

## **Securing Mulberry: Mulberry Harbour Kite Anchor Remains**



**A historical and physical assessment of the archaeological remains  
of Mulberry Harbour moorings on Peel Bank, off Woodside, Isle of  
Wight**

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Front cover image: Kite Anchor replica at Arromanches-les-Bains, Normandy. © Martin Davies

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## 1. Summary

This report investigates the history of an assemblage of Kite Anchors, recently identified in the area of Peel Bank, off Woodside, near Wootton Creek on the Isle of Wight. The anchors are of a type constructed during the Second World War as an essential part of Mulberry Harbour, the prefabricated harbour built in Britain and assembled in France in the wake of the Invasion of Normandy in 1944. A total of 2434 are known to have been constructed during the war, although only two other examples have been found to survive.

Peel Bank was a mooring area for the floating roadways used to connect offshore pierheads to the shore. The anchors were fitted onto these roadways for their passage over to France and subsequently used to secure them to the seabed. After the equipment at Peel Bank had all been sailed to Normandy, the mooring facility was closed and all elements of the harbour were thought to have been removed.

In fact the discovery of these anchors has highlighted a number of other associated artefacts, along a two mile length of intertidal beach. This includes a number of cable reels, frame assemblies, an erection tank saddle and one USN Navy Lighterage Pontoon, as well as two previously identified wrecks, believed to be sections of the floating roadway.

While all of these items represent important aspects of Mulberry Harbour, the Kite Anchors, being both complete items and incredibly rare, are perhaps the most historically significant. It is considered that their removal from an area with which they can be most closely associated in the UK is justified, in order to ensure their protection and conservation.

This report has been prepared by Martin Davies (In Depth Photography) and Stephen Fisher (Ronin Archaeology) for the Nautical Archaeology Society. The report has been supplied to the client, Beckett Rankine, 47 Gillingham Street, London, SW1V 1HS.

The detail in this report was made possible with the kind assistance of local diver Hilary Martin, who liaised with local residents, local historian David Moore, Tim and Mike Beckett and Chris Howlett.

## 2. Introduction

This document sets out the results of a historical assessment of the Second World War archaeology and archaeological potential at Peel Bank, where a proposal has been made to recover examples of Kite Anchors.

### 2.1 Project Study Area

The centre of the area of investigation is Peel Bank, site of a Second World War mooring area for elements of Mulberry Harbour, the ‘floating harbour’ built off the Normandy coast in the weeks after D-Day. Peel Bank is a shallow off-shore ledge running parallel to the high water mark of the Isle of Wight, approximately 1.3km into the Solent. The Peel Wreck buoy, broadly central to the bank, is located at 50.748512, -1.223905.

A map of the study area is shown in Figure 1. The location of the Peel Wreck buoy is shown by the red triangle.

**Figure 1. Map of Study Area**



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### **3. Methodology**

#### **3.1 Sources**

A number of different sources of information have been consulted to inform this assessment. They include:

##### **3.1.1 Archaeological Databases**

The study area outlined above served to define the areas that were used to conduct searches for archaeological data relevant to the Kite Anchors. The National Record of the Historic Environment was consulted to search for known wrecks or land-based artefacts that may be connected to the anchors.

##### **3.1.2 Historical Records**

A number of published sources, research results and other publications were used to identify the historical context of the site and use of the features of interest, in order to enable the military remains to be analysed in their full context. The documents and publications reviewed are listed in Section 9.1.

##### **3.1.3 Research Results, Grey Literature and Publications**

Mulberry Harbour has received remarkably little coverage in published sources, with only one mainstream book (Hartcup, 1977) still in print. As a result, the activities at Peel Bank receive little coverage, next to the more significant events elsewhere. Accordingly, further research was carried out at The National Archives in Kew, London. Second World War Admiralty, War Office and Government records were searched in order to establish the full history of Kite Anchors and Peel Bank's role in Mulberry Harbour. A full list of documents consulted can be found in Section 9.2.

##### **3.1.4 Archive Collections**

In order to establish the survivability and therefore the significance of the Kite Anchors, a number of museums and archives were contacted as part of this study. A full list can be found in Table 5.

### **3.2 Assessment and Analysis of Archaeology**

Per Historic England's *Historic Environment Good Practice Advice in Planning (Note 2: Decision-Taking in the Historic Environment)* (2014), this report seeks to "determine... the nature, extent and significance of the historic environment within a specified area, and the impact of ... proposed development on the significance of the historic environment, or will identify the need for further evaluation" (Historic England: 2014, 3). Accordingly, the significance of the artefacts at Peel Bank, both locally within the context of the larger feature it is part of, and more broadly on a national level, requires consideration. These considerations were made using guidance available from Historic England (*Designation Listing Selection Guide: Military Structures: 2011* and *Historic Environment Good Practice Advice In Planning: 2015*), which, although ostensibly for structures, has much relevance to the study area and its artefacts. Further, all archaeological sites and monuments are at risk from a wide range of factors, both natural and human, and this also been taken into account in Section 7.

### **3.3 Limitations of this study**

This study has only examined Second World War built heritage assets in the vicinity of Peel Bank. No other heritage from different periods has been recorded unless it is directly influenced by this heritage. Accordingly, although Wootton is well known for many other periods of history (Loader, Westmore & Tomalin, 1997:2), they have not been considered here as they are not within the study's scope.

This study has been a desk based assessment. Although it has obtained data from a number of reports that involved fieldwork within the study area, not all features have necessarily been surveyed and no further fieldwork has been conducted as part of this research. There is high potential for previously unrecorded features or artefacts to exist within the study area.

## **4. Historical Background**

### **4.1 Mulberry Harbour**

At a conference in Quebec in August 1943, the Allied powers preparing for the Invasion of Europe the following year, agreed that it would most likely prove impossible to capture a

working port quickly enough to facilitate the discharge of men and materiel to supply their build-up of forces on the French mainland. The decision was made to build their own harbour instead. Codenamed Mulberry, the plan was set in action to create two prefabricated harbours that could be built on the French Coast after the invasion; Mulberry A (American) and Mulberry B (British). Both would be made up of a massive harbour wall constructed of dozens of large concrete caissons that could be floated to France and sunk to form a breakwater. These concrete megaliths, code-named Phoenix, remain to this day the most awe inspiring part of the project. But they were worthless without the other important elements that make a working port.

#### **4.1.1 Whales and Beetles**

Inside the sheltered waters of the harbour, piers were required to allow the sea going vessels to come alongside and discharge their cargo. The ability to unload deep draught vessels onto beaches without the use of ports had in fact been considered long before the Quebec conference, and it was as early as May 1942 that Churchill issued his now famous memo: "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." By August a specification had been put forward by Lord Mountbatten, Head of Combined Operations. A pierhead capable of berthing three 2,000 ton coasters would need to be connected to a pier no more than a mile long capable of supporting a continuous flow of traffic (Hartcup, 1977:28-30).

Three proposals were submitted but two, the Croc & Hippo, and the Swiss Roll designs were rejected after testing. The third proposal suggested a floating bridge and fixed pierhead that would move up and down with the tide (Hartcup, 1977:31).

The piers, which were codenamed Whale, subsequently underwent a series of test constructions and a trial was held in summer 1943. The pierheads, known as Spuds by the British (on account of the spud leg design) and Lobnitz piers by the Americans (after the name of the inventor of the dredger the design was inspired by), were 200ft long, 60ft wide and 11ft deep steel floating platforms and at each corner was an 89ft long steel leg that could be lowered onto the seabed when the pier was in position. The platform could subsequently be raised and lowered on the legs with the tide, maintaining a stable platform at all states of the

tide and ramps could be fitted onto the large deck, allowing vehicles to be unloaded from different height vessels. To assist with the docking of landing ships and landing craft, a Buffer Pontoon attachment could be used, creating an artificial landing ramp onto which the ship could 'beach' and discharge its cargo. The pierheads were built in the north of Britain, but towed to Southampton to have their spud legs fitted (Falconer, 2013:84-85).

A floating roadway would then be required to connect the pierheads to the shore. The earliest inception of the design for this was created by William Everall and Allan Beckett. The first design proposed a shallow pontoon bridge and this grew into the 80ft Whale roadway sections that were eventually used. Everall designed each roadway section to be able to flex, whilst bearings at the joints with neighbouring sections allowed further movement. This meant that the roadway would move and twist with the movement of the seas and was not so rigid that it would break in rough weather. Telescopic units were also designed to account for the lengthening of the pier as the tide dropped (Falconer, 2013:90-91).

The roadways would need to be supported by floating units and for this steel pontoons were designed. Code-named Beetles, each unit would sit under the join between two Whale roadways, providing sufficient flotation to keep them well above water. It was quickly apparent that there was insufficient steel to make the 460 floats that would be required: precast concrete panels were used to construct the walls of the Beetles instead. The concrete was more fragile and so the steel floats tended to be reserved for pontoons likely to ground at low tide, especially on rocks. Three sizes of pontoon were eventually built; 31 PP5 units (41ft 9in long, 14ft 11in wide and 8ft deep), 327 PP6 units (41ft, 9in long, 15ft 3in wide and 9ft 7in deep) and 126 PP7 units (41ft 9in long, 18ft 9in wide and 9ft 10in deep), each of which could support the load of the roadway plus vehicles of 25 tons to 40 tons (Falconer, 2013:92-93).

The Whale roadways and Beetles were assembled at a number of locations in the south of England. In the Solent, Beetles were built at Southsea, the Beaulieu River and Marchwood. Whale roadways were also constructed at Marchwood, which, under the title of No. 1 Port and Inland Water Transport Repair Depot, became the main assembly area for the Whale units. Once Beetles had been constructed, they were floated to Marchwood, where the

roadway sections were fitted in lengths of pre-prepared sections known as tows (Hartcup 1977:82).

Although supported by Beetles at the joining of the roadway units, each end of the tow was supported by an Erection Tank. These were 36ft long welded steel tanks filled with compressed air. The tank, fixed underneath the end of a Whale roadway unit using a bracket called a saddle, held the roadway above the height of the Beetle to which it was to be attached, allowing it to be carefully manoeuvred into position. When ready, the Erection Tank could be flooded, lowering the roadway into place on the Beetle before the tank was removed. They were also useful for supporting sections of roadway when damaged Beetles needed to be replaced, or an emergency floats (Hartcup 1977:43-44).

The tows, which varied in length from two to six roadway sections, were then loaded with equipment necessary for their voyage, including tool kits, pivot plates and spare saddles, and readied for towing to the parking area where completed sections would await their journey to France (Hartcup 1977:82).

#### **4.2 The Kite Anchor**

Although the roadway could flex with the movement of water, it needed to remain as linear as possible. In order to achieve this, the Beetles would need to be kept firmly moored. Initially, the possibility of laying moorings along the seabed was considered, but this process was too complicated and time consuming. Instead an anchor was required that could hold the Beetles firmly in position (Hartcup 1977:44).

Various anchors were experimented with, including the Admiralty CQR pattern anchor which worked along the lines of a plough and was designed to dig into soft ground, but all were found to be too heavy or unwieldy for the work required. Allan Beckett began to design a new anchor, which when towed along soft ground, actually burrowed deep into it, going further under as more load was applied. After early experiments with tin plate models towed by his yacht, the company of Braithwaites and Co. began to construct trial models. Minor modifications were made until the final design was achieved and the small 6cwt anchor was found to be capable of resisting 30 ton pulls. The anchor was named the Kite Anchor, based upon the similarity of the forces that cause the uplift of a flying kite, the only difference being that the anchor pulled down instead of rising. It could not dig into rock, so in areas where

moorings would need to be laid in rocky outcrops, special rock insertion kits were developed, allowing the mooring wire to be inserted directly into the stone.

