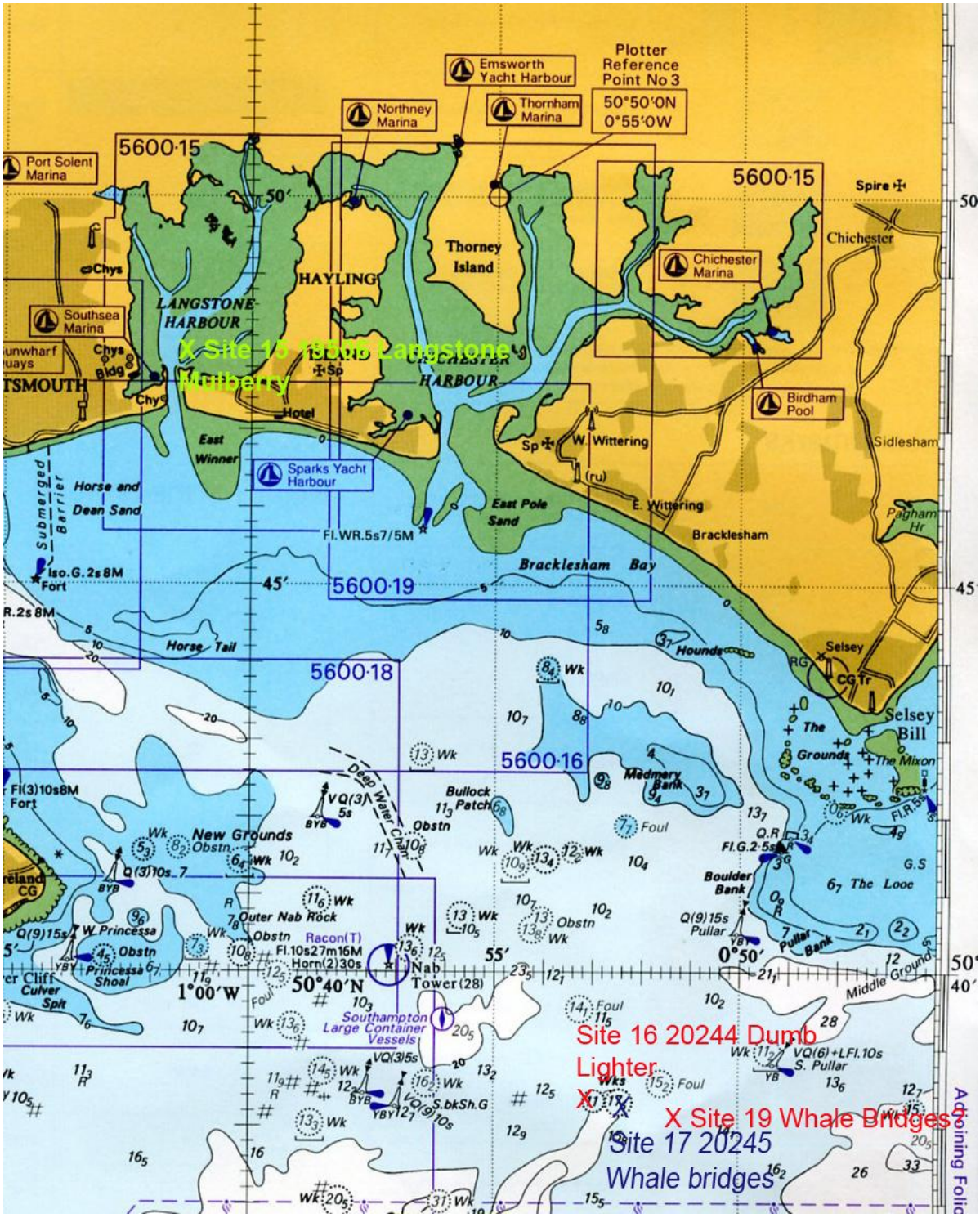


Figure 4 Extract from UKHO chart 5600 showing location of 4 sites to the west of Selsey Bill

## Survey Findings

24. The following sketches, photographs and narrative comment are made for each site surveyed. Given the number of sites visited the aim was to obtain a general view rather than a detailed archaeological recording of data. The sketches therefore are representations rather than accurate scaled drawings and should not be relied upon for navigation around a site.

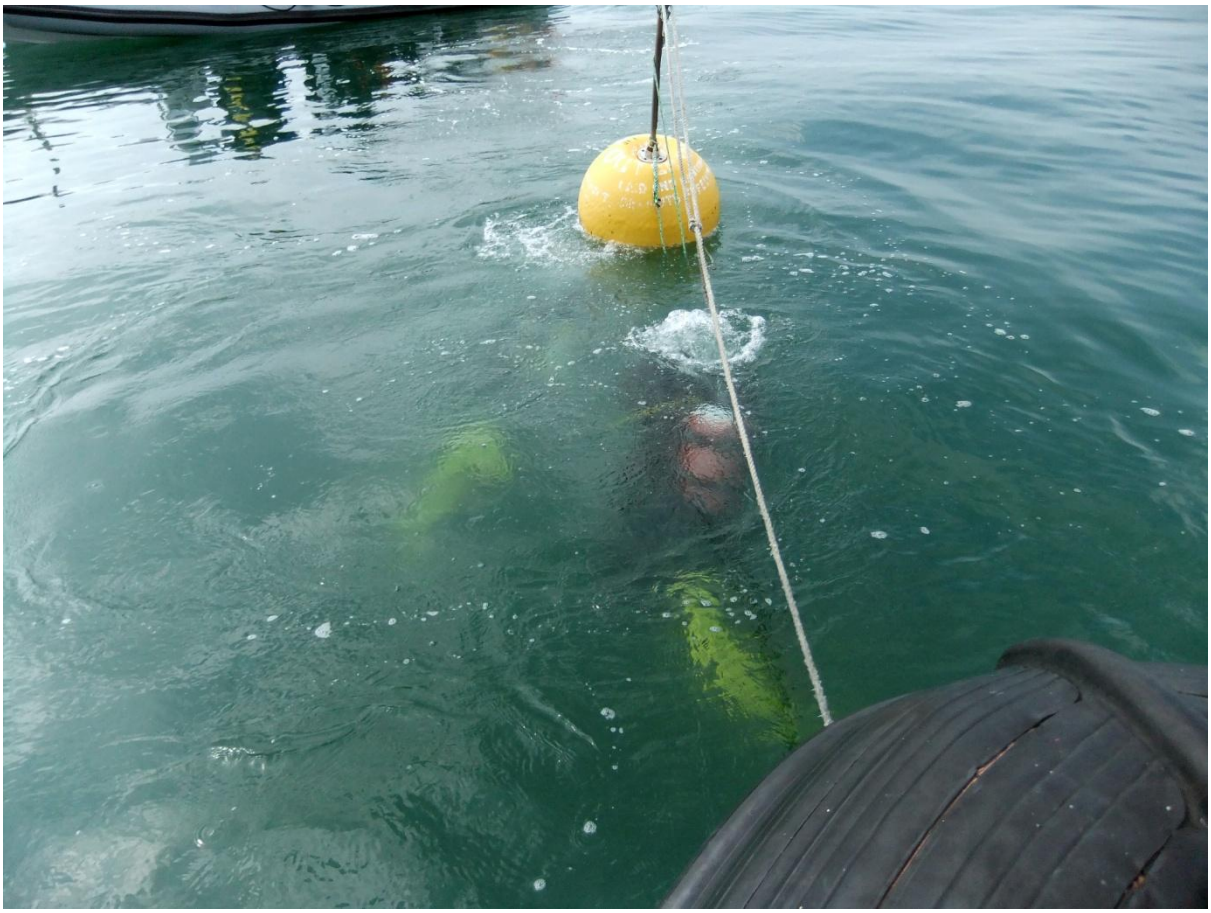

**Figure 5 Divers descend on the wreck of the Outer or Far Mulberry. The wreck is permanently marked with a large yellow buoy.**

## 1. Concrete Whale Float (Beetle)

Dive Sussex reference site 70. Position 50° 44’.250N 000° 43’.805W.

This was the first of our survey dives and the opportunity was taken by a member wishing to manage this dive as part of his progression towards Dive Leader qualification. He devised an innovative was to search for an object using a 90m length of line which pairs of divers used as a baseline to swim a parallel course at distances of 10 and 20m away. Following a detailed briefing the exercise was conducted effectively though unfortunately nothing was found.

Max depth 5.1m. Water temperature 18C. The seabed was the normal gravel that is present in the area. A flat seabed with clumps of long ‘thong’ weed was home to plenty of marine life including a large plaice which measured nearly 50cm nose to tail.

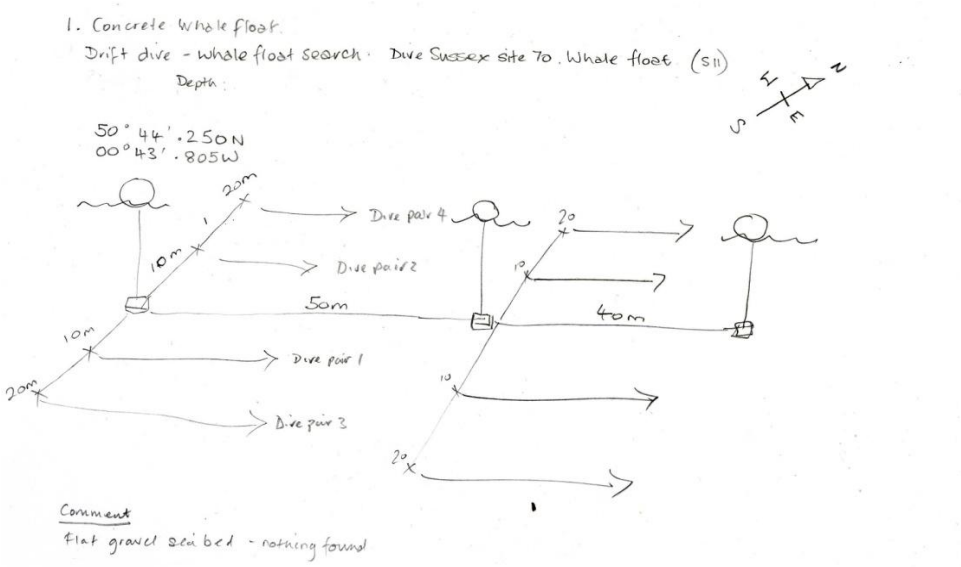


Figure 6 Plan of search technique.

Figure 7 A large plaice resting on the sea bed.

## 2. Obstruction - 'Crumbly' Mulberry

UKHO site reference 20111 - Dive Sussex reference site 66. Position 50° 44'.534N 000° 44'.391W

This site showed well on the sonar equipment and was quickly located. Two dives were conducted on the site which was a large area of broken, collapsed concrete and re-enforced steel rods (re-bar). It was unrecognisable as any particular structure but was consistent with one of the smaller C or D size Mulberry units. A number of the steel re-bars were bent over into arches this could have been as a result of significant force (explosives?). At one of the corners there was a pair of bollards. A small wall, 11m long and 2m high was the main piece if remaining structure of an otherwise very broken tangled mess of rubble and steel.

Max depth 6.8m. Water temperature 19C.

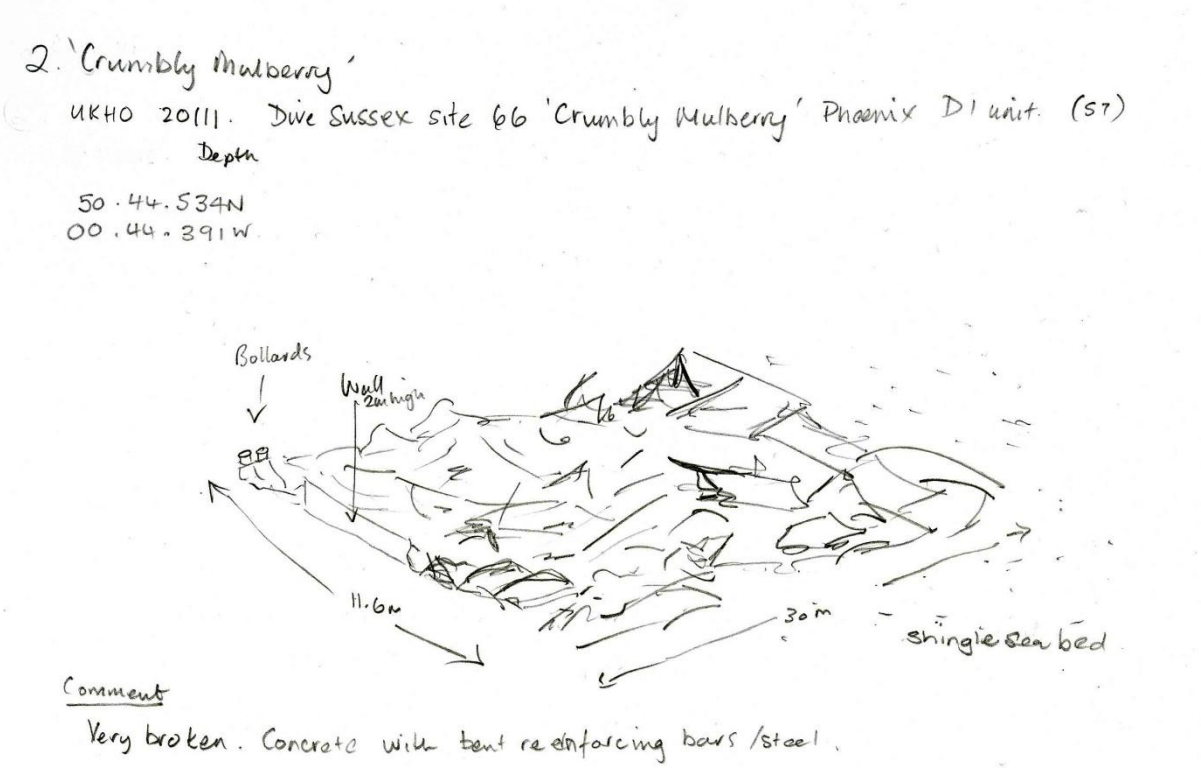


Figure 8 The Crumbly Mulberry site.

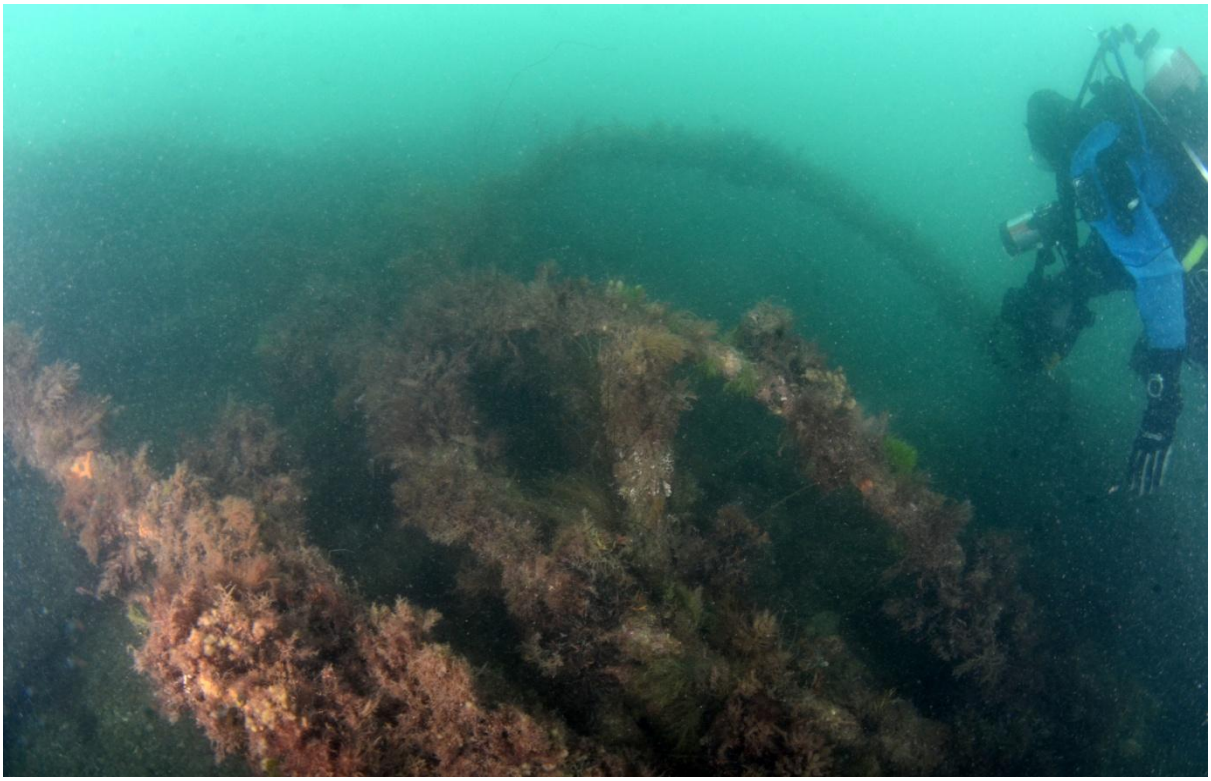

Figure 9 Curved over re-bar forming arches of steel.

Figure 10 More of the steel re-bar has formed curved arches.

Figure 11 The 'wall' is the largest piece of structure left.

Figure 12 The base of the wall - a conger's home.

Figure 13 Large concrete girders have collapsed.

Figure 14 A diver examines the two bollards.

