

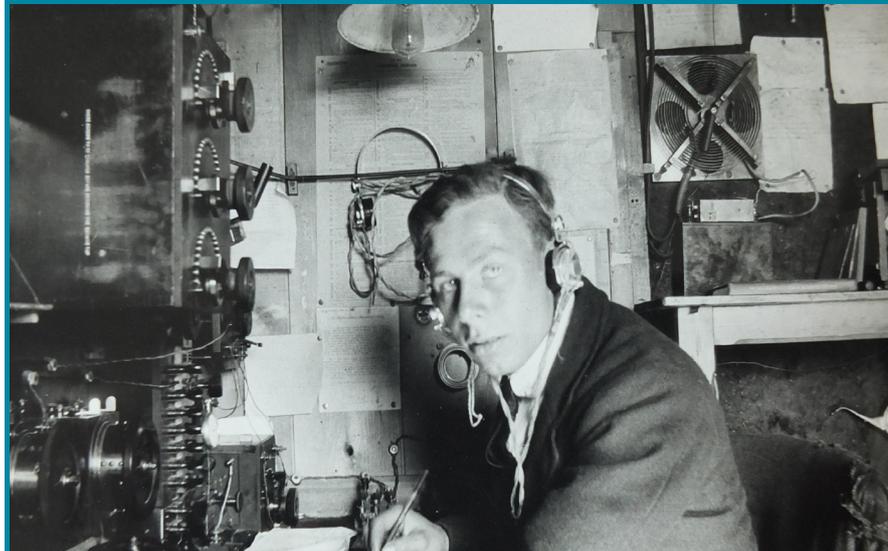
Forgotten Wrecks
of the
First World War

First World War Wireless Stations of the South Coast of England



LED BY IWM

July
2018





FORGOTTEN WRECKS OF THE FIRST WORLD WAR

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South Coast of England



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1 Project Background

Forgotten Wrecks of the First World War is a Heritage Lottery Funded project dedicated to raising the profile of a currently under-represented aspect of the First World War. While attention is often focused on the Western Front and major naval battles like Jutland, historic remains from the war lie, largely forgotten, in and around our seas, rivers and estuaries.

With over 1,000 wartime wrecks and dozens of coastal sites along England’s south coast alone, the conflict has left a rich heritage legacy and many associated stories of bravery and sacrifice. The underwater memorials represent the vestiges of a vital, yet little known, struggle that took place on a daily basis, just off our shores. The study and promotion of these archaeological sites presents a unique opportunity to better interpret them and improve physical and virtual access.

The project focuses on underwater and coastal sites from the Isle of Thanet in Kent, to beyond the Isles of Scilly, and over half way into the English Channel. The sites include merchant and naval ships, passenger, troop and hospital ships, U-boats, ports, wharfs, buildings, coastal communications, defence structures and bases, and foreshore hulks. These sites, under water and on the foreshore, have been degrading and deteriorating due to natural and human processes for approximately 100 years and, as a result, are extremely fragile. In many cases, this project represents a final opportunity to record what remains on the seabed and foreshore before it is lost forever.

The project aims to characterise the nature and extent of the maritime First World War archaeological resource surviving on the south coast’s seabed and around the coast. This will enable an understanding of the record of maritime activity created during the conflict and provide a window onto some of the surviving sites. While it has not been possible to visit and record every site dating to the First World War along the south coast of England, a representative sample of sites have been selected for more detailed study, analysis and interpretation.

With particular regard to coastal, rather than fully submerged archaeological remains, it has been noted in wider commentaries on England’s coastal heritage (Murphy, 2014: 94) that there are relatively few surviving sites because of subsequent reuse and/or destruction during or following the Second World War. As a result, from the perspective of identifying coastal research priorities an emphasis has been placed (Murphy, 2014: 119) on the need to differentiate First World War sites from those of the Second World War. With all of this in mind, the following report addresses one type of coastal site dating to the First World War – Wireless Stations.

This report collates information collected during the project through research and fieldwork, relating to the wireless stations of the south coast. A relatively large number of coastal wireless stations existed within the study area, these are briefly presented in Section 2 along with background information on the development of the technology. Further report sections then detail sites where extended research was undertaken, site visits and/ or fieldwork have taken place during the Forgotten Wrecks Project.

TABLE 1.1: SUMMARY TABLE – SITES SURVEYED, YEAR OF SURVEY AND POSITION

| Site Name | Year Visited | Easting | Northing |
|--------------------------------|--------------|---------|----------|
| Lizard Wireless Station | 2016 | 171473 | 11930 |
| Poldhu Wireless Station | 2016 | 166200 | 19600 |
| Bolt Head Wireless Station | 2016 | 272400 | 36100 |
| Prawle Point Wireless Station | 2016 | 277333 | 35067 |
| Culver Cliff Wireless Station | 2017 | 463447 | 85613 |
| Horsea Island Wireless station | 2016 | 463650 | 104419 |
| Newhaven Wireless Station | 2017 | 544400 | 100000 |

2 Wireless Technology and Station Development Background and Project Approach

Wireless stations, developed during the late 19th and early 20th centuries, played a variety of crucial roles in the First World War (FWW), particularly on the battlefield. Most importantly for this project, however, were the roles they played in ship-to-shore communications both for the Merchant Navy as well as for the Military. The emerging technology was also crucial in the development of direction finding and listening stations (pinpointing the location of enemy wireless stations and zeppelins) many of the stations discussed in this report were used in these roles during the war years.

2.1 Wireless Technology and its Significance to the First World War

Whilst wireless technology itself was already being developed in Britain throughout the late 19th century, it was Guglielmo Marconi a 21 year-old Italian-Irish man who, in 1895, brought the development of ship-to-shore wireless apparatus to Britain after a lack of interest from the Italian Navy. Recognising the vulnerability of ships once out of sight of land, and the increase in international shipping, Marconi set out to advance this form of communication which would become of great importance during the war years. Marconi was not alone in the advancement of this technology, institutions such as the Post Office, the Navy and the Admiralty were greatly influential in this field. As will be discussed below, the relationships between these individuals and institutions with their various aspirations and demands drove the development of this technology through early 20th century and can be seen through the development of early wireless stations.

This report does not cover the specifics of the development of the technology in detail, but focuses on the physical structures (stations) involved in the network which supported the War at sea and maritime traffic.

2.2 Early Wireless Stations in Cornwall

In the early years of Marconi's wireless experiments in England, a location was sought that would provide an ideal situation for control of the seas around the west coast of Britain, as well as ease of signal transmission. Land's End, Cornwall, was the obvious starting point. This location, however, was already home to the Eastern Telegraph Company at Porthcurno; a technology whose proponents feared would be made obsolete by the development of wireless. To avoid competition and to keep his experiments a secret, the Lizard peninsula was instead chosen as Marconi's most westerly location in 1900.

The Lizard station, on the Lizard peninsula (See Section 3.1), was a good choice for several reasons: it was a promontory of high ground surrounded by water with few trees to interfere with signals and composed of Serpentine rock, the properties of which give excellent earthing capabilities. It also benefitted from the nearby Great Western Railway at Helston and not just for the provisions of workers, huge lengths of aerial timbers and concrete, but also for the wooden waiting building in Lizard village that they appropriated for their station. Opening on the 18th January 1901, it was only a few days later at this station that Marconi received a distance record signal from his station 186 miles away at St. Catherine's Point, Isle of Wight; his "first little miracle" (Barlow 2004). This demonstrated the ability to transmit 'over the horizon'—that the line of sight did not stop the propagation of wireless signals—giving weight to his more ambitious experiments to be made at nearby Poldhu in the near future (See Section 3.2).

Poldhu wireless station located near to the Lizard station was constructed in 1900 in its purposefully out-of-the-way location (See Section 3.2). This allowed Marconi to work on his ambition of proving the possibility of transatlantic wireless communication to the many sceptics at the time. On 12th

December 1901 he realised his dream and the first transatlantic signal was sent from Poldhu to St. Johns, Newfoundland, beating the odds and paving the way for Marconi's 1909 Nobel Prize in Physics. It is, therefore, a site of great historical significance. Poldhu was also the site where the declaration of war was transmitted on the night of 4th August 1914.

A key role that these two stations played was in highlighting the need for syntony, which is the ability to transmit over several wireless channels at once. This plays out neatly within the story of the first coast station to handle an SOS call, which occurred on 18h April 1910:

"On that evening Mr. Burchell was the duty operator and was receiving message number two from a ship called the Minnehaha. The ship was owned by the Atlantic Transport Company carrying 67 passengers and 100 crew on board, and a mixed cargo including grain, tobacco, pianos, motorcars etc. in her holds and 230 head of cattle on deck. She had spent three days in thick fog on her voyage from the New York. The wireless operator on the ship suddenly broke off sending the message and said "stand by we might need help stand by SOS SOS.....we are aground somewhere off Bishop on the Rocks".

In fact the ship was 19 miles away from the wrongly identified Bishops Rock Lighthouse, grounded on the Scilly Rock of Bryher, one of the Isles of Scilly. Ten minutes later the massive high-powered transmitter at Poldhu commenced its news transmission and completely jammed signals between the ship and the Lizard (Barlow 2011: 17-18).

This incident was important for two key reasons: first, the blocking of the signal by the powerful Poldhu broadcast highlighted the need for multiple signals to be transmitted and received (syntony). This was particularly significant given the increasing numbers of ships in the sea and the likelihood that they would be using wireless transmission in the near future. Second, the recently erected Post Office station at Bolt Head, Devon, and (See Section 3.3) heard absolutely nothing of this exchange. This demonstrated the issues with the placement of coastal stations in areas where signals could not always reach and led to the movement of all coastal traffic to the south-west of England, where it would stay for the next ninety years.

This movement to the south-west was under the control of the Post Office who, after realising that the Marconi Company were beginning to develop a monopoly over this new technology, had taken over the majority of coastal stations in 1909. However, after realising the station at Lizard was susceptible to interference from nearby Poldhu, the PO opened their own station at St Just, near Land's End. This led to the closure of the Lizard station for ship-to-shore communications but its retention for use as a listening station during the FWW.

2.3 Growth of the Wireless Station Network

The recognition of the importance of wireless technology led to the involvement of other organisations in the development of stations, notably Lloyds, the Admiralty and Railway Companies. Technology was rapidly developing and stations and associated equipment evolved at a fast pace.

The establishment of Bolt Head wireless station is of importance as it was the first station belonging to the Post Office to be built specifically for ship to shore communication (see Section 3.3). Opened on December 11th 1908, its job was to establish public communication with all vessels carrying wireless telegraphic apparatus, irrespective of the system of wireless telegraphy that they had installed. The significance of the Post Office ownership has to do with the government's fears about an expensive wireless monopoly building up; they wanted to have a stake in this enterprise from an early stage and create a station that could be used by all companies.

As discussed above, one of the key things that came out of Bolt Head was the development and use of syntony. At Bolt Head they managed to use syntony to avoid the inevitable interference that resulted from being in such close proximity to busy shipping lanes. After the first six months of service, however, it was reported that the station had difficulty picking up signals from Liverpool to the west due to the presence of high ground in between (Post Office Archive Report 10/8/1909).

Further issues arose from the lack of profit being made by Bolt Head. It was the first in the Channel not to be in the control of Marconi, with resulting competition over paid traffic. Bolt Head was useful, but not profitable. As such, it was closed down in 1914 with Prawle Point (of Lloyds) (See Section 3.4) taking over the connection to Exeter (via Kingsbridge) on the 1st July 1914, forming a direct circuit between the two locations (Archive Report 10/8/1909).

From 1909 onwards Horsea Island became the base for one of the Admiralty's first high powered shore wireless telegraphy stations (See Section 3.6), with a further two at Cleethorpes, near Grimsby and Gibraltar. The role of these stations was to distribute orders and information to Navy ships in European waters (Phimester, 2015: 35). The station quickly became the Navy's most highly regarded, conducting not just routine wireless work but also experimentation and training.

At the outbreak of the First World War the running of the Marconi and GPO ship to shore stations was passed to the War Office. In 1915 the Navy established sixteen new auxiliary wireless stations to be used for communications with the yachts, trawlers and drifters that made up the Auxiliary Patrol and the minesweeping service. Some of these sites were within existing buildings or structures, while others were on new sites. Key considerations for the location of stations were having a coastal position without any high or wooded surroundings, having infrastructure nearby for transport and staff accommodation, being close to a telegraph line and for strategic purposes to be not easily visible from sea.

A number of Trinity House lightships around the coast were equipped with wireless sets and operators on board. The role of the ships was to maintain contact with local coastguard stations, help guide ships into ports and harbours, and to monitor for ships in distress (Phimester, 2015: 45). Within the Forgotten Wrecks study area were two such vessels the Gull Light Vessel and the Goodwin Light Vessel.

The network established provided coverage across Channel waters and linked a network that included the whole of the Western Front in France, the resulting ability to transmit information and collect information from the enemy contributed to Britain's success in the war. The ranges of the low powered and high powered wireless shore stations as of 1908 is shown in Figures 2.1 and 2.2, these were kindly provided by HMS Collingwood Heritage Collection and are from the Torpedo School Report of 1908.

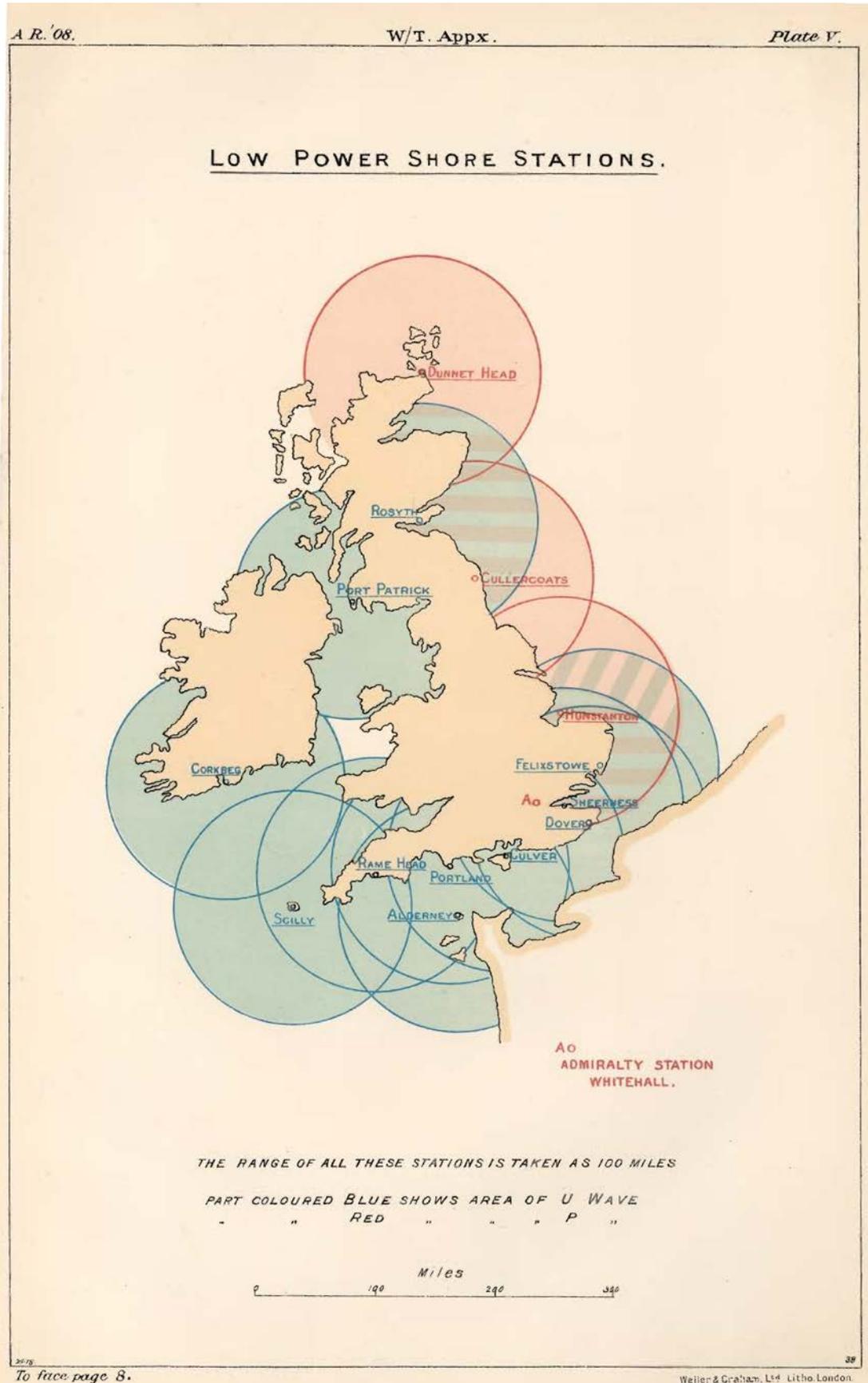


FIGURE 2.1: DIAGRAM SHOWING THE RANGE OF THE LOW POWERED WIRELESS SHORE STATIONS IN 1908 (COURTESY OF HMS COLLINGWOOD HERITAGE COLLECTION)