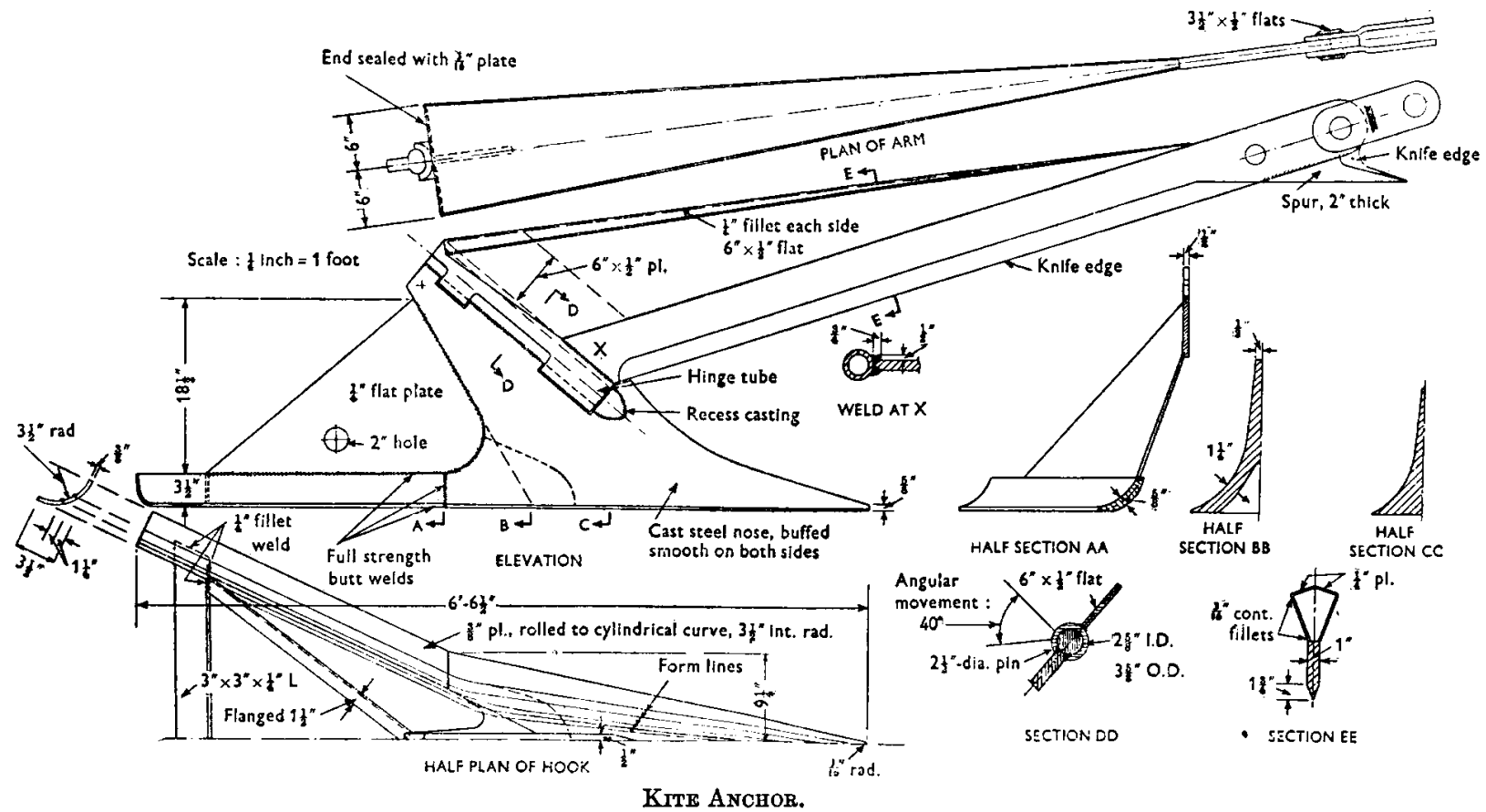
The Kite Anchor resembles a small plough. Its main arm is lined over the plough blade so that as soon as it is towed, the blade faces into the direction of the tow. At this point its blade begins to pull into the ground and, as tension is increased, it bites deeper until eventually the tow cannot pull any further or the cable holding it snaps. An experiment with a boom defence vessel, HMS *Barham*, saw the anchor dropped over the side of the ship. After it had hit the seabed and the ship had run out all of the cable, it completely stopped the ship and broke the load clock that measured the force exerted on the cable (Evans, Palmer & Walter, 2000:34).

**Figure 2. A replica of a Kite Anchor at Arromanches, Normandy.**



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Figure 3. Engineering Drawing of the Kite Anchor



Courtesy of Tim and Mike Beckett

Amongst the multitude of components being assembled for the Whale project, the Kite Anchors were given the schedule letter L. Initially 2,000 Kite Anchors were considered necessary, but this was revised down to 1,240 (1,040 for planned use plus 200 spares) in October 1943, roughly proportionate to the number of floats that were needed. That month, the design was released and it was forecast that 100 would be ready by the end of January 1944, 600 by the end of February and the full order of 1,240 by the end of March 1944. This prediction proved correct and the full complement was ready by March 31<sup>st</sup> 1944 (WO 219/953 and WO 219/955).

In fact far more than this were produced. Table 1 includes a full listing of the numbers constructed, including three orders placed in 1944 by the Admiralty, which will have been far too late to contribute to Mulberry (AVIA 53/280).

**Table 1. Construction of Kite Anchors**

<b>Order Date</b>	<b>Firm</b>	<b>Quantity</b>
9 <sup>th</sup> July 1943	Braithwaite & Co. Ltd.	46
8 <sup>th</sup> November 1943	Braithwaite & Co. Ltd.	600
8 <sup>th</sup> November 1943	Dornah Long & Co. Ltd.	200
8 <sup>th</sup> November 1943	Ashmore Benson Pease & Co.	620
8 <sup>th</sup> November 1943	John Booth & Son	420
9 <sup>th</sup> November 1943	Braithwaite & Co. Ltd.	200
13 <sup>th</sup> November 1943	Noreland Hayne & Co. Ltd.	260
18 <sup>th</sup> January 1944	Electric Welding Co. Ltd.	8
13 <sup>th</sup> April 1944	Broomside Boiler Works Co. Ltd.	30
18 <sup>th</sup> May 1944	Joseph Cook Sons & Co. Ltd.	50
	Total produced	2,434

To anchor the Beetles, it was found necessary to construct two purpose designed craft. The first was an unpowered raft, known as a Mooring Shuttle. In essence, this was a small catamaran, with a central section supported by two long floats. Inside the central section was a large drum around which was wound 1,200ft of mooring wire and two Kite Anchors, one at

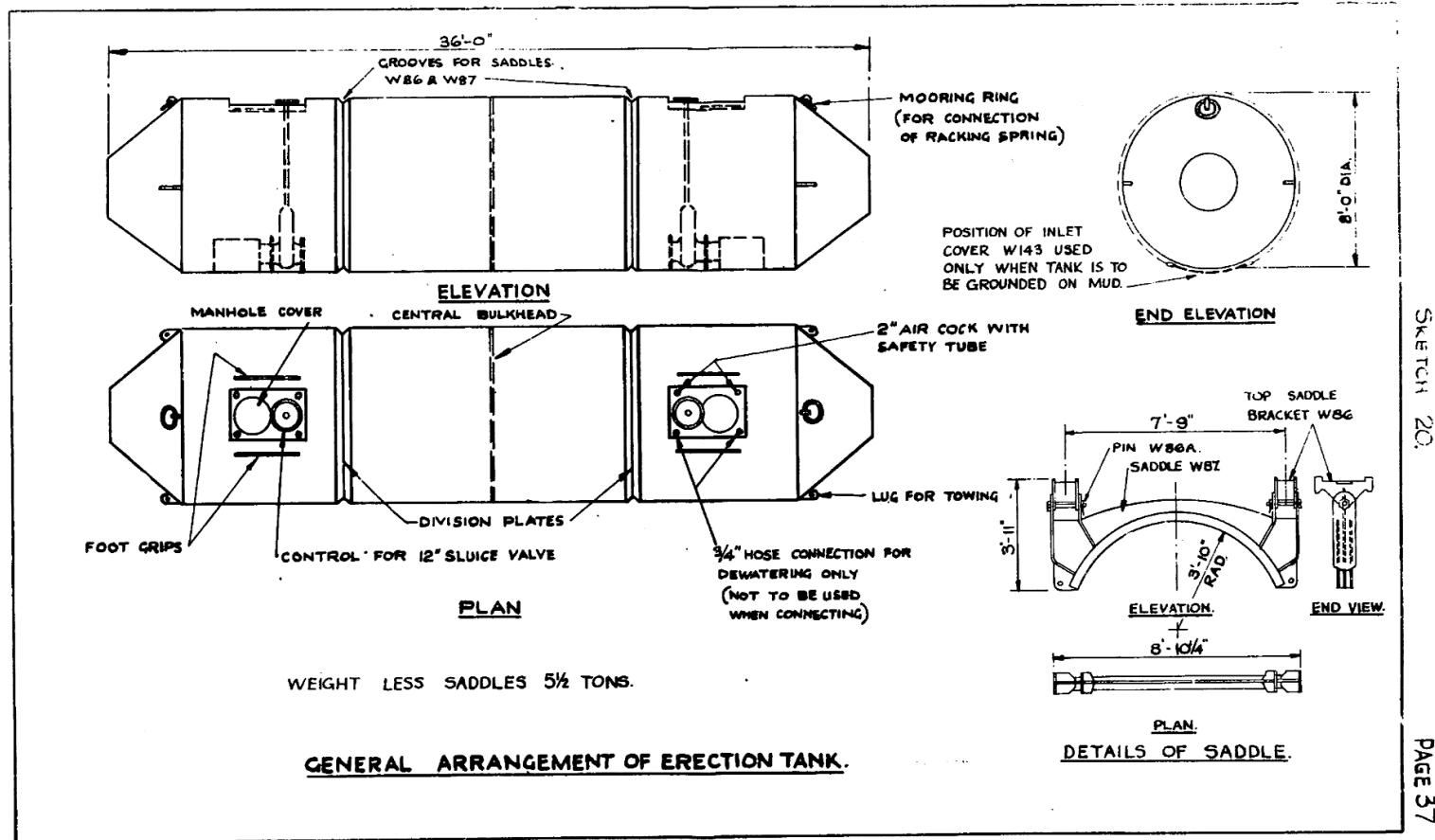


each end of the raft. The Shuttle was towed by a small powered craft designed and built by Camper & Nicholson Ltd. (who had yards in Gosport and Southampton) called a Surf Landing Under Girder (SLUG) boat, a 20ft long, 2 ton boat crewed by two men. The boat was designed to be low enough to manoeuvre under the Whale roadways (hence its name) allowing both sides of the Beetles to be secured to the seabed. The SLUG towed the Mooring Shuttle to a position 600ft away from one side of the Beetle being anchored and dropped one anchor over the side. Sufficient cable was played out as the SLUG returned to the Beetle and the cable was secured to the mooring bollards. The SLUG then went under the Whale to secure the other side and the cables could be tightened with special pull lifts. The SLUG boats could also be used to inflate Erection Tanks and carried a winch for kedging (Hartcup, 1977:45-46).

Although Peel Bank was the mooring area, it seems unlikely that it was meant for any new equipment, such as the SLUGs or Kite Anchors, to be fitted to the Whale tows there. The logistics of moving the equipment across the Solent to the Isle of Wight and the fact that so little infrastructure was prepared at Peel Bank seems to preclude this. Furthermore, Marchwood was the central reception depot for Whale roadways (DEFE 2/428:7) and even minor elements such as Trumpets (a guiding fitting to simplify the joining of tows) were done there (WO 199/1678). Although the Kite Anchors, SLUG boats and Mooring Shuttles were transported to France on the Whale tows, it has not been possible to trace exactly where they were loaded onto the Whale tows.

The Kite Anchor would prove its value in Normandy during the great storm that struck both Mulberry A and B at the end of June. The British piers at Mulberry B had benefitted from the use of all available Mooring Shuttles and every Beetle had been anchored securely. Moreover, there was sufficient wire to further secure each float to its neighbour so that, by the time the storm hit, the British piers were “braced up like a woman’s corset” (Hartcup, 1977:117). The American piers however, had only been anchored on every other Beetle. This meant that when the storm hit, the anchors were insufficient for the weather and eventually dragged, swinging the piers out of position with disastrous consequences. After the storm, Mulberry A was closed and all efforts were focussed on Mulberry B (Hartcup, 1977:119).

Figure 4. General Arrangement of Erection Tank, including illustration of Saddle.



Courtesy of Tim and Mike Beckett

### ***4.3 Moorings at Peel Bank***

The study area saw some military activity in the early years of the war. Ranalah Yacht Yard in Wootton Creek built numerous naval vessels during the war (Wootton Bridge Historical, Fisbourne), including two Royal Navy Harbour Defence Motor Launches in 1941-42 (Lambert & Ross, 1990:137).

From September 1943 to May 1944, Osborne Bay was used as a trial landing area by the B-Wing Saltwater Training School. The school, based at G1 Hard in Stokes Bay, Gosport, trained troops in the operation of Duplex Drive (DD) tanks. DD Tanks were amphibious tanks that could 'swim' from landing craft positioned offshore and onto a beach and, although most well-known for their roles on D-Day, were also used in other operations in 1944 and 1945. The tanks were loaded onto landing craft at Stokes Bay and sailed across the Solent until 1,200 yards off the coast of Osborne beach, where they would launch into the sea and swim the remainder of the way to Osborne Bay. The landing craft then beached, allowing the tanks to re-embark and return to Stokes Bay (Burgess, 2018).

It was initially intended that all of the Mulberry Components would be moored in Christchurch Bay prior to D-Day. However, this area was already expected to be required for warships and the use of this locality would be a clear indicator for the enemy that Normandy was a likely target. Instead, in February it was decided to park the largest units, the Phoenix breakwaters and Whale piers, at Dungeness off the Kent coast, and Selsey off Sussex. In April, lack of space and the poor shelter at both these locations raised the need for a new site for Whale elements (DEFE 2/428:6-7). At a meeting on the 10<sup>th</sup>, it was concluded that the only area suitable was Area 23 (South), the stretch of coast between Old Castle Point at East Cowes and Wootton Creek (the whole area was referred to Peel Bank, although strictly speaking the western extent was Osborne Bay). Area 23 was ideal as it lay in the shelter of the Isle of Wight, and close to Marchwood where the elements were being assembled. However, using it involved displacing twenty-six Motor Mine Sweepers (MMS). Osborne Bay was expected to be free from the end of April if it was no longer required by the DD tanks (ADM 199/1619:183).