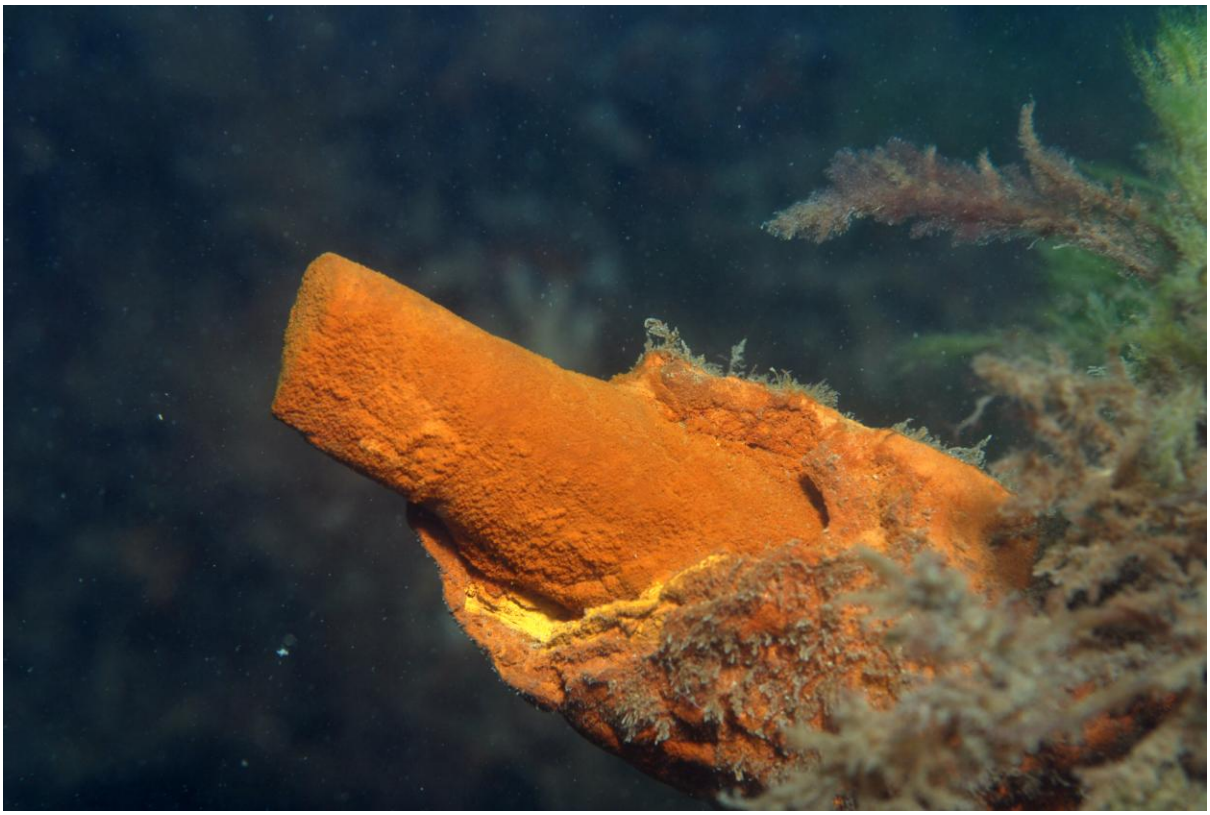

Figure 15 The concrete Mulberry units had steel re-enforced bars (Re-Bar) for strength.

## 3 Obstruction - Unidentified (likely to be part of Mulberry)

UKHO Site reference 20081 - Dive Sussex site 96. Position 50° 42'.523N 000° 37'.794W

This was our first major surprise of the survey. A little further out than The Park area the wreck was picked up relatively easily by the sonar equipment. A little over 10m in length and rising 1.7m from the flat sea bed we placed our shot about 5m from the wreck.

Maximum Depth 17m average depth 15.3m, water temperature 18C.

The wreck site was a mass of irregular shaped rocks, each approx 25-30cm in size. The rocks were in an oval shape mound which was clearly defined around the edge. Near one end we found a copper nail extending out about 15cm from the rocks. It had a round head and shaft and was green in colour as is normal for copper. At the other end of the site there were some irregular shaped objects which appeared to be concreted metal. What resembled the stock of an anchor could be seen with part of the fluke just visible. Wooden timbers were also sighted just below the surface of the sand, occasional protruding from the sea bed.

We hope to investigate this wreck further, very early research on copper nails in ship building would indicate that round head with round shaft usually older pre 18th C then square head square shaft from mid 18th through modern times. We are keen to learn whether the rocks were cargo or ballast and if more can be established from the anchor and other artefacts.

One thing that we are confident of – that the wreck site is very unlikely to be connected with Mulberry harbours.

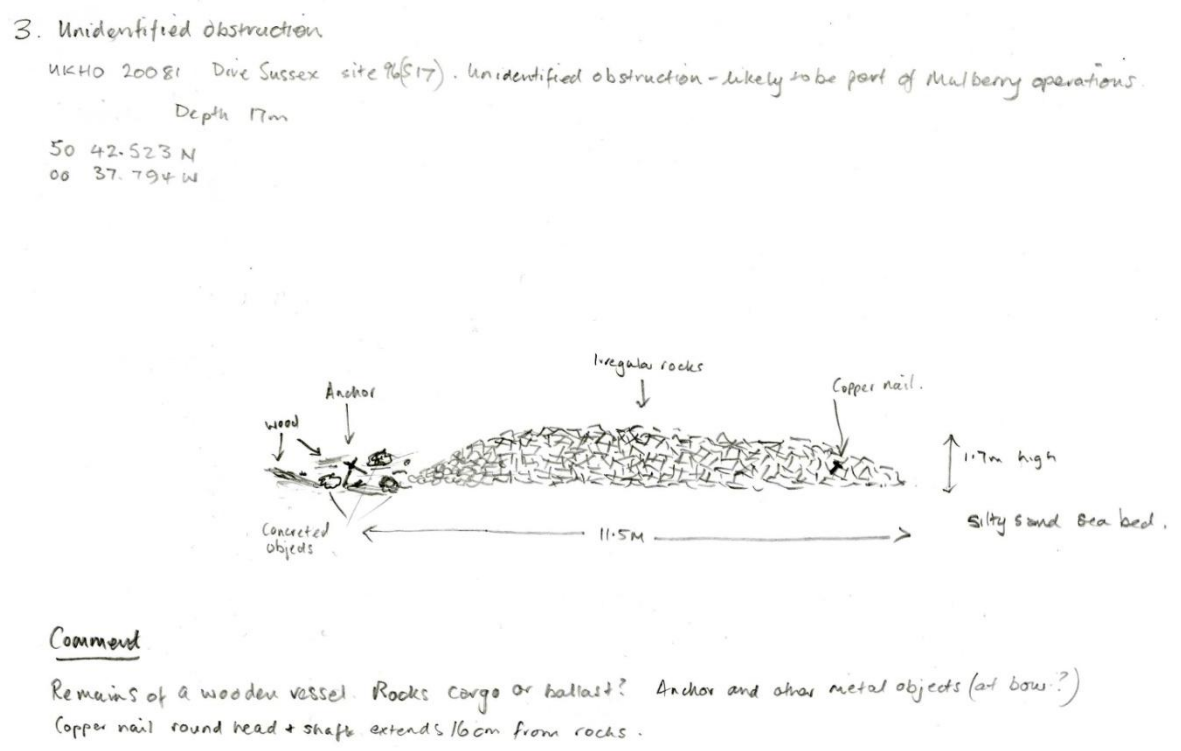


Figure 16 Not the remains of a Mulberry but an old wooden shipwreck.

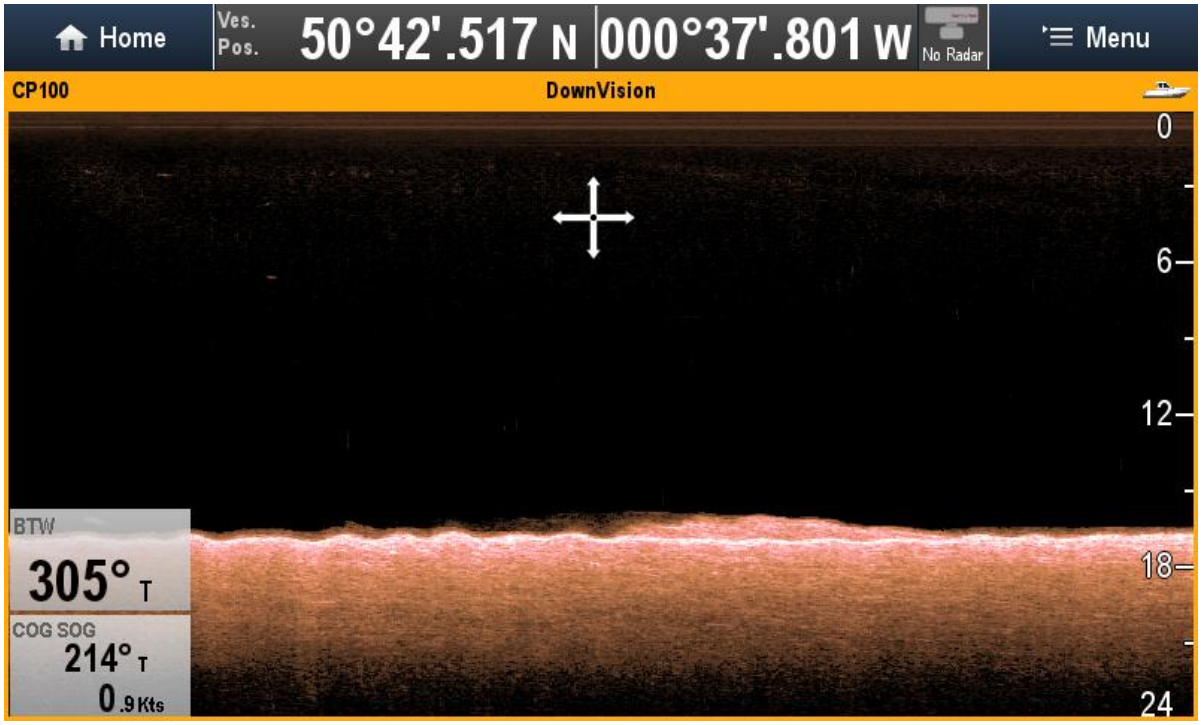


Figure 17 Sonar image of the mound of rocks.

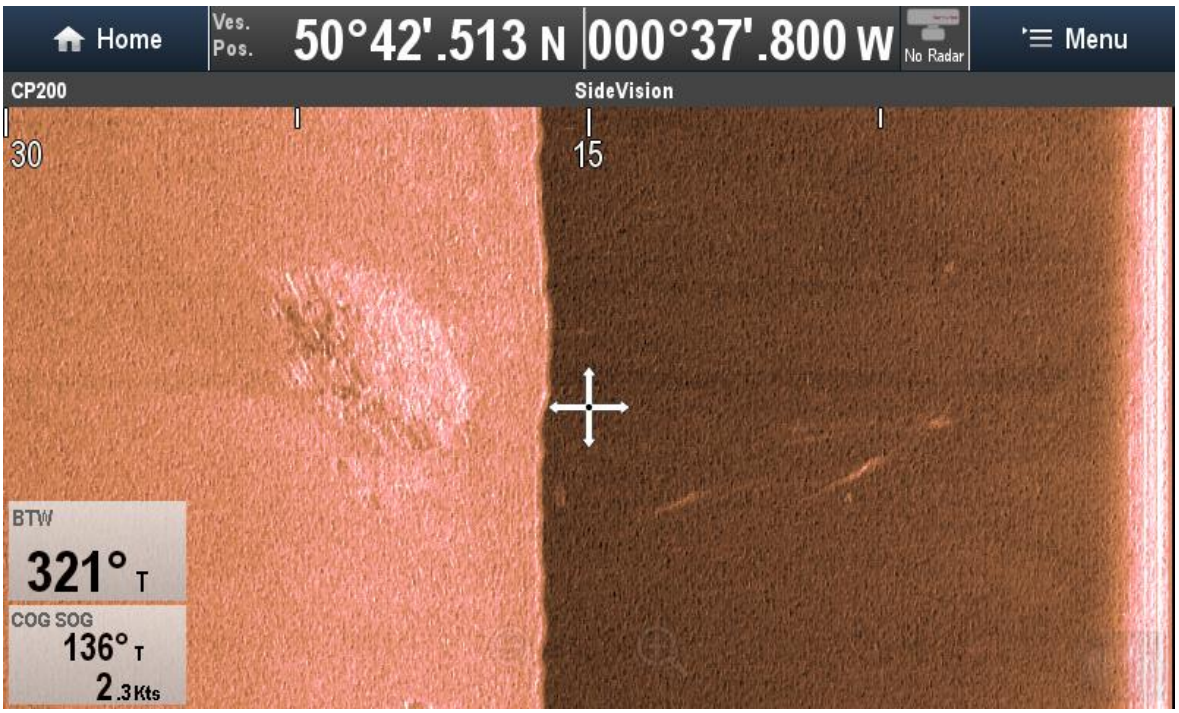


Figure 18 Side scan image of the wreck site showing the oval rock mound.

Figure 19 The anchor rests on the sandy sea bed.

Figure 20 Diver measuring the anchor.

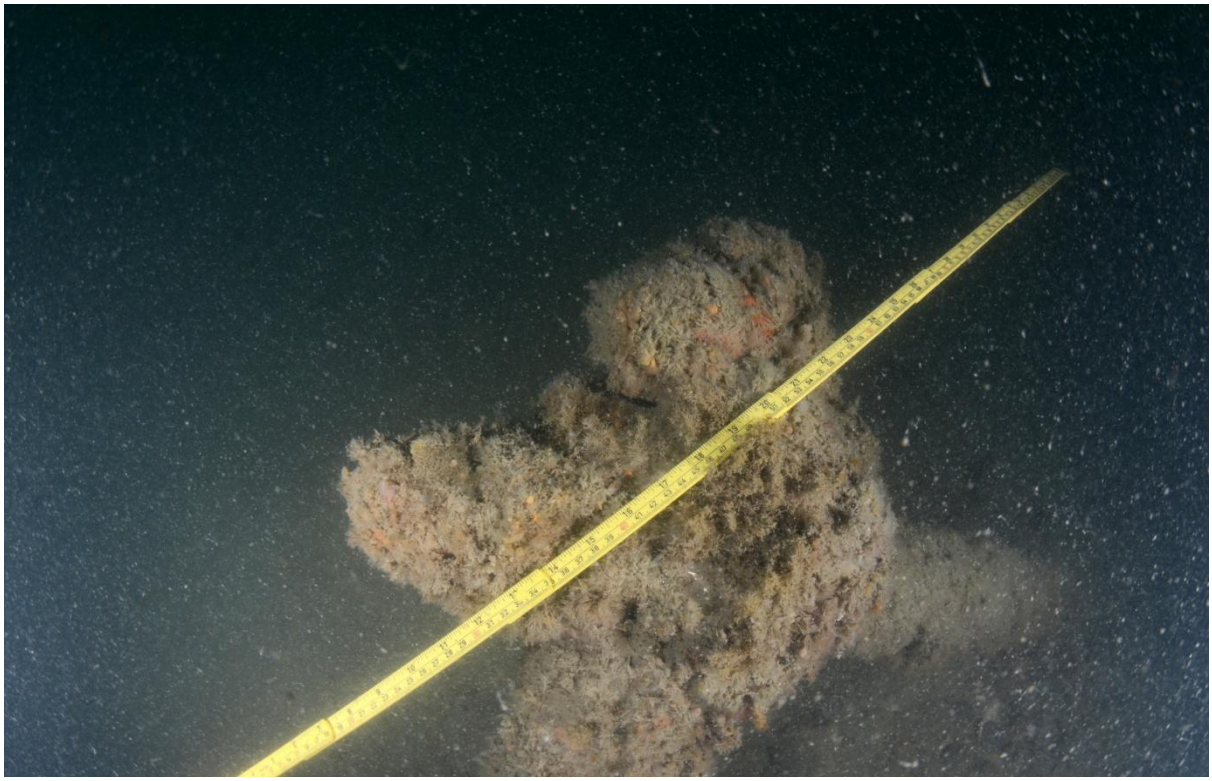

Figure 21 The top of the anchor.

Figure 22 Exposed timbers and concreted objects.

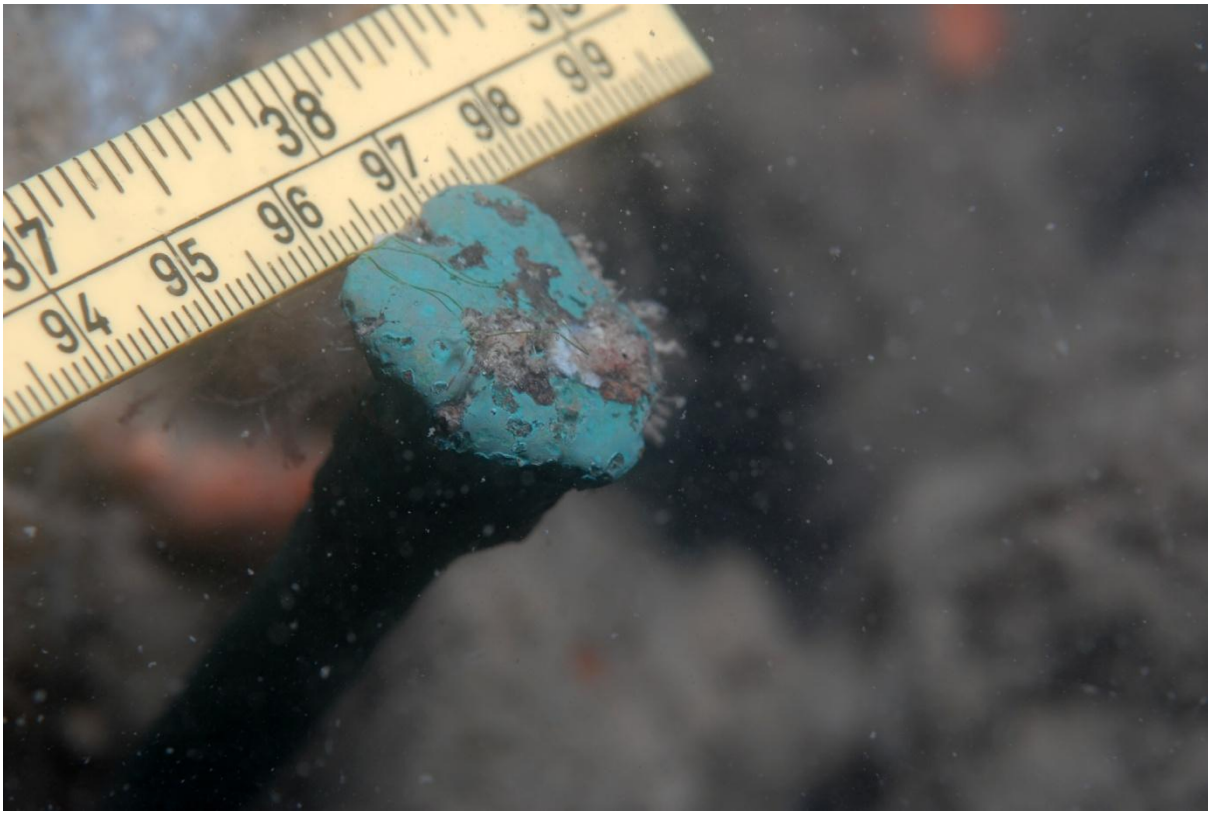


Figure 23 The copper nail protrudes from the rocks.