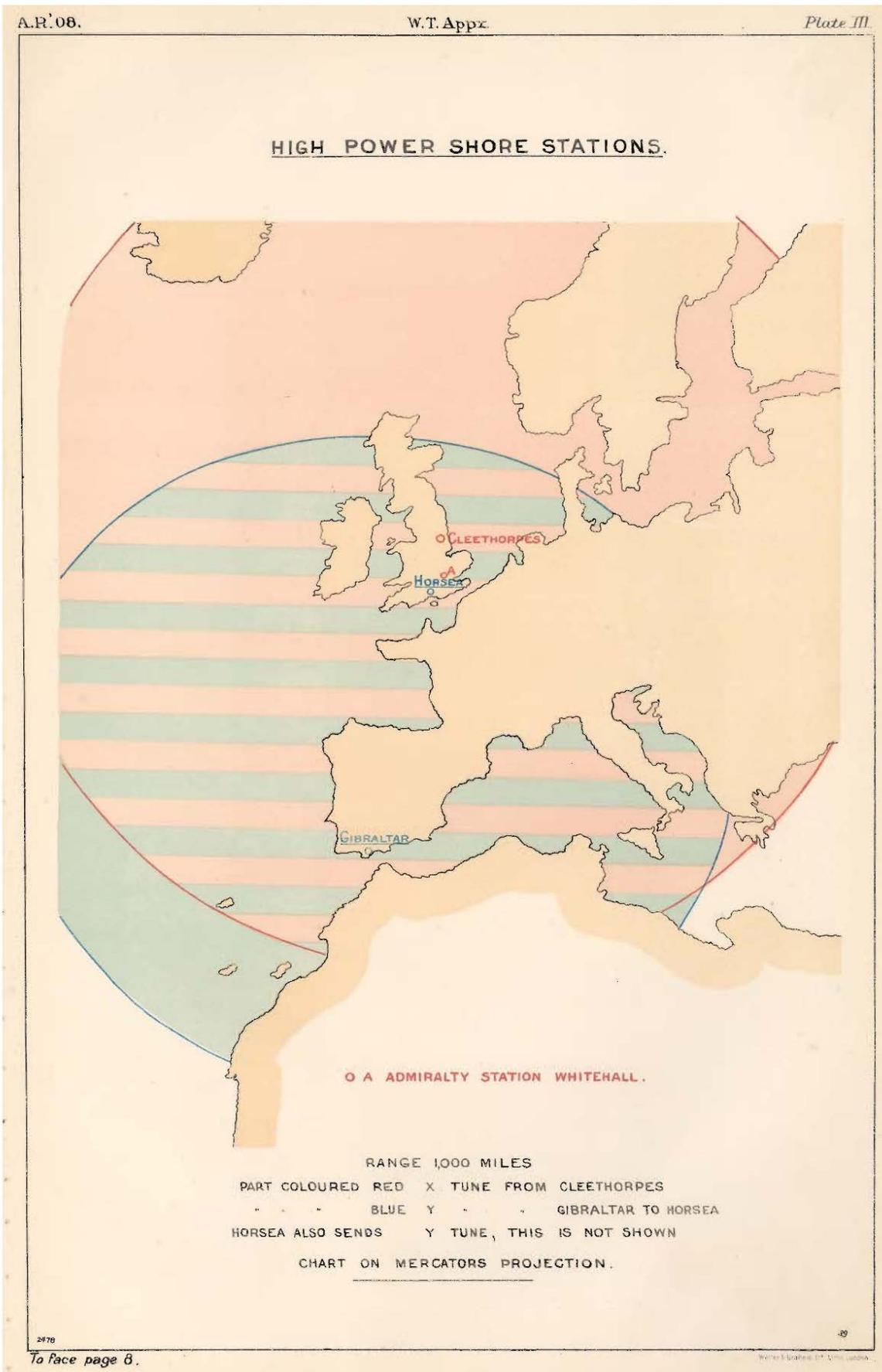


FIGURE 2.2: DIAGRAM SHOWING THE RANGE OF THE HIGH POWERED WIRELESS STATIONS IN 1908 (COURTESY OF HMS COLLINGWOOD HERITAGE COLLECTION)

2.4 Wireless Technology at Sea

An appreciation of the value of wireless telegraphy at sea was first highlighted on 3 March 1899, in the Forgotten Wrecks project area. Wireless telegraphy had been installed on the East Goodwin Lightship, and when a freighter collided with it, a distress wireless message for help was relayed to a land station at South Forland (International Maritime Organisation: 2018).

By 1899, the Mercantile Marine and Royal Navy accepted that wireless telegraphy was here to stay. There was rapid development and the first transatlantic signal was accomplished on 12 December 1901. Some ships began to be fitted with rented Marconi equipment which could “speak” with shore-based stations, but equipment in these ships had to be operated by Marconi personnel (Marconi Collection).

The Royal Navy had been conducting its own experiments from 1897 to improve wireless transmission and reception, and in 1900 procured Marconi equipment for many of its ships plus UK and foreign land-based stations (The Dreadnought Project).

SS Lake Champlain of the British Beaver Line was the first British merchant ship to have Marconi wireless installed, and its first voyage with this new equipment was on 21 May 1901, creating much interest. Uptake was initially slow, but by mid-summer of 1907, 139 British and foreign vessels were fitted with Marconi’s wireless telegraphy, primarily passenger ships and some Trinity House lightships. The next few years saw reasonably rapid expansion of wireless telegraphy installed in passenger and mail ships, and tankers. By mid-1910, approximately 300 mercantile marine ships were fitted with equipment, and the importance of wireless telegraphy led to Lloyd’s Register being specifically marked for these ships (The Electrician 1910).

The sinking of the Titanic in 1912, which had two Marconi wireless operators on board demonstrated the value of this method of communication. Following the tragedy the first International Conference for ‘Safety of Life at Sea’ was convened in London in 1913 attended by 65 countries. One of the key recommendations to come out of the conference was to have 24-hour wireless watch, in recognition of the contribution this had played to saving of over 700 lives (The Guglielmo Marconi Foundation)

During the war, vessels over 1,600 tons were required to be fitted with wireless telegraphy. The War created a very strong demand for wireless operators for the Navy and Merchant Marine.

3 Study Approach to the South Coast Wireless Stations

Work undertaken for Historic England by Oxford Archaeology (Phimester, 2015) has helped significantly in identifying sites which were active during the First World War within the study area of the Forgotten Wrecks of the First World War project. The table below draws on the Phimester report, in addition to information on the ship-to-shore stations to provide a list of coastal sites within our project area. The sites highlighted in blue are those which have been subject to further research and/or fieldwork as part of the Forgotten Wrecks of the First World War project.



FIGURE 3.1: SUMMARY MAP - FIRST WORLD WAR WIRELESS STATIONS WITHIN THE PROJECT STUDY AREA

TABLE 3.1: SUMMARY OF WIRELESS STATIONS WITHIN THE STUDY AREA, USING DATA FROM PHIMESTER, 2015; SITES HIGHLIGHTED HAVE BEEN SUBJECT TO EXTENDED STUDY.

| Site | Position | Owned/ operated by | Description |
|-----------------------------|------------------------------------|--------------------|--|
| Bolt Head, Devon | SX 724 361 | GPO | Remote coastal site where there is potential for remains to survive. |
| Culver Cliff, Isle of Wight | SZ 63447 85613 | Admiralty | Concrete remains of pads for masts and small buildings survive. |
| Horsea Island, Hampshire | SU 63650 04419 and SU 63261 04681. | Admiralty | Unclear if there are standing buildings related to the wireless station in existence. |
| Lizard, Cornwall | SW 71547 11894 And SW 71473 11930. | Marconi/ Lloyds | Site was a Marconi wireless station, with close-by Lloyds signal station. Remains of this important station exist have been recently restored. |
| Newhaven, East Sussex | TQ 444 000 | Railway Company | Possible surviving structure at the site. |
| Poldhu, Cornwall | SW 662 196 | Marconi/ Lloyds | Concrete platforms survive as well as earthworks. |
| Prawle Point, Devon | SX 77333 35067 | Admiralty | The 19 th century building survives as a coastguard station, unclear if other remains survive. |
| Niton, Isle of Wight | SZ 498 753 | Marconi/ Lloyds | Concrete bases remains. |
| Dover Castle, Kent | TR 32765 41635 | Admiralty | Wireless room survives within the Port War Signal Station. |
| Fort Blockhouse, Gosport | SZ 62601 99323 | Admiralty | Possible that the wireless room survives within the fort (remains in military use). |
| Lands' End, Cornwall | No specific position | Admiralty | Unknown if physical remains survive. |
| Lydd, Dungeness | TR 085 173 | Admiralty | Coastguard stations survives which might have been used as part of the wireless station. |
| Nodes Point, Isle of Wight | SZ 637 899 | Garrison/ Army | No evidence of station yet identified. |
| North Foreland, Kent | TR 39916 69658 | Lloyds (then GPO) | Was situated next to the lighthouse, unclear if wireless station traces or mast bases survive. |

| | | | |
|-------------------------------------|----------------|-----------------|--|
| Pevensey/ Polgate, East Sussex | TQ 651 06 | Admiralty | Unclear if physical remains survive. Site was also an Air Ship base. |
| Poole, Dorset | SZ 03827 87043 | Marconi/ Lloyds | Wireless station set up in the Haven Hotel which survives. |
| Portland Bill, Dorset | SY 67777 69094 | Admiralty | Earthworks are visible relating to the wireless station, also used in WWII |
| Puckpool, Isle of Wight | SZ 61446 92210 | Garrison/ Army | Situated within a battery/ fort, unclear if location of wireless station is known. |
| Rame Head, Cornwall | SX 42064 48714 | Admiralty | Unclear if any evidence survives on the ground. |
| Sandwich, Kent | TR 35106 58699 | Admiralty | Site is now a golf course, unclear if remains survive. |
| Southsea Castle, Portsmouth | SZ 646 980 | Garrison/ Army | Area where stations were located appears to have been developed. |
| Warden Point Battery, Isle of Wight | SZ 324 875 | Garrison/ Army | Location of the wireless station within this battery is unknown. |

3.1 Archaeological Characteristics of a Wireless Station

Phimester (2015: 47) has explored the different character of wireless stations, outlining that “The layout of the First World War wireless stations, their buildings and associated infrastructure were not of a standard type but varied according to their functional role and significance, and their date of construction. Some standardisation of buildings is evident however, both before and during the war.”

No two wireless stations are alike, they are built to serve a particular purpose in a specific, usually very remote, area. Therefore the general layout is never the same and equipment needed differs based on purpose, location and the date of construction. Wireless stations were designed as temporary facilities. The installation of a wireless station took up very little room, as demonstrated by the many buildings that were adapted prior to and during the war.

The mast or masts (depending on configuration) have a relatively low foot imprint on the land. The archaeology is usually a series of concrete building foundations and concrete pads, often with a central pad which held the mast or masts. A series of large blocks with rings set in are usually spaced equidistantly from this for the stays that were connected to the mast for stabilisation.

For purpose built facilities the buildings mostly consist of wooden construction with a concrete foundation which is often all that survives. Buildings related to wireless stations have also been constructed from brick and corrugated iron, with a key architectural consideration being ventilation and windows. Phimester 2015 outlines that during the war these temporary buildings and related equipment appear to have been standardised and ordered as a type. Consequently it is likely that facilities built during the war are more likely to be similar in their archaeological foot print.

Research undertaken during the project at the National Museum of the Royal Navy’s Fleet Air Arm site located a number of photographs of wireless stations, particularly those located with seaplane stations. Photographs taken at the Westgate seaplane station include Figures 3.3, 3.4 and 3.5 which show the exterior of the wireless hut (which is likely to be of the more ‘standardised’ design), along with images of the equipment within the hut and being used by a wireless operator.



FIGURE 3.2: THE HAVEN HOTEL WITH THE MARCONI MAST CLEARLY VISIBLE (COURTESY OF POOLE MUSEUMS)





FIGURE 3.4: WIRELESS OPERATOR AT WORK WITHIN THE WIRELESS HUT AT WESTGATE SEAPLANE STATION (COURTESY OF THE NATIONAL MUSEUM OF THE ROYAL NAVY: CHEESMAN COLLECTION YEORN 2007/192/2617)

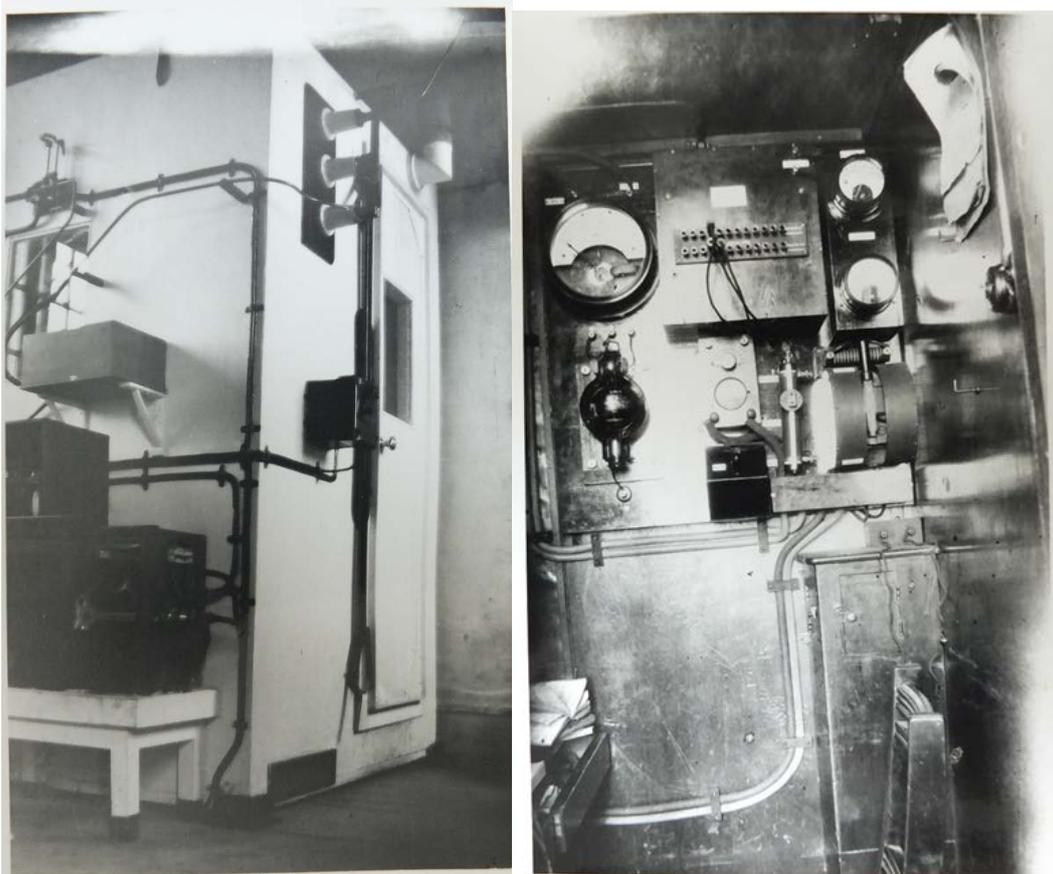


FIGURE 3.5: WIRELESS EQUIPMENT WITHIN THE HUT AT WESTGATE SEAPLANE STATION. (COURTESY OF THE NATIONAL MUSEUM OF THE ROYAL NAVY: CHEESMAN COLLECTION YEORN 2007/192/2616 & 2615)

3.2 Research and Investigation Approach

Whilst research into these coastal wireless stations has been carried out (e.g. Phimester 2015), and much research has been conducted into their historical and political circumstances (e.g. Bruton 2012), little archaeological investigation has taken place. Inferences about the preservation and location of remains have been made, for the most part, using satellite imagery. The exceptions to this are the stations on the Lizard peninsula, which have seen a lot of input from local historians leading to the building of museums and information centres.

The collection of wireless stations located within the Forgotten Wrecks study area provide the opportunity to study and compare in more detail a range of stations which include those that were built pre-war or during the war, constructed by the Marconi, Lloyds, the Admiralty, GPO or railway companies, and demonstrate a range of construction materials and forms.

There are two types of wireless station – intercept stations which focus on communication and listening, and direction finding stations which were used for airships to find their way home. This report largely concerns itself with intercept sites, however often a direction finding mast is located nearby. Wireless intercept and direction finding stations were usually at different sites due to using different frequencies and different receivers, on some sites they could both be present but separated by 100m or so (Barlow, Lizard Wireless stations, 2016).