Peel Bank, between Wootton Creek and Kings Quay, had in fact already been allocated as a training area for American personnel on the 24<sup>th</sup> March 1944 (ADM 199/1633:140). The meeting on the 10<sup>th</sup> April 1944 concluded however, that the training area "can continue to be

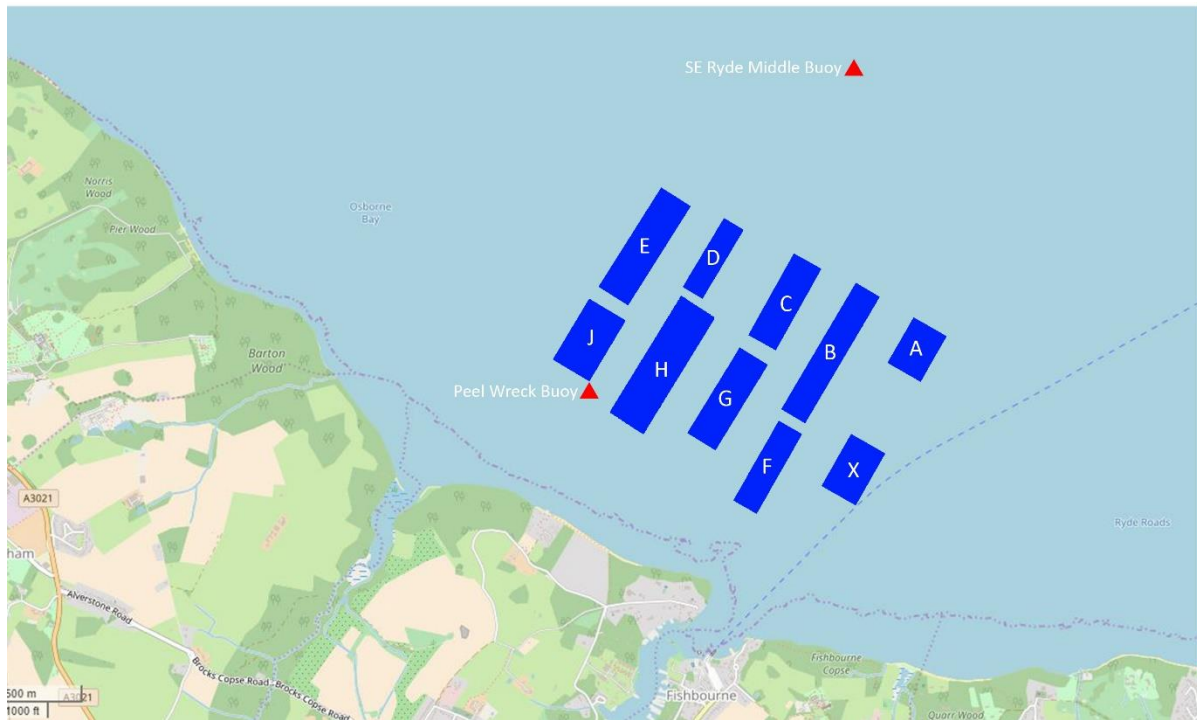
used, and the laying of the moorings for pier roadways will not interfere with this training. Crews under training will help with handling the tows” (ADM 199/1619:183). This statement would turn out to be much more prophetic than expected.

Although no record has been uncovered that clarifies when it was assigned as a British training area, Peel Bank soon became home to both American and British units training to use Mulberry. The American unit was the 108<sup>th</sup> Naval Construction Battalion, formed from Section 2 of the 97<sup>th</sup> Construction Battalion (better known by their initials CB and more commonly as Seabees), whilst the British was the 969 Port Floating Equipment Company, Royal Engineers. The moorings were to be administered by the Royal Navy who provided a small unit to assist with the moorings and prepare the tows for towing. As established, the Seabees and Royal Engineers would assist with readying the equipment for France.

At a conference on the 20<sup>th</sup> April 1944, the responsibility of laying the moorings at Peel Bank was given to the Boom Defence Officer Portsmouth. The moorings proposed were A class buoys, secured to eight or five ton concrete clumps, backed up by 7.5 ton concrete clumps to be supplied by the Army. The layout of the 76 ‘trot’ moorings were also planned by the Army, based on the sizes of the various tows they would need to moor. The concrete mooring clumps stood a whole 5 foot off the bottom of the seabed, necessitating the transfer of the Whale tows from a tug to a smaller TID tugs (known as “Tiddlers”) whilst still in deep water, so that the tight space between moorings could be safely navigated (ADM 199/1615:204).

The laying of the moorings began on the 23<sup>rd</sup> April 1944 and was completed on the 14<sup>th</sup> May 1944, after being considerably delayed by the slow supply of material from the Army. Eventually six bar boats and three boom trawlers laid 86 buoys on the bank. Additionally, eleven trots for Rhino floats were laid in Osborne Bay by the 9<sup>th</sup> May 1944 (ADM 179/417:3-4). The layout of the Peel Bank trots is shown in Figure 5.

**Figure 5. Approximate locations of the Peel Bank trots and the locations of the Peel Wreck buoy and SE Ryde Middle Buoy.**



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#### 4.3.1 Facilities on Land

British personnel, both Royal Engineers and Royal Navy, were accommodated at Kitehill Camp. A recce conducted on the 10<sup>th</sup> April 1944 identified the camp, in the grounds of Kitehill House and Farm, as suitable accommodation for the men required for work at Peel Bank. It was described as being able to accommodate 1,000 men and that all necessary camp structures were already erected (ADM 199/1633:155). Local residents recall that officers were accommodated in the farm house, the dairy was used for storage and other outhouses used as the cookhouse. A reference to “extra tentage” in the Royal Engineer’s War Diary suggests that the enlisted men’s accommodation may have been tents (WO 171/1754) and it is possible that other accommodation was in nearby New Copse (Martin – : pers. comm.).

On the 15<sup>th</sup> April 1944, an advance part of one officer and 43 enlisted men of 969 Company, Royal Engineers, arrived at the camp, followed by the rest of the company and their CO, Major Cowan, on the 25<sup>th</sup> April 1944 (WO 171/1754). On the same day, they were joined by a small Royal Navy party under Lieutenant Commander Simpson, RNR, which eventually grew to

some 60 men by the end of May. The camp served as accommodation for the Royal Navy party until the 3<sup>rd</sup> June 1944, but was considered to be far from adequate by Commander Fardell (who took over from Simpson in May), noting that it was a mile from the landing stage and that in the absence of any Royal Navy vessels, all transport to the moorings was conducted by Army SLUG boats (ADM 179/432).

The Seabees, under Lieutenant Freeburn, were also accommodated in Wootton. After requesting accommodation, the American authorities were offered the use of “Rasters Holiday Camp”, with space for 200 men, from the 11<sup>th</sup> April 1944 until D+30 (ultimately the 6<sup>th</sup> July) (ADM 199/1633:153). There were in fact four pre-war holiday camps at Wootton. Woodside Bay was set around the grounds of Woodside House on the coast overlooking Peel Bank and used as a naturist camp before it was closed during the war. Little Canada, on the west shore Wootton Creek was built in the 1930s and requisitioned during the war, playing host to the local militia and Canadian troops. Another camp was at Lakeside, south of Wootton High Street and the fourth was Wootton Holiday Camp, established in 1937 and known locally as “Rafters” (Wootton Bridge Historical, 2018, Holiday Camps). This camp was in the same location provided (in the form of military grid references) in the initial offer of use to the American forces. It had been requisitioned earlier in the war and occupied by the 11th (Royal Militia Island of Jersey) Battalion, The Hampshire Regiment, who had their HQ at Meadow Croft (or Meadowcroft) house on the east side of the junction between Wootton High Street and Palmers Road (Wootton Bridge Historical, 2018. Wootton holiday Camp). This house may have served the same function for the Seabees. Stanford, who calls the camp “Resters”, records that its facilities were basic, lacking bedding, a telephone and even drinking water when the men arrived (Stanford, 1951:104).

The location of the landing stage is not given, but can be presumed to be in the vicinity of Fishbourne. Historic Ordnance Survey maps show that the only landing stage accessible at all states of the tide was the one built alongside the slipway of the Fishbourne Ferry Terminal, constructed in 1926 (Wootton Bridge Historical, 2018. Cross Solent Ferries). This is also exactly one mile from Kitehill Farm along public roads. Local residents recollect that boats used by the personnel were moored along the sea wall between the landing stage and the old Coastguard Station to the east, at the end of Fishbourne Lane (Martin: pers. comm.).

The only other land based facility recorded in historical records is a teleprinter hut in Fishbourne, recorded by Commander Fardell. The location is not given but can be presumed to have been in the vicinity of the ferry terminal (ADM 179/432).

#### **4.3.2 Operations**

The men working at Peel Bank were required to check the incoming Whale units, effect repairs and prepare equipment on the tows prior to their journey to France (CTF 128, 1944:10-11). Potential tensions between the two nationalities were quickly overcome thanks to a trade in frozen beef (from the Americans) and gin (from the British), but there were still problems. The US supplied six small TID tugs and the British expected to supply a Motor Fishing Vessel (MFV) by the 25<sup>th</sup> April 1944. However, the tugs frequently wandered off without instruction (Stanford, 1951:105) and Fardell reported that there were absolutely no naval vessels at the start of their work and the MFV did not appear until the 7<sup>th</sup> May 1944 (ADM 179/432). Until the 27<sup>th</sup> May 1944, an Army field telephone was the only means of communication with other units (ADM 179/432) and so the presence of two American Submarine Chasers, who regularly made trips around different units and bases, was very popular. The Seabees also brought their own bulldozer to Peel Bank on a Rhino ferry (although there is no indication where it was landed) (Stanford, 1951:104).

Once the first moorings had been laid, tugs began to bring completed tows of Whale roadway to Peel Bank from Marchwood. However, it soon became evident that the tows were far from ready before they even got to Peel Bank. Many arrived there and at Selsey in poor states of repair and some were in sinking condition. Allan Beckett himself rode on one of the tows from Marchwood and witnessed the entire tow sink after one Beetle was punctured on a submarine defence, slowly taking the entire assemblage with it (Evans, Palmer & Walter, 2000:3). 969 Company's War Diary refers to rough weather holding up training, the need for officers to collect SLUG boats from Southampton and that, on the 8<sup>th</sup> May 1944, the men were involved in recovering sunken Beetles (WO 171/1754). On the 18<sup>th</sup> May 1944 it was observed that the "amount of maintenance which the Port Handling Equipment Company has been called upon to carry out in connection with the Whale tows has assumed such proportions as to be beyond the capabilities of 969 Company, although all available personnel (total number 200) of 970 Company have been attached." When approached, the liaison officer at Marchwood simply stated that the moment the tows left his facility, they were no longer his

problem and refused to assist in any way. At the expense of their training, the men of 969 Company had instead been working 20 hour days to rectify the problems and make the equipment ready for France (ADM 199/1619:283).

This was reiterated on the 24<sup>th</sup> May 1944 (ADM 199/1619:227), and on the same date it was noted that several tows had indeed sunk. One tow, B1/577 was unseaworthy and could not be moved, whilst another, C1/583, sank whilst being taken from the moorings and also could not be moved. At the same time, it was hoped that another two tows, presumably also damaged, could be moved the following day. It was also reported that two tows, C1/630 and D1/1636, had been built into a pier (WO 219/949).

The pier is presumably the one completed by the Americans. Admiral Kirk, head of the American Mulberry force continually demanded the construction of a complete pier, connected to a pier head, to test the equipment. On the 23<sup>rd</sup> May 1944, he signalled his desire to make “immediate full scale tests [of a pierhead] using an LST loaded with a typical load” (Stanford, 1951:110). A test was held the next day at Peel Bank, where a completed pier connected a pierhead to a shore ramp, presumably at Woodside. A number of high ranking officials, including Admiral Bertram Ramsey, the Naval Commander in Chief for Operation Neptune attended. To everyone’s consternation, it was quickly discovered that once the Landing Ship Tank had beached against the Buffer Pontoon attached to the pierhead, it could not open its bow doors. Eventually a cutting torch was used to achieve this, during which time it was noticed that there were insufficient bollards on the pierhead to securely moor the LST, and tenders were required to hold it in position instead. When the doors were finally open, the metal pierhead was found to be too slippery for a tank to climb up from the bottom deck, and the upper deck could not be unloaded without cutting away fittings inside the ship (Stanford, 1951:111-112).

Changes were immediate. The Buffer Pontoon’s surfaces were filled in with concrete and timber baulks. Modifications were made to the ramps to both decks of the LSTs and lines were painted on the pierhead decks to make it easier for tank drivers to negotiate their way around the cramped space (WO 219/379B). This was felt preferable to modifying 120 LSTs, but even so, this was done as well (Hartcup, 1977:87). Meanwhile, a lack of authority of tugs was fixed



by placing Commander Fardell, RN in overall command as Senior Naval Officer, Peel Bank on the 25<sup>th</sup> May 1944(WO 219/379B).

Despite the adverse conditions, a chart produced on the 28<sup>th</sup> May 1944 showed the Herculean task achieved by the men at Peel Bank. 59 tows were ready for sailing: those required first, for sailing on D-Day itself, were moored in A, B and C trots, in the north east corner of the mooring area. The others would be towed out according to a schedule over the following days. A number of damaged tows were also indicated: C1/583 was “across moorings” in Trot D and presumably disabled although not labelled as sunk, suggesting that some recovery had taken place. B2/594 was shown as sunk alongside Trot A, D1/587 was unserviceable in Trot J, D2/604 in Trot H was of questionable condition and C1/512 was shown to be sunk at one end in Trot A. B1/577, recorded as unseaworthy on the 24<sup>th</sup>, is not shown, nor is it shown on a listing of all Whale tows. It is most likely that B1/577 is a mistype of C1/577, a genuine unit. This unit is shown on the chart in Trot D, but is not indicated to be unseaworthy (ADM 199/1619:232). The pier is not shown, and neither is a second one said to have been constructed by the British (ADM 199/1619:276). There is little detail on the British pier, but it may be the one referred to in the 969 Company War Diary as King’s Pier on the 12<sup>th</sup> May 1944 (WO 171/1754). If this is the case, it may be deduced that the pier was moored towards the west of Peel Bank near King’s Quay inlet.