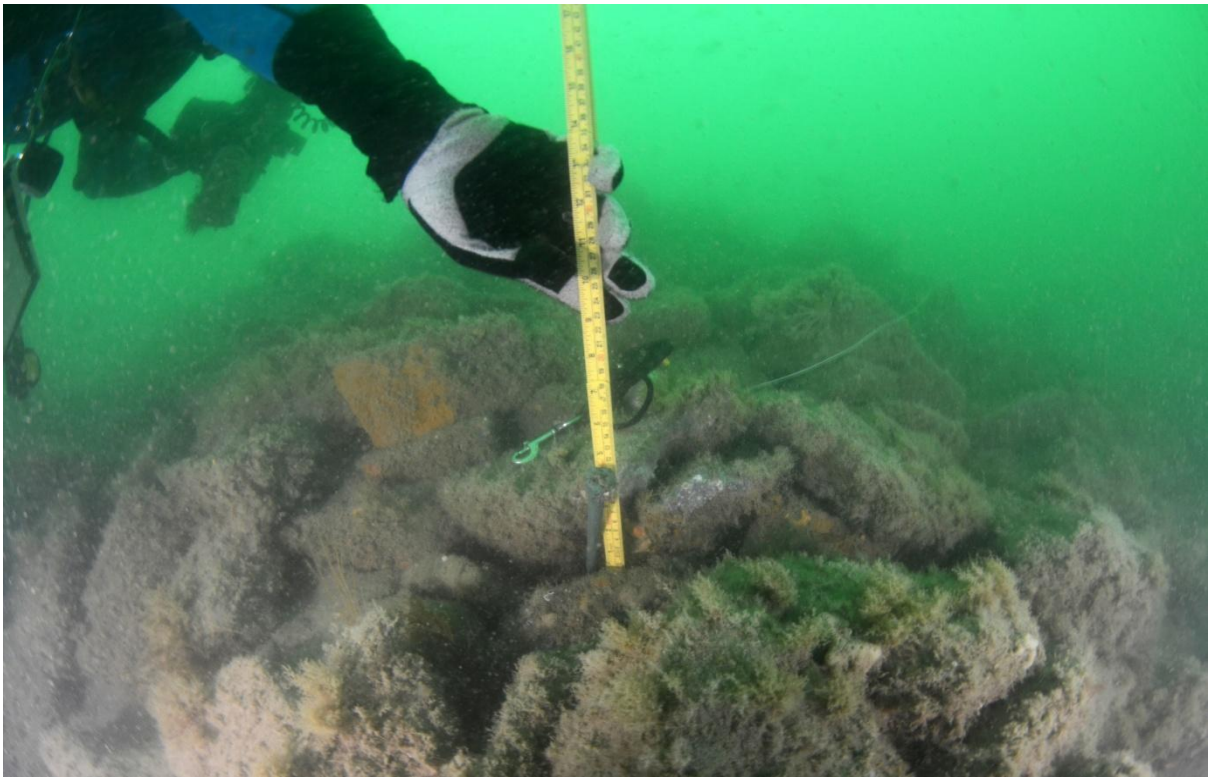

Figure 24 A diver measures the copper nail.

4. **Obstruction - Inner Mulberry**

UKHO site reference 20131 Dive Sussex reference site 63.

50° 45'.619N 000° 43'.647W

The Inner or Near Mulberry is a feature well known to local residents and divers alike. It is clearly marked by a tall red can buoy as the feature exposes at low water and is therefore a hazard to vessels.

The site was visited twice by divers who also took the opportunity to walk (carefully) around the exposed top of the wreck. The site is that of an Intermediate Pier head Pontoon which was used as a rest place for men working at the pier head unloading the vehicles and supplies arriving 24 hours a day.

The Inner Mulberry is still fairly intact though it is possible to swim through from one side to the other in a couple of places. To the north east side the remains of a previous navigation marker lies on the sea bed.

Maximum depth 6.1m. Water temperature 18C.

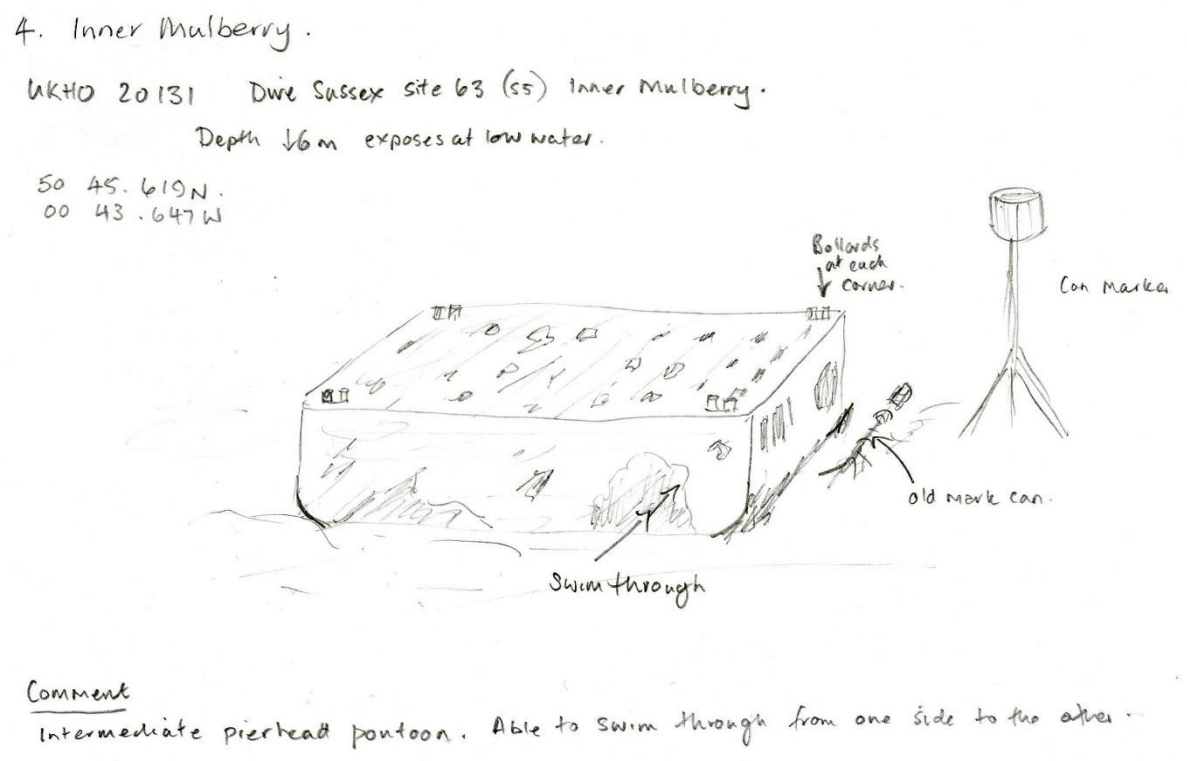


Figure 25 The Inner or Near Mulberry - Intermediate Pier Head Pontoon.

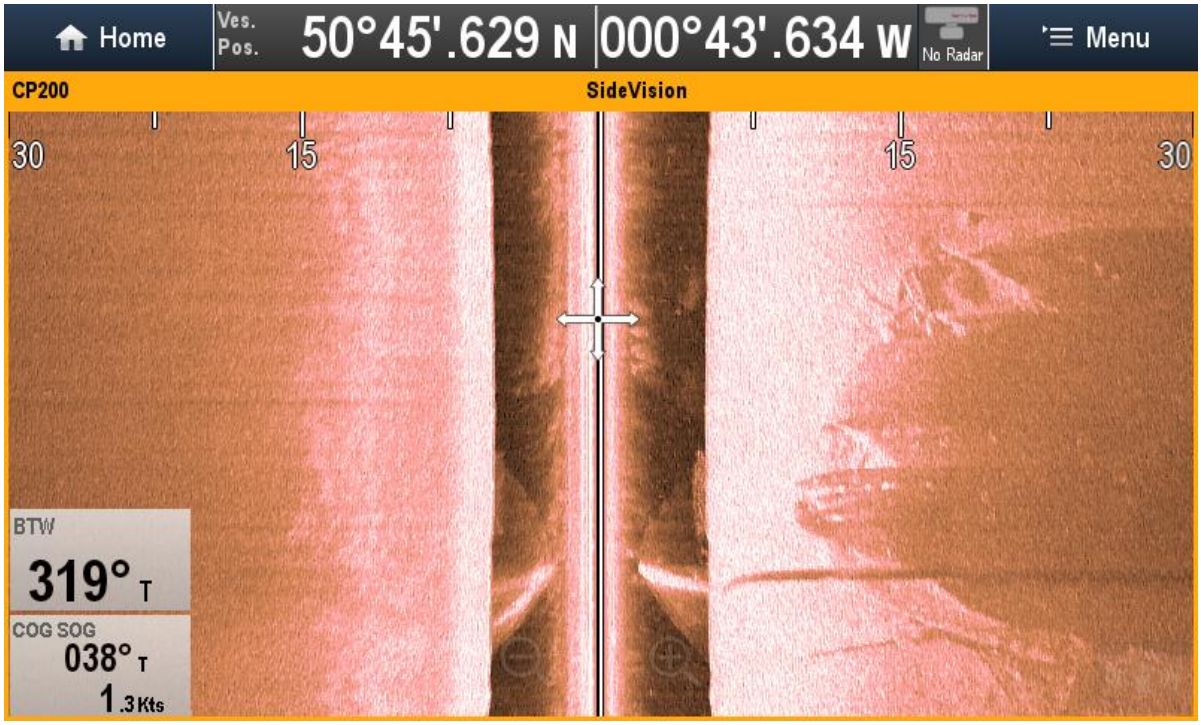


Figure 26 Side scan of the Inner Mulberry. The old navigation post is at the bottom right of the image.

Figure 27 A diver measuring the old navigation post.

Figure 28 Low water provides a chance to step on top of the Inner Mulberry.

Figure 29 The Inner Mulberry is still very intact.  Take care when walking on the top as there are holes appearing.

## 5. Wreck – Whale Bridges x 2

UKHO site reference 19988  Dive Sussex reference site 104.

50° 37’.530N  000 °34’.184W

This was the deepest and furthest out of our dives and we prepared by diving on Nitrox with detailed dive planning involving decompression stops.  There had been a lot of problems with poor visibility in this area which we believed was linked to the dumping of spoil from Southampton water dredging works.  The result was a very dark and poor visibility dive and whilst detailed measurements in the conditions were not practicable it was evident that we were diving on whale bridge sections.  Time on site was also limited due to depth.  The reported beetle pontoons were not observed though that is not to say that they were absent.

Maximum depth 32.3m.  Water temperature 18C.

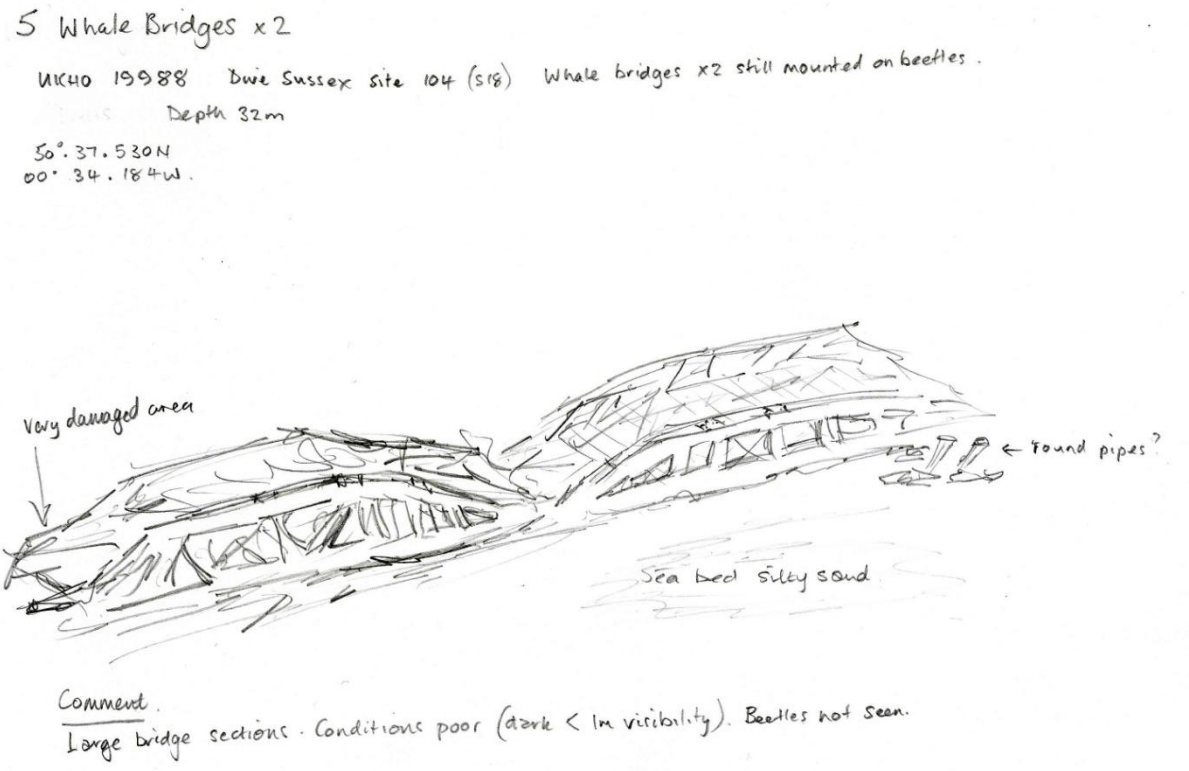


Figure 30 Whale Bridges at 32m.

Figure 31 Large pipes?

Figure 32 The top of one of the whale bridges showing the raised bolts/rivets typical of a whale bridge construction.

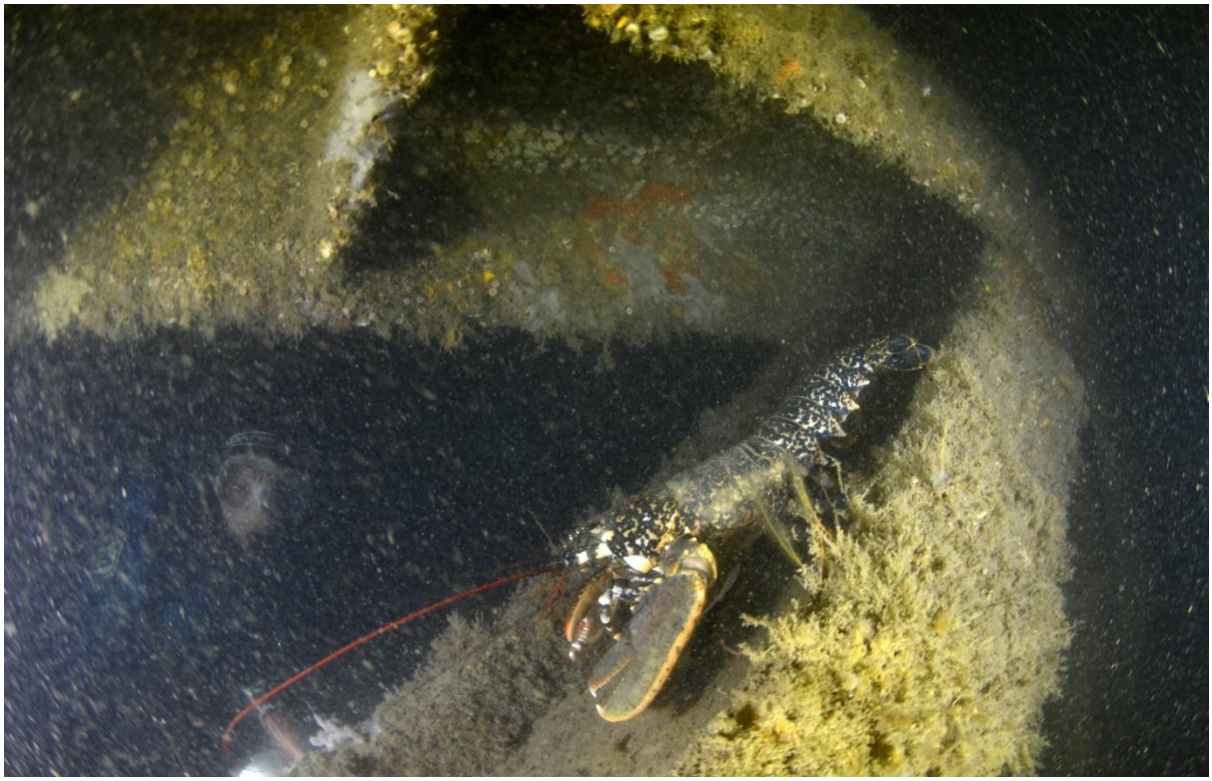

Figure 33 A large lobster hides amongst the steel bridge.

Figure 34 The end of the bridge runs into the silt/sand seabed.

Figure 35 The steel structure is still standing upright.

## 6 Obstruction – Mulberry Unit

UKHO Site reference 20095 - Dive Sussex site 72. Position 50° 43’.669N 000° 43’.306W

We located this wreck close to the position reported. It is a large rectangular object which has begun to collapse at each end. Standing approx 1.2m from the sea bed it is a lattice of diagonal-cross supports with a top that has square panels each with an embossed cross between corners. There was no sign of mooring bollards or other securing features. The site was 22m x 8m and stood 1.2m from the seabed. Whilst it is likely to be part of the Mulberry operations we have yet to determine whether it was intended to be transported to France or whether it was in support of the Selsey/Pagham mooring arrangements.

Maximum Depth 5.8m; Average depth 5.1m. Water temperature 18C.