Due to the lack of knowledge of the precise locations of some stations, work on these focused searching search for in-situ foundations of buildings and structures relating to the wireless stations. Once located, these were to be photographed and compared with historic maps, where available, to see if any more could be deduced about the use of these stations.

Part of the fieldwork undertaken for this project included meetings with specialists on the stations based on the Lizard peninsula, in particular David Barlow, who were invaluable for furthering our understanding of the broader significance of these stations.

3.2.1 Desk Based Research

Initially a desk based assessment of each site was conducted in order to understand the development of the site as a whole and to identify the main areas of interest. This included reviewing historic maps to look at changes through time, as well as using the maps to identify possible locations of the more elusive stations.

A visit was made to the British Telecom (BT) archives in London to view documents relating to the building and subsequent closure of Bolt Head, and the passing of work to Prawle Point (Archive report 10/8/1909). Further trips were made to The National Archives at Kew by volunteer Chris Heal, where he located a series of plans of Horsea wireless station during WW1. Research at the National Museum of the Royal Navy's Fleet Air Arm site reveals a number of historic photographs of wireless stations, many of which were attached to seaplane stations.

Key sources consulted during the project included:

Barlow, D. 2004. *From Spark to Satellite. Marconi in Cornwall*. Coherer Books (Barlow, From Spark to Satellite. Marconi in Cornwall , 2004)

Barlow, D. 2007. *The History of the Lizard Wireless Station – Marconi's "First Little Miracle"*. Bass Point, Cornwall: The Radio Officers' Association (Barlow, The History of the Lizard Wireless Station- Marconi's "First Little Miracle". Bass Point, Cornwall , 2007)

Archive Report 10/8/1909. *Report on the first 6 months working of the wireless station at Bolt Head*. Original documents relating to the planning and building of the W/T Station, National Archives, Kew (ADM 116/1066 and ADM 140-1484-17)

Phimester/ Oxford Archaeology 2015. *First World War Wireless Stations in England*. English Heritage report 3748 (Phimester, 2015).

3.2.2 Fieldwork Methodology

Forgotten Wrecks Project site visits and fieldwork aimed to:

- Provide opportunities for volunteers to access and take an active role in the recording and research of a range of different types of maritime First World War site.
- Record extant remains for heritage records.
- Record extant remains for public dissemination, enabling 'virtual' access for those not able to achieve physical access.

The approach taken at each site is detailed in the individual sections below. Further general information related to methods can be found in *Forgotten Wrecks of the First World War: Project Methodology Report*.

The field work carried out on the wireless stations included sites with known archaeological remains, those of particular significance (historically or archaeologically) and those where identification of the remains would enrich the archaeological record.

4 Results

The following sections present a brief history of each of the wireless stations visited during the project, followed by information gathered during fieldwork and survey. 25 wireless stations with possible remains were identified in the study area. Seven of the 25 were selected to be surveyed as part of the Forgotten Wrecks of the First World War project (Figure 4.1).

The site characteristics make them relatively simple to survey with three of the sites surveyed during fieldwork on nearby and/ or related First World War archaeology. This further demonstrates the importance of wireless communication and the need for a wireless capability alongside key military facilities.

The extent of the remains, has meant that levels of work undertaken at each site differ, many of the sites outside of current military bases are in large open spaces within remote locations, making access difficult at certain sites. Some are on coastal paths and are open to the public.

Extensive work has been undertaken at Horsea Wireless Station as a unique site within the collection. The Warden Point battery on the Isle of Wight was visited but no obvious remains of a wireless station could be discerned from the rest of the fort remains.



FIGURE 4.1: WIRELESS STATION WITHIN STUDY AREA (GREEN DOTS INDICATE SITES WHICH HAVE BEEN SURVEYED)

4.1 Lizard Wireless Station, Cornwall

4.1.1 Site History & Context of Field Investigation

The wireless station at the Lizard is of great historical significance. Dating from 1901 it is the oldest surviving Marconi station responsible for ship to shore communication. The site was restored by the National Trust between 1999 - 2001. As with Poldhu, this is not only one of the oldest stations, but was also the site of one of Marconi's great achievements: in January 1901 Marconi received an early signal from his transmitter at Niton, Isle of Wight, 186 miles away. This proof of concept began the development of many subsequent stations and quick adoption of the technology by the navy in the pre-war years.



FIGURE 4.2: RESTORED REMAINS OF LIZARD WIRELESS STATION

The Poldhu Station was constructed immediately following this test and is significantly larger than the Lizard station. The Lizard station, consists of two small timber-clad rectangular structures (Figure 4.2), and a concrete platform for the mast surrounded by a fence.

At present, both the Marconi station described here, as well as a nearby Lloyds station, survive and are Grade II listed, owned and managed by the National Trust. The Lloyds station, to the east, was part of the coastguard lookout and is now a museum (Figure 4.3). The Marconi station, to the west, is open to the public as a museum fitted with wireless equipment.



FIGURE 4.3: RESTORED LLOYD'S SIGNAL STATION

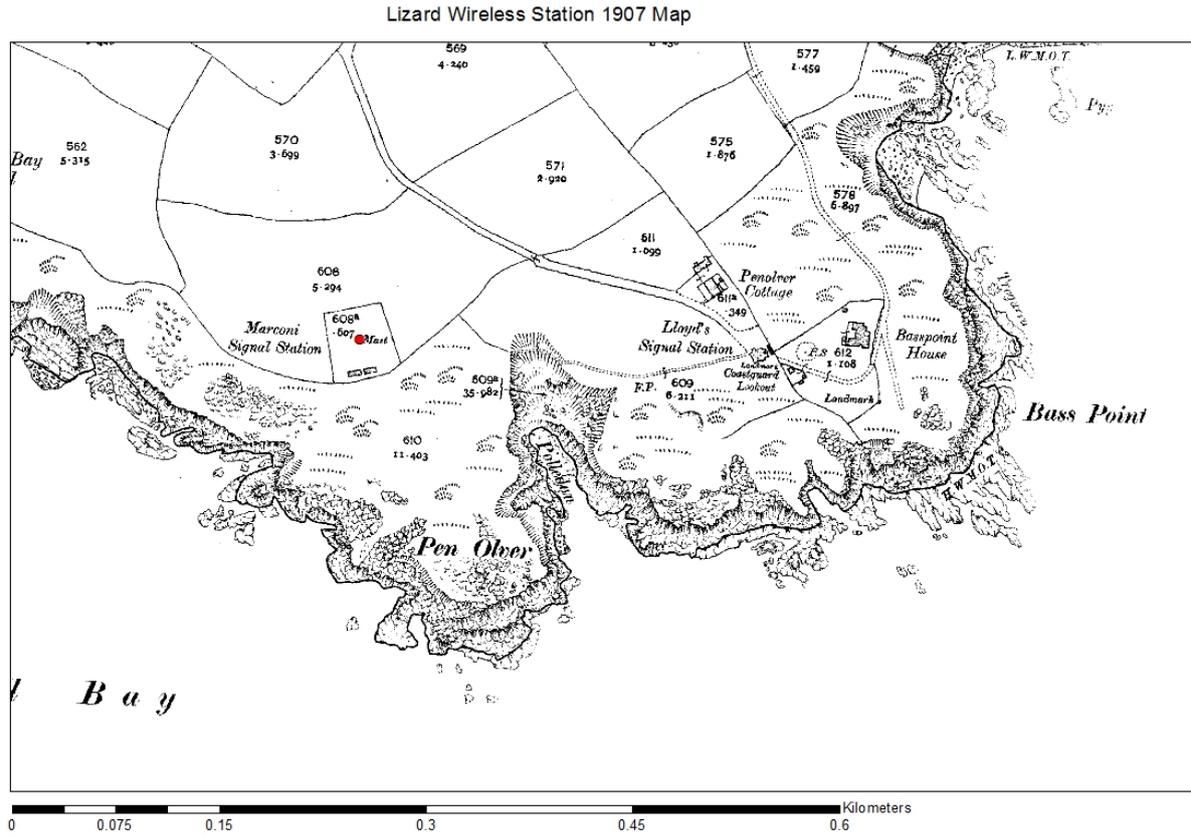


FIGURE 4.4: 1907 - MAP - LIZARD WIRELESS STATION

The Historical maps from 1907 demonstrate the early placement of these wireless stations but also the isolation in which there where designed for to perform optimally (Figure 4.4). The Lloyds wireless station and signal station was an existing building which was adapted for use as a wireless station during the First world war. Modern aerial photography shows that the area remains largely unchanged, being an open coastal space with very little modern development.



FIGURE 4.5: AERIAL IMAGE OF LIZARD AND LLOYDS STATIONS (PHOTOGRAPH: CHANNEL COASTAL OBSERVATORY OGLv2)



FIGURE 4.6: AERIAL PHOTOGRAPH SHOWING DETAIL OF THE LIZARD STATION (PHOTOGRAPH: CHANNEL COASTAL OBSERVATORY OGLV2)

By examining the aerial photography (Figure 4.5 & Figure 4.6) it is easy to see the fenced off area where the mast was located (position marked with red dot). There has been no development at the site which has been well maintained since its installation over a hundred years ago. Development close to the station since the 1900s is limited to a series of houses to the North West of the site, which do not encroach on the context of the wireless station.

The station itself was decommissioned by 1920 at which time the huts were converted to become holiday huts and a kitchen and garage were added. During restoration The National Trust restored the two huts and added an additional out hut at the rear of the accommodation hut.

4.1.2 Geographical Context

The station is located on top of the cliffs of the Lizard peninsula, a well-known geographical feature at the south west extents of the British Isles (Figure 4.7). As one of the oldest wireless stations its location was chosen for a number of geographical and bio geographical reasons. The peninsula has a high elevation with a jagged rock coastline with no structures and few local residents. The area is surrounded by water, meaning there is very little risk of interference from structures outwards towards the sea.

The bedrock of the Lizard is a type of rock known as serpentine rock which is perfect for wireless transmission. The rock contains very little iron or other elements with magnetic properties that could interfere with signals as well as also having excellent earthing properties. The area had been used for signalling ships prior to the construction of the Marconi stations, as demonstrated by the Lloyds signal station that can be seen marked on an 1879 map (See Figure 4.8).

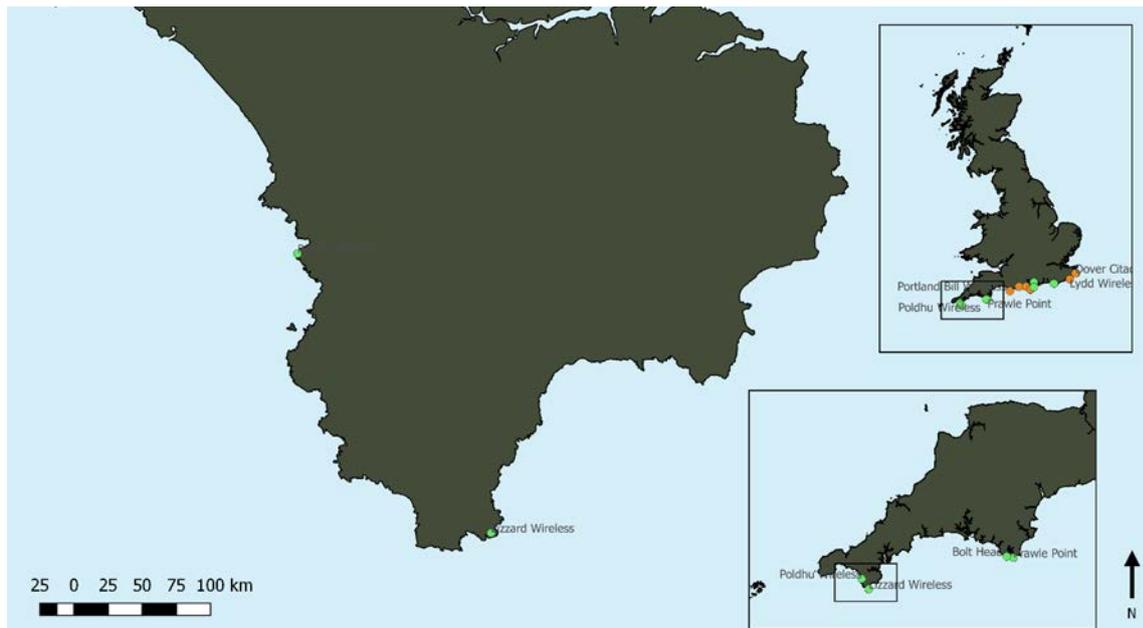


FIGURE 4.7: LIZARD WIRELESS STATION LOCATION

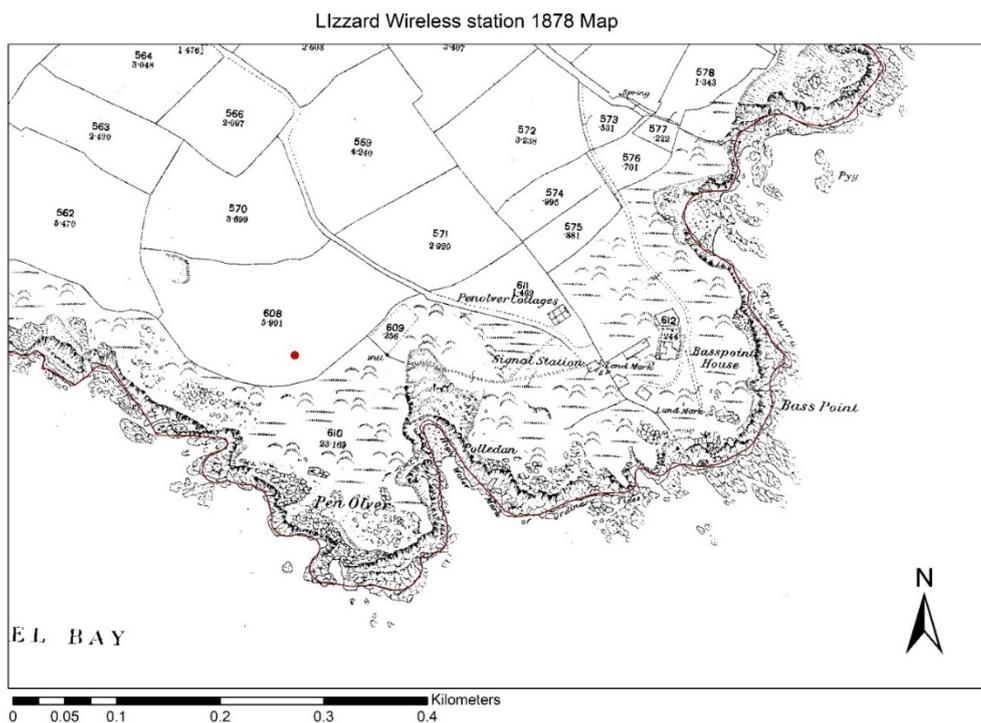


FIGURE 4.8: 1879 – MAP OF THE LIZARD PENINSULAR SHOWING POSITION OF THE LLOYDS SIGNAL STATION (RED DOT SHOWS WHERE MARCONI STATION IS LOCATED)

4.1.3 Aims for Field Investigation

A great deal of work has been conducted at the Lizard wireless station and it is the subject of a large number of books in addition to having undergone full restoration. The site is protected through being a National Trust property, being a Listed Building and having World Heritage status.

The aim of the fieldwork was to inspect the remains at the site to better understand the form and character of wireless stations. Through examining this restored, well maintained and well documented site, it was possible to gather data to compare to other station remains across the study area.

Fieldwork at the site aimed to:

- Gather a photographic record of restored elements;
- Photograph the buildings and note particular features; and
- Determine what could be learnt from comparing this early wireless station to the later stations within the study area.

4.1.4 Fieldwork Results

The site was visited in June 2016 when members of MAT staff (Amanda Bowens & Rachel Bynoe) met with local historian, David Barlow, who kindly provided a tour of the wireless sites on the Lizard peninsula providing information on their how they relate to each other.



FIGURE 4.9: SITE PLAN OF THE LIZARD WIRELESS STATION

The restoration of the Lizard station makes it one of the best persevered examples of an early wireless station. The two huts are still extant on the site, they are of a simple in design, being seated on top of concrete footings. The western hut is a wooden framed building with an apex roof and overlapping strakes approximately 10m in length and 7m wide (Figure 4.10).



FIGURE 4.10: LIZZARD – WESTERN HUT – NORTH EAST FACING

The eastern building is identical in construction however with a felted apex roof. The structure measures 8m in length by 4m wide and is now used as a public toilet.