969 Company had departed from Kitehill Camp by the end of May 1944 in preparation for their move to Normandy (WO 171/1754). The date of the Seabees’ departure is not specified, but they were in Normandy immediately after the invasion. On the 3<sup>rd</sup> June 1944 an accommodation vessel, HMS *Queen of Kent*, was finally allocated to Peel Bank and the Royal Navy party moved to accommodation afloat. They remained on ships until the site was closed (ADM 179/432).

Following the invasion of Normandy, the Whale tows were towed to Normandy to schedule. It is known that many tows were lost whilst crossing the Channel, and of course many were damaged during the storms that wrecked the harbours. Meanwhile new units continued to arrive at Peel Bank, but in far less numbers than before.

There is no record explicitly stating that any of the sunken or damaged units were recovered, but a report from commander Fardell on the 8<sup>th</sup> July 1944 recorded that “all sunken Whale

units [at Peel Bank] have now been raised due to the determined effort and most creditable work carried out by Lieutenant Commander Steptoe in charge of the two bar vessels *Bartisan* and *Bardale*" (ADM 199/1619:296).

On the 27<sup>th</sup> July 1944, eighteen operational roadway tows and a Buffer Pontoon remained moored at Peel Bank, along with six non-operational tows awaiting return to Marchwood. In addition, eight single Beetle units, of which five were operational, were moored in F trot. Added to these was one on the beach undergoing repair and one sunk unit that was hoped to be recovered in the next two days. Ten Erection Tanks were on site, six of which were in use supporting tows, two of which were moored on Peel Bank, one in Wootton Creek and one of which was damaged and on a barge (ADM 199/1619:276).

By the 17<sup>th</sup> August 1944, these figures had been reduced to ten operational Whale roadway tows, four non-operational tows, one Buffer Pontoon, two Intermediate Concrete Pontoons, six concrete Beetles and three Erection Tanks. In addition there were two barges and a landing barge, LBV 146. Further west in Osborne Bay were two warping barges, several sections of Naval Lighterage Pontoon, a tug and a catamaran. Nothing remained to be salvaged except six Kite Anchors "which were used in building the British exercise pier and left behind. These anchors will be lifted by PM 19<sup>th</sup>." (ADM 199/1619:279). The following day a memo discussed the option of moving the remaining equipment as it was no longer required for operations, and disbanding the naval party, mentioning that the "C in C Portsmouth has other needs for the area and moorings". By the 20<sup>th</sup>, these arrangements were in hand and it was intended to have the site clear by the 28<sup>th</sup> (ADM 199/1619:172-174). On the 27<sup>th</sup> August 1944, the final remaining units were reported to have been towed to Marchwood and Peel Bank was declared clear of all Whale material, leaving only two barges, one Naval Lighterage Causeway, one Naval Lighterage Compressor barge and one Naval Lighterage tug without engines in Osborne Bay (ADM 199/1619:281).

#### **4.3.3 Post Overlord**

There is no indication as to what use the C in C Portsmouth had planned for Peel Bank. However, a year later on 23<sup>rd</sup> June 1945, there was discussion about using the bank as a "parking site" for sixteen spare Phoenix caissons. The soft mud bed was considered to be a problem and it was noted that if the site was used, "arrangements would have to be agreed

between the War Office DTN and the War Office department concerned with the DD tank trials” and “On the whole it was preferred not to use this area” (ADM 199/1633:48). The reference to DD tanks suggests that the B Wing Saltwater Training School at Stokes Bay was still active at the time.

However, some facilities obviously returned to Peel Bank eventually. On the 11<sup>th</sup> May 1946, the Isle of Wight County Press reported on an inquest held into the death of two Royal Engineers who had drowned whilst attempting to return to a “Mulberry Harbour pier head moored off Wootton Creek” after a night of drinking. The pierhead was manned by a small garrison under the command of a “Major Leese”, suggesting that the installation was more than a temporary arrangement (Isle of Wight County Press, 1946). The pierhead, number 416, remained off Wootton until April 1948 (Isle of Wight County Press, 1948).

## 5. Survival of Features

### 5.1 *Land-Based Infrastructure*

Wootton Holiday Camp, the Seabees wartime camp, was closed and sold in 1975, after which it was built over by a housing development (now Church Close). Meadow Croft, the house at the junction of Wootton High Street that may have served as the Seabees' HQ, appears to be the same building depicted on 1940s Ordnance Survey maps.

There is little evidence of military occupation at Kitehill today. Historic Ordnance Survey mapping indicates that whilst several farm buildings are still present, others have been removed and replaced. There is no significant change in the area around the farm between the 1930s and the 1960s. However, the 1972 National Grid map shows a sewage works in the small wood south of the farm, accessed by a track from Firestone Copse Road. The works seem to have little function as there is no other new infrastructure on higher ground, and it may in fact be a relic of the military camp. The works is still present today and forms the basis of Kite Hill Farm Caravan and Camping Park. Local residents also believe that there is evidence of a military camp in New Copse (Martin: pers. comm.).

The area of the original slipway and landing stage at Fishbourne Ferry Terminal has been completely redeveloped. However, the Coastguard Station to the east is still present and a number of old mooring bollards line the wall between the building and the terminal.

### 5.2 *Peel Bank*

The exact origin of the Kite Anchors in the vicinity of Peel Bank is not completely clear. Whilst clearly part of the mooring site, the presence of up to ten anchors in 2018 after the site was closed in 1945 is not clearly explained in any historical sources. They were not required during the storage of the Whale tows (the moorings were used for that purpose) and are therefore most likely part of the training and, in particular, the construction of the piers. It is certainly possible that six of them are those referred to in the report of the 17<sup>th</sup> August 1944, previously used in a pier (ADM 199/1619:279). Although the area was reported as cleared by the 27<sup>th</sup> August 1944 (ADM 199/1619:281), the recovery of these anchors is not explicitly mentioned and they may have in fact been left. Even so, this would only account for six of the ten anchors. The presence of an erection tank saddle may be linked to the report of the 17<sup>th</sup> August 1944,

which notes that three of the erection tanks in use on the 27<sup>th</sup> July were still present (ADM 199/1619:276). However, there is no mention of the three cable reels.

Some of these artefacts lie very close to the high water mark on Woodside Beach. Although Woodside isn't named in any documents, it is undoubtedly the beach onto which the piers were built and probably the location that a Beetle was being repaired on the 27<sup>th</sup> July 1944. It is quite possible that these items are just pieces of spare equipment that were left, possibly obscured by a high tide, when the site was finally closed. Alternatively, the anchors may be related to the extended stay of Pierhead 416, although it had been found during the war that the pierheads were stable enough without needing anchors (Evans, Palmer & Walter, 2000:33).

It should be remembered that the anchors, saddle and reels are items that would have been stowed on the complete tows. Peel Bank was a very busy site between May and August 1944, as was the entire south coast. The identified items are fairly small pieces of equipment that may quite easily have been lost overboard and forgotten. In expectation of losses during Operation Neptune, every item of equipment used in the invasion was defined as expendable and its loss did not have to be reported (Maher, 1996:120). It may simply be that many of these items reflect the extreme activity of the period.

There are two wrecks in the vicinity of Peel Bank that may be associated with the activities of the Second World War. The first is the Peel Wreck, marked by a buoy at 50.748507, -1.223918. This wreck, although identified as concrete (Pastscape, Peel Wreck), is most likely a steel Beetle, confirmed by a dive in 2016 (Martin, pers. comm.). A second site at approximately 50.763060 -1.1947356 may represent the remains of a Whale tow, although it is outside the mooring area (Pastscape, Mulberry Harbour Units).

It is tempting to assume that these wrecks may be those identified in records as sunken units. The Peel Wreck in particular may be the sunken Beetle referred to on the 27<sup>th</sup> July 1944 (ADM 199/1619:276), but this is not mentioned on the 17<sup>th</sup> August 1944, despite a specific note that only six Kite Anchors remained to be salvaged (ADM 199/1619:279). Likewise, it may be tempting to assume that the potential Whale tow is C1/583, reportedly lost leaving Peel Bank (WO 219/949), but this unit appears to have been recovered by the 27<sup>th</sup> May 1944 and is shown in the mooring area (ADM 199/1619:232). The report of the 8<sup>th</sup> July seems to suggest

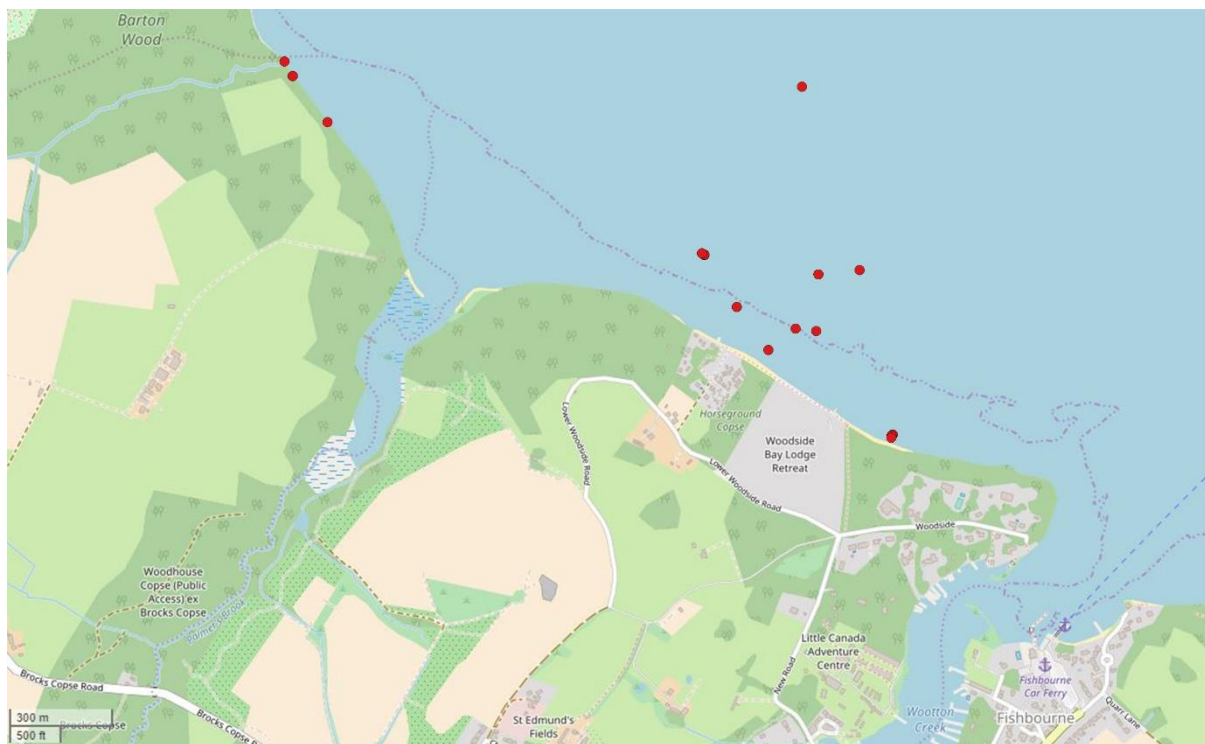
that the remains are unlikely to be any of the units sunk before that date (ADM 199/1619:296). The location of the longer tow is actually in the main shipping channel and may in fact be one on its way out of the unit to Selsey, possibly one of the tows described by Beckett. More detailed research into losses of Whale tows and cross checking with those known to have been incorporated into the French harbours, may reveal its identity.

Further west in Osborne Bay the clear remains of a Naval Lighterage pontoon unit are visible on the shore at 50.763060 -1.1947356. This is most likely part of the causeway mentioned on the 27<sup>th</sup> August 1944 (ADM 199/1619:281).

## 6. Field Survey

The site at Woodside beach, near Wootton Bridge, Isle of Wight is publically accessible via a path off Lower Woodside Road and runs along the side of Woodside Bay Coastal Retreat<sup>1</sup> holiday village. At the end of the path there are several steps that lead on to the beach. The sea level at high water reduces the amount of beach significantly with signs of coastal erosion into the woodland behind. However once the tide begins to ebb the sea retreats quickly exposing an intertidal zone of up to 300m in places. The majority of the Kite Anchors and artefacts are below the High Water line and only become exposed at Low Water on a spring tide. The beach is mainly firm, relatively clean sand with a line of small stones/pebbles and occasional rocks. There is a sea grass meadow that extends outwards from approximately 200m off the shore.

**Figure 6. A map of Woodside Beach and surrounding terrain. The red dots represent the position of the Kite Anchors and associated assemblies.**



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<sup>1</sup> Lower Woodside Rd, Wootton Bridge, PO33 4JPE



The area and its connection to Second World War Mulberry Harbour activities is mentioned in the Isle of Wight Shoreline Management Plan (Isle of Wight County Council, 2010:41-43). The location of the Peel wreck is also mentioned in the Plan.

**Figure 7. Several Kite Anchors were in the vicinity of the sea grass meadow.**



© Martin Davies

### **6.1. General Survey Methodology**

There are very few opportunities during the year to visit the site when there is low spring tide sufficient to view the majority of the anchors. One of the lowest water spring tides occurred on Friday 2<sup>nd</sup> March 2018 at 0.3m and this is when the field survey was conducted.

Those participating in the survey were;

Martin Davies, Alison Mayor, Mike Beckett, Hilary Martin, Dave Moore and Robert Watkins.