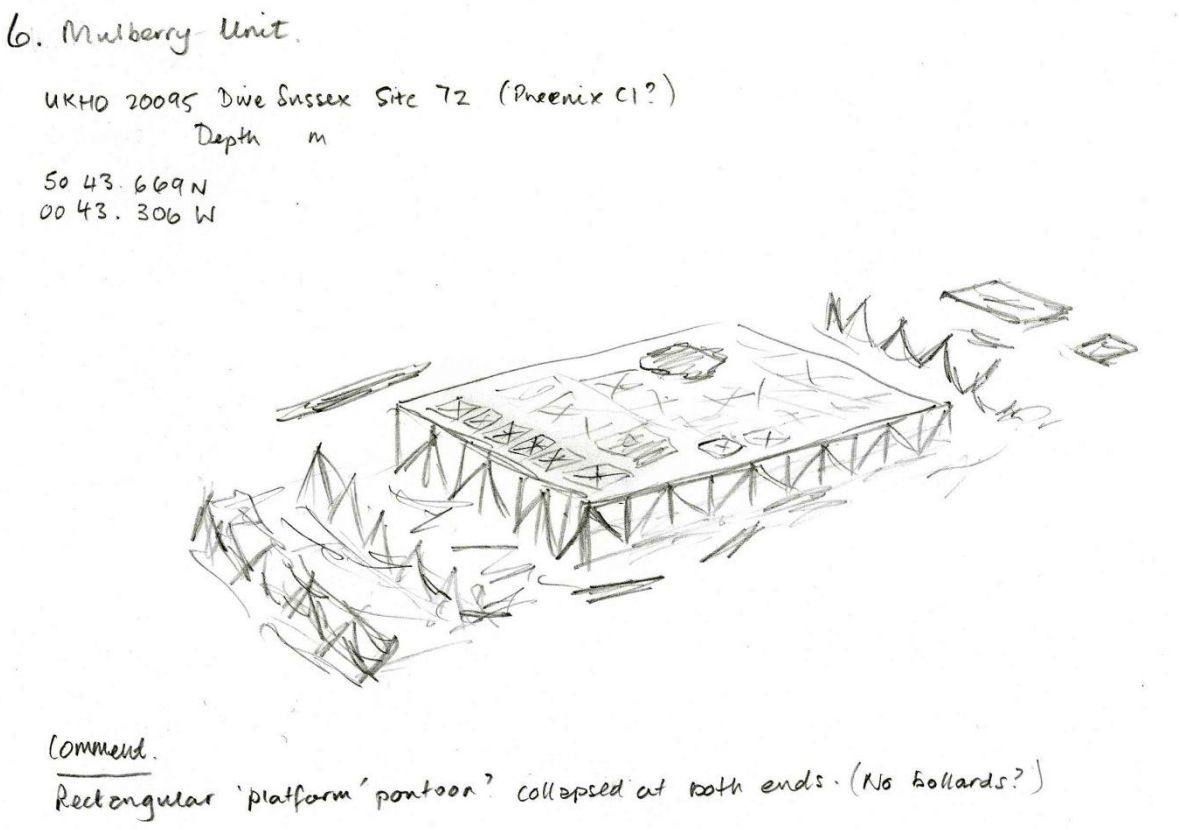


Figure 36 The steel structure (buffer pontoon?)

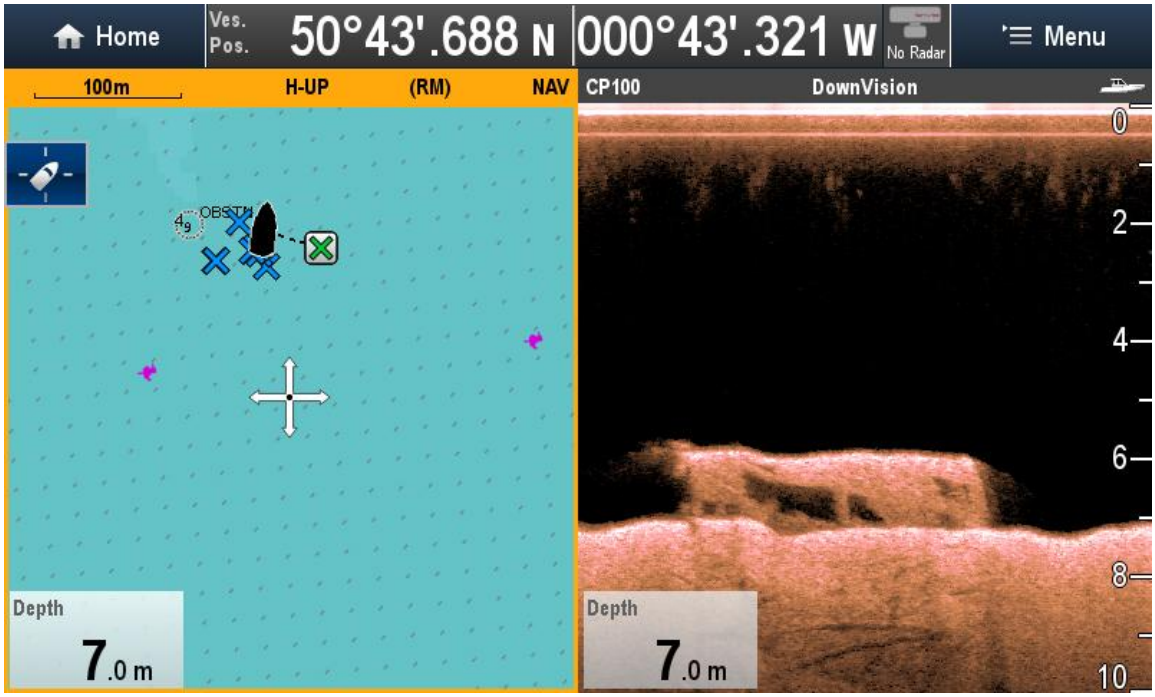


Figure 37 The pontoon from a 'down vision' view.

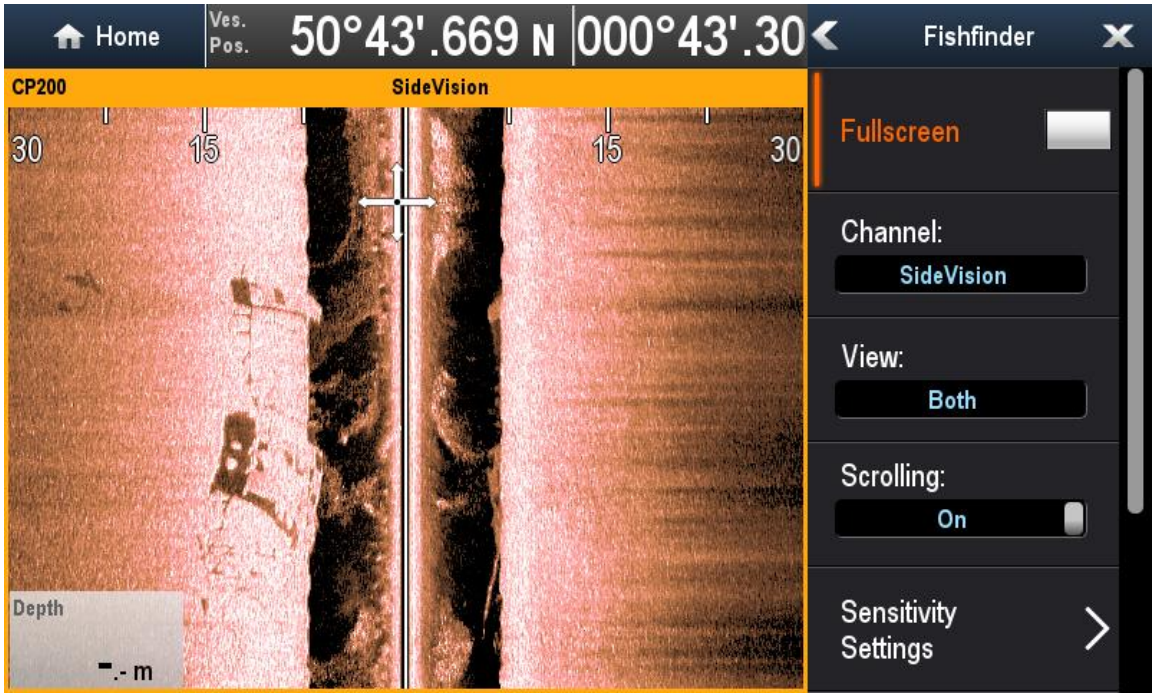


Figure 38 The pontoon appears on the left hand side of the side scan image.

Figure 39 Measuring the pontoon.

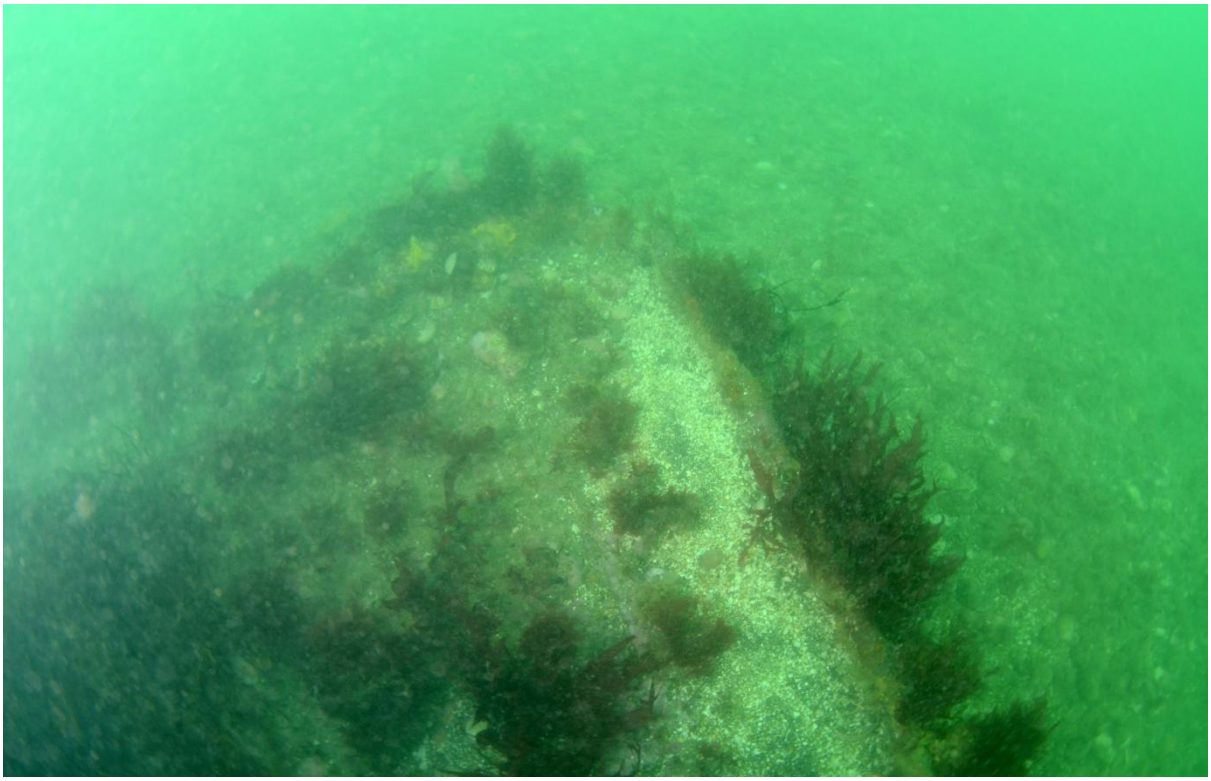

Figure 40 A view of the top of the pontoon structure.

## 7. Stainless Steel Mystery

Dive Sussex site 73. Position 50° 44’.320N 000° 44’.530W

This object was not located with sonar or during circular searches around various positions in the area.

Presume item has either moved, marks are inaccurate or item has been recovered.

No corresponding UKHO reference.

Not found.

## 8. Two Beetle Whale Floats

Dive Sussex site 69. Position 50° 44’.150N 000° 43’.900W.

This object was not located with sonar around various dived positions in the area.

Presume item has either moved, marks are inaccurate or item has been recovered.

No corresponding UKHO reference.

Not found.

## 9 Obstructions – Concrete Puzzles

UKHO Site reference 20113 - Dive Sussex site 71. Position 50° 44'.560N 000° 43'.344W.

We located 3 areas of wreckage close to position given. The site appears to be the remains of at least one concrete beetle well broken up and spread 10-20m apart. Familiar elements were beginning to appear as regular features on this type of site. Bollards (of similar size), re-enforced concrete and cross beams with H profile steel girders were all present on the design of Beetles and the general size/shape of these 'puzzles' were consistent with that of a very broken concrete beetle.

Site c was the largest and stood 2.5m high at some points. Draped around this main structure was a large amount of chain. We presume this was related to trawling activities. There was evidence of potting in the area with lots of abandoned lines/pots.

Maximum depth 6.8m. Water temperature 18C.

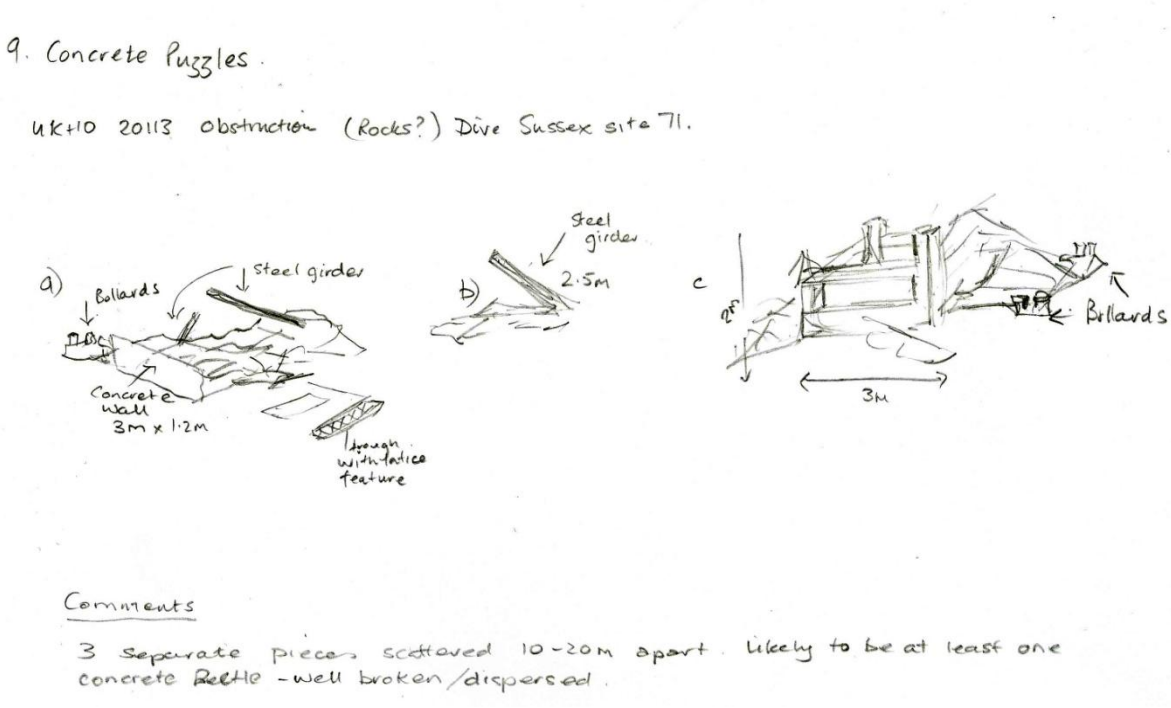


**Figure 41 Sketches of the 3 main elements of the 'concrete puzzles'. Believed to be a concrete Beetle.**

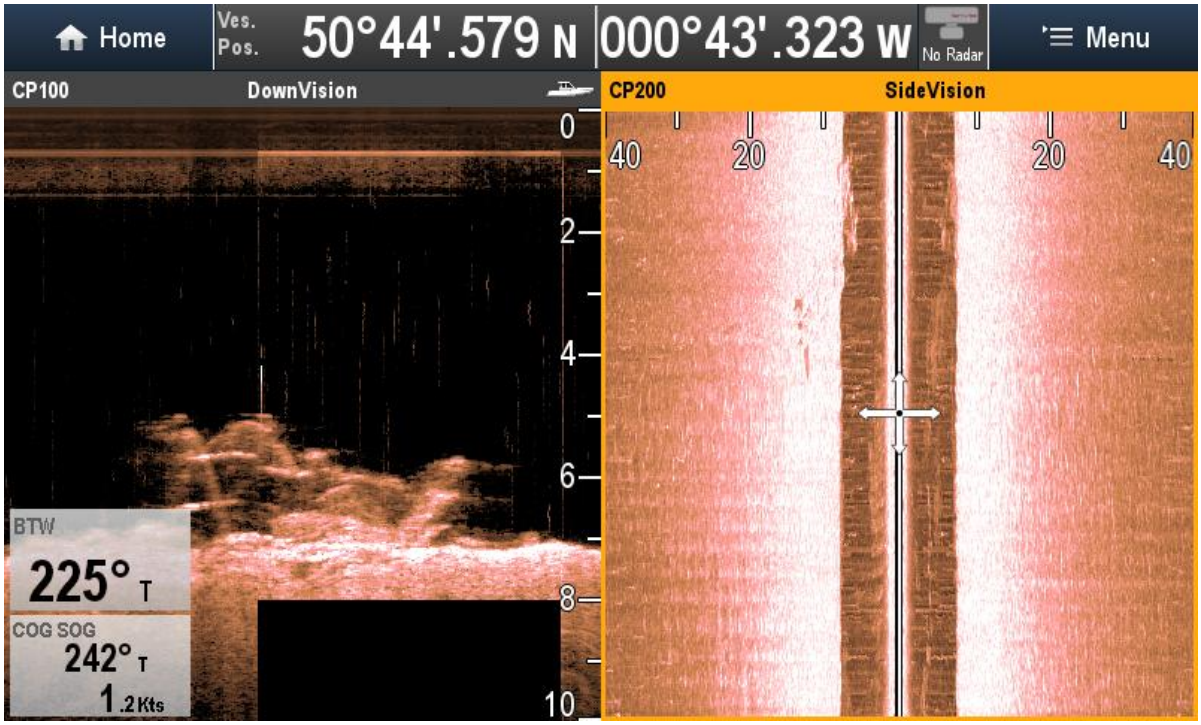


Figure 42 'Down Vision' and side scan images of site c).