FIGURE 4.11: 2ND HUT TO THE EAST - SOUTH FACING

Two detached concrete hard standings can be seen to the north of the main building, these relate to the conversion of the site to holiday accommodation (see Figure 4.12). The western foundation is 10m in length and 4m wide. The eastern foundation is square and approximately 5m x 5m.

The mast has been restored set to the side of a concrete block in the original position (Figure 4.13). This very early mast is a lot smaller than later examples, especially comparing it to the four behemoths at Poldhu situated a few kilometres to the west (See Section 3.2) and the masts related to the high powered site at Horsea (See Section 3.6).



FIGURE 4.12: SOUTH FACING IMAGE OF WESTERN HUT - THE BOTTOM RIGHT OF THE IMAGE SHOWS THE FOUNDATION OF AN OLD HOLIDAY HOME.



FIGURE 4.13: RESTORED MAST AT LIZARD STATION

4.1.5 Discussion

The remains of the Lizard station have been reconstructed, forming a local information centre about the original site. The history of the site is well documented as are the in-situ features. The huts are in their original position with the only additions to the site since 1907 being the garage and kitchen that are now only visible as concrete footings.

There is very little further that can be achieved at the site archaeologically, however, it does provide the archaeologist with a template of what can be expected on a wireless station of this size. The timber-clad buildings are believed to be the type that was adopted at some of the later wireless stations.

The mast provides a rare opportunity to understand how they are mounted and what might be likely to survive on an archaeological site. The stays and masts themselves are very unlikely to survive, but the block into which this mast is attached is made of concrete and the moorings that the stays were attached to similarly have the potential to survive.

4.2 Poldhu Wireless Station, Cornwall

4.2.1 Site History & Context of Field Investigation

Poldhu wireless station located near to the Lizard station was constructed in 1900 in a purposefully out-of-the-way location (Figure 4.14- Poldhu wireless station location). This allowed Marconi to work on his ambition of proving the possibility of transatlantic wireless communication to the many sceptics at the time.

On 12th December 1901 he realised his dream and the first transatlantic signal was sent from Poldhu to St. Johns, Newfoundland, beating the odds and paving the way for Marconi's 1909 Nobel Prize in Physics. Poldhu was a much larger installation than the Lizard station, after a few issues with a parabolic mast configuration lost to a storm, the site had a four mast design (Figure 4.15 - Poldhu Hotel and wireless station prior to royal visit 1903): 215 feet (66m) high and forming a 200 foot (61m) square.

Poldhu was taken out of service in 1933 and dismantled completely by 1935, however, the concrete footings are still present. Just to the north of Poldhu is the Poldhu Hotel, now a care home, which originally housed the Marconi workers.

The land on which the Poldhu station sits was donated to the National Trust 1937, with adjacent land added in the 1960's. The site has a stone monument erected by the Marconi Company in 1937, and a visitor centre which was opened in 2001. The memorial is a grade II listed building.

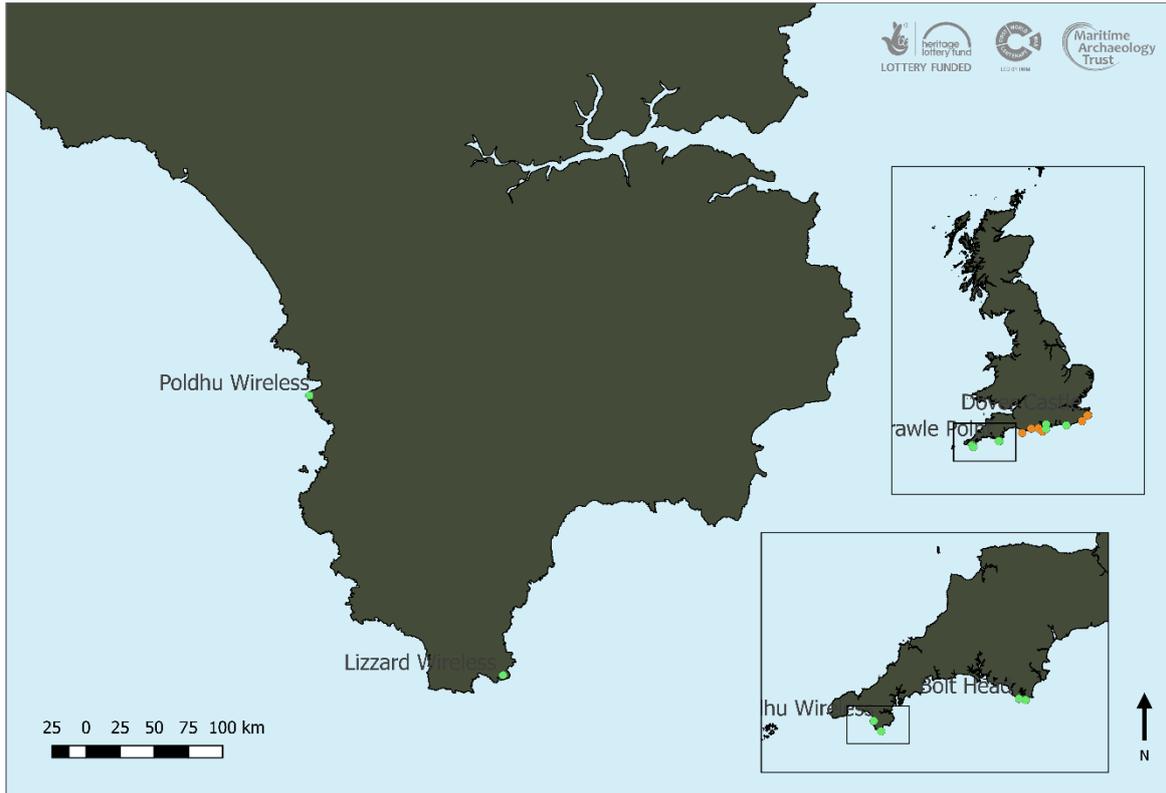


FIGURE 4.14: POLDHU WIRELESS STATION LOCATION



FIGURE 4.15: POLDHU HOTEL AND WIRELESS STATION PRIOR TO ROYAL VISIT 1903 (SOURCE: UNKNOWN)

4.2.2 Geographical Context

The Poldhu site lies on the Lizard peninsula in Cornwall, it is on the coast overlooking Mounts Bay, in the parish of Mullion. Its isolation made it perfect for Marconi's experiments. Similar to the Lizard station there has been very little development at the site to this day, other than the installation of a car park and visitors centre. A small house has also been built to the north east of the site in a former field (Figure 4. 16).



FIGURE 4.16: AERIAL PHOTOGRAPH SHOWING THE LOCATION OF POLDHU WIRELESS STATION (PHOTOGRAPH CCO VIA OGL v3)

The station at Poldhu is included on the 1907 Ordnance Survey map in some detail (Figure 4.17). The map includes the buildings, positions of the four large masts and further small posts and additional masts. It does not show the position of the circular mast arrangement that was lost to a storm.

Prior to field investigation the historic maps were combined with modern aerial photographs made available via the Channel Coastal Observatory (CCO) website (Open Government Licence v3) which allowed many archaeological features to be plotted. Within the CCO data a large circular feature can be seen to north west of the main site (See Figure 4.16). There is a singular mast marked in the same position on the 1907 map (Figure 4.17), this may be a mast that survived the loss by storms of the original configuration as there is a clear trackway leading to the position.

The 1907 map shows the main site focused around the square placements of the masts. The CCO photographs show the remains of another building to the north east of the main site that are not marked on historical maps. This could be a later addition, or may not be related to the wireless station.

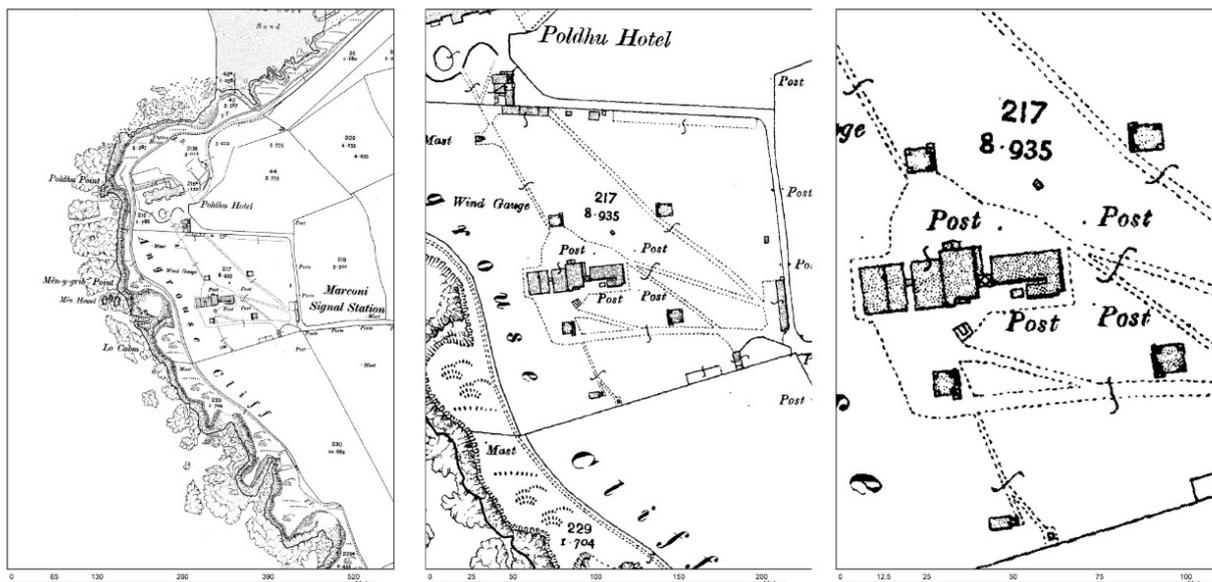


FIGURE 4.17: 1907 ORDNANCE SURVEY MAP SHOWING POLDHU WIRELESS STATION

4.2.3 Aims for Field Investigation

Poldhu was a large, experimental and unique site within the project study area and, like the Lizard station, was used to understand the extent and character of archaeological remains that could be expected on other wireless station sites. Desk based research had demonstrated the archaeological potential at the site, this information was used to target field investigation which included:

- Identify the original structural remains
 - Create a sketch plan
 - Photograph
- Identify any existing earthworks/structure that is not visible on the CCO imagery
- Visit the Marconi centre (on site) for any additional information
- Investigate structural remains relating to the 1907 buildings
- Investigate the remains of the circular masts and the related earth works.

4.2.4 Fieldwork Results

The site at Poldhu was visited by MAT staff (Amanda Bowens & Rachel Bynoe) in June 2016. A series of images and notes were taken detailing the archaeological remains present at the site.

The remains consist of five interconnecting buildings with rectangular footprints (Figure 4.18), with a further rectangular building connecting to the north-south running boundary path towards the east (see figures below). Modern aerial photography, in conjunction with historic maps, also shows that the paths that connected these buildings are still visible today delineated with small earth work boundaries. The paths are approximately 3m in wide (Figure 4.19 - Remains of earthworks around paths).

Poldhu was taken out of service in 1933 and dismantled completely (other than the concrete footings) in 1935. Just to the north of Poldhu is the Poldhu Hotel, now a care home, which originally housed the Marconi workers.



FIGURE 4.18: REMAINS OF THE FIVE INTERCONNECTED BUILDINGS



FIGURE 4.19: REMAINS OF EARTHWORKS AROUND PATHS



FIGURE 4.20: AERIAL PHOTOGRAPHY SHOWING THE REMAINS OF POLDHU WIRELESS STATION (PHOTO: CCO, CONTAINS PUBLIC SECTOR INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE V3.0)



FIGURE 4.21: PLAN OF ARCHAEOLOGICAL REMAINS OVERLAIN ON AERIAL PHOTOGRAPH OF THE POLDHU SITE

There are the remains of a generator footing and the transmitter station within the collection of five interconnected buildings at the centre of the site. The circular feature and associated earth works was confirmed as the location of the circular mast arrangement. A modern mast has been erected in the north west of the site in the position of an original mast. The base for securing the stays is believed to be from the First World War, it is formed of a concrete block set flush with the ground with a central mooring point (Figure 4.22 - Concrete block used to tether the stays of the mast.) The concrete is coarse with many stone inclusions, similar blocks have been located at Newhaven wireless station (See section 4.7).



FIGURE 4.22: CONCRETE BLOCK USED TO TETHER THE STAYS OF THE MAST.

The footing for the circular mast, visible on the historic maps, is extant on the site. This concrete base is approximately 1.5m in diameter with six pins set equidistantly within it. The recessed edge is for seating the main body of the mast (Figure 4.23: Circular footing of mast). The mast would have been bolted upright with a series of stays attaching them to the square concrete mooring blocks.



FIGURE 4.23: CIRCULAR FOOTING OF MAST

4.2.5 Discussion and Future Work

The remains at Poldhu are extensive giving a unique insight into the physical traces of multiple mast configurations and their footings. A complete survey of the area would prove useful and allow the site detail to be mapped with scaled plans of each of the features. There also remains a high potential for further below ground remains to be in-situ.

4.3 Bolt Head Wireless Station, Devon

4.3.1 Site History & Context of Field Investigation

This station was the first wireless station belonging to the Post Office, built specifically for ship to shore communication. Opened on 11 December 1908, its job was to establish public communication with all vessels carrying wireless telegraphic apparatus, irrespective of the system of wireless telegraphy that they had installed. The significance of the Post Office ownership has to do with the government's fears about an expensive monopoly building up; they wanted to have a stake in this enterprise from an early stage and create a station that could be used by all companies.

One of the key things that came out of Bolt Head was the development and use of syntony, which is the ability to tune in to specific frequencies. At Bolt Head they managed to use syntony to avoid the inevitable interference that resulted from being in such close proximity to busy shipping lanes. This demonstrated the importance of syntony and the need to experiment with its use.

After the first six months of service, however, it was reported that the station had difficulty picking up signals from Liverpool to the west due to the presence of high ground in between. A good example of this is the story of the *Minnehaha*, which illustrates both the problems with Bolt Head as well as the need for syntony, as outlined in section 3.2 above. With Bolt Head proving useful but not profitable it was closed in 1914.

There is very little information regarding the position and character of the wireless station, this is likely due to its short history of use. The information that we do know comes from the report on six months service, the proposal to shut it down and Brian Faulkner's 'Watchers of the Waves: a history of maritime coast radio stations in Britain' who reported that; The building was 40' long x 16' wide x 16' high consisting of five rooms. It has three section 180' masts and four aerials.

4.3.2 Geographical Context

Bolt Head is an isolated rocky peninsula to the west of the entrance to the Kingsbridge estuary (Figure 4.24). The precise location of the station is not clear from sources so far consulted. In Phimester's 2015 report there is an approximate position provided for the site at the general 'Bolt Head' location. There are no historic maps showing the location of the station, with the Ordnance Survey map of 1955 being the first updated after the end of the stations use. Modern satellite imaging does not show any obvious footings or structures.

The station would have been in close proximity to a much earlier signal station used to communicate with ships. Although in an isolated place, similar to the stations at Poldhu and the Lizard, the Bolt Head station suffered from interference and was not as suitable a location as had been believed.