Conditions were not ideal with recent snowfall and strong onshore winds accompanied by sleet/rain showers. Low Water (Portsmouth) was in the late afternoon at 16:59 GMT with sunset at 17:47 which meant that lighting conditions were poor for photography especially for those anchors further offshore.



Each anchor was visited systematically as the tide retreated and they became visible. The anchors were numbered and labelled (K1 to K7 and K10) before a GPS position was recorded using a hand held GPS. General photographs were taken to show context/location. Not all anchors were completely exposed from the water even when the tide was at its lowest point.

**Figure 8. Photographs were taken of each anchor as they became exposed by the receding tide.**



© Alison Mayor

One new anchor (K10) was discovered and recorded as it remained partly underwater. Two Kite Anchors (K8 and K9) together with other cable reels (R3 and R4) were not visited as they are located on a private beach some distance away. Details of K8 and K9 included in this report were kindly provided by local historian David Moore. The numbers were allocated in line with that established by Hilary Martin who kindly guided to each anchor as the tide receded.

Other artefacts associated with Mulberry Whales and Kites were similarly recorded, namely cable reels, frame assembly and a saddle.

After labelling each anchor and artefact was oriented with a north arrow and a 0.5m scale bar was also placed next to the anchor or on the anchor if it was partially submerged. Notes were made of the general condition of each anchor and the local environment.

## 6.2. Photogrammetry

Where practicable a series of images taken for each of the anchors that were sufficiently exposed enough to make a photogrammetry 3D model. As the anchors remained very wet, the conditions for 3D model creation were not ideal due to reflective surfaces. The models have nonetheless been produced to the best of our ability with the given limitations and time constraints on the site. The photographs and photogrammetry images enabled the condition and orientation of each anchor to be recorded in situ. The resultant images may be viewed in 3D by accessing the [sketchfab.com](https://sketchfab.com) website using Google Chrome and AdobePDFviewer. It is also possible to view the models using Virtual Reality equipment.

## 6.3. Survey Findings

The information in table 2 below represents the positioning of each anchor and associated artefacts.

**Table 2. GPS positions for each of the anchors and associated artefacts (WGS84).**

ANCHOR NUMBER	GPS Way Point	LATITUDE	LONGITUDE
K1	36	50° 44'.606N	001° 13'.417W
K2	38	50° 44'.517N	001° 13'.424W
K3	34	50° 44'.638N	001° 13'.699W
K4	33	50° 44'.639N	001° 13'.699W
K5	31	50° 44'.521N	001° 13'.475W
K6	29	50° 44'.353N	001° 13'.237W
K7	30	50° 44'.488N	001° 13'.543W
K8 *	-	50° 44'.926N	001° 14'.714W
K9 *	-	50° 44'.853N	001° 14'.629W
K10	37	50° 44'.612N	001° 13'.315W
R1 (Reel – K6)	-	50° 44'.351N	001° 13'.240W
R2 (Reel – K3/K4)	35	50° 44'.641N	001° 13'.705W
R3 * (Reel – K8)	-	50° 44'.926N	001° 14'.714W
R4 *	-	50° 44'.949N	001° 14'.734W

S1 (Saddle)	32	50° 44'.556N	001° 13'.620W
Frame Assembly (K6)	-	50° 44'.348N	001° 13'.241W

\* Not visited. Reported position (David Moore) – private beach.

It was noted that the collection of anchors and associated artefacts were spread over a large area with the furthest distance being in excess of 2,000m apart (K6 to K8). There was little correlation between the position of anchors relative to one another with the exception of anchors K3 and K4 which appeared to be positioned as a pair together with the remnants of a cable reel. None of the anchors observed were embedded into the seabed in a way that would indicate they had been placed under a load, although K9 (not visited) is reportedly mostly buried. This would indicate that the anchors were not being tested or placed under any strain when lost. We have also noted that the fully submerged wreck, known locally as the 'Peel Wreck'<sup>2</sup> is also, from the description likely to be connected to the WW2 activities at Wootton and is likely to be a steel or concrete Beetle. The UKHO also chart a number of other obstructions<sup>3</sup> below the water line which may also be associated with the mooring of Whale tows in preparation for the Normandy landings. It is therefore very possible that additional anchors may be present and submerged below the low water line.

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<sup>2</sup> UKHO wreck number 19139 position for peel wreck **Latitude** = 50°44'.901 N **Longitude** = 001°13'.453 W.

<sup>3</sup> UKHO wreck numbers 78195 and 19643.

**Table 3. Distances between Kite Anchors and other recorded artefacts (metres).**

	Lat (N)	Long (W)	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	R1	R2	R3	R4	S1	F1 (Frame)	Peel Wreck
K1	44.606	13.417	0.00	165.03	335.78	336.11	171.47	513.86	263.75	1,631.53	1,492.30	120.06	515.81	343.70	1,631.53	1,669.13	255.30	520.44	547.97
K2	44.517	13.424	165.03	0.00	392.55	393.61	60.23	374.54	149.45	1,691.02	1,543.28	217.43	375.52	401.49	1,691.02	1,731.27	240.80	379.42	711.98
K3	44.638	13.699	335.78	392.55	0.00	1.85	340.40	756.16	332.57	1,303.68	1,160.41	452.62	756.24	8.96	1,303.68	1,342.82	177.86	759.33	566.01
K4	44.639	13.699	336.11	393.61	1.85	0.00	341.58	757.45	334.11	1,302.93	1,159.78	452.82	757.55	7.95	1,302.93	1,342.03	179.45	760.64	564.42
K5	44.521	13.475	171.47	60.23	340.40	341.58	0.00	417.86	100.43	1,634.38	1,485.69	252.12	418.31	349.36	1,634.38	1,674.98	181.88	421.74	704.23
K6	44.353	13.237	513.86	374.54	756.16	757.45	417.86	0.00	437.18	2,030.43	1,875.91	488.30	5.11	765.07	2,030.43	2,072.82	585.52	10.38	1,045.99
K7	44.488	13.543	263.75	149.45	332.57	334.11	100.43	437.18	0.00	1,594.21	1,441.16	352.34	436.44	341.08	1,594.21	1,636.25	154.93	438.75	772.11
K8	44.926	14.714	1,631.53	1,691.02	1,303.68	1,302.93	1,634.38	2,030.43	1,594.21	0.00	167.93	1,739.70	2,029.38	1,295.00	0.00	48.62	1,453.79	2,031.30	1,478.62
K9	44.853	14.629	1,492.30	1,543.28	1,160.41	1,159.78	1,485.69	1,875.91	1,441.16	167.93	0.00	1,603.38	1,874.68	1,151.91	167.93	216.23	1,304.21	1,876.43	1,381.14
K10	44.612	13.315	120.06	217.43	452.62	452.82	252.12	488.30	352.34	1,739.70	1,603.38	0.00	491.30	460.22	1,739.70	1,776.32	372.20	496.56	559.13
R1	44.351	13.240	515.81	375.52	756.24	757.55	418.31	5.11	436.44	2,029.38	1,874.68	491.30	0.00	765.15	2,029.38	2,071.82	585.22	5.68	1,048.74
R2	44.641	13.705	343.70	401.49	8.96	7.95	349.36	765.07	341.08	1,295.00	1,151.91	460.22	765.15	0.00	1,295.00	1,334.08	186.29	768.23	564.88
R3	44.926	14.714	1,631.53	1,691.02	1,303.68	1,302.93	1,634.38	2,030.43	1,594.21	0.00	167.93	1,739.70	2,029.38	1,295.00	0.00	48.62	1,453.79	2,031.30	1,478.62
R4	44.949	14.734	1,669.13	1,731.27	1,342.82	1,342.03	1,674.98	2,072.82	1,636.25	48.62	216.23	1,776.32	2,071.82	1,334.08	48.62	0.00	1,494.78	2,073.81	1,503.96
S1	44.556	13.620	255.30	240.80	177.86	179.45	181.88	585.52	154.93	1,453.79	1,304.21	372.20	585.22	186.29	1,453.79	1,494.78	0.00	587.96	668.25
F1 (Frame)	44.348	13.241	520.44	379.42	759.33	760.64	421.74	10.38	438.75	2,031.30	1,876.43	496.56	5.68	768.23	2,031.30	2,073.81	587.96	0.00	1,053.86
Peel Wreck	44.901	13.453	547.97	711.98	566.01	564.42	704.23	1,045.99	772.11	1,478.62	1,381.14	559.13	1,048.74	564.88	1,478.62	1,503.96	668.25	1,053.86	0.00

[illegible]

Original chart Copyright © United Kingdom Hydrographic Office, 2036 The Solent and Southampton Water.



#### **6.4. Comments and Observations on each Anchor/Artefact.**

This section documents the position, condition and photographic record of each artefact. Where possible a screen shot of the photogrammetry model has been included, although the full 3D image (where available) will provide a better view of the anchor.

##### **Anchor K1**

Position

Latitude 50° 44'.606N	Longitude 001° 13'.417W
-----------------------	-------------------------

This anchor is only partially visible at low water and appears to be on its side. There is some concretion and much marine growth on the external structure. It is difficult to assess the full condition of this anchor due to it being partly submerged. The arm of the anchor is complete and the main structure is in place though much of the plate has corroded.

**Figure 10. Kite Anchor K1 at low water looking back to the shore line.**



© Martin Davies

Photogrammetry of this Kite Anchor was not possible due to it being partially submerged.

**Figure 11. Kite Anchor K1 detail photograph.**



© Martin Davies

## **Anchor K2**

Position

Latitude 50° 44'.517N	Longitude 001° 13'.424W
-----------------------	-------------------------

This Kite Anchor dries at low water and a photogrammetry model was made of the anchor in situ. The anchor is in reasonable condition though there is a large hole in the arm/shank where corrosion has set in. Much of the plating around the hook/blade has corroded away and the main structure is also beginning to collapse. Some marine concretion is present and there was a large amount of marine growth covering all parts of the anchor. Loose seaweed was removed for photographic purposes and to examine the condition of the anchor.



**Figure 12.** Kite Anchor K2 at low water was covered in seaweed.



© Martin Davies

**Figure 13.** Kite Anchor K2 being prepared for photogrammetry.



© Martin Davies

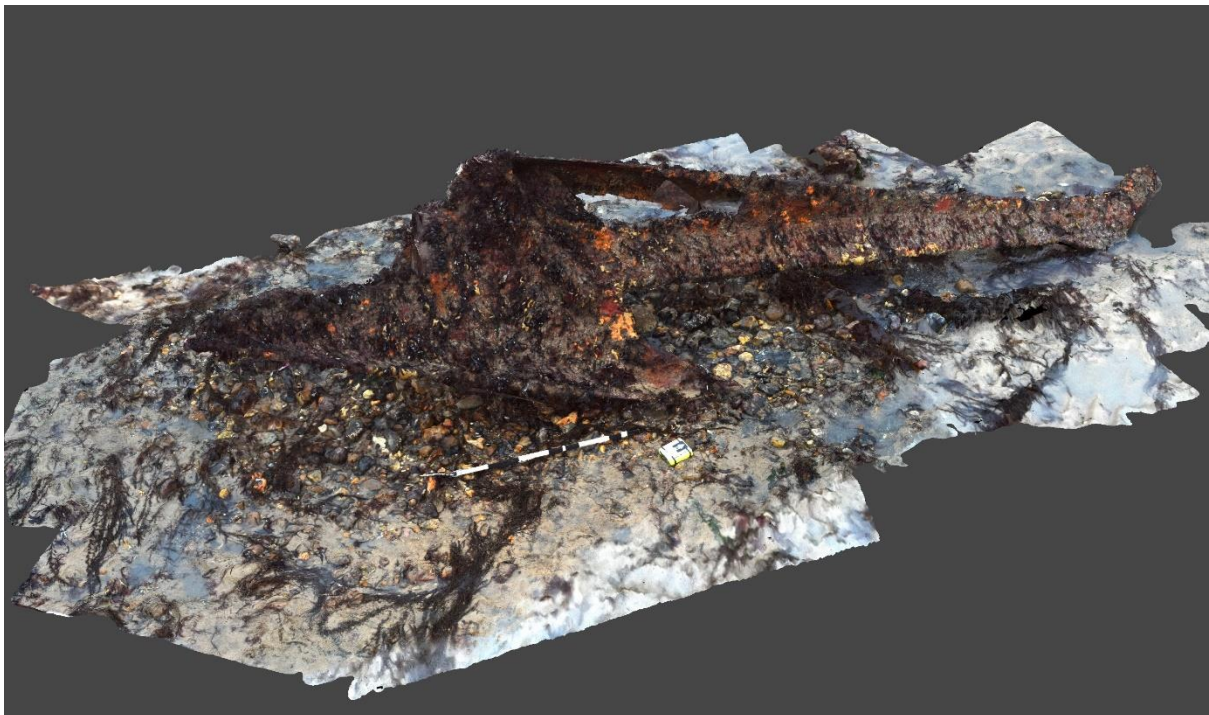


Figure 14. Kite Anchor K2 in shallow water showing the corrosion to the hook plates.



© Martin Davies

Figure 15. Kite Anchor K2 - screen shot of photogrammetry model.