Figure 43 a view of part of site c)

Figure 44 A diver explores site a)

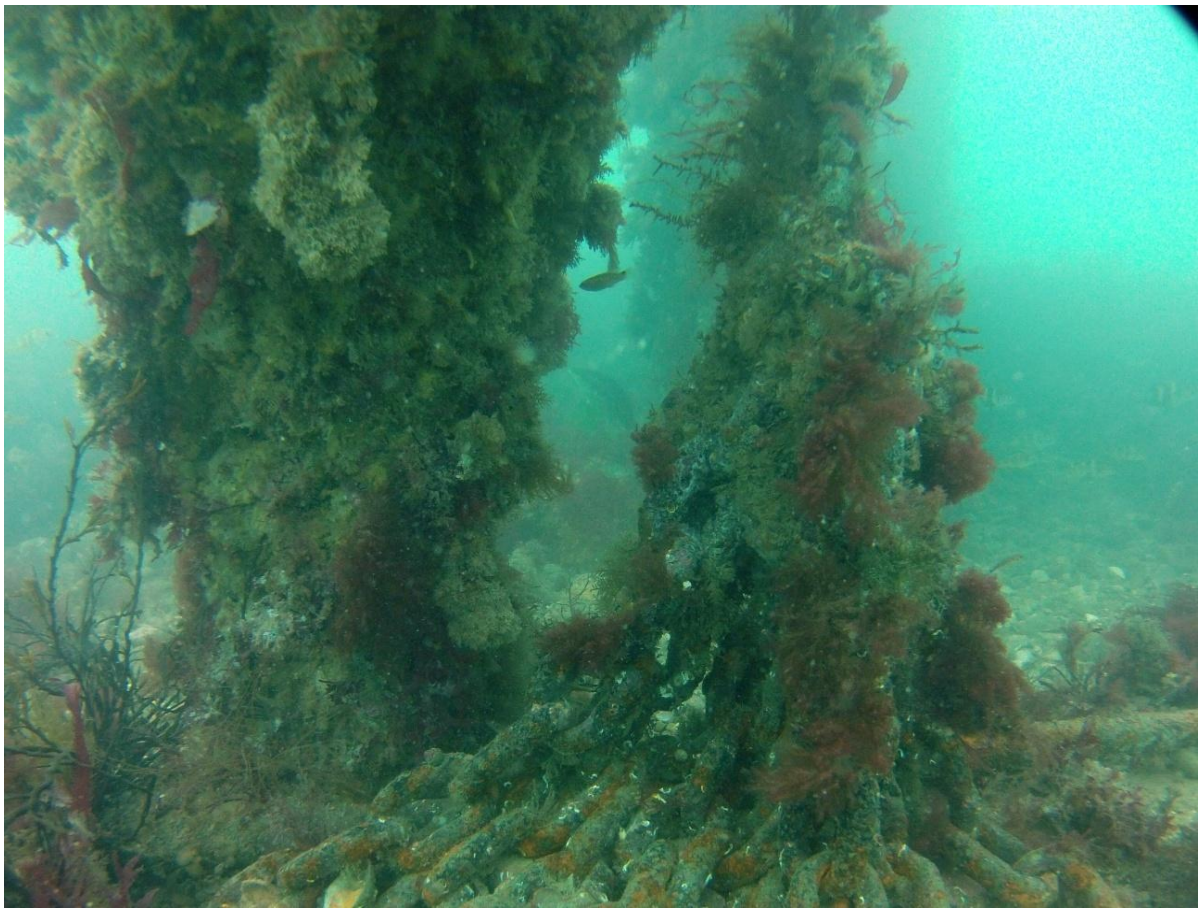

Figure 45 Entangled in part c) was a large amount of chain.

Figure 46 Part of the wreckage at site b).

Figure 47 The wreckage provides an artificial reef for fish and other marine life.

## 10 Obstructions – Concrete Bumps

UKHO Site reference 20125 Position 50° 45’.355N 000° 41’.657W Believed linked to UKHO 61917 (see 13 below)

This was a very odd site and has us really puzzled as to what we were looking at. Two domed concrete objects resembling pill boxes with a slot in the dome. One had a nozzle type feature which seemed to have a rubber hose attachment. From their location and other features on the chart we now believe they are part of a disused waste water outflow.

Maximum depth 9m. Water temperature 18C.

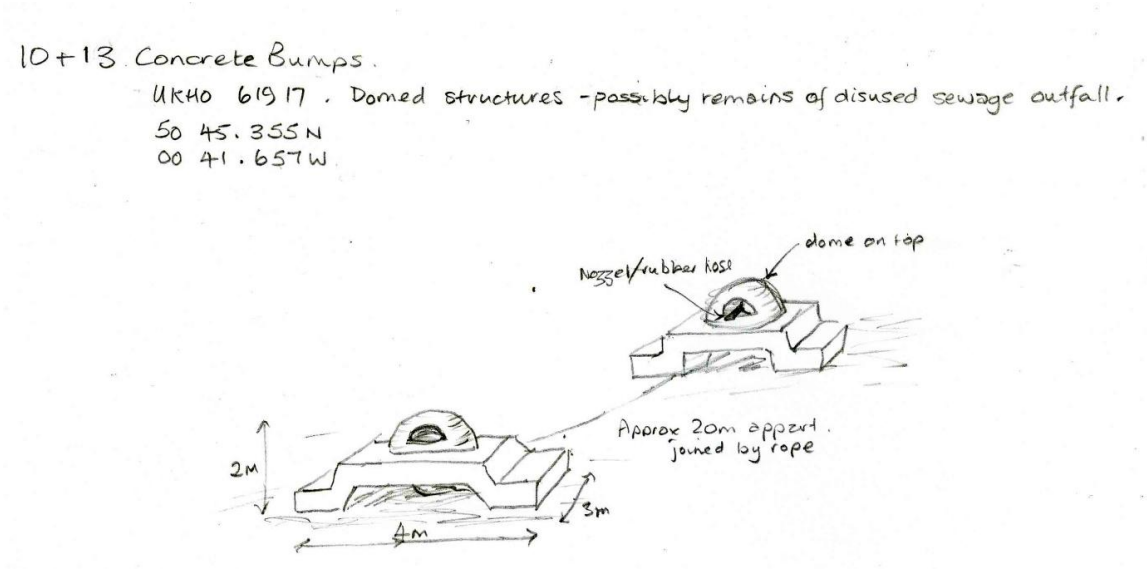


Figure 48 Concrete 'Bumps' believed to be part of a disused outflow pipe system.

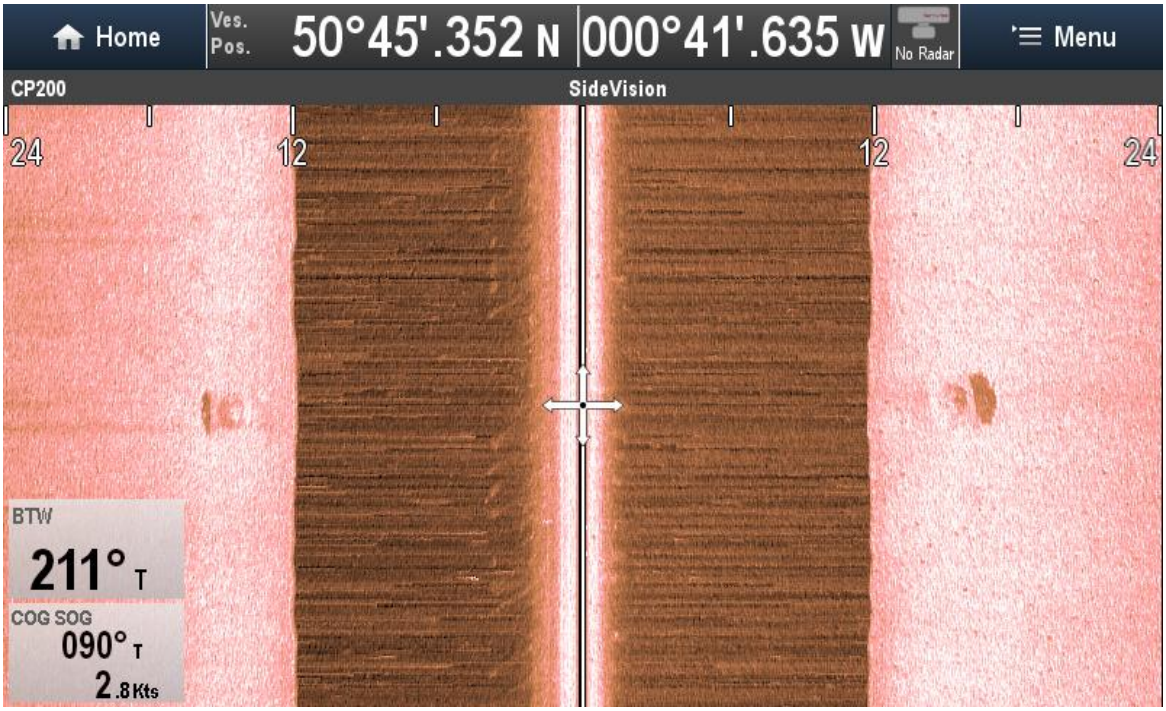


Figure 49 Side scan image of the concrete 'Bumps'. (one each side)

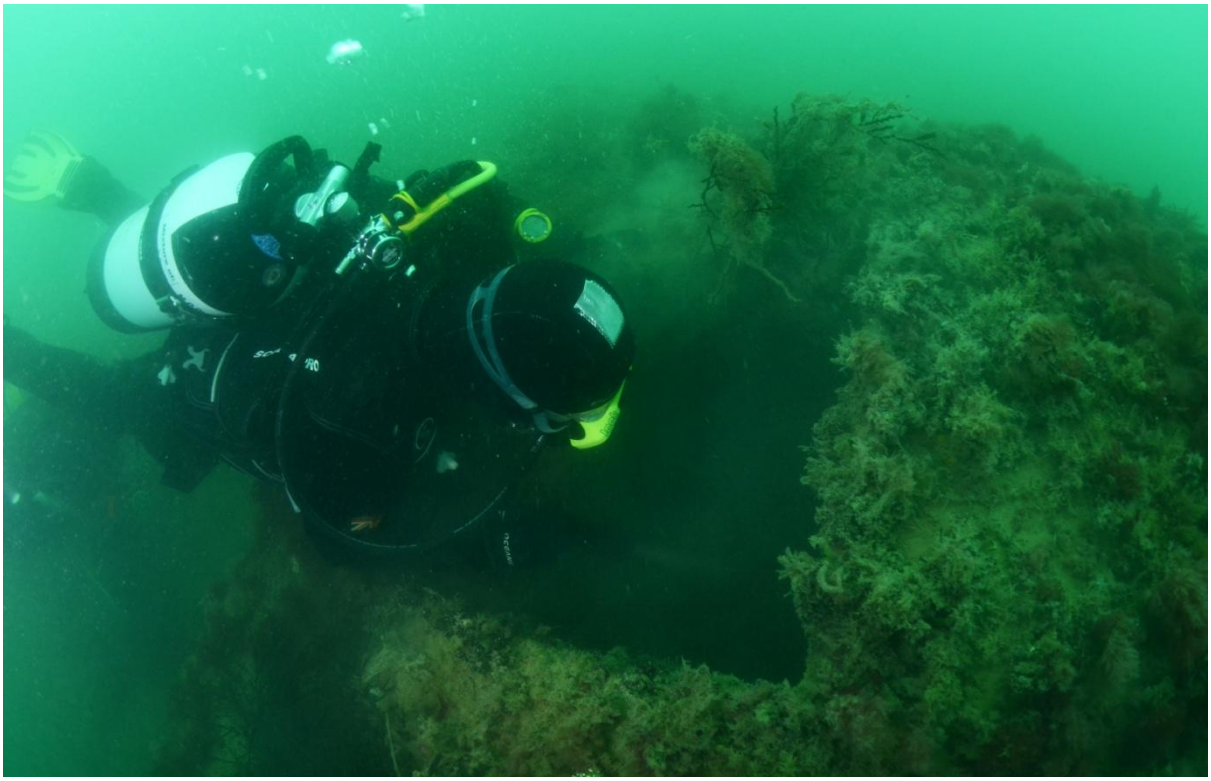

Figure 50 A diver peers into the opening at the top of the dome.

Figure 51 A nozzle in the opening of the dome.

## 11. Obstructions – Loading Pontoon

UKHO Site reference 20113 - Dive Sussex site 75. Position 50° 44’.141N 000° 45’.034W.

This was an unexpectedly lovely dive in perfect conditions. We could see the wreckage from the surface. The wreck is an extremely long (60m) steel structure that appears to be a jetty or bridge. It has a main outer steel structure with diagonal supports. Some parts of the top are open allowing light to penetrate through. The width was approx 14.5m and height off sea bed approx 1.3m. The marine life was prolific for such shallow depths.

The wreckage lies at 90 degrees to the shoreline indicating that it may have been part of the support structures for servicing the attendance of the assembled Mulberry units. Small boats and other vessels would have been needed to take operators / sailors to the mulberries.

Maximum depth 4.2m. Water temperature 18C.

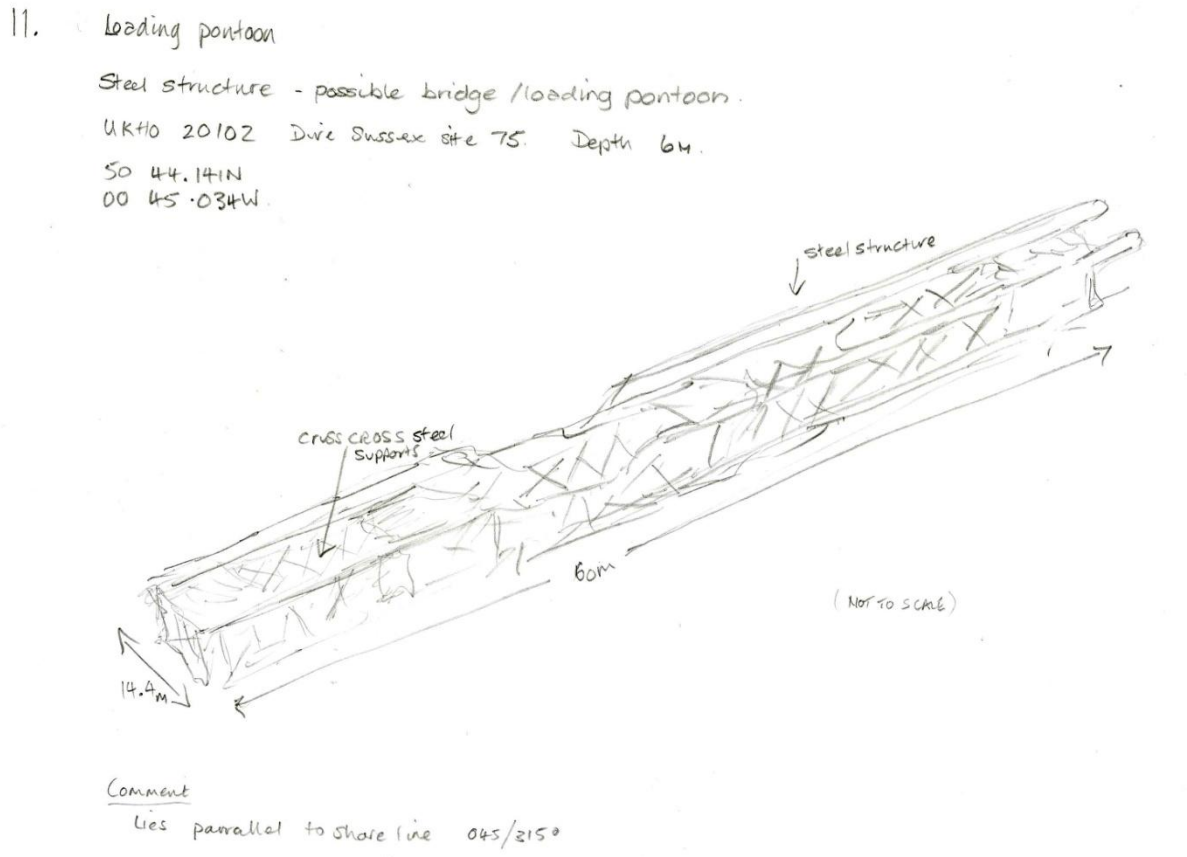


Figure 52 The loading pontoon. 60m long.

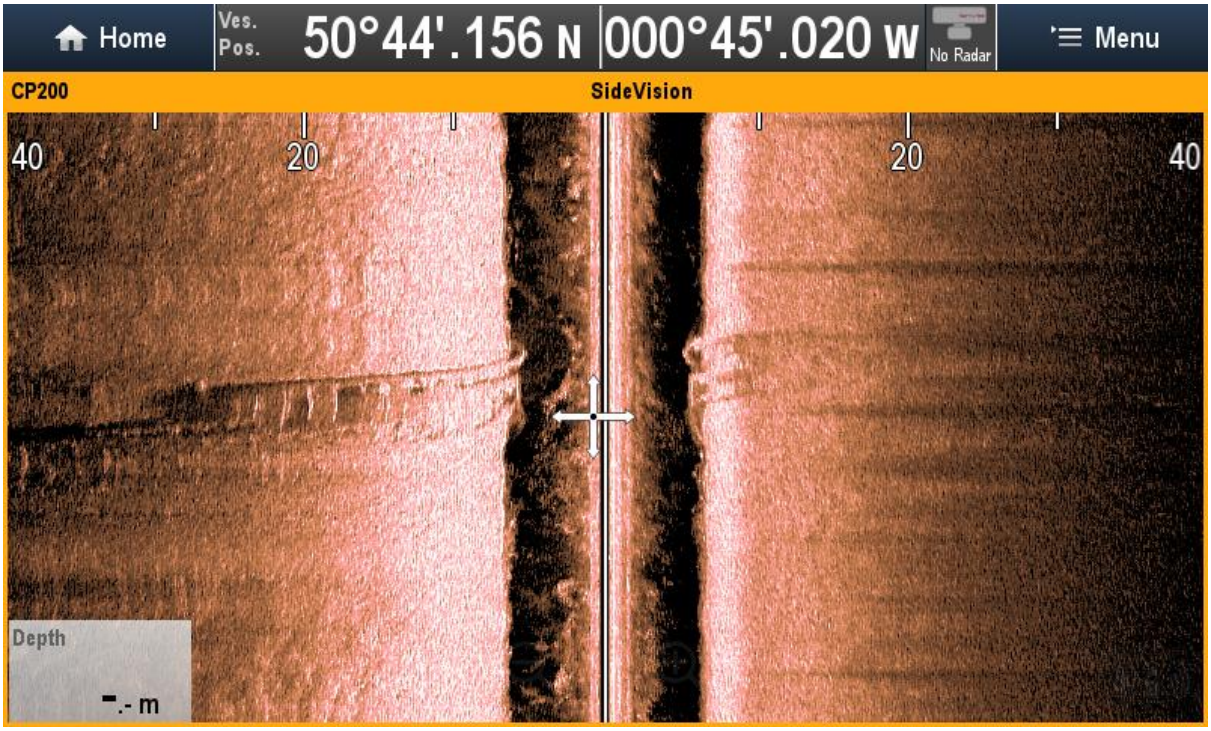


Figure 53 A side scan image of the loading pontoon.

Figure 54 The end of the bridge pontoon has two extended arms.

Figure 55 The pontoon stretches far into the distance - even with good visibility!