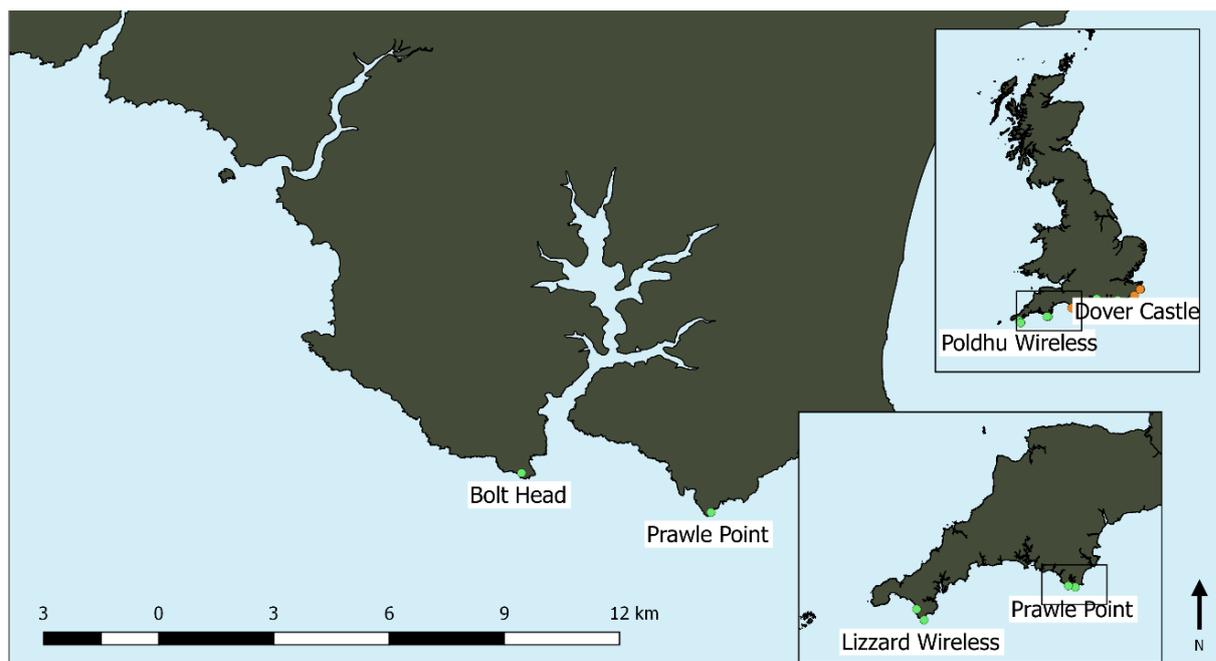


FIGURE 4.24: LOCATION MAP BOLT HEAD AND PRAWLE POINT WIRELESS STATIONS

4.3.3 Aims for Field Investigation

The aims for fieldwork were to:

- Walk across the area looking for anything that appeared to be anthropogenic, including irregular growth of vegetation that might imply buried foundations/structure that may relate to either the wireless station or the coastguard look out point.
- If located then gather a photographic record.
-

4.3.4 Fieldwork Results

The site was visited by two members of MAT staff in June 2016 with the aim of locating any traces of the wireless station. Despite an extensive search there were no remains identified. Figure 4.25: 1955 Ordnance Survey map and Figure 4.26 show the possible location of Bolt Head. In Figure 4.25 the red dot relates to the approximate location given in the Historic England report (Phimester, 2015).

To take investigation of this site further a more detailed search of any available archives would be recommended to narrow down the potential position of the remains, this could be followed by further field survey to locate any remaining features.

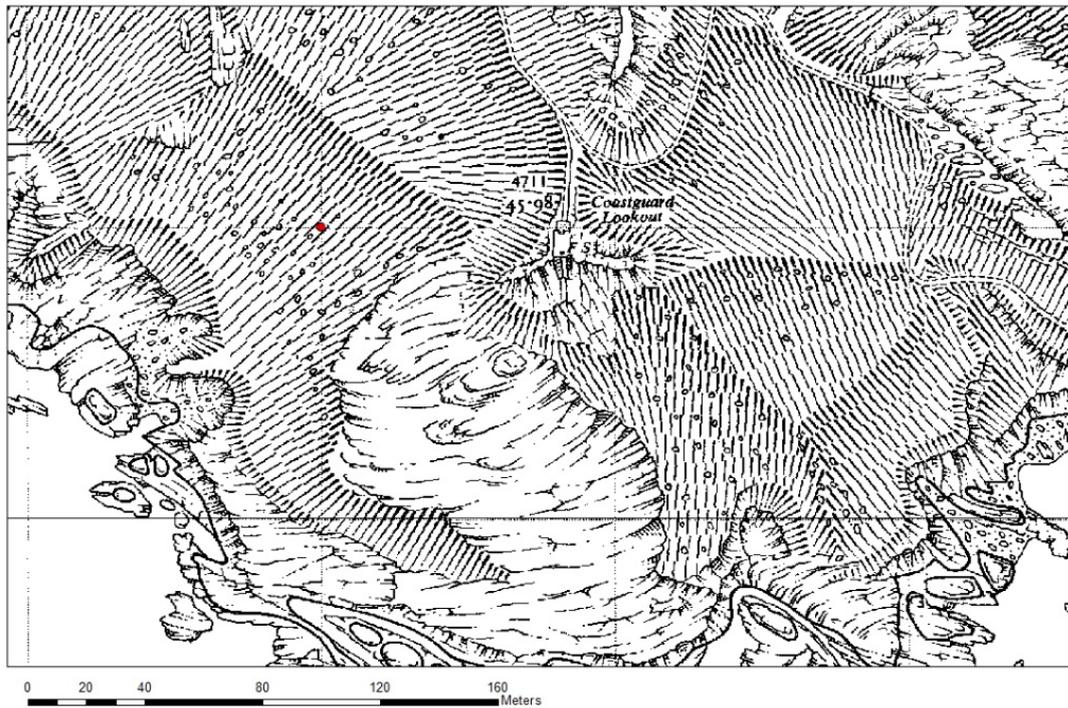


FIGURE 4.25: 1955 ORDNANCE SURVEY MAP SHOWING THE POSITION OF THE BOLT HEAD COASTGUARD LOOKOUT, RED DOT SHOWS POSITION GIVEN FOR WIRELESS STATION IN PHILMESTER 2015 REPORT.

Bolt Head CCO

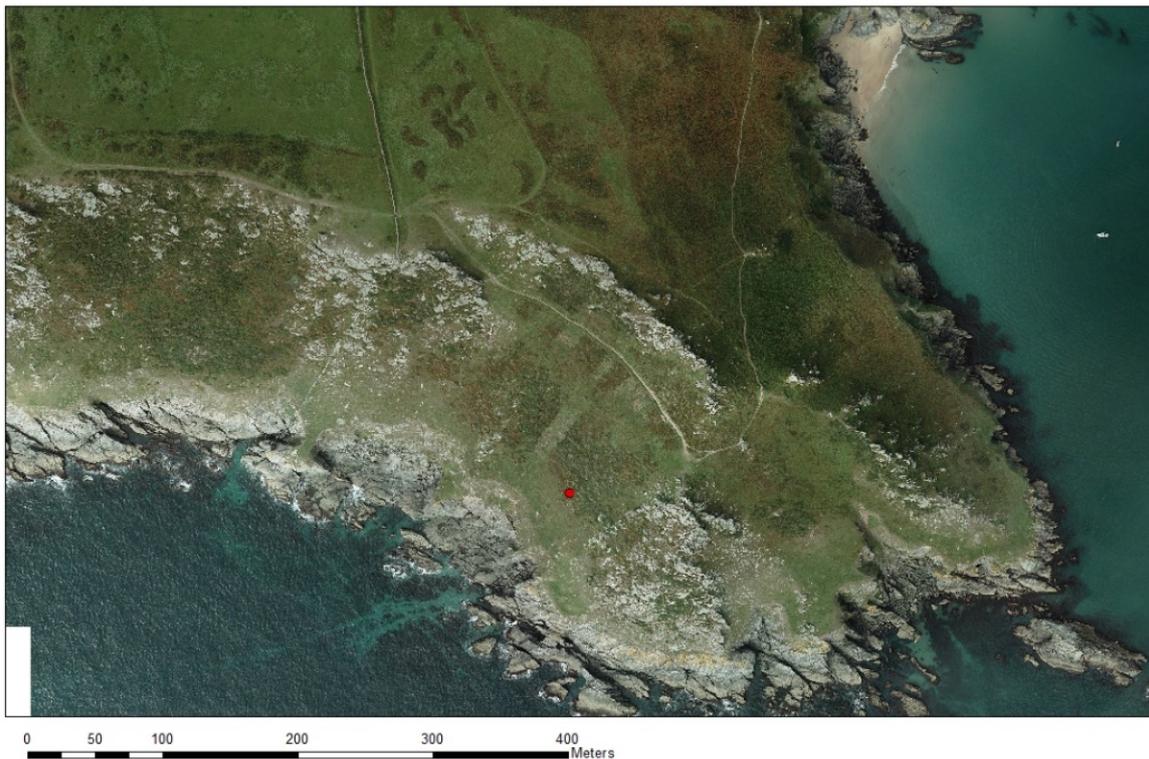


FIGURE 4.26: AERIAL PHOTOGRAPH OF THE AREA WHERE BOLT HEAD WIRELESS STATION WAS LOCATED (PHOTO: CCO)

4.4 Prawle Point Wireless Station, Devon

4.4.1 Site History & Context of Field Investigation

This site is an example of a wireless station which reused an existing building rather than constructing a new one. Prawle Point began its life as a signal station, working from 1882-1956, with a semaphore station in the vicinity for many decades before.

There are records of signals being received at the station during the First World War, a good example of which is the loss of the airship C8 in 1916, which was sighted by Prawle Point making a forced descent into the water. Help was sent but sadly there was just one survivor. Letters relating to this have been found and made publicly available through this project (<http://anyflip.com/wiic/nbqc>).



FIGURE 4.27: PRAWLE POINT—LLOYDS SIGNAL STATION DATA UNKNOWN C.1937

The present building is believed to have been erected by the Admiralty as a Coast Guard lookout in the 1860s. It became a Lloyd's Signal Station in 1882 and from here signalmen telegraphed details of passing ships to Lloyd's of London for the benefit of anxious owners and underwriters.

Between 1903 and 1951 the lookout served as a Royal Naval Shore Signal Station with both Lloyd's and Admiralty signalling undertaken by naval personnel who also carried out coastguard functions (Lloyd's signalling continued until 1956). The signal station also lies on the site of a Medieval chapel.

Phimester 2015: 61 states that "At Prawle Point the 19th century coastguard station, which survives, is thought to have been used as a wireless station during the First World War. There is archaeological potential for the survival of evidence relating to the wireless station above and below-ground, further investigation is required."

The coastguard service left the watch station in the early 1970's and in 1997 the National Coast Watch Institution took over and renovated the old building at the Point and has been steadily improving it since then.

To the east of the station there is a Second World War radar station. The grass covered bunker near to the path and another set to the east housed the transmitter receiver and generators. The site was defended by light aircraft guns to the north on the cliffs just below the coastguard station.

4.4.2 Geographical Context

The importance of this location within the landscape is demonstrated by the continued use of the Coast Watch station at the site (See Figure 4.24 in Section 4.3.2 for general location). Prawle point has a commanding view over the sea and like many of the wireless stations is in a remote area ensuring little interference from buildings. With the site first used for a Medieval chapel there is a long history of use.

There are two main structures shown on the historic maps and visible through aerial photography (Figure 4.28 and 4.29) the more southerly being the signal station and the most northerly a row of houses built by Lloyds Inc. in 1905.



FIGURE 4.28: AERIAL PHOTOGRAPH SHOWING THE LOCATION OF PRAWLE POINT WIRELESS STATION (PHOTO: CCO)

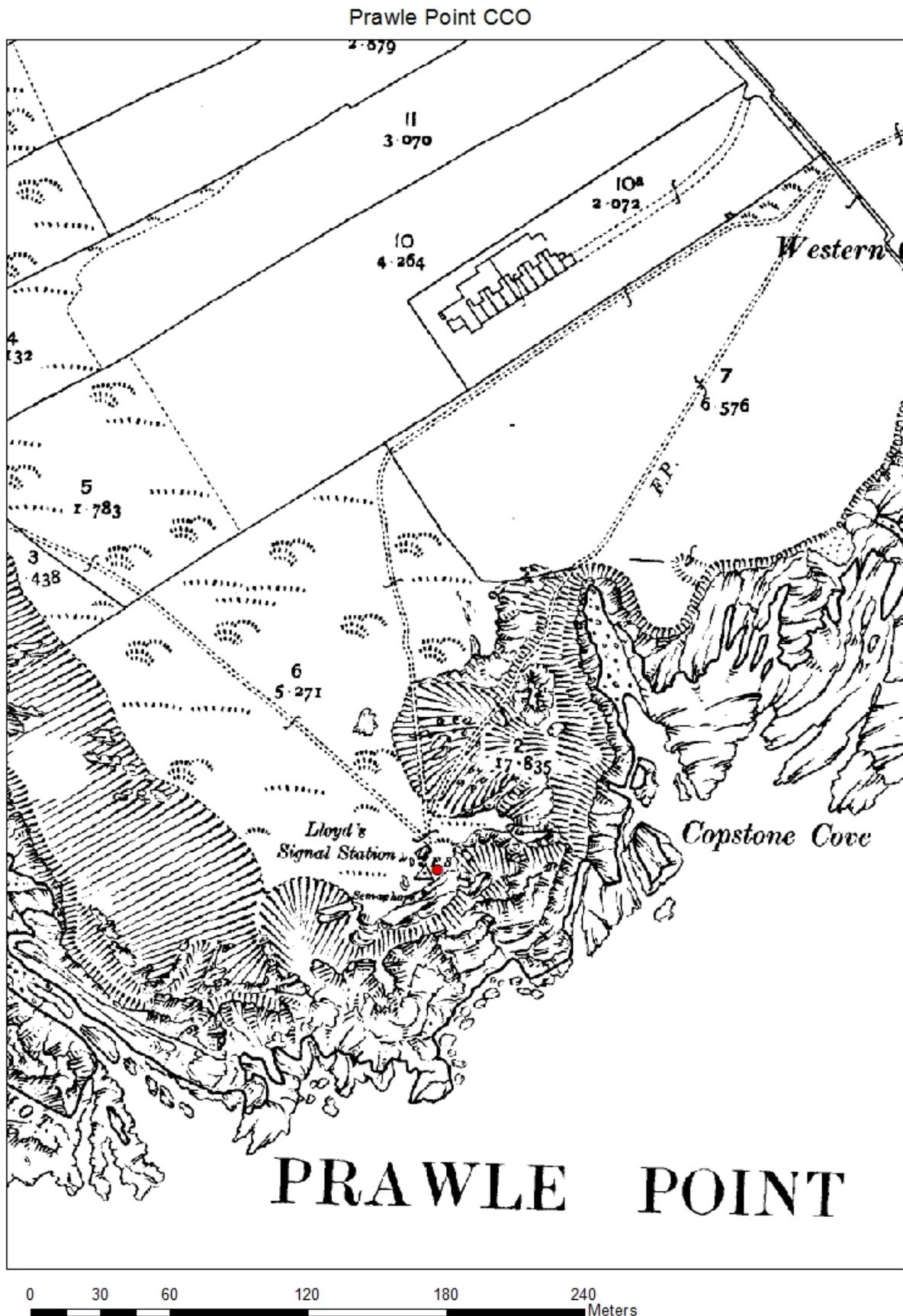


FIGURE 4.29: PRAWLE POINT - 1907 HISTORIC ORDNANCE SURVEY MAP

4.4.3 Aims for Field Investigation

The site is located among rocky outcrops, which makes it difficult to get an accurate idea of the potential archaeological remains from satellite imagery. The fieldwork aimed to:

- Identify any remaining anthropogenic structures from the surrounding area, these may be difficult to distinguish due to rocky outcrops and growth.
- If remains are located take photographs and create a sketch plan.
- Consult with the current National Coast Watch members to ask if they have any further information on the use of the site as a wireless station.

4.4.4 Fieldwork Results

The site was visited by two members of MAT Staff during June 2016. Historic maps and modern satellite imagery (Channel Coastal Observatory) had been used to refine the search area for Prawle Point Station, however, this was relatively straight forward to locate as the Lloyds signal station was based in an Admiralty Coast Guard lookout base that is still in use (Figure 4.30).



FIGURE 4.30: COASTGUARD STATION AT PRAWLE POINT THAT WAS USED AS A WIRELESS STATION

Comparing the modern remains with those shown in the historic photograph from 1937 (Figure 4.27) there have been considerable changes to the site. Although in the same position over time it is not clear how much of the structure that would have been in place during the First World War survives. Further survey and research are likely to help determine whether any such remains survive.

No traces of remains related to potential mast locations or stays were discovered during the walkover survey, although further areas that could not be accessed could be subject to further searches.

4.5 Culver Cliff Wireless Station

Culver signal wireless station is one of a series built along the south coast by Guglielmo Marconi (Figure 4.31), it was built for the Admiralty for military use. The remains of the site are today delineated by naval boundary stones, and the main site is covered over by a car park. Culver station was noted for exceptional reception and would often receive messages that could not be received by naval signal operators in Portsmouth. During the Second World War Culver station was used for intelligence gathering, staffed by members of the Women's Royal Naval Service (WRNS) billeted in the nearby coastguard cottages.