© Martin Davies

View 3D model - <https://sketchfab.com/models/d2dee26509c946e3adc06135148babda>

## Anchor K3

Position

Latitude 50° 44'.638N	Longitude 001° 13'.699W
-----------------------	-------------------------

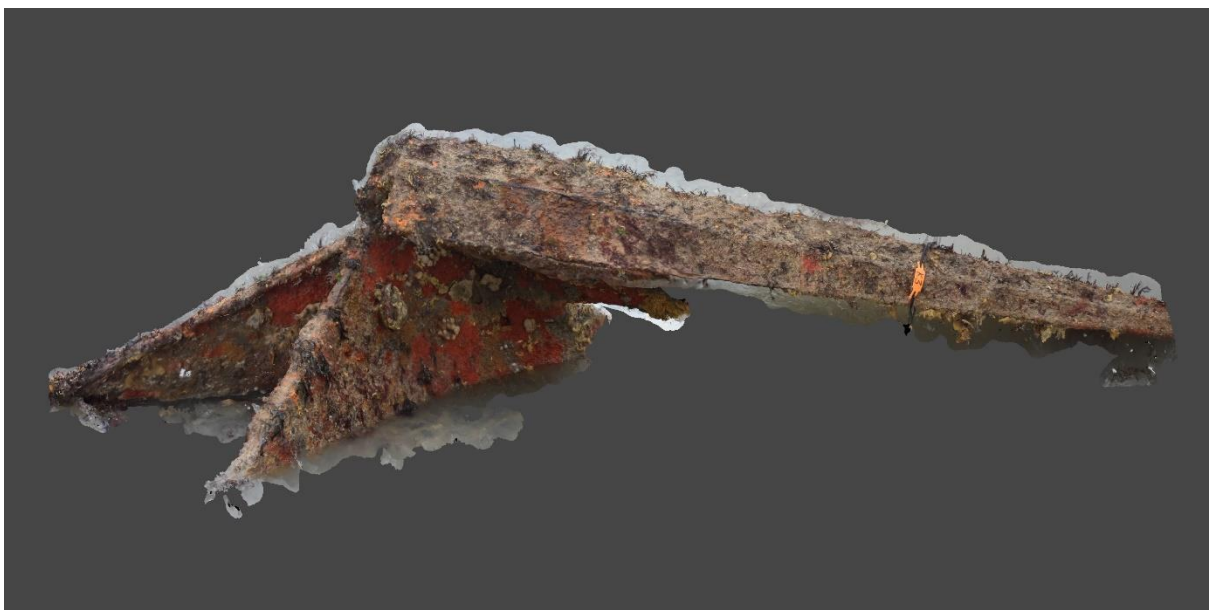
Kite Anchors K3 and K4 are positioned close together and in the vicinity of a cable reel (R2).

**Figure 16. Kite Anchors K3 (background) and K4 (foreground) just before low water.**



© Martin Davies

**Figure 17. Kite Anchor K3, screen shot of photogrammetry model.**



© Martin Davies



Anchor K3 does not dry completely and is only visible on the lowest of tides. A partial photogrammetry model was made of the anchor. The condition of this anchor is relatively good with much of the structure and hook plating still complete. However some parts of the anchor were not visible as they were underwater. The anchor arm and kite hook were concreted and covered in marine growth.

## Anchor K4

Position

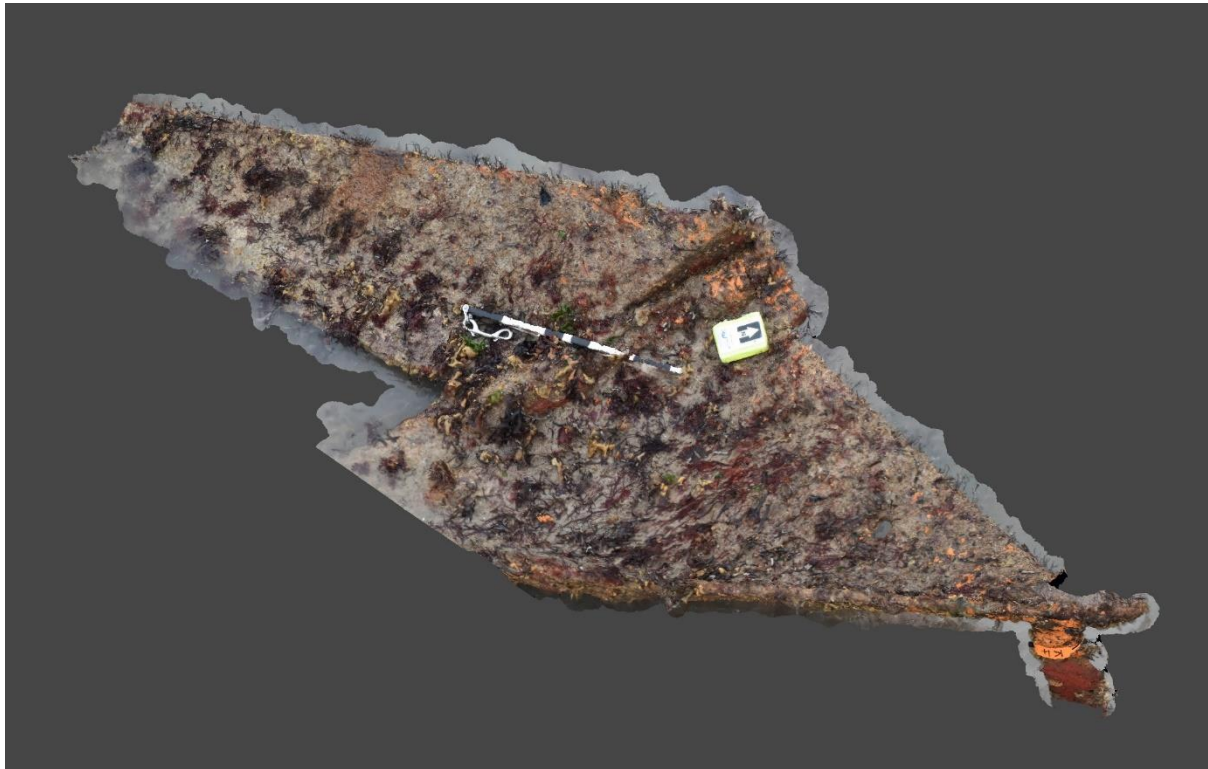
Latitude 50° 44'.639N	Longitude 001° 13'.699W
-----------------------	-------------------------

Anchor K4 is only a metre away from K3 and further submerged underwater. The component parts were visible and a partial photogrammetry model was made of the structure. The anchor is on its side and appears to be in reasonably complete and a similar condition to K3. It was concreted and covered in marine growth.

**Figure 18.** Surveyors standing by K4 waiting for tide to recede. The top of K3 to the left of K4 and R2 further left are beginning to emerge.



Figure 19. Kite Anchor K4 - screen shot of photogrammetry model.



© Martin Davies

### Anchor K5

Position

Latitude 50° 44'.521N	Longitude 001° 13'.475W
-----------------------	-------------------------

Anchor K5 is assessed to be in poor condition and has lost a lot of material from the shank and the plough / kite shape. It is not heavily concreted and there is exposed steel. The lack of concretion may have speeded up the corrosion process over time. Whilst still recognisable as a Kite Anchor it is considered the worst of the collection that was observed.



**Figure 20. Kite Anchor K5 as the sea retreats towards low tide.**



© Alison Mayor

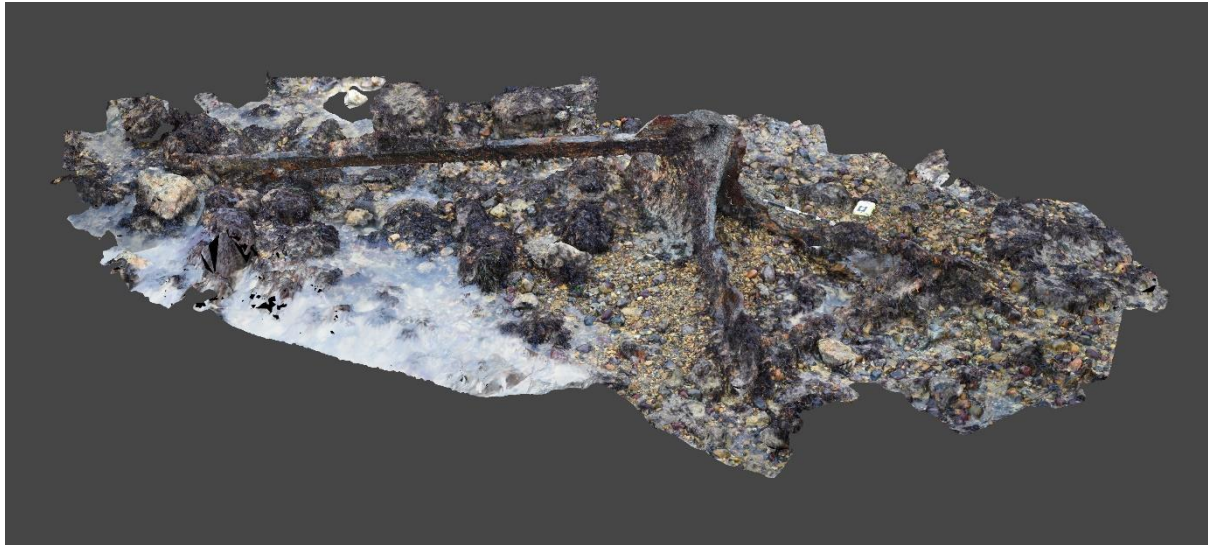
**Figure 21. K5 anchor is in extremely poor condition.**



© Martin Davies



**Figure 22. Screen shot of photogrammetry of K5.**



© Martin Davies

View 3D model - <https://sketchfab.com/models/9f2e6441262a4573abfcbee886b5adef>

## **Anchor K6**

Position

Latitude 50° 44'.353N	Longitude 001° 13'.237W
-----------------------	-------------------------

K6 was the first anchor to be surveyed as it is closest to shore and emerges once the tide begins to retreat. Also in the vicinity are several other features including two wooden pontoon like frames with metal fittings and a cable reel (R1).

This anchor is adjacent to cable reel R1 and it appears that this anchor may have been positioned on a mooring shuttle, the remains of the frame of which can be seen protruding from the sand to the south of it (F1). The surrounding area also includes other artefacts which may be connected to the Second World War Overlord preparations, namely some rectangular metal and wooden frames (possibly pontoons), and wooden supports driven into the sand which may have provided the support to a small jetty. It is possible that this area may have been where much of the activity between shore and Whale tows took place.

The anchor (K6) is positioned close to the edge of the beach and is some distance from the other anchors in the collection, being the furthest to the east. This Kite Anchor is in poor condition with the plough shaped hook and shank heavily corroded. There was a significant amount of marine vegetation on this anchor being positioned in shallow water which has



given rise to rapid growth of the seaweed. A photogrammetry model of the anchor has been produced, the anchor being positioned on its side and the arm is partially buried in the sand.

**Figure 23. Remains of mooring jetty posts at the shoreline near K6**



© Martin Davies

**Figure 24. The shoreline around K6, showing R1 and the shuttle, covered in marine vegetation. In the background are the two pontoon frames.**



© Martin Davies



**Figure 25. The arm of K6 is partly buried. In the background are the pontoons/frames.**



© Martin Davies

**Figure 26. Screen shot of a photogrammetry of anchor K6.**



© Martin Davies



View 3D model - <https://sketchfab.com/models/3e5044369ab54c2aaced06d10c8bfc0f>

## Anchor K7

Position

Latitude 50° 44'.488N	Longitude 001° 13'.543W
-----------------------	-------------------------

Kite Anchor K7 is probably in the best condition, being positioned mid-way in the intertidal zone with several rocks nearby. There is some corrosion of the hook area though this is not considered material. A shackle is present on the end of the arm but no cable is attached.

**Figure 27.** Anchor K7 is found amongst rocks once the tide has receded.



© Martin Davies

The arm appears to be in excellent condition in comparison to the other surveyed anchors. There is some concretion on it and some growth but it is in general very clean compared to the rest of the collection. A photogrammetry model has been made of K7.

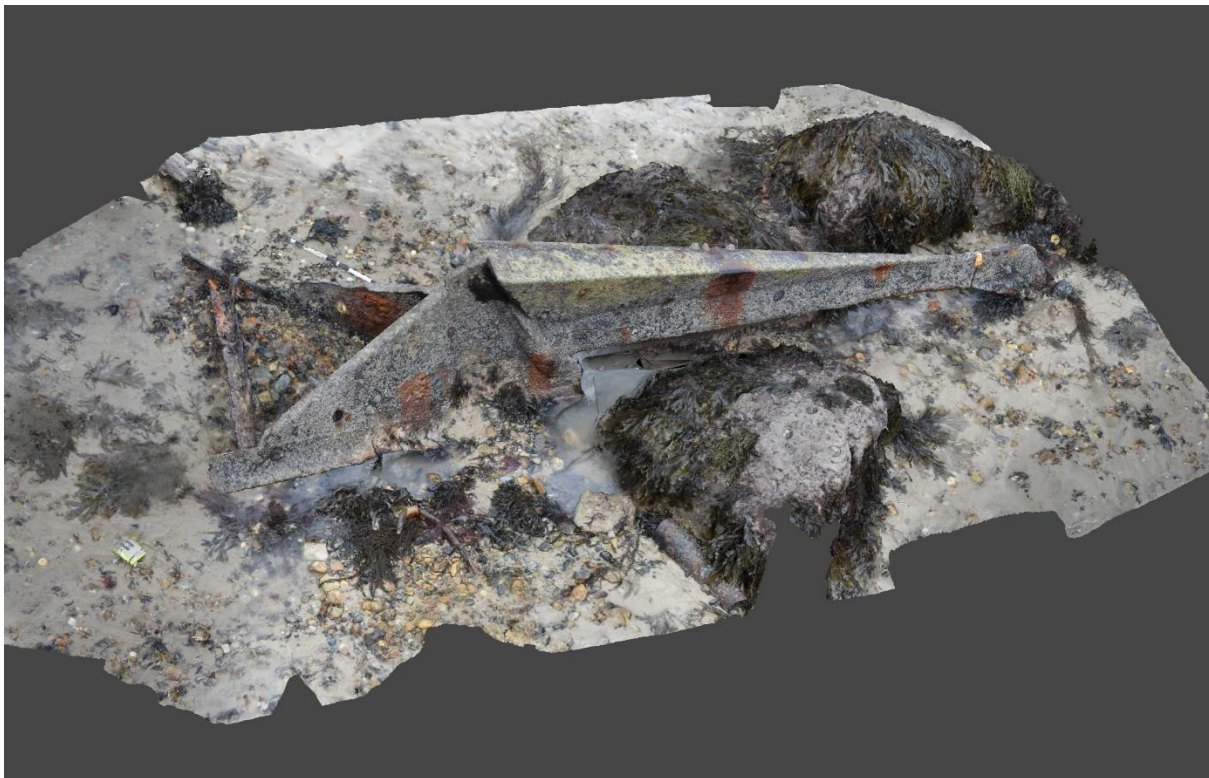


Figure 28. Anchor K7 is in remarkable condition in comparison with the others surveyed.