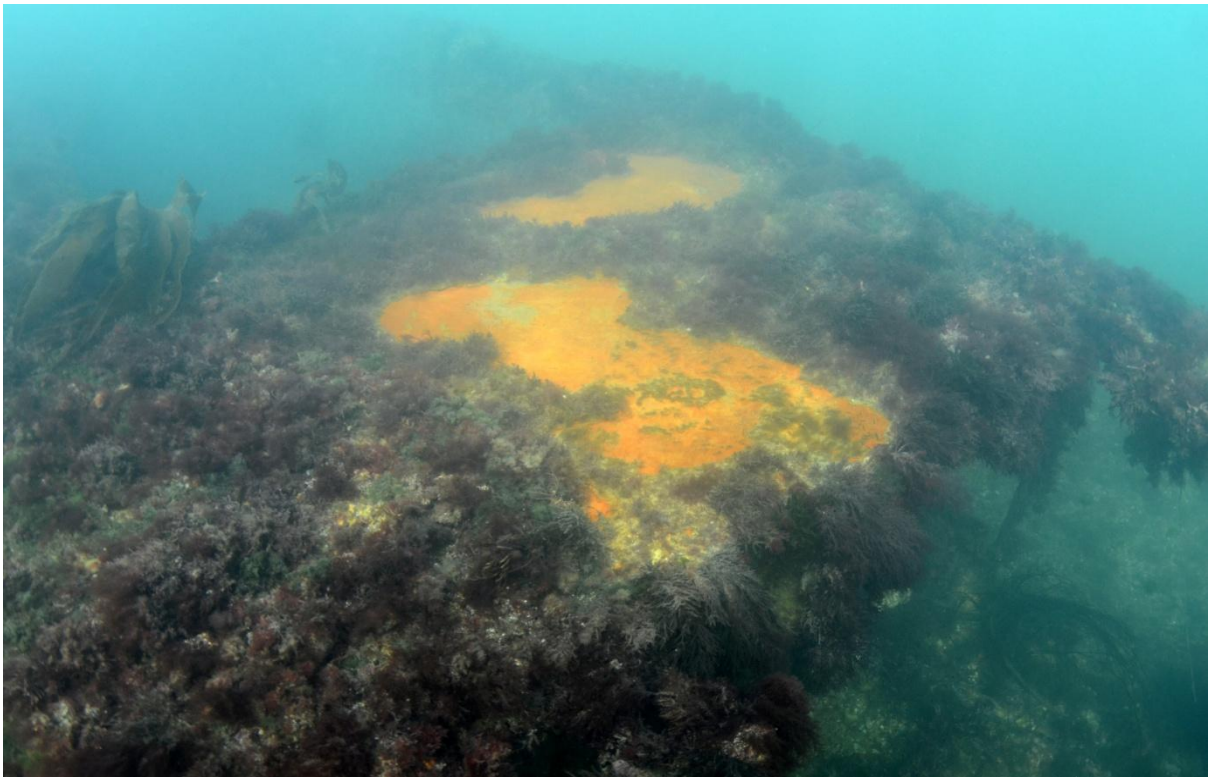

Figure 56 The top of the bridge pontoon has started to collapse. The metal structure is exposed in places.

## 12. Obstructions – Far Mulberry – Phoenix A1 unit

UKHO Site reference 20116 - Dive Sussex site 59. Position 50° 44'.742N 000° 42'.223W.

This is one of the most popular dive sites along south coast of England and visited by thousands of divers over the years. Its relatively shallow depth and abundance of life make it a firm favourite amongst all levels of diver. The site is permanently marked with a yellow buoy and a rope takes you to the site. The site is more than 60m long by approx 20m wide. The concrete clump anchors (1) mark the start and end of the tour round the Mulberry. In its complete state the A1 unit would have stood 19m high, another 10m above the current highest point. The north wall is just the bottom section of the A1 unit, the rest has been dispersed. On the underside of the north wall there are growing communities of jewel anemone (4). Further details can be found in the recently published SCUBA magazine 'Wrecked' feature.

Maximum depth 9.3m. Water temperature 18C.

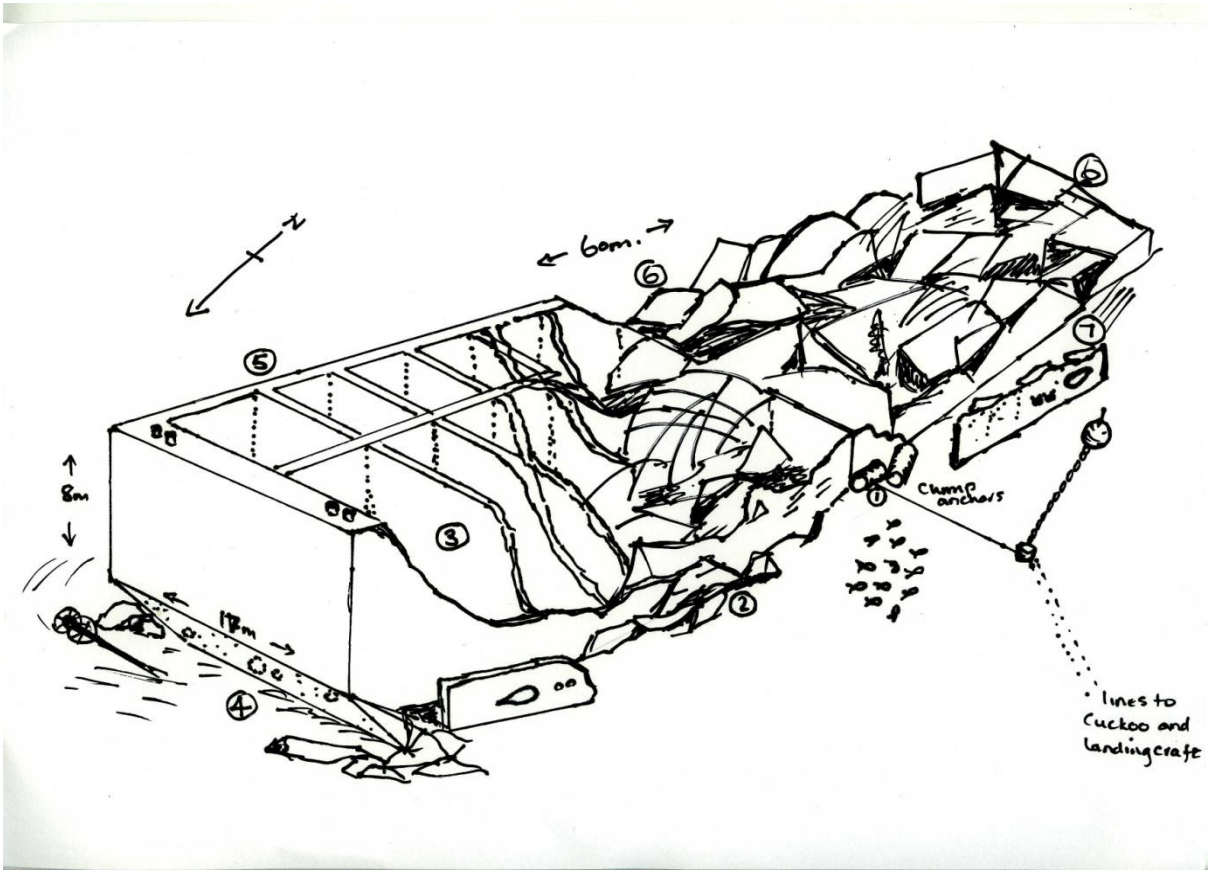


Figure 57 The Far or Outer Mulberry is the remains of a Phoenix A1 Mulberry unit.

**Figure 58 The Far Mulberry is a favourite amongst divers as it is teeming with marine life. Lengths of steel supports can prove a hazard in poor conditions.**

**Figure 59 Large bollards can be found at several places on the wreck site.**

Figure 60 Near the wall at the north east side can be found a wheeled structure. Possibly part of the flooding mechanism.

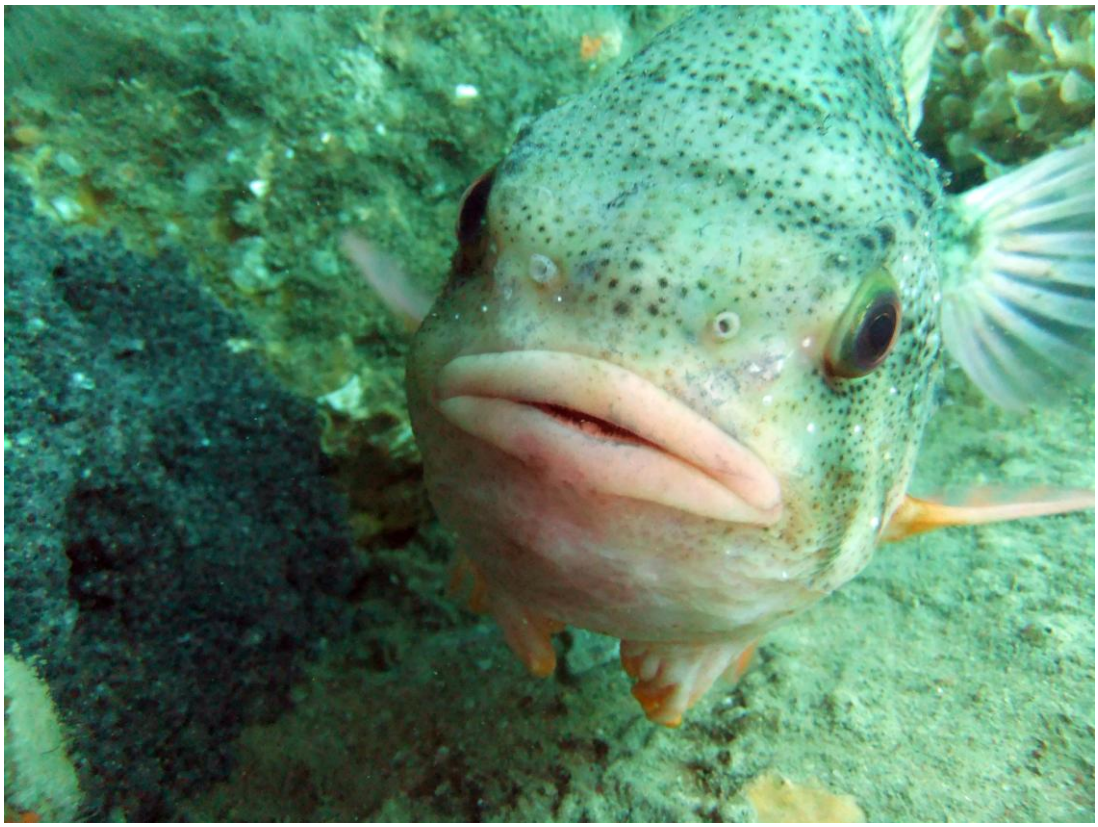

Figure 61 The Outer Mulberry is locally renowned for its marine life. In the spring Lumpsuckers lay their eggs.

**13. Obstruction – Fragment of Debris(?)**

UKHO Site reference 61917 - Position 50° 45’.355N 000° 41’.657W.

We believe this may be the same site as No 10 (Concrete Domes) and associated with the outfall pipe.

No other obstructions found in the area by sonar.

14. **Obstruction – Recorded as ‘Inner’ Mulberry**

UKHO Site reference 20123 - Position 50° 45’.017N 000° 43’.033W.

Not found with sonar. The entry on the UKHO data sheet is based on a telephone report from a member of the water board reporting the ‘Inner Mulberry’. Later report by UKHO states no visual sighting at low water. We believe this is an error and refers to site 4 above (UKHO 20131).

## 15. Wreck – Langstone Harbour Mulberry

UKHO Site reference 19506 - Position 50° 47’.550N 001° 01’.240W. Wreck.

This wreck is another well known landmark for local residents and also makes a unusual dive site. The site is visible at all states of tide and subject to permission from the harbour master can be dived. It is easy to bring your boat and tie up alongside. The UKHO data record also mentions the wreck of a sunken fishing vessel which is positioned the north east side of the Mulberry. It is possible to dive both wrecks at the same time. There does not appear to be a separate report for each wreck.

The Mulberry is a partially built Phoenix unit which was built locally but broke its back on launching. It was abandoned and has since become a place for fishermen to store their lobster pots.

Measuring the wreck was problematic because of the two large cracks that have broken the Mulberry into 3 main pieces but the measurements taken are consistent with an A1 unit 60m long and 18m wide. The flooding compartments, towing points and bollards are clearly visible. From examining various photographs it appears that the two end pieces are gradually falling away from the centre piece.

Marine life is abundant with large shoals of fish and colourful sponges. Langstone Harbour is a protected RAMSAR site but also has a colony of common seals. The Langstone Harbour Master was interested to see images of what marine life we saw... Finding it hard to believe we would see anything... He was delighted to be given some images to include in his next newsletter.

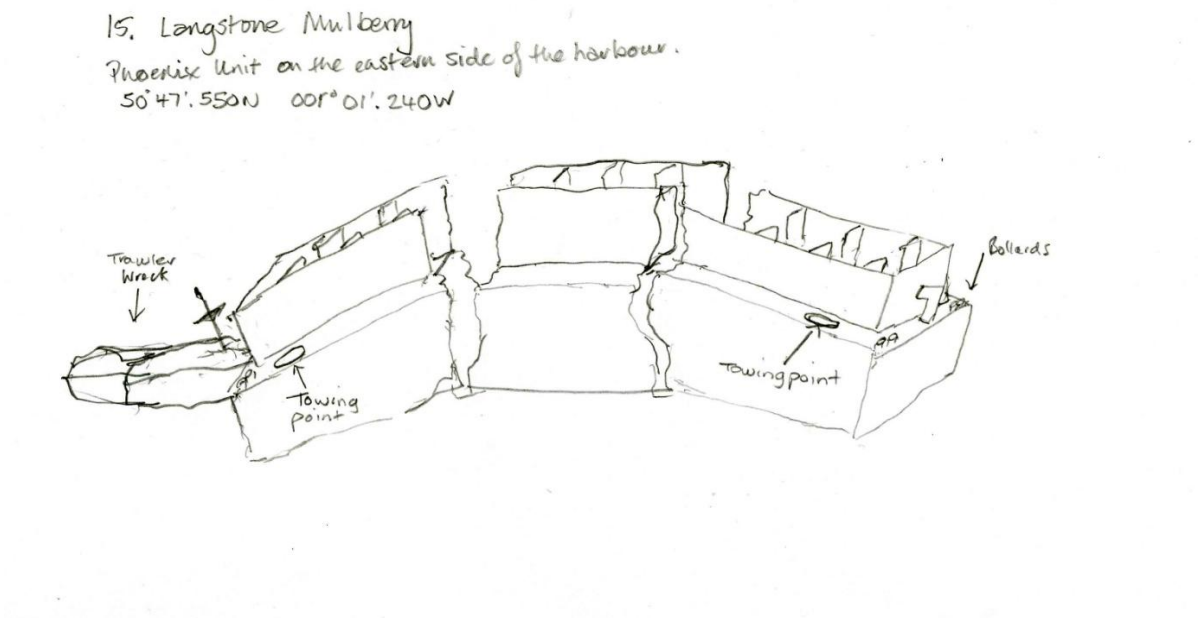


Figure 62 Sketch of the Langstone Harbour Mulberry. The mast of a wrecked trawler can be seen at most states of tide.

Figure 63 The Langstone Mulberry is a well known local landmark in Langstone Harbour.

Figure 64 The Langstone Mulberry is a tapestry of sponges.

## 16. Wreck – Steel Beetle.

UKHO Site reference 20244 – Wreck – Barge or Dumb Lighter. Position 50° 38’.367N 000° 52’.935W.

This wreck was first dived by our members during the 2009 project ‘Neptune Wrecks’. It is believed to be an intact steel Beetle float. We understand from Chris Howlett that this may be only one left in existence.

The wreck is relatively shallow at 15m and the underwater investigation by divers found the wreck to lying on its side and very intact. It is considered to be of metal construction, probably steel, and had no visible means of propulsion. The wreck was small, approximately 42 feet (12.8m) long and was square at both ends. There was no way of establishing whether there was a bow or stern. The ends and cross section were very squared/angular.

The wreck had a pairs of bollards at each end and some raised pieces of metal structure along the top. There were two openings, one on each site but at opposite ends. Both appeared to be the result of plates being missing but one was larger than the other. On looking inside there appeared to be no connecting sections, each seemed to be a sealed section. The larger hole had a large crack which indicated an area of damage. The bottom of the wreck was flat with tapered sides. There was a scour around the wreck. Diving conditions were not good with poor visibility and a strong current so only limited measurement could be taken.

Length 12.88m, Beam 4.84m, Height 2.72m. Maximum depth 17m.

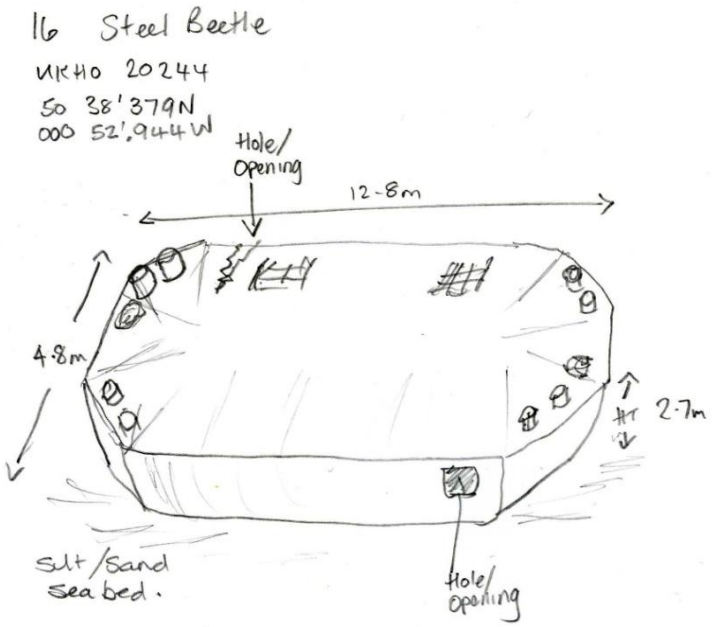


Figure 65 The steel Beetle - may be the last example of this whale float.