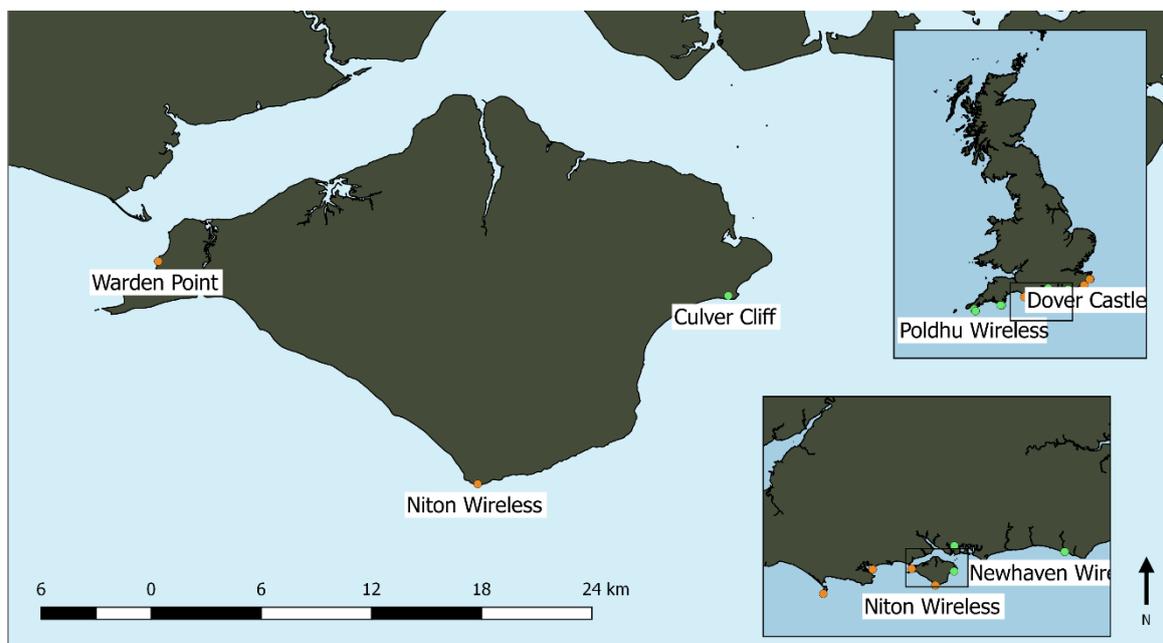


FIGURE 4.31: LOCATION MAP SHOWING THE POSITION OF CULVER CLIFF WIRELESS STATION IN RELATION TO OTHERS ON THE ISLE OF WIGHT.

4.5.1 Site History & Context of Field Investigation

Culver Cliff wireless station was recorded with volunteer support from the 1st Lake Girl Guides. The survey focused on two archaeological sites:

- Culver wireless station
- Culver Downs battery, which was active during the First World War

The sites are in very close proximity as shown in the Figure 4.32: CCO image of Culver cliff with position of archaeological sites marked. The battery was built in 1893 and was manned during both the First and Second World Wars.

The Culver signal station was an Admiralty station which stood adjacent to the Yarbrough Monument from 1906 until the 1950's. The Yarbrough Monument, which is in close proximity to the west of the site, is a large granite obelisk moved to the site in the 1860's from the higher summit of the Bembridge downs. A Palmerston fort built in the late 1860's is also located on Culver Downs located to the west inland from the wireless station.



FIGURE 4.32: AERIAL PHOTOGRAPH SHOWING THE POSITION OF THE CULVER CLIFF WIRELESS STATION (LEFT) AND TWO BATTERIES (RIGHT) (PHOTO: CCO)



FIGURE 4.33: CULVER CLIFF WIRELESS STATION 1920 – YARBROUGH MONUMENT TO THE LEFT OF IMAGE (PHOTO: BRITAIN FROM ABOVE)

Historic photographs of the site (Figure 4.33) shows a substantial roughly square structure with probable observation platforms. Unlike many typical wireless stations Culver was not a series of a relatively simple small huts and a singular mast. Although not marked on OS maps, aerial photographs

show there is a tall mast adjacent to the station which dwarves the Yarbrough Monument which is 75ft high.

During the First World War the whole site of Culver Down was a military zone and closed to the public. The Downs have a number of other historic military features such as barracks and a number of private dwellings related to the signal station.

Culver Downs is now owned and managed by the National Trust who are responsible for maintaining the Yarbrough Monument, Culver Battery, Palmerston Fort and other historic remains on the site. The National Trust have erected various plaques and information boards and the Culver Trail is a well-established walk which includes the wireless station as a key historical feature along the walk.

4.5.2 Geographical Context

Culver Down is a typical chalk down with a commanding position overlooking the Solent and across Sandown Bay. Like many of the wireless station sites in this report the area is high on a cliff allowing a clear line of sight and good conditions for wireless communication. The site was reused during the Second World War leading to more construction work on fortifications and housing for those that manned the station, these structures can be seen on historic mapping. The Ordnance survey map of 1898 (Figure 4.34) shows the Coastguard signal station has been established, this did not show on mapping prior to this date.

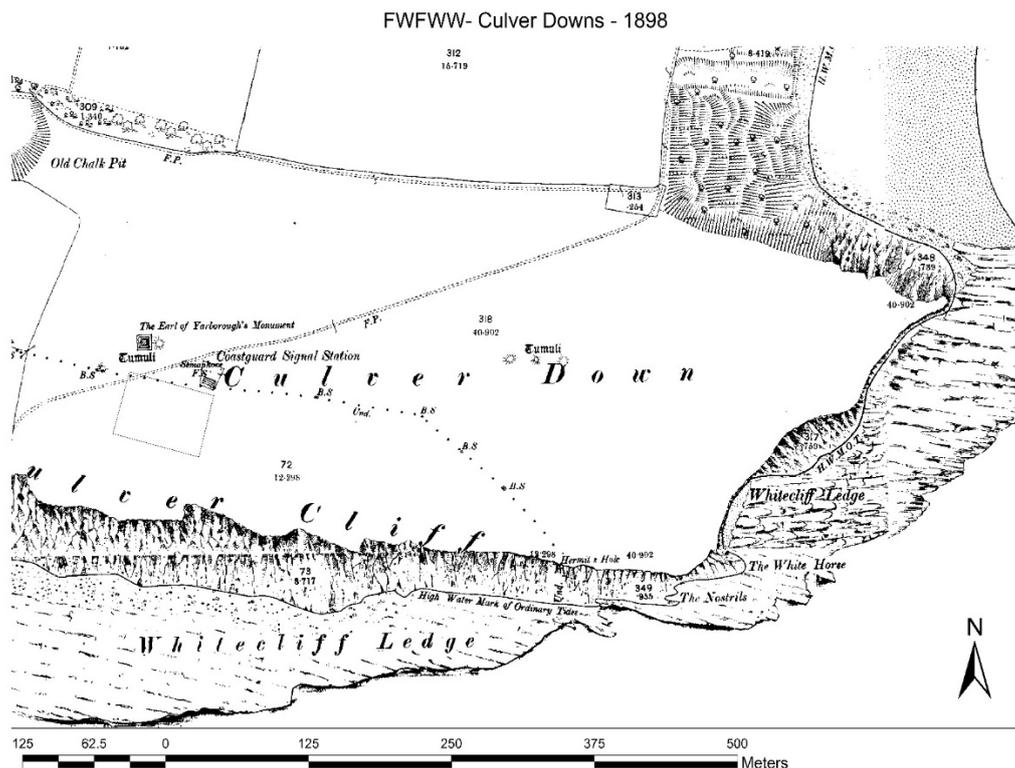


FIGURE 4.34: 1898- ORDNANCE SURVEY MAP OF CULVER

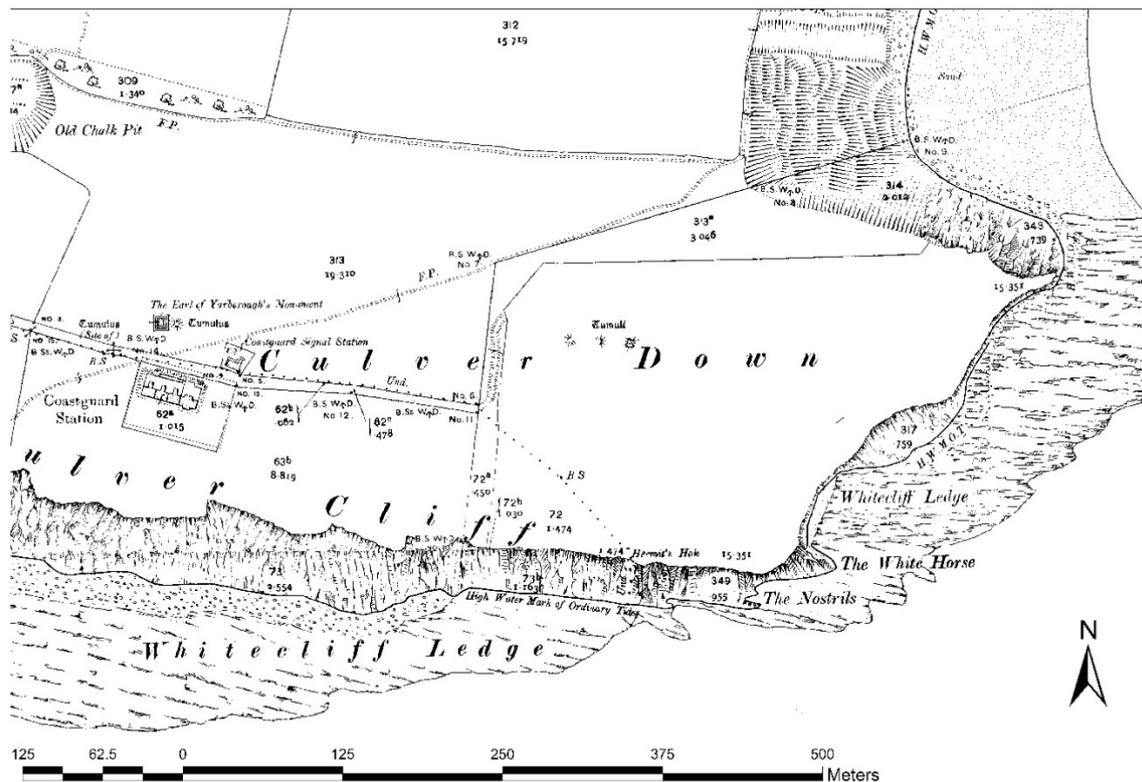


FIGURE 4.35: 1909 – ORDNANCE SURVEY MAP OF CULVER

The Culver wireless station, like the example at Prawle Point, is built at the location of an older Coast Guard signal station which has been established in the late 1800's. The cottages were established in the early 1900's and construction appears to have been completed by 1909 shown in Figure 4.35.

Maps produced after 1909 show the establishment of the wireless station building, but do not include the locations of the masts. The Ordnance Survey maps from 1937 to 1960 (Figure 4.36) show the wireless station as two square buildings. Interestingly, the gun batteries are not shown but the barracks buildings constructed are clearly evident. From the 1970s onwards maps show the station as having been removed and no longer in service.

A review of modern satellite images shows the remaining foundations of many of the historical features on Culver Down (Figure 4.37). The wireless station which is centre left and has been almost entirely removed with half of it being used as a carpark.

4.5.3 Aims for Field Investigation

The site at Culver Cliff/Down is significant as one of the examples of a large wireless station that is uncharacteristic of the concrete footings and timber sheds that were present at so many other sites. The station is a substantial structure and, although the site is now partly covered by a car park, the northern extents are a mixture of over grown shrubbery with some foundations, although the sites for the masts are unknown. Based on the available information fieldwork had the following aims:

- Identify all First World War remains present at the site;
- Attempt to locate any evidence of the masts;
- Record the characteristics of the remains; and
- Gather a full photographic record of remains.



FIGURE 4.36: 1937 - 1960 – ORDNANCE SURVEY MAP OF CULVER DOWN

FWFWW - Culver Downs Wireless Station - CCO Map



FIGURE 4.37: AERIAL PHOTOGRAPH SHOWING THE FOUNDATIONS OF HISTORIC STRUCTURES AT CULVER DOWN (PHOTO: CCO)

4.5.4 Fieldwork Results

Survey undertaken in April 2017 enabled a walk over survey to be undertaken and a series of photographs to be collected. The site of the carpark is where the station building would have stood, to the north and around the edges of the car park a number of concrete bases and features can be located, although the amount of vegetation on the site makes some features difficult to discern. The largest concrete base (Figure 4.38) to the north of the wireless station location is thought to be related to buildings most likely of Second World War date. There are other features such as rings fixed with concrete that could have been related to mast stays for the wireless station.



FIGURE 4.38: CONCRETE BUILDING BASE LYING TO THE NORTH OF THE WIRELESS STATION SITE

4.5.5 Discussion and Future Work

For more information to be gathered on the surviving concrete remains that could be related to the wireless station and associated masts, it would require some of the vegetation on site to be removed. This may allow for positive identification of which building bases and features were contemporary with the wireless station.

4.6 Horsea Island Wireless Station, Portsmouth

4.6.1 Site History and Context

Horsea Island was the Admiralty's first high-powered shore wireless telegraphy station and, as such, plays a significant role in the understanding of the development and use of this technology. It was also the site of the first intentionally constructed torpedo testing range, built in 1885, and, as a result of the necessary landscape changes this brought, has potential for investigations into the impact of these changes on the coastline and drainage pattern of the island.

Whilst the torpedo range was largely obsolete by the outbreak of the First World War, with torpedo testing moving into open water areas such as Stokes Bay, the tank was modernised and retained. The wireless station was in place by 1909 and was in use throughout the FWW, continuing until the 1960s. Fieldwork has concentrated on the site's use as a coastal wireless station, however, any evidence likely to be related to the use of the site in the First World War has also been recorded.

Originally two separate islands: Little and Great Horsea, Horsea Island is an area of reclaimed land that dates back to the late 19th century. Built with the purpose of housing a torpedo test range, major landscape remodelling was undertaken in order to join the two islands, with chalk from the nearby Paulsgrove chalk pit, as well as from the excavation of the torpedo lake itself, used to turn the mud and marshland into hard ground. Simultaneously, at the NW of Little Horsea a pier was extended into the channel of Portchester Lake with a five tonne Ransome and Rapier crane erected to facilitate the transport of heavy building goods to the shore. Several buildings were constructed (Figure 4.39), including the old farmhouse on Little Horsea ('the cottage'), which was enlarged for the

caretaker/storekeeper, torpedo workshops, a boiler house, stores and mess rooms, all of which were completed by 1888.

The torpedo test range, whilst described as “the finest in the country” (Ripley, 1982), was soon rendered obsolete by the rapidly advancing torpedo technology. Improvements were made, such as a lengthening by 265 yards in 1905 and increased experimentation from 1915 and throughout the First World War, but the frequency of its use declined as the technology required greater and greater distances.

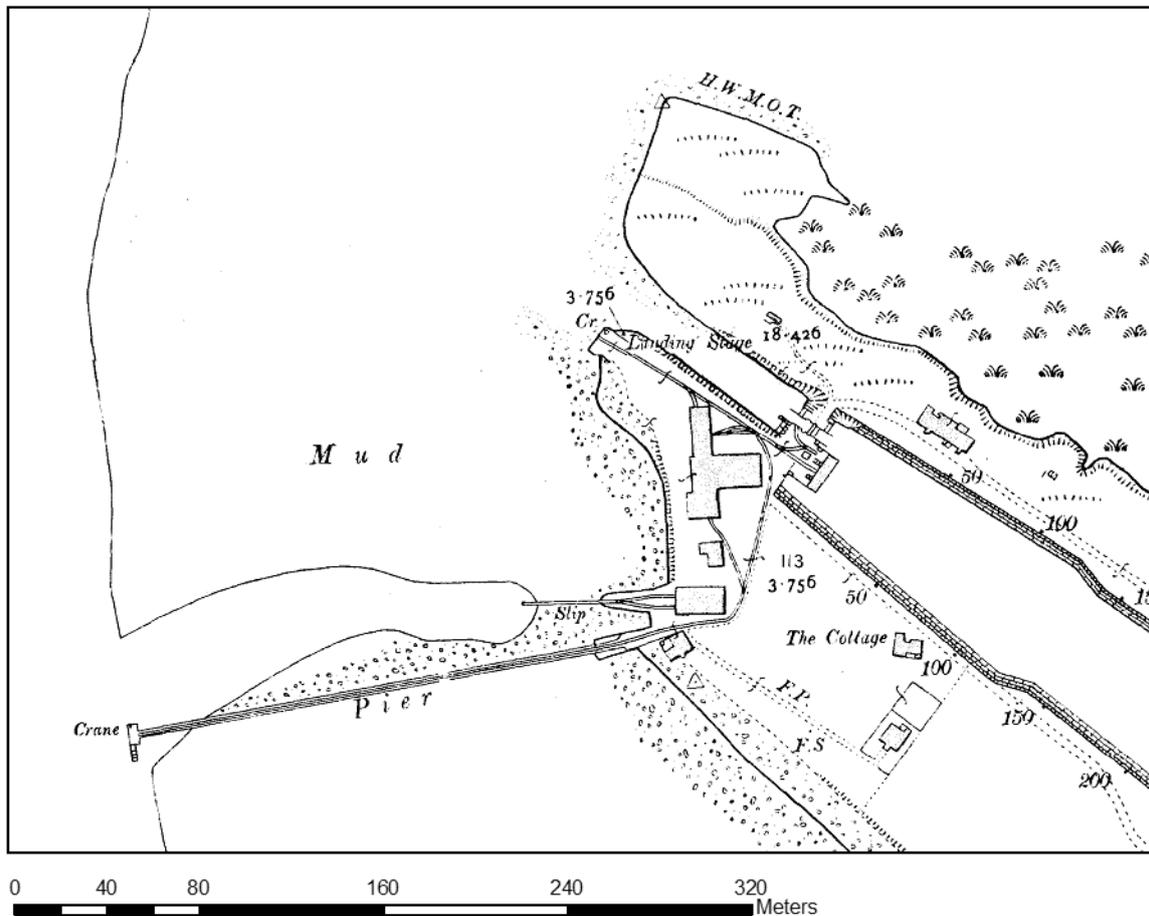


FIGURE 4.39: 1900 ORDNANCE SURVEY MAP SHOWING THE LOCATION OF BUILDINGS USED IN THE RUNNING OF THE TORPEDO LAKE

From 1909 onwards the island also became used as one of the Admiralty’s first high powered shore wireless telegraphy stations, with a further two at Cleethorpes, near Grimsby and Gibraltar. This necessitated alterations to pre-existing buildings such as the mess room block on the north of the island, which was altered to house new wireless equipment and more staff. Four wooden aerial ‘Marconi’ masts in eight foot tabernacles were erected, each standing 150 foot tall and held fast with wire stays. The four Marconi masts were surrounded by eight 60-foot spreader masts. The station quickly became the Navy’s most highly regarded, conducting not just routine wireless work but also experimentation and training.