© Martin Davies

Figure 29. Kite Anchor K7 - screen shot of 3D photogrammetry model.



© Martin Davies

View 3D model - <https://sketchfab.com/models/58eda2d863354850b1c44a13cb3aeeb1>

### **Anchor K8 (Not surveyed)**

Position

Latitude 50° 44'.926N	Longitude 001° 14'.714W
-----------------------	-------------------------

Anchor K8 is reported to be close to the shoreline near Barton Hard, Barton Beach between King's Quay and Osborne Bay. K8 is reported as very corroded (worse than K5). There is a cable reel nearby at 50° 44'.908N 001° 14'.647W.

### **Anchor K9 (Not surveyed)**

Position

Latitude 50° 44'.853N	Longitude 001° 14'.629W
-----------------------	-------------------------

K9 is mostly buried in the shingle bank and the condition is unknown. There is a separate wire reel drum at 50° 44'.949N 001° 14'.734W.

### **Anchor K10**

Position

Latitude 50° 44'.612N	Longitude 001° 13'.315W
-----------------------	-------------------------

Kite Anchor K10 was only discovered at the low tide during the survey when the top of the anchor appeared above the surface of the water.

### **Reel R1**

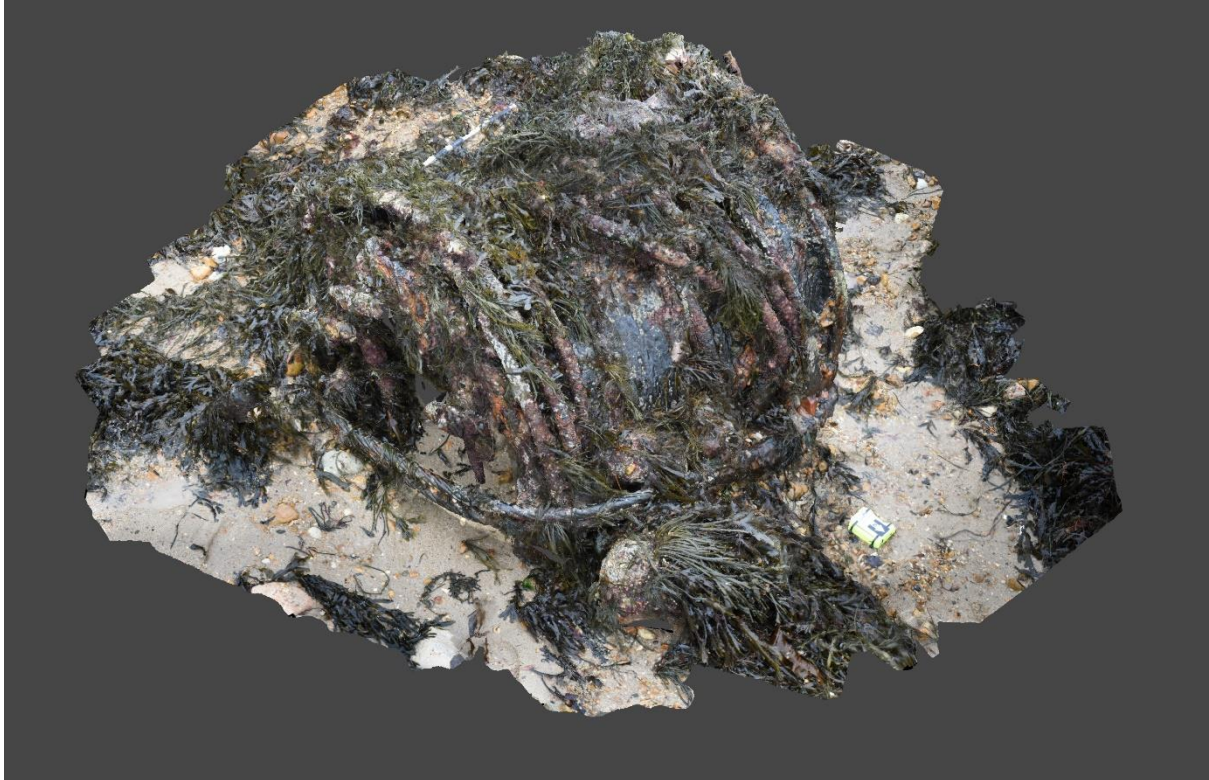
Position

Latitude 50° 44'.351N	Longitude 001° 13'.240W
-----------------------	-------------------------

Positioned very close to K6 is cable reel R1. The reel is heavily corroded and covered in seaweed though the cable is still wound. A photogrammetry model was made of the remains.



**Figure 30. Reel 1 photogrammetry model.**



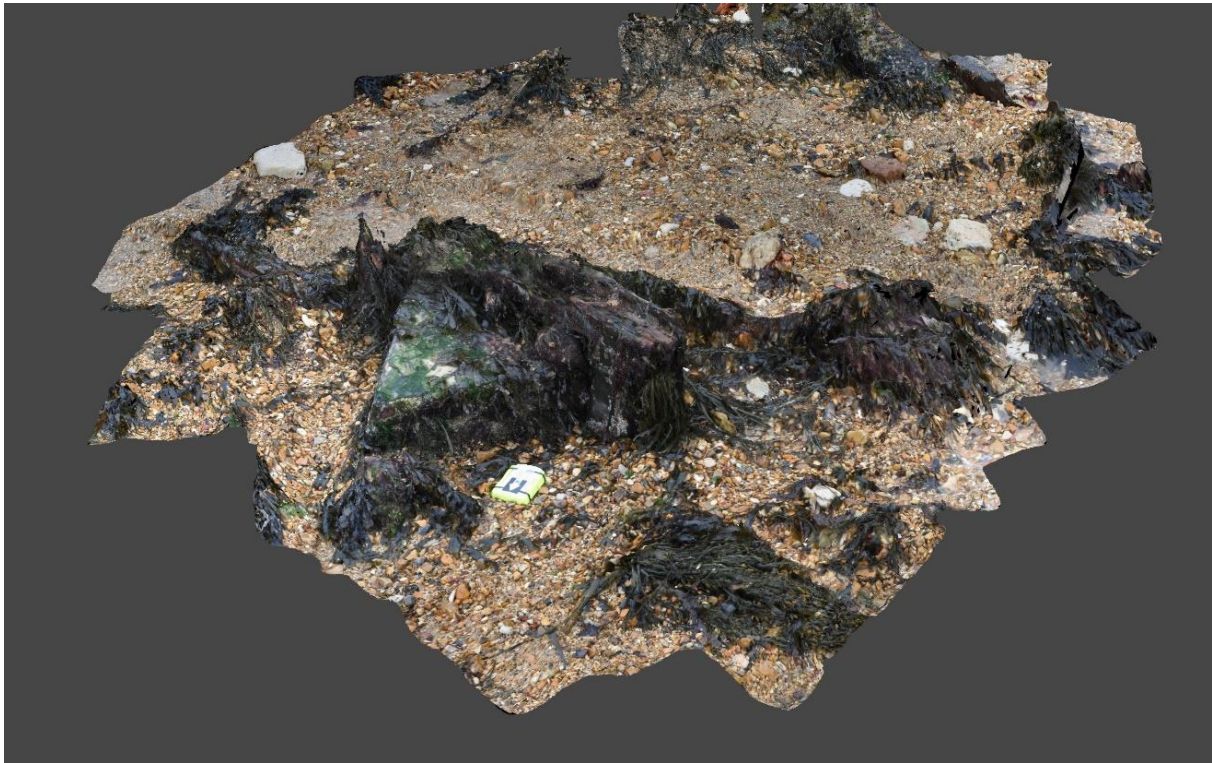
© Martin Davies

View 3D model - <https://sketchfab.com/models/62b4541ab5144542b1c1816f6434c565>

### **Frame 1 (F1)**

The remains of the mooring shuttle are adjacent to the reel R1. Only the heavy supporting construction parts now are visible. This item is part of the frame associated with the reel R1 and would have supported the reel on the shuttle and allowed it unwind the cable as required. It is located very close to the reel and the base is significantly corroded.

**Figure 31. A photogrammetry of (F1) the mooring shuttle remains.**



© Martin Davies

View 3D model - <https://sketchfab.com/models/0eff7877089d4b19b592b2e8fc60c902>

## Reel R2

Position

Longitude 50° 44'.641N	Latitude 001° 13'.705W
------------------------	------------------------

Reel R2 lies close to anchors K3 and K4 and also very close to the reel is part of its support frame that was used to allow the wire to unwind. The reel is complete with cable and is heavily concreted. This along with K3 and K4 would have been placed on a mooring shuttle and there are some buried remains of a shuttle near to R2 below the water.



**Figure 32. Reel R2 at low water is on a sandy seabed with occasional sea grass.**



© Martin Davies

### **Reel R3 (not surveyed)**

Position

Latitude 50° 44'.926N	Longitude 001° 14'.714W
-----------------------	-------------------------

This reel is reported as being close to anchor K8. It was not surveyed as it is located on a private beach - condition unknown.

### **Reel R4 (not surveyed)**

Position

Latitude 50° 44'.949N	Longitude 001° 14'.734W
-----------------------	-------------------------

This reel is reported as being close to anchor K9. It was not surveyed as it is located on a private beach – condition unknown.



## Saddle S1

### Position

Latitude 50° 44'.556N	Longitude 001° 13'.620W
-----------------------	-------------------------

The remains of an erection tank saddle can be seen mid-way between K7 and K4 at the position given, this is a heavy construction item in reasonable condition due to the heavy gauge material use in its build. A photogrammetry model has been made of it, there is some light concretion over the surface of the saddle and only light marine growth.

**Figure 33. The Saddle S1 at low water.**



© Martin Davies

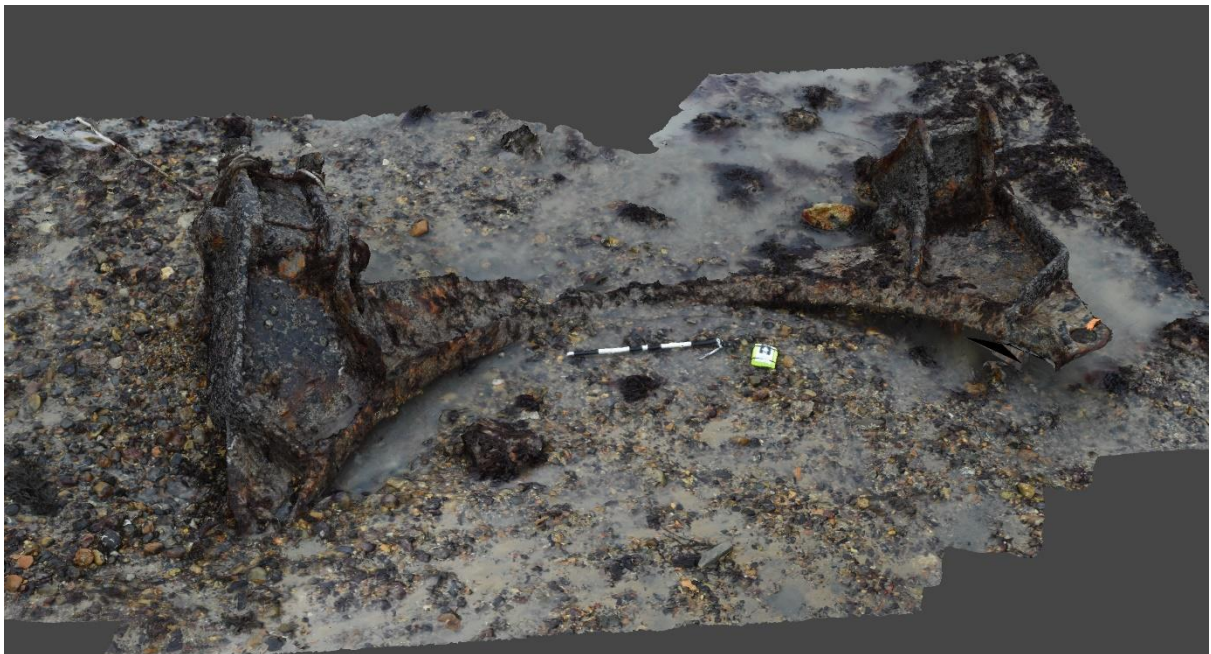


**Figure 34. The Saddle from the end view with a mooring rope tied to it.**



© Martin Davies

**Figure 35. Screen shot of the photogrammetry model of the Saddle (Plan view).**



© Martin Davies

View 3D Model - <https://sketchfab.com/models/b6cab7578a4440e0809d023271c5d718>



### **6.5. *Summary of the observations and condition of the Kite Anchors and Artefacts.***

Even after 74 years either underwater or in an intertidal zone the majority of the anchors are easily recognisable as Kite Anchors, although some are in extremely poor condition. The anchors are located across a wide area, the furthest apart being over 2km away from each other. It was interesting to note that other related artefacts such as cable reels and shuttle frame were generally positioned close to the Kite Anchors, the exception being the Saddle.