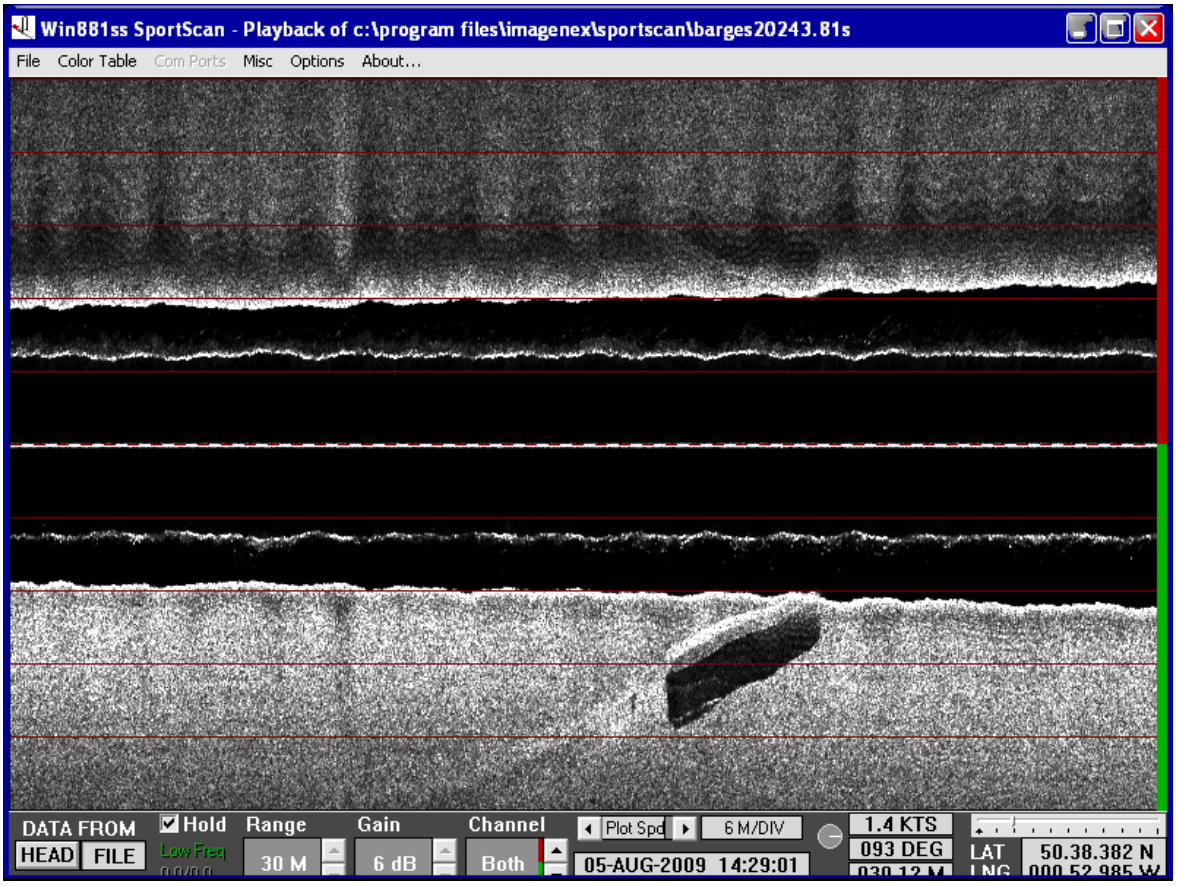


Figure 66 Side Scan image of the Beetle

Figure 67 The top of the wreck with bollards.

Figure 68 – Bollards on the top end of the wreck

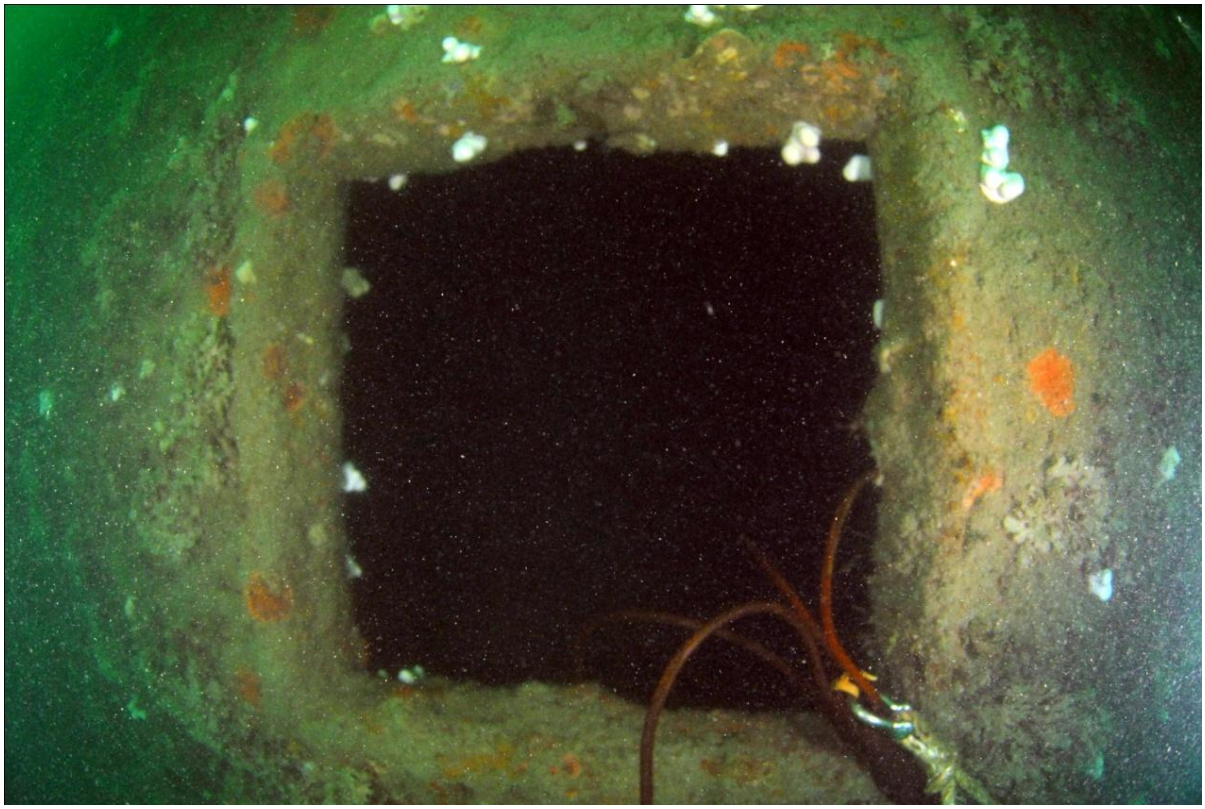

Figure 69 - Small opening / hole

Figure 70 - the crack near the larger opening and velvet swimming crab.

**Figure 71 A small inachus crab and top shell.**

## 17. Wreck – Beetles and Whale Bridges

UKHO site reference 20245 Barge or dumb lighter. Position 50°38'.364N 000°52'.454W. (This likely to be the site referred to at no 19 on the list.)

This site was very interesting, two relatively intact concrete Beetles upside down but with whale bridges still attached.. The Beetles seem to have fared better than the steel bridges which have collapsed. The length of the outer whale bridge (approx 38m) leads us to think it may be two sections of bridge, particularly when there appears to be a joint assembly midway along.

The joint assemblies could be clearly seen. An arch of steel approx 1m across with a rounded joint socket were seen on each Beetle and also midway along the outer whale bridge which indicates that there are two whale bridge sections.

This site could be a project in its own right with much to see. Marine life was also very abundant with a large ross coral, shoals of bib, scallops, sponges and hydroids. The seabed was mainly shingle but with rocky outcrops. The site is relatively close to a gravel extraction area and we could hear these ships whilst on our dive.

Maximum Depth 22.4m. Water temperature 14C.

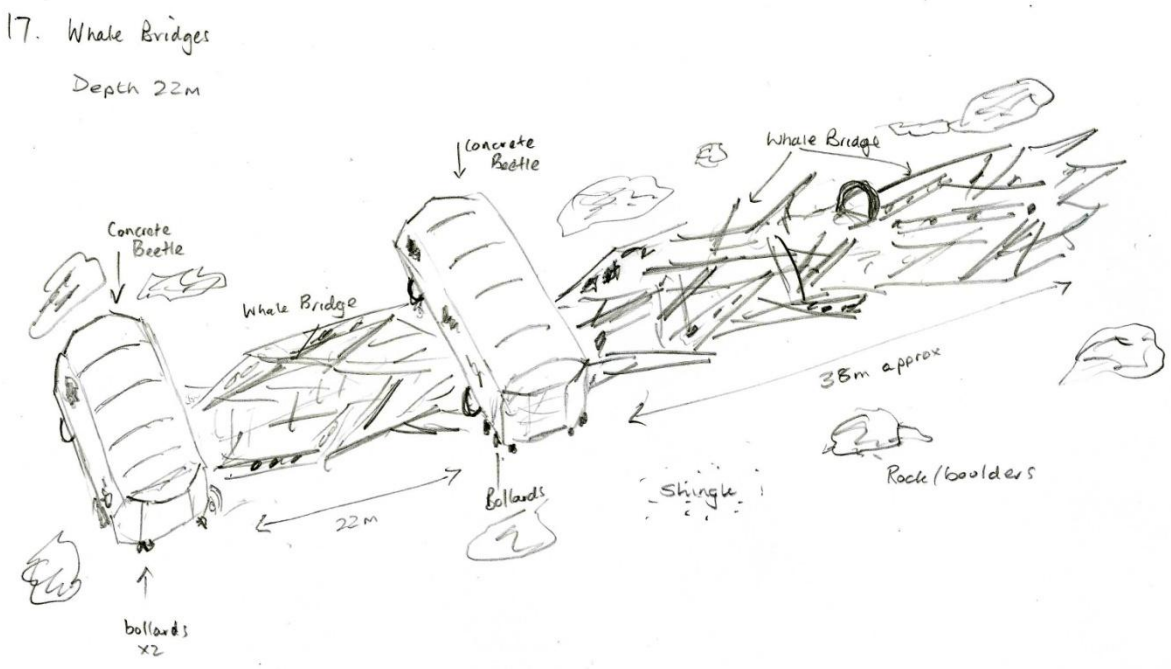


Figure 72 Sketch of the Whale Bridge/Beetle site.

Figure 73 A diver examines part of the Beetle joint assembly.

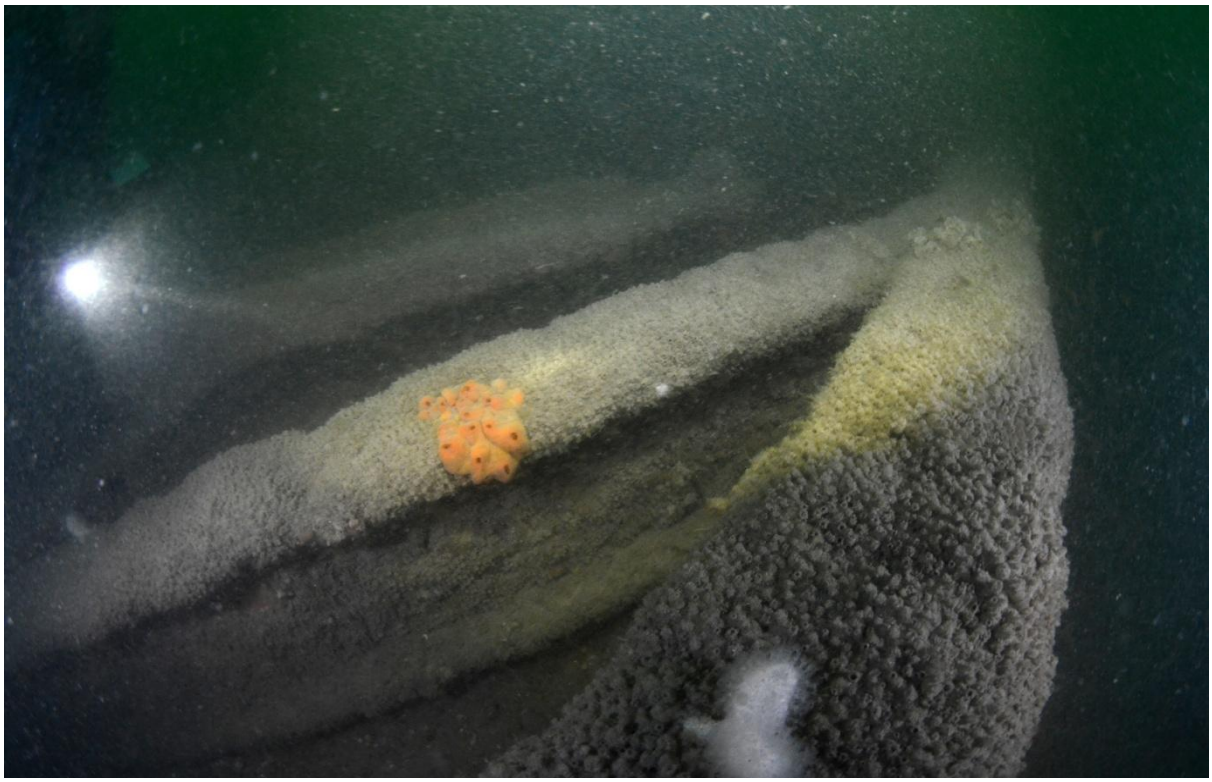

Figure 74 Part of the Whale bridge which has collapsed.

18. **Wreck – Concrete Beetle**

UKHO site 20141 noted as a concrete barge (Dead). Position 50° 46'.633N 000° 41'.833W.

This wreck is a concrete beetle which has come to rest on the beach at Aldwick, West Sussex, just a few miles along the coast from Selsey and Pagham. The wreck fully exposes at low water springs and provides a good opportunity to observe one of these Mulberry components. Although collapsing due to the wave action it is clearly recognisable as a concrete Beetle. The UKHO record appears incorrect and should be recorded as a 'Live' wreck.

An underwater survey was not required.

Figure 75 The concrete Beetle at Aldwick beach is fully exposed at low water (springs).

**19. Whale Bridges**

50° 38’.365N 000° 51’.477W

Position marks from former local dive charter skipper. Not found using sonar equipment. Presume should be site 17 above.

**20 and 21. Obstruction**

UKHO sites 20112 and 20114. Positions 50°44'.550N 000°42'.083W and 50°44'.567N 000°41'.884W.

Both sites are close to the Far Mulberry (site 12 above) but were not located by sonar despite several attempts.

**22. Obstruction**

UKHO Site 62711 Dive Sussex site 64. Position 50°45'.710N 000°43'.020W. Described as possible mooring anchors for Mulberry Units – dries at low water. Nothing found by sonar search.

**23. Obstructions**

UKHO site 58275 Position 50°44'.500N 000°43'.500W.

Located in 2 parts. This site appears to be pieces of a broken concrete Beetle, only one part dived. This site is very broken but there were some familiar features seen at other concrete beetle sites. The dive on the second part, <10m away was abandoned due to technical problems but it is likely to be part of the same wreck. A large section of 'H' profile steel girder was present together with bollards and concrete supports.

Maximum depth 7.2m. Water temperature 18C.

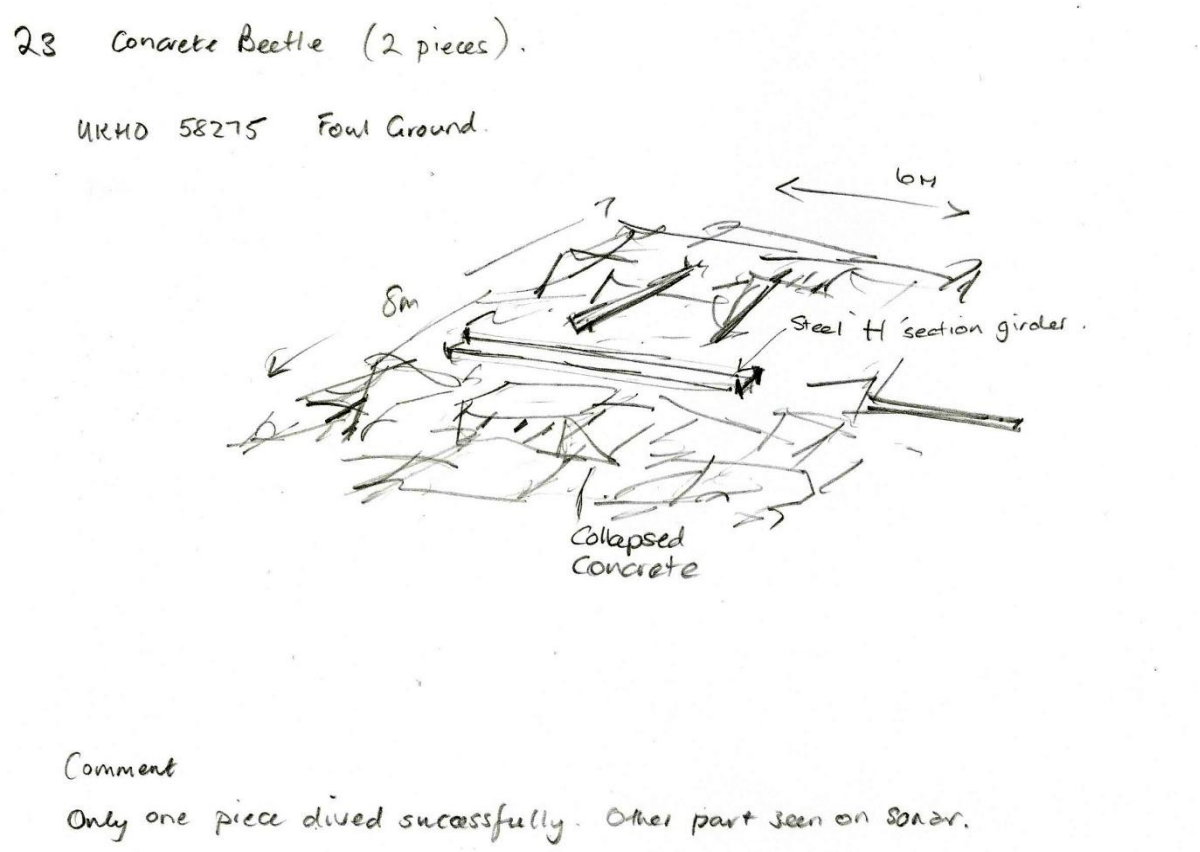

Figure 76 A length of 'H' profile steel girder.

Figure 77 Layers of collapsed concrete.

**Summary of survey findings**

25. The first thing that strikes you is how much there is associated with the Mulberry Operation in the local area 70 years on from the Normandy campaign. There is still more to investigate both east and west of the Selsey area but it is clear that the waters of West Sussex and Hampshire are a rich source of WW2 heritage and the surveys conducted here are just a small piece of a much larger scale
26. The majority of the sites surveyed were found to have some wreckage present, though much was not identified or did not align with the description. The real surprise was the old wooden shipwreck which we intend to examine further.
27. However we can establish from our work that there appears to be the following Mulberry related wreck sites;

    a. 2 Phoenix A1 units (Sites 12 and 15)
    b. 1 Mulberry Phoenix Unit – type unknown (Site 2)
    c. 1 Intermediate Pier head Pontoon (Site 4)
    d. 4 (possibly 5) steel whale bridges (Sites 5 and 17).
    e. 5 or more concrete Beetles (Sites 9, 17, 18 and 23)
    f. 1 steel Beetle (Site 16)
    g. Support bridge and pontoon (possibly) (Site 11 and 6).