FIGURE 4.40: HORSEA ISLAND - EARLY 1920'S SHOWING THE ELWOOD MASTS (SOURCE: UNKNOWN)

As wireless technology progressed, so did the development of Horsea Island, with significant increases in the numbers and layout of buildings, aerial masts and supporting equipment on the island. The development of the eastern extent of Horsea came post-WW1, with the majority relevant to this report restricted to the west and north of the island.

During WW2, many of the Victorian buildings were destroyed and have since been re-built, but the residences and former mess rooms survived. The island was used as a wireless station until around 1960, and has since had further landscape remodelling: the land to the north of the island at Paulsgrove has been reclaimed, finally linking Horsea Island to the mainland completely. Despite no longer being used as a wireless station, the area is still in use today as part of the Royal Navy's Defence Diving School. Due to the remodelling of the landscape, this is likely to have obscured or removed evidence from the First World War facilities and buildings.

4.6.2 Geographical Context

Horsea Island sits within Portsmouth Harbour and is joined to the mainland by reclaimed land, it is fully accessible by road. Originally two separate islands, the areas around these were mudflats, with creeks and channels draining towards the Solent. Two separate occasions saw the remodelling of this landscape, the first being the joining of the two islands in the late nineteenth century—discussed above—and the second being the reclamation of the tidal mudflats to the north of the island in the early 1970s, joining it to the mainland.

The majority of the site investigated as part of the project lies above the high water mark, with only the site of the old pier being sometimes covered at high tide.

4.6.3 Aims of Field Investigation

Figure 4.40 shows that towards the western extent of Horsea Island, and around the time of the First World War, there were several buildings, structures and masts associated with the wireless station, fieldwork sought to answer:

- Do any structural/foundational remains of these buildings still exist?
- How do they relate to the later building phases of the site?

4.6.4 Field Work Results

Initially a desk based assessment was conducted in order to understand the development of the site as a whole and to identify the main areas of interest. This included creating regression maps of the site to look changes through time. Project volunteer, Chris Heal, visited The National Archives, Kew, and was successful in locating a collection of site plans that give detailed descriptions of the layout of the site during the First World War.

A site visit was organised with the Royal Navy for the 2nd June 2016, along with eight volunteers and two staff members. This visit was to search for assess and record the remaining structures in order to get a better idea of how much remains of the original wireless station.

The Key sources consulted for the Fieldwork at Horsea include:

- Ripley, B. 1982. *Horsea Island and the Royal Navy*. The Portsmouth Papers No. 36. (Ripley, 1982)
- Historic OS maps: 1866, 1867, 1870, 1874, 1879, 1898, 1910, 1911, 1932, 1950, 1951 and 1952.
- Channel Coastal Observatory satellite imagery.
- Original documents relating to the planning and building of the wireless Station, National Archives, Kew (ADM 116/1066 and ADM 140-1484-17).

Work at Horsea aimed to address the above research questions through a combination of field walking the site, assessing extant remains, determining how they have changed and how they relate to later structures. This was done through field walking and recording including:

Structural remains:

- Using the results of the regression maps, two main areas of the site were chosen as key areas for extant remains (Figure 4.41). The group of volunteers was split into two, with each half focussing on a different area.
 - The remains of First World War buildings further along the torpedo range and towards the east have been absorbed into current buildings. As such, the less visible structures to the western extent were the focus of this work.
- Areas were searched for remains of pre/ First World War structures and, where found, these were recorded by measured sketch and photography.
- Assessments were made as to how much of the landscape has been modified since the building of the structures around the time of the First World War.

Foreshore:

- Remains located on the foreshore were assessed in a similar way: extant structures were photographed and sketched.
- The pier area was recorded at low tide as it involved walking out into the intertidal zone. The pier supports, where extant, were measured to determine their individual dimensions and their relationship to one another.
- The potential for further work in the intertidal area was assessed.

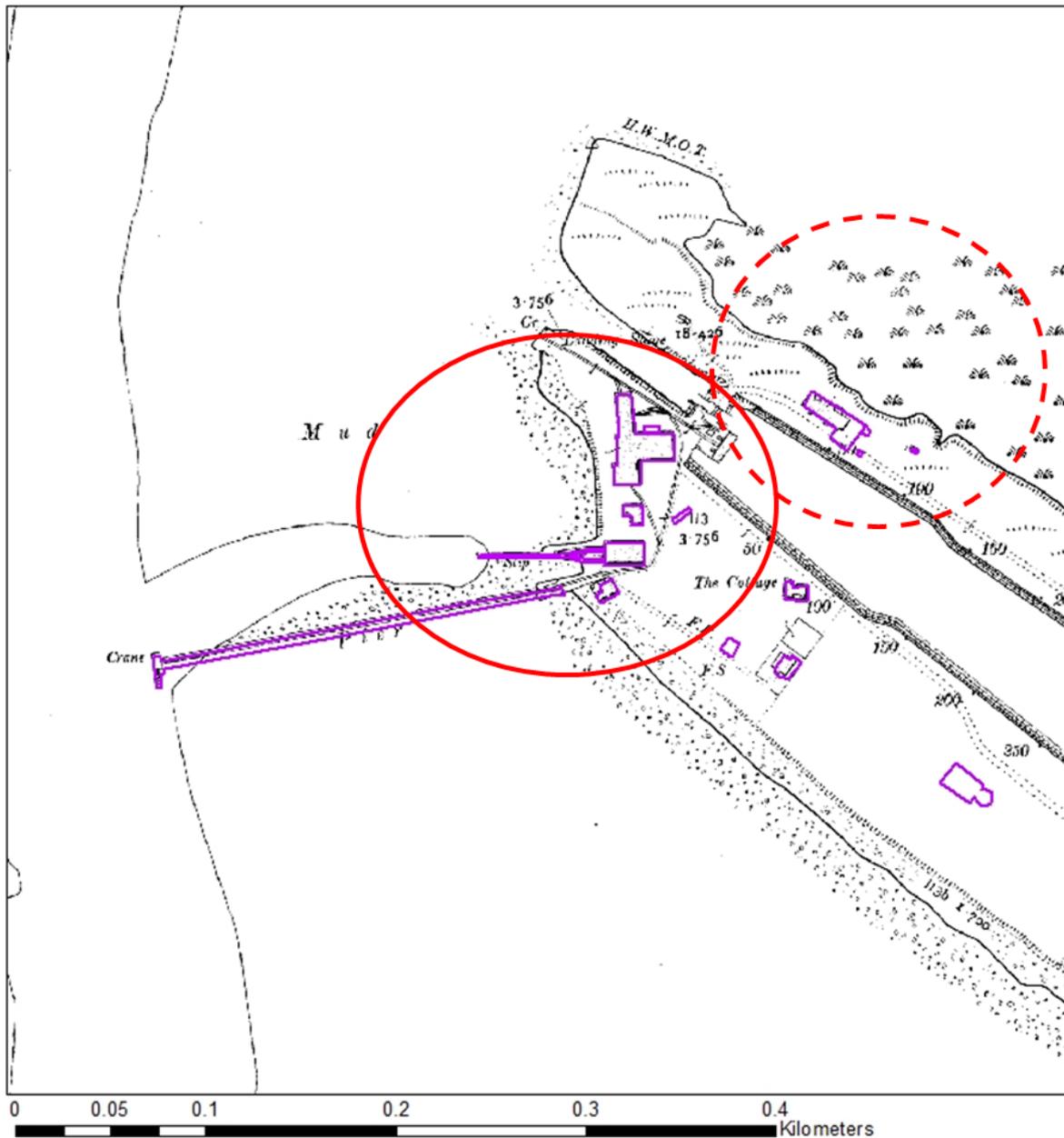


FIGURE 4.41: THE TWO AREAS CONCENTRATED ON: AREA 1 IN THE DASHED LINE AND AREA 2 IN SOLID LINE. THE PURPLE OUTLINES SHOW THE LOCATIONS OF THE STRUCTURES IN USE DURING THE FIRST WORLD WAR. BASE MAP IS AN ORDNANCE SURVEY MAP FROM 1910.

Eight volunteers were involved in fieldwork, with access facilitated by Navy personnel. Initially the group was split into two, with one half focusing on Area 1 and the other on Area 2. Area 2 was by far the most productive, with the vast majority of First World War structures in Area 1 either covered or destroyed by subsequent landscape remodelling. After this initial survey, the entire group moved around onto the foreshore where they assessed the remains of the pier and the structures associated with the torpedo range and various early aerial masts. Much remained intact on the foreshore and intertidal zone owing to the restricted access and lack of subsequent construction work.

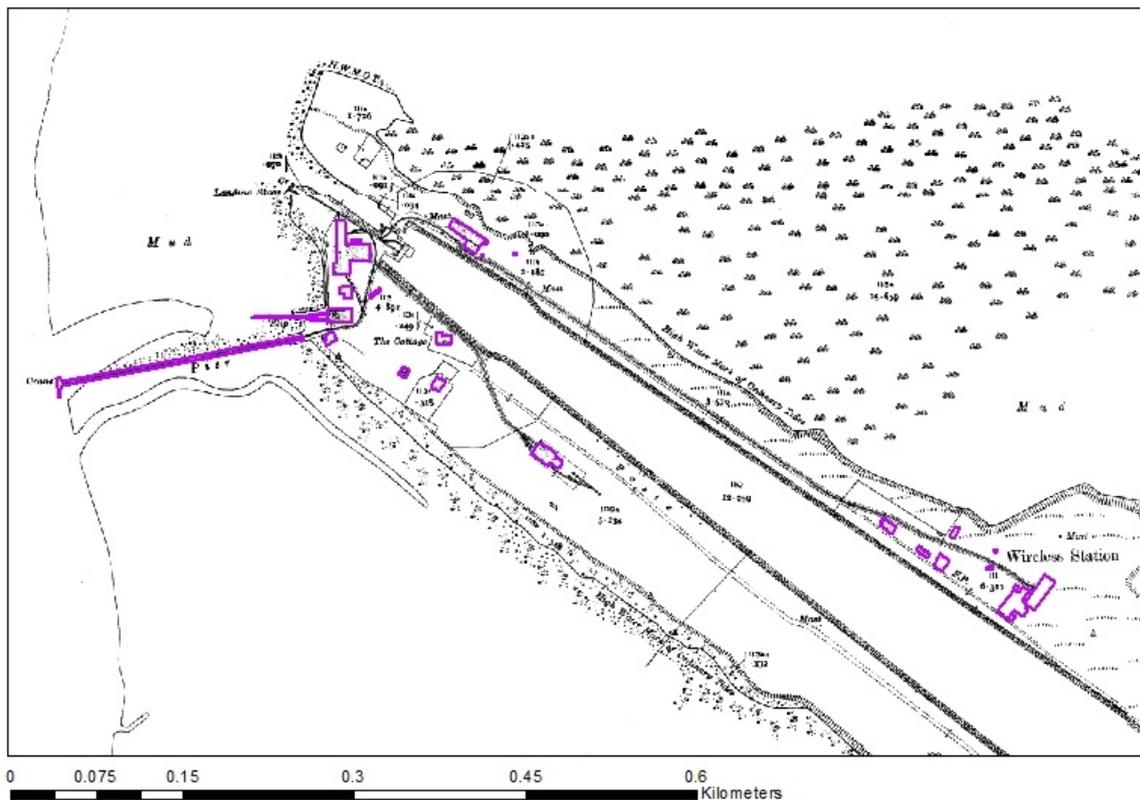


FIGURE 4.42: SHOWING THE LOCATION OF STRUCTURES ASSOCIATED WITH THE FIRST WORLD WAR. BASE MAP: ORDNANCE SURVEY MAP 1932.

4.6.4.1 Desk Based Research Results

The Desk-Based Assessment (DBA) and historical research phase of investigation proved to be extremely helpful in establishing the overall disposition of structural remains at the site, as well as providing some indication of the likely changes to those remains over time.

The historic Ordnance Survey maps from the period 1866-1952, in conjunction with modern satellite imagery from the Channel Coastal Observatory, were used to track the changes to both landscape and structures through time. In particular, the building of and changes to structures relating to the First World War. Figure 4.42 shows the structures that relate to the early stages of torpedo and wireless work at Horsea Island, with relevant structures digitised in purple. The basic sequence of development shows the west of the island being the focus of the earlier work: several buildings are built and a series of masts erected. The pier has been constructed by this time and is still in use.

Historic photographs show the large 150 foot Elwood masts that were in use (Figure 4.40) and it is documented that each would have had been held in place by wire stays, locating the remains of which were part of the field walking.

One of the most significant sources of information came from the National Archives at Kew. Here, two documents were found relating to the planning and building of the wireless station. These documents help to clarify how the existing structures on the island were adapted and added to for the purposes of the wireless station. For example, historic maps show the location of a small building on the north side of the torpedo lake (see Figure 4.42 above) but determining its function is not possible. The added information from the archives, however, adds both textual as well as graphical information and allows us to identify specific structures.

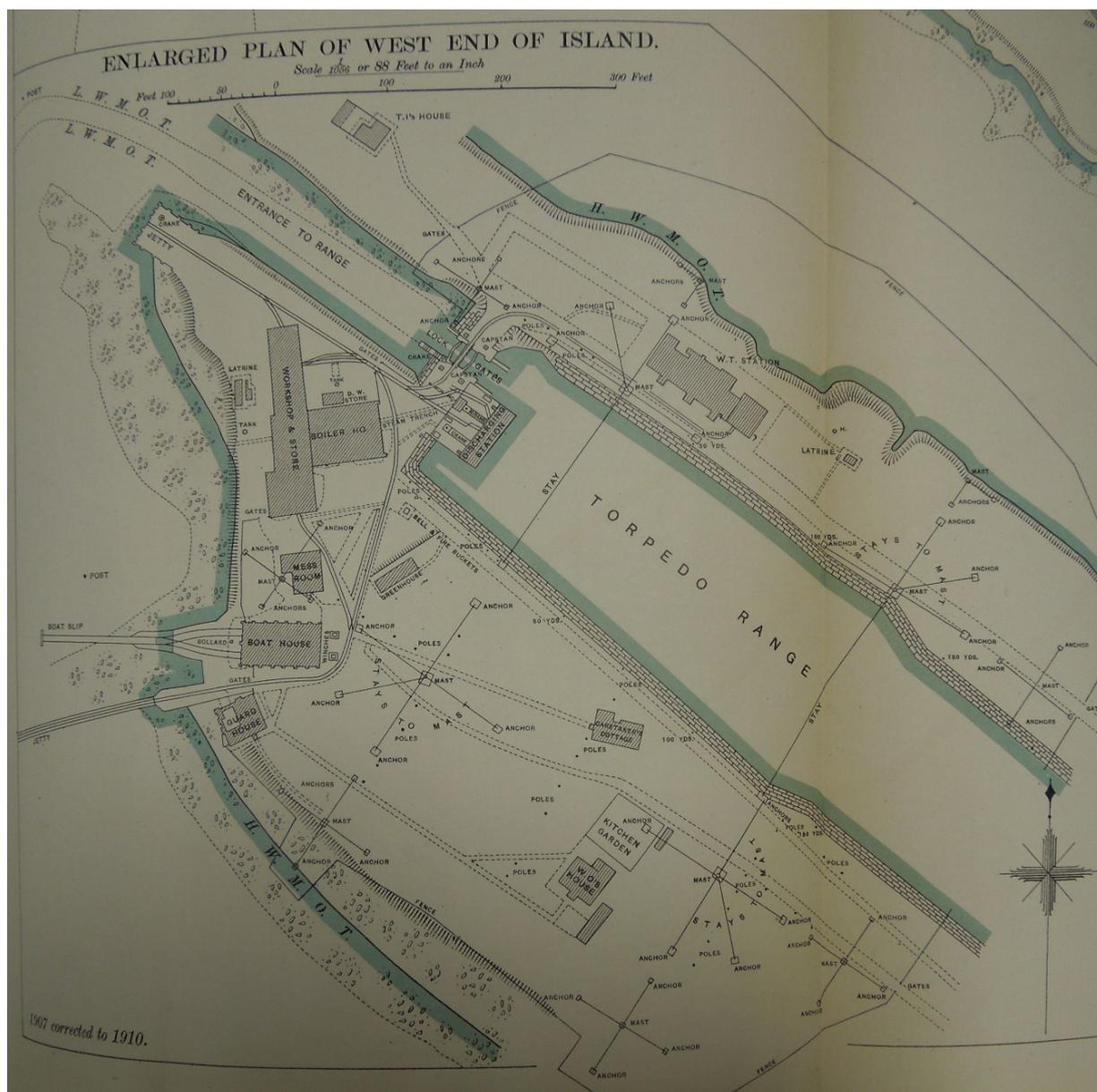


FIGURE 4.43: ORIGINAL PLAN OF THE WEST END OF HORSEA ISLAND FROM 1910 (THE NATIONAL ARCHIVES ADM 140-1484-17)

From these documents it was possible to identify the locations of key buildings relating to the wireless station (Figure 4.43). It also shows details such as the locations of anchor points for aerials, which are otherwise lost on OS maps.