There was no indication that the anchors had been deployed intentionally and placed under strain: none of the anchors surveyed had embedded themselves into the seabed as they had been designed to do when under load. The reels of cable surveyed were intact with cable, which indicates these were not connected to anchors. The random positions would indicate the nature of the loss of these anchors and cables was not intentional.

Some of the Kite Anchors are extremely corroded: whilst others may look fairly robust it is recommended that great caution be exercised should recovery be attempted. Marine concretion has helped preserve some of them, others have their steel exposed and have been reduced in size and weight – accordingly their strength will also have been lost. It is understood that no galvanic protection was given to them, so their remains today are a credit to the design, construction methods and materials used.

The metallurgic properties of the steel may have changed considerably over time and there may be no strength left within the steel. There is a risk that the Saddle may also be brittle/fragile despite its fairly robust appearance. In the event that any of these anchors are removed it is recommended that they are placed on a platform and carefully supported during removal.

The anchors considered to be in the best condition were K7 (best) and K3 and K4.

## 7. Significance of the Kite Anchors

There are many examples of Mulberry around the English Channel and in Britain and France. However, it is clear that there are very few examples of Kite Anchors recorded anywhere in Europe. When the harbour at Arromanches-les-Bains was dismantled, very few of the anchors were recovered. They had buried themselves so deeply into the sand that the cables broke before the anchor came to the surface (Evans, Palmer & Walter, 2000:35). Aerial photographs show that the remaining elements of the harbour had assumed the locations that they are in today by 1947.

Kite Anchors were used subsequent to Mulberry Harbour. Beckett recorded their use in the Netherlands at Walcheren, where various Mulberry components including Beetles and Phoenixes were used to help repair the dykes destroyed during the capture of the island in 1944. During a demonstration with a bulldozer on the beach outside Westkapelle, one anchor was observed to bury itself so rigidly into the sand that the cable being used to pull it snapped (T 166/132/1:51). The total number used in the Netherlands was not recorded, nor those used in Dieppe or other French ports. However, a total of 348 were recorded as surplus at the end of the war and were disposed of. Table 2 lists their fates (AVIA 53/280:20).

**Table 4. Distribution of spare Kite Anchors at the end of the Second World War.**

Quantity	Disposal
104	French government, Ministry of Transport
12	A. Monk & Co. Ltd. Civil Engineering Company
12	Phoenix Timber Ltd.
1	Camper & Nicholson
219	Offered for sale from Marchwood. No sales made, anchors subsequently disposed of as scrap.

After the war, Beckett became involved in a patent dispute with the inventor of the CQR anchor. Although efforts were made to market the anchor commercially, it does not seem that the design was manufactured beyond its wartime use.

Very few Kite Anchors have since been traced. One well known example can be found at a memorial to Allan Beckett at Arromanches-les-Bains in Normandy, but this is in fact a replica

built especially for the memorial (New Civil Engineer, 2009. French honour Mulberry engineer). As part of this assessment, a number of museum collections were checked or contacted to see if they had or knew of an example of a genuine anchor. A full list of those contacted is found in Table 3. As is evident, only two examples, both believed to be genuine, have so far come to light. This assemblage would therefore appear to represent the largest collection in the world and must be considered significant as a result.

**Table 5. Museums contacted to identify potential Kite Anchors.**

<b>Museum</b>	<b>Response</b>
<b>In the UK:</b>	
The D-Day Museum	Closed at time of report
National Museum of the Royal Navy	None known
Imperial War Museum	None listed in online archive
<b>In Normandy:</b>	
Site et Musée de la Batterie de Merville	
Mémorial Pégasus	
Le Grand Bunker, le Musée du Mur de l'Atlantique	
Musée du N°4 Commando	
Musée Radar de Douvres	
Caen Normandie Mémorial	
Centre Juno Beach	
Musée America Gold Beach	
Musée du Débarquement	One authentic example in reserve collection, believed to be only example in Normandy.
Liberators Museum	
Musée Mémorial Bataille de Normandie	
Musée des épaves sous-marines du débarquement	
Big Red One Museum	

Overlord Museum	
Musée Mémorial d'Omaha Beach	
Museum D-Day Omaha	One authentic example on display outside museum, believed to be only example in Normandy.
Normandy Victory Museum	None
Musée du Débarquement Utah Beach	
D-Day Experience	
Airborne Museum, Sainte Mere Eglise	
<b>In The Netherlands:</b>	
Stichting Bunkerbehoud	None
muZEEum	
Polderhuis Westkapelle	None
Zeeuws Museum	None
Liberation Museum Zeeland	
Watersnoodmuseum	None

Whilst Peel Bank is closely associated with Mulberry Harbour and the use and preparation of Whale units in particular, it is a part of a network of other sites in the immediate area that contributed to the project. These include Southsea and the River Beaulieu where Beetles were constructed and, to a lesser extent, Southampton and Portsmouth Docks, where Phoenix caissons and Bombardons were built. Many other related archaeological sites exist in a similar area. At Lepe Country Park are the best preserved remains of a Phoenix beach construction site, with less well preserved remains at Hayling Island and Stokes Bay. In Langstone Harbour is a complete Phoenix Caisson that broke during construction and was abandoned in the harbour before D-Day.

Perhaps Peel Bank's most significant association is with Marchwood, where the completed tows were coming from. After the war, a multitude of Whale spares were left at the port, evidenced by 1945 aerial photographs. Many of these spares are still visible: some 36 Beetles were incorporated into a sea wall used during land reclamation in Dibden Bay during the

1950s. Two Whale roadways and a Buffer Pontoon were used by Red Funnel at their ferry terminal at Town Quay in Southampton after the war; one roadway and the pontoon have now been listed. In this context, the anchors at Peel Bank can therefore be considered an exemplar of the activity there, as well as being some of the very few archaeological remains at this location.

On the other hand, Peel Bank was a temporary site, little more than a parking area for Whale spans before their journey to France. Its role was therefore very ephemeral with no permanent infrastructure: the remains left there are little more than forgotten items. Were Peel Bank a military camp, the few artefacts left would be the equivalent of a broken down truck and the remains of a few entrenching tools, rather than huts or defensive emplacements. They are items left on site, not part of it.

## 8. Conclusions

Kite Anchors are extremely rare and to have located a collection of 10 is a remarkable achievement. Only two other original Kite Anchors are known to have survived, both of which are in Normandy museums.

Whilst the Kite Anchors are certainly indicative of the wartime activities at Peel Bank, by themselves they do little to inform the public about the site. Nor do they in any way inform the public about the story of the anchors themselves and their employment France. In contrast to this, preserved and interpreted in a museum they would serve a much better purpose, and can be used to inform the public about a remarkable invention with a significant role.

In addition and perhaps most importantly, the anchors are incredibly rare and correspondingly very valuable. It is impressive that they have survived this long in a maritime environment, but eventually naturally processes will inevitably degrade them. Added to this more serious risk of human interference. These artefacts are relatively small and, should their presence became more widely known, it would not be difficult for souvenir hunters to remove them from the study area.

With this in mind, the historical significance of the Kite Anchors and their incredibly rarity means that serious consideration should be given to their recovery and preservation.

## 9. References

### 9.1. Published Sources

Anon, 1946. Two Soldiers Drowned at Wootton. *The Isle of Wight County Press*. 11 May 1946. Page 8.

Anon, 1948. Another Grim Memento of War... *The Isle of Wight County Press*. 17 April 1948.

Burgess, S., 2018. *The Duplex Drive Tanks of D-Day: B-Wing Saltwater Training School Stokes Bay*. Available from: [www.duplexdrivetanks.co.uk/DUPLEXPAGES/SALT1.html](http://www.duplexdrivetanks.co.uk/DUPLEXPAGES/SALT1.html) [Accessed January 2018].

Chartered Institute for Archaeologists, 2014. *Standard and Guidance for Historic Environment Desk-Based Assessment*.

Evans, J., Palmer, E. & Walter, R., 2000. *A Harbour Goes to War*. Brook House Publishing.

Falconer, J., 2013. *D-Day Operations Manual*. Haynes.

Hartcup, G., 1977. *Code Name Mulberry: The Planning, Building and Operation of the Normandy Harbours*. Pen and Sword.

Historic England, 2011. *Designation Selection Guide: Military Structures*. Historic England. Available from: [https://content.historicengland.org.uk/images-books/publications/dlsg-military/military\\_final.pdf/](https://content.historicengland.org.uk/images-books/publications/dlsg-military/military_final.pdf/) [Accessed January 2018].

Historic England, 2014. *Historic Environment Good Practice Advice in Planning Note 2: Decision-Taking in the Historic Environment*.

Isle of Wight County Council, 2010. *Isle of Wight Shoreline Management Plan 2. Appendix D: Annex 1. Full Heritage Review*. Available from: [http://www.coastalwight.gov.uk/smp/FINAL\\_SMP\\_for\\_web/pdf\\_Appendices/AppendixD/Appendix%20D-Annex1\\_Heritage%20Review\\_Dec10\\_Final.pdf](http://www.coastalwight.gov.uk/smp/FINAL_SMP_for_web/pdf_Appendices/AppendixD/Appendix%20D-Annex1_Heritage%20Review_Dec10_Final.pdf) [Accessed April 2018]

Lambert, J., & Ross, A., 1990. *Allied Coastal Forces of World War II Volume 1: Fairmile Designs & US Submarine Chasers*. Conway Maritime Press.

Loader, R., Westmore, I., & Tomalin, D., 1997. *Time and Tide. An Archaeological Survey of the Wootton-Quarr Coast*. Isle of Wight Council.

New Civil Engineer, 2009. *French Honour Mulberry Engineer*. Available from: <https://www.newcivilengineer.com/world-view/french-honour-mulberry-engineer/1995929.article> [Accessed January 2018].

Pastscape, 2004. *Mulberry Harbour Units, Monument Number 1398096*. Historic England. Available from: [www.pastscape.org.uk/hob.aspx?hob\\_id=1398096](http://www.pastscape.org.uk/hob.aspx?hob_id=1398096) [Accessed January 2018].

Pastscape, 2017. *Mulberry Harbour Unit (Peel Wreck), Monument Number 767411*. Historic England. Available from: [www.pastscape.org.uk/hob.aspx?hob\\_id=767411](http://www.pastscape.org.uk/hob.aspx?hob_id=767411) [Accessed January 2018].

Stanford, A., 1951. *Force Mulberry: The Planning and Installation of the Artificial Harbour off US Normandy Beaches in World War II*. William Morrow and Company.

Wootton Bridge Historical, 2018. *Cross Solent Ferries*. Available from: <http://woottonbridgeiow.org.uk/crosssolent.php> [Accessed January 2018].

Wootton Bridge Historical, 2018. *Fishbourne*. Available from: <http://woottonbridgeiow.org.uk/fishbourne.php> [Accessed January 2018].

Wootton Bridge Historical, 2018. *Holiday Camps*. Available from: <http://woottonbridgeiow.org.uk/lakeside.php> [Accessed January 2018].

Wootton Bridge Historical, 2018. *Wootton Holiday Camp*. Available from: <http://woottonbridgeiow.org.uk/woottonhc.php> [Accessed January 2018].

## **9.2. Unpublished Sources**

ADM 179/417. Operation "Overlord": Report by Boom Defence Officer, Portsmouth and Portland.

ADM 179/432. Operation "Overlord": Reports on Establishment of Beach Shelters and Artificial Ports. Enclosure 6: Report by Senior Naval Officer, Peel Bank.

ADM 199/1615. Operations "Mulberry" and "Pluto": Reports, Minutes, Instructions etc.

ADM 199/1619. Operation "Mulberry" and "Pluto": Arrangements for Operation "Gooseberry".

ADM 199/1633. Control Organisation (Tugs): Papers on Various Tug Units.

AVIA 53/280. Kite Anchor: Patent Position.



CTF 128, 1944. Task Force 128 War Diary.

DEFE 2/428. Narrative of Rear-Admiral Mulberry/Pluto together with Reports.

T 166/132/1. Major Allen H Beckett: Kite Anchor; Correspondence Papers.

WO 171/1754. 969 Company War Diary.

WO 199/1678. Mulberry: Security of Artificial Harbours.

WO 219/379B. Construction and Maintenance of Mulberry Type Artificial Harbours and Pier Heads.

WO 219/949. Composition, Siting, Construction and Operation of Artificial Harbours, Breakwaters and Blockships (Mulberries, Gooseberries, Whales and Phoenix) in Operation Overlord.

WO 219/953. Composition, Siting, Construction and Operation of Artificial Harbours, Breakwaters and Blockships (Mulberries, Gooseberries, Whales and Phoenix) in Operation Overlord.

WO 219/955. Composition, Siting, Construction and Operation of Artificial Harbours, Breakwaters and Blockships (Mulberries, Gooseberries, Whales and Phoenix) in Operation Overlord.