    In addition the wreck of an old wooden vessel was an unexpected and a pleasant reminder of how diving new sites can be so surprising. In just 17m of water this wreck will be relatively easy to survey but a real challenge to research given what little remains. However we intend to investigate further when the opportunity arises.

28. Any one of the sites where wreckage was found could benefit from a full detailed survey to more accurately record the site and we are keen to locate a kite anchor by exploring the whale bridge wrecks in more detail.
29. We will forward our findings to the UKHO so that any corrections required to the charted wrecks and obstructions can be made as appropriate
30. A total of 24 different divers took part in a total of 110 dives and gathered information for the Mulberry 70 project. Divers who participated in the underwater surveys were;

    Alison Mayor, Martin Davies, Jenny Watkins, Rob Watkins, James Vaughan, Jim Fuller, Edward Rollins, Matt Finnie, Malcolm Green, Doug Carter, Tom Templeton, Derek Bower, Dean Thomas, Clive Puddifoot, Trevor Perkins, Neil Jeffrey, John Bohea, Brendan Keating, Mark Raiyru, Patrick Day, Joe Bater, Toni Bates and Jeremy Dunning.

# Part 3 Historical Research

31. Our yearlong investigation of the Mulberry sites around the Selsey/Portsmouth area has been supported by much research and interaction with other organisations. There is much already written about the Mulberry history but not so much about what exists today.
32. Some key documents such as the plans for the storage and security of the Mulberry units ahead of D Day can be found in National Archives but how they relate to what we physically see today is sometimes a mystery. Research is ongoing and we intend to make more dives in the area, particularly the whale bridges.

**The Mulberry Story**

33. Following the failures of the Dieppe Raid in 1942 the Allies realised that they could not break the German 'Atlantic Wall' in gaining a foothold in the shortest route across the Channel to northern France. However in planning Operation Overlord in landing in Normandy the Allied forces realised how important it would be for support the invading forces with men and supplies of equipment.
34. At the end of 1942 Prime Minister Winston Churchill ordered that two temporary harbours, each the size of Dover, be designed and constructed so that they could be towed across the Channel and installed on the Normandy coast in order to allow larger ships to unload supplies as efficiently as possible. The pierheads must be capable of managing the large tidal range found along the Normandy coast.

10, Downing Street,
Whitehall.

PIERS FOR USE ON BEACHES

C.C.O. or deputy.

They must float up and down with the tide. The anchor problem must be mastered. Let me have the best solution worked out. Don't argue the matter. The difficulties will argue for themselves.

30. 5. 42.

IWM

**Figure 78** Letter from Winston Churchill **© IWM (H 41067)**

35. The best of British construction and engineering specialist set about designing each of the various components that would be required. Pierheads, bridges/roadways, anchors, methods of reducing the impact of wave action on the operation of the harbours, and sea walls etc. Early designs were tested in Wales and also Scotland and within a year the largest British construction project was to commence.
36. The Mulberry components were constructed all around the country including Southampton, Portsmouth, Hayling Island and east to Dungeness and the Thames. The units were gathered together in the west and east of the Solent and also at Selsey/Pagham in the 3 weeks leading up to D Day.
37. Each component was given its own code name and the entire project was conducted in strict secrecy. At its height there were 25 thousand people working on the construction of Mulberry components from the largest Phoenix Units to anchors and chains etc. Many construction workers thought the constructions were part of defence fortifications.

**Figure 79 A concrete caisson or Phoenix, part of the Mulberry harbour for D-Day under construction 27 Jan 1944.** IWM (H5379)

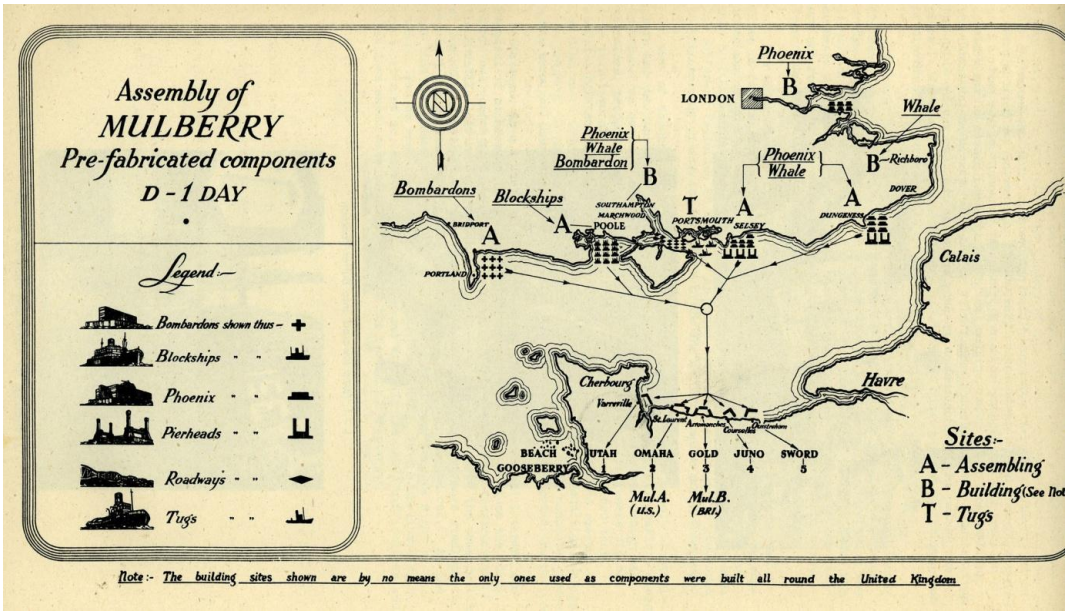


Figure 80 In simplistic diagrammatic form the Mulberry plan is illustrated above.

The detailed planning was phenomenal - and all top secret.

Figure 81 Off Selsey, on the south coast of England, completed caissons parked awaiting D Day. IWM (H38675).

38. The Mulberry Harbour components were given the following code names;

***Corn cobs*** and ***Gooseberries***

"Corn cobs" were ships that crossed the channel either under their own steam or that were towed and scuttled to create sheltered water at the five landing beaches. Once in position the "Corn Cobs" created "Gooseberries".

***Bombardon***

Large floating breakwaters fabricated in steel that were anchored outside the main breakwaters that consisted of Gooseberries (block ships) and Phoenix (concrete caissons). The design of the Bombardons was the responsibility of the Royal Navy while the Royal Engineers were responsible for the design of the rest of the Mulberry harbour equipment.

***Phoenix***

Reinforced concrete caissons constructed by civil engineering contractors around the coast of Britain, collected and sunk at Dungeness, the Cant and Pagham. The Phoenixes were towed across the channel to form the "Mulberry" harbour breakwaters together with the "Gooseberry" block ships.

***Whale***

The dock piers were code named "Whale". These piers were the floating roadways that connected the "Spud" pier heads to the land. Designed by Allan Beckett the roadways were made from innovative torsionally flexible bridging units that had a span of 80 ft., mounted on pontoon units of either steel or concrete called "Beetles" or ”Dolphins”

***Spud Piers***

The pier heads or landing wharves at which ships were unloaded. Each of these consisted of a pontoon with four legs that rested on the sea bed to anchor the pontoon, yet allowed it to float up and down freely with the tide.

***Beetle***

Beetles were pontoons that supported the "Whale" piers. They were also known as “Dolphins”. The majority of Beetles were constructed concrete but where additional strength was required they were made of steel. They were moored in position using wires attached to "Kite" anchors which were also designed by Allan Beckett. These anchors had a very high holding power.

***Mulberry "A”***

The Mulberry harbour assembled on Omaha beach at Saint-Laurent-sur-Mer was for use by the American invasion forces. Mulberry "A" was not securely anchored to the sea bed, resulting in such severe damage during the Channel storms of late June 1944.

***Mulberry "B”***

Mulberry "B" was the harbour assembled on Gold Beach at Arromanches for use by the British and Canadian invasion forces. It was finally decommissioned 6 months after D-Day as allied forces were able to use other harbours closer to the advancing Allied Forces.

39. The photograph below of the original plan, illustrates the extent to which Mulberry units were assembled in the weeks before the Normandy campaign. 60 of the largest A1 Phoenix units plus pier heads, smaller B, C and D units, whale bridges and much more were carefully positioned in lines parallel with the coast line. Given the sheer scale of Mulberry components that gathered at Selsey it is hardly surprising that so much remains today. Similar plans for the Solent (Berthing Plan P) and Dungeness (Plan D) are also available.

40.

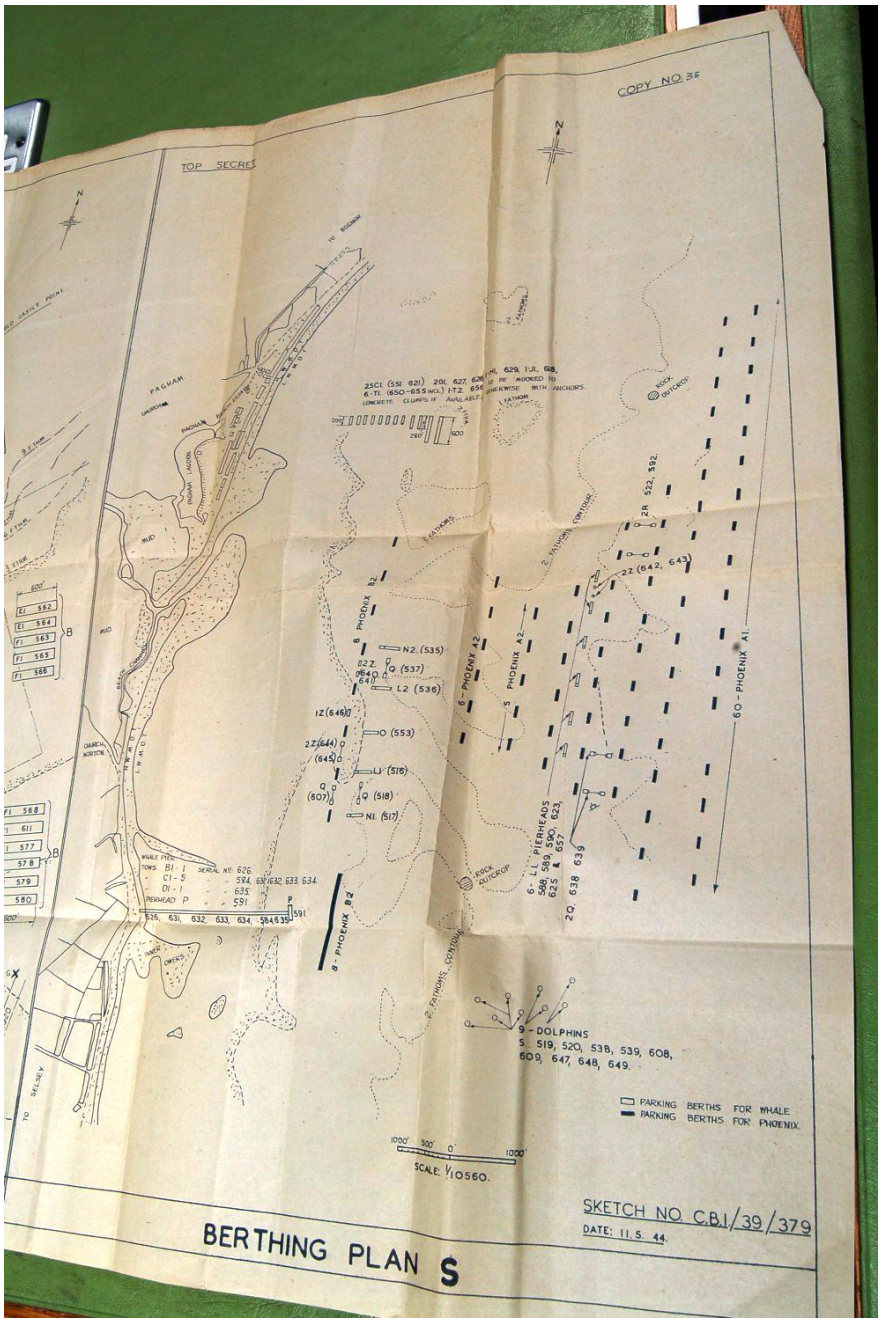


**Figure 82 This key document sets out the 'parking' arrangements for all the Mulberry units at Selsey (Berthing Plan S) Image courtesy of Chris Howlett.**

Figure 83Phoenix caissons for Mulberry Harbour off Selsey Bill. © IWM (A 24115)

**Linking the Mulberry's to Selsey today**

41. In respect of some of the Mulberry Harbour components believed to have been located during the survey project the details for each type of unit are as follows;

a. **Phoenix A1 Unit. (Sites 12 and 15).**

The construction of the Phoenix Caissons called for 15,000 workmen and 630,000 tons of concrete The largest Phoenix A1 units, which measured 60m x 17m x 18m high, and displaced over 6000 tons were built at sites around the South and East coast. The height of the caissons was partially built before being floated. Construction was completed to full height while they were afloat. The plan was to build 146 caissons but in the end 212 were made. Their bottom and external walls were constructed of 380mm thick reinforced concrete, with cross walls 230mm thick. They were open at the top. To make them seaworthy, they had 'swim ends', consisting of 6m x 6m chamfers, roughly shaped across the width at the bottom of the vessel fore and aft. Once constructed, the caissons were sunk at various sites in the English Channel for storage. As D-Day approached, they were pumped out and re-floated. Tugs towed them into place about a mile from the Normandy coast. A crew of 12 men were needed to operate each Unit. With the tugs holding them in position, their sea-cocks were opened and they subsided to rest on the sea bed to form part of the harbour sea defences.

Figure 84 A Phoenix unit being towed across the Channel. IWM (H39300).

**b. Whale Bridges (Sites 5 and 17).**

Whale was the code name for the floating bridge roadways that connected the harbour pier heads to the land. They were supported by 'Beetles' which were floats constructed of steel or concrete (see below). Towing the whale and beetle assemblies was a difficult exercise as the beetles were towed across their beam. We found two sets of Whale bridges and at one site these were still attached to their Beetles. Unfortunately we were not able to locate a Kite anchor, which were normally transported on top of the Whale Bridges.


Figure 85 Part of the floating roadway being towed across the Channel to Arromanches. IWM (B5689)

**c. Concrete Beetles (Sites** 9, 17, 18 and 23).

The shortage of steel meant that the vast majority of beetles were constructed from concrete. The power of the sea over the years has destroyed much of the beetles in shallow water but site 17 has two examples in good condition. The Beetle on the shore line at Aldwick is breaking up and we believe many of the smaller sites we visited were the remains of concrete Beetles. There are also a large number (39) on the shore line at Dibden Bay near Southampton which may have been brought back from Normandy after the War.


Figure 86 A section of the causeway being attached to a reinforced concrete float or Beetle. (IWM H39106).

d. Intermediate Pier Head Pontoon (Site 4).

These units were designed for use by workers at the pier head. They were accommodation/rest facilities and constructed out of concrete with steel reinforcements. There is another Intermediate pier head pontoon on the beach at Arromanches which we were fortunate to be able to visit ourselves at low tide during our visit to Normandy..


Figure 87 The Intermediate Buffer Pontoon at Arromanches (Martin Davies)

e. Pontoon (Site 6)

Indications are that the platform style unit at site 6 is a pontoon which would have secured the Whale bridge to the Spud Pier Head unit.

Figure 88 Buffer pontoon links a Spud Pier Head to a Whale bridge© IWM (A 24371)

f. Steel Beetle (Site 16).

Similar in design to the concrete beetle above these beetles were placed where the additional strength of steel would be needed, in deeper water. Unfortunately we cannot find an image in the IWM collection to illustrate the steel Beetle but their design/appearance was very similar to the concrete version..

**Conclusions**

42. Whilst the majority of sites did reveal remains which appear to have a Mulberry connection clearly one or two were not. The wooden shipwreck (Site 3) was a complete surprise and clearly worth more investigation. The two concrete bumps (Site 10) also had us puzzled for a while but given their proximity to a charted disused outflow site these strange objects began to make some sense.

43. What is clear is that there are many more Mulberry sites along the south coast of England and beyond which could benefit from further investigation and consolidation into a central record. Some very good work has been done recently (eg Maritime Archaeology Trust Solent 70) which record the archaeology linked to the part played by the South Coast in the preparations for Operation Overlord and we are hoping this report add some further detail to the underwater remains associated with this historic event.

# Part 4 Outreach and Conclusions

44. Our Mulberry 70 project has been challenging mainly because of the sheer number of sites investigated. Many of the sites in themselves are shallow and relatively easy to dive and in themselves perhaps do not appear of significance... broken concrete and steel. However collectively they do represent a significant part of history, of wartime ingenuity and planning.
45. We were surprised by some of the results, in particular the old wooden shipwreck, which just goes to illustrate that there is still many sites to investigate... spanning hundreds of years. This site took us by surprise – and we are looking forward to trying to find out more about this wreck site.
46. The high level of interest we have found from divers and the wider community has surprised us immensely and has given us much encouragement. People have freely shared information and this has helped us achieve so much in what is a relatively short time. It is clear that there is still much more that could be done, and we will continue to visit these sites in order to gain more information and data.
47. As a result of the publicity of the Neptune 70 initiative and our Mulberry project we were particularly fortunate to have made contact with Catherine Connors who invited us to join her group of divers (Scuba Ninjas) to dive the Normandy wrecks including 2 parts of the Mulberry harbours. In addition to the great diving we learnt much from visiting the many museums and places of interest which were particularly relevant to the work we have done since 2008. This expedition report is available separately.
48. We will be making this report available on our web site and also sending copies to Historic England, UKHO and other interested parties. A feature about the Mulberry Harbours in the Selsey area (as covered by our project) has been submitted to Serena Cant to appear in due course on the Historic England Blog – 'Wreck of the Week'.
49. We have recently been engaged with the D Day museum by participating in their consultation on the re-development of the museum and its displays.
50. Our sincere thanks to those people who have supported us, the BSA Jubilee Trust, Chris Howlett and the UKHO, Mulberry Divers in Selsey, Serena Cant from Historic England, Andrew Whitmarsh from the D Day museum Portsmouth, Stephen Fisher from the Maritime Archaeology Trust, the Channel Coast Observatory, Catherine Connors from Normandy, and many others for their time, help and support.

Alison Mayor

Project leader and report author.

Southsea Sub-Aqua Club.