Significantly, the textual accounts that accompany the plans, as well as detailing costs and materials proposed for use, mention their desire to push ahead with the development of the technology: "...it is submitted that the work may be proceeded with at an early date as this station is urgently needed now in order to continue the necessary experimental work in connection with the high power telegraphy stations." (ADM 116-1066). The development of Horsea was clearly seen as an important part of furthering this technology and, with the rapid advances in torpedo technology rendering the range at Horsea obsolete, this was to become the main function of the site.



FIGURE 4.44: VOLUNTEER RECORDING THE REMAINS OF THE OLD BOAT HOUSE IN AREA 2.

4.6.4.2 Field walking Results

During field walking several structures were located. The vast majority of these were within Area 2 (see Figure 4.41 above) and related to the foundations of original structures, such as the boat house, with some potential mast footings and winches (Figure 4.45).



FIGURE 4.45: BOAT HOUSE FOUNDATIONS AND A WINCH FROM AREA 2

4.6.4.2.1 Area 1 Results

Area 1, was almost entirely devoid of remaining structure. One concrete base and one possible mast footing were found (Figure 4.46), both along the margin of the torpedo lake. It appears likely that the lack of evidence in this area is due to the remodelling of the landscape during the reclamation of the land to the north and its transformation into a landfill site.



FIGURE 4.46: POSSIBLE AERIAL SUPPORT/MAST FOOTING FROM AREA 1

4.6.4.2.2 Area 2 Results

The field walking on the foreshore was particularly productive. Several features were located, all on the foreshore in Area 2 and in proximity to the pier. The exception to this is the large crane that is still located next to the western end of the torpedo lake. An array of features were found on the foreshore, including what appears to be a torpedo carrier, possible mast bases, sleepers for transport tracks and the remains of a winch.

This was also the location of the remains of the pier. A series of wooden posts were recorded out into the intertidal zone, although further work would be required to record this in detail. Significant remains of the pier's legs are still extant, extending into the intertidal zone (Figure 4.47). The leg posts were made from concrete and several of the legs had the remains of wood still within their central cavity (Figure 4.48), the posts were approximately 0.75m wide, with 0.30m thick walls. The distance between the posts increases towards the shore from approximately 3.4m at 97m towards the shore from the low waterline, to 2.4m at the waterline.

Future work could map the pier legs in more detail and potentially take some short cores to look at the affect their construction had on the landscape development in this area.



FIGURE 4.47: THE REMAINS OF THE PIER LEGS EXTENDING INTO THE WATER



FIGURE 4.48: CROSS SECTION OF ONE OF THE PIER LEGS WITH WOODEN REMAINS IN THE CENTRE. 50CM SCALE.

Area 2 contained far more extant structure associated with the wireless station. This consisted of the foundations of buildings (Figures 4.49 and 4.50) as well as mast footings and winches and is likely to be due to the reduced impact of the northerly land reclamation in this area. It is also the previous location of boat houses and slipways and so has remained used in these settings since the First World War. As the pier has gone out of use and the buildings towards the northern and eastern extent of Horsea have been constructed and extended, this end of the island has remained undeveloped, preserving these structures since the early 20th century.

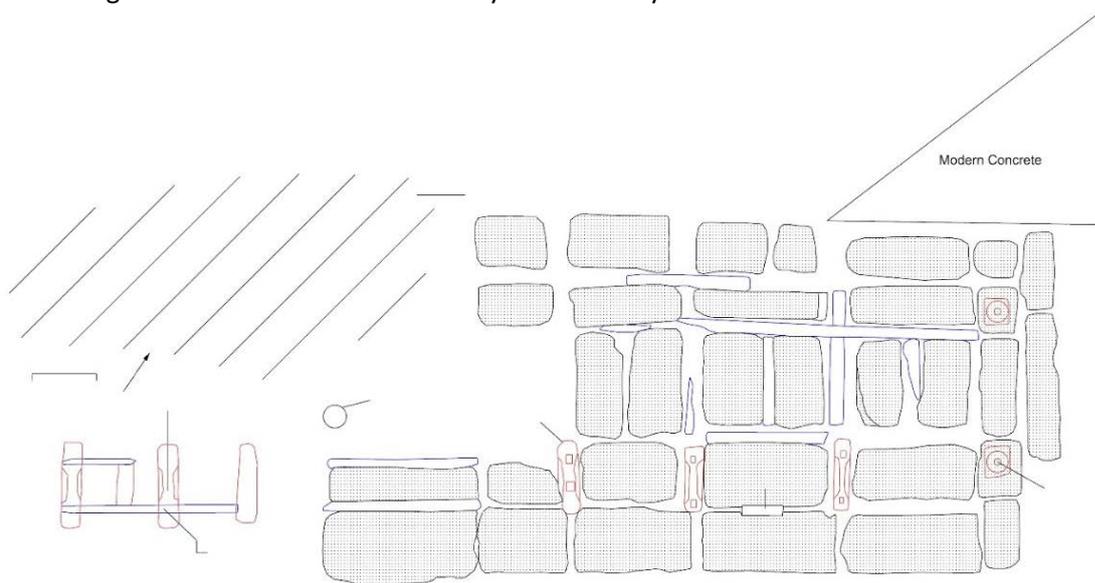


FIGURE 4.49: PLAN CREATED FROM INITIAL SKETCH OF THE BOAT HOUSE FOUNDATIONS IN AREA 2



FIGURE 4.50: VOLUNTEER SKETCHING REMAINS OF THE BOATHOUSE IN AREA 2

Further remains in this location were situated on the foreshore, probably relating to torpedo transport (Figure 4.51) and aerial supports (Figure 4.52), as well as the Ransome and Rapier crane that still exists near to the entrance of the torpedo range (Figure 4.53). The preservation of this material is likely to

be due to the limited access available to the public in this area, so the structures are otherwise only subject to general chemical weathering and erosional processes from the water.



FIGURE 4.51: THE REMAINS OF A TORPEDO TRANSPORTER



FIGURE 4.52: POSSIBLE AERIAL MAST BASE



FIGURE 4.53: RANSOME AND RAPIER CRANE

4.6.5 Conclusions and Future Work

Horsea Island underwent significant landscape change throughout the course of the 20th century, almost entirely in response to its military development. First, through the construction of the torpedo testing facility and, second, as one of the Admiralty's first high powered shore based wireless telegraphy stations. The main focus of this work were the structures relating to the latter and what survives of these today. However, there was also interest surrounding the construction of the pier, crucial for bringing materials to the island, as well as its resulting landscape modification.

Future work could include a more detailed assessment of the pier remains and some geotechnical work to analyse the effect that its construction had on the landscape in the surrounding area. Geophysical work, such as Ground Penetrating Radar, could also be undertaken in Area 1 to determine whether the First World War structures were buried or destroyed by the land reclamation.

4.7 Newhaven Wireless Station, East Sussex

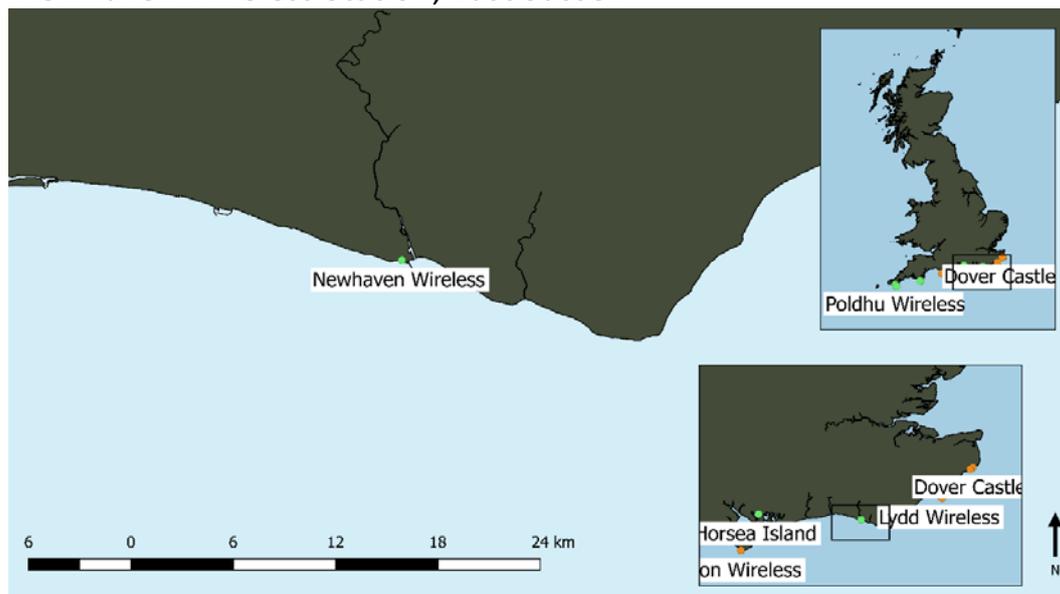


FIGURE 4.54: LOCATION OF NEWHAVEN WIRELESS STATION

4.7.1 Site History & Context of Field Investigation

Newhaven wireless station was to become one of the key stations in ship to shore communication during the First World War, it was established in 1904 becoming operational in 1905. The station achieved ship to shore radio communications around 1912 (Phimester 2015: 25).

During the First World War Newhaven port played a significant role in the war effort and was taken over exclusively for military use at the outbreak of war. As one of the closest English ports to the front lines the port was responsible for transporting 6,000 tons a day in 1915 rising steadily through the war supplying everything that was needed to maintain the operations on the continent. The wireless station establishment was part of the war effort and the increasing importance of Newhaven port.

Despite the rich history of the port and cliffs very little has been written about the Newhaven wireless station. The station was on the cliffs directly to the west of Newhaven Fort and three later gun emplacements. It is recorded as having an approximate location in this area, and very little is known about its operational capacity.

Newhaven Fort to the east of the position of the wireless station has a commanding and forceful position in the landscape overlooking the harbour entrance. There has been a permanent gun battery at the harbour entrance since 1759. The Fort was built as a Palmerston Fort, and construction began in 1862. The Fort was heavily updated in the 19th century and became a highly strategic location with the growing importance of Newhaven during the First World War.

There are three 20th century gun emplacements on top of which a current and active Coast Guard station has been built. They are related to the expansion of the fort from the 1800's onwards though both World Wars.

At Nore Point, 200m to the west of the position of the wireless station there is a grouping of First World War military earth works. The earth works consist of a practice trench and a rear communications trench accessed from a larger dugout. The earthworks were identified on a 1951 aerial photograph. An aerial photograph from 1996 shows some survival at the northern extent however the site to the south had been lost.

The area also has significant amounts of archaeology from the Second World War, heavy agricultural activity and constant cliff erosion. This makes establishing the precise form and location of some of the First World War remains difficult.



FIGURE 4.55: AERIAL PHOTOGRAPH SHOWING NEWHAVEN WIRELESS STATION (PHOTO: CCO)

4.7.2 Geographical Context

The UK's south east coast is a highly dynamic and rapidly eroding series of cliff faces which has witnessed three significant collapses on the Sussex coastline in 2017. Similar collapses are historically well recorded in Newhaven, areas of the cliffs and foreshore below are shut off to protect the public. The expected position of the wireless station is located directly in the area of likely collapse with elements of archaeology related to the site clinging on to the cliff edge.

The site is located on top of the Brighton to Newhaven Cliffs, directly west of the Fort that overlooks the mouth of the River Ooze. Review of historic maps identified that the cliff line has dramatically eroded in the last 200 years.

Satellite imagery was consulted during research, however, the large amount of vegetation at the site made it difficult to discern structures, particularly the concrete buildings that often appear like the chalk bedrock. A number of possible linear features and anomalies were plotted for investigation as part of the fieldwork.

4.7.3 Research Questions & Aims for Field Investigation

Previous desk based investigations of the site, have not managed to pin-point the precise location of the wireless station remains. This situation influenced the aims of the fieldwork which included:

- Identify potential First World War remains related to the Wireless station at Newhaven;
- Establish the extents of these remains;
- Determine the characteristic features and dimensions of these remains; and
- Record and photograph all archaeological remains believed to relate to the wireless station.

4.7.4 Fieldwork Results

The fieldwork at Newhaven took place in August 2017, alongside work to survey areas of Newhaven Harbour and the seaplane base active during the same period as the station. Because the location of the wireless station is uncertain the whole area of the coast line from the coastal watch station to Nore Point was walked, recording all notable anthropogenic features, many of which had been located from aerial images. Any remains suspected to be related to the wireless station were photographed and a site record sheet completed.

At the site location referenced by Philmester 2015 there was no obvious trace of a wireless mast, any concrete or other footings to suggest the station had been present at this location. However, further west on the coastal path are two clear series of concrete footings with features that are likely to relate to a wireless station. These areas were referenced as 'Location A' and 'Location B' (Figure 4.57).



FIGURE 4.56: NEWHAVEN WIRELESS STATION POTENTIAL POSITIONS OF ARCHAEOLOGICAL REMAINS



FIGURE 4.57: AERIAL PHOTOGRAPHS SHOWING DETAIL OF LOCATION A AND B

4.7.4.1 Location A

Location A lies 101.5 m away from the stated position of the wireless station, it consists of a rectangular linear array of six foundation blocks with a series of blocks with mooring rings set externally (See Figure 4.60). The feature is on the edge of the cliff which limited what could be recorded, however, a series of measurements, scaled photographs and a record sheet were created for the feature. The rectangular remains are not complete as most of the structure was too close to the cliff edge to measure safely. A clear wall foundation could be seen in between the blocks identified on the aerial images the building itself was measured to a safe point.



FIGURE 4.58: CONCRETE LINEAR FEATURE AT LOCATION A, NEWHAVEN WIRELESS STATION

The block foundations are made from concrete with large pebble inclusions they are 50cm by 50cm, on the top a bonding scree for the coursing of the structures is visible. The foundation wall is made from the same material. The light bonding agent can be seen in Figure 4.58) delineating the corner of the structure. The corners all have a single bolt set within them suggesting some standardised construction method.



FIGURE 4.59: CONCRETE BLOCKS WITH MOORING RINGS FOR THE WIRELESS MAST STAYS

To either side of the structure are large concrete blocks with mooring rings set within them (Figure 4.59). These are presumed to be associated with the structure due to their location and construction material. The blocks measure 70cm x 70cm. They have been laid flush with the ground and are set directly into it. The blocks are equidistant from one another with a centre point within the structure, these have been interpreted as stays for a wireless mast.

A record within the National Record of the Historic Environment (NRHE) (Pastscape: Monument No 1525400) shows a probable Second World War military building in this area, this has been interpreted from a desk based study of aerial images. It states that the structure consists of a 'rectangular outline approximately 5m by 4m' with six circular marks (circa half a metre in diameter) which are symmetrically arranged around the rectangular structure. This interpretation was from a 1946 aerial photograph which would have been taken when the site was still an active military area.

It would seem that the person interpreting the photographs is actually viewing the remains of the First World War wireless station rather than remains related to the Second World War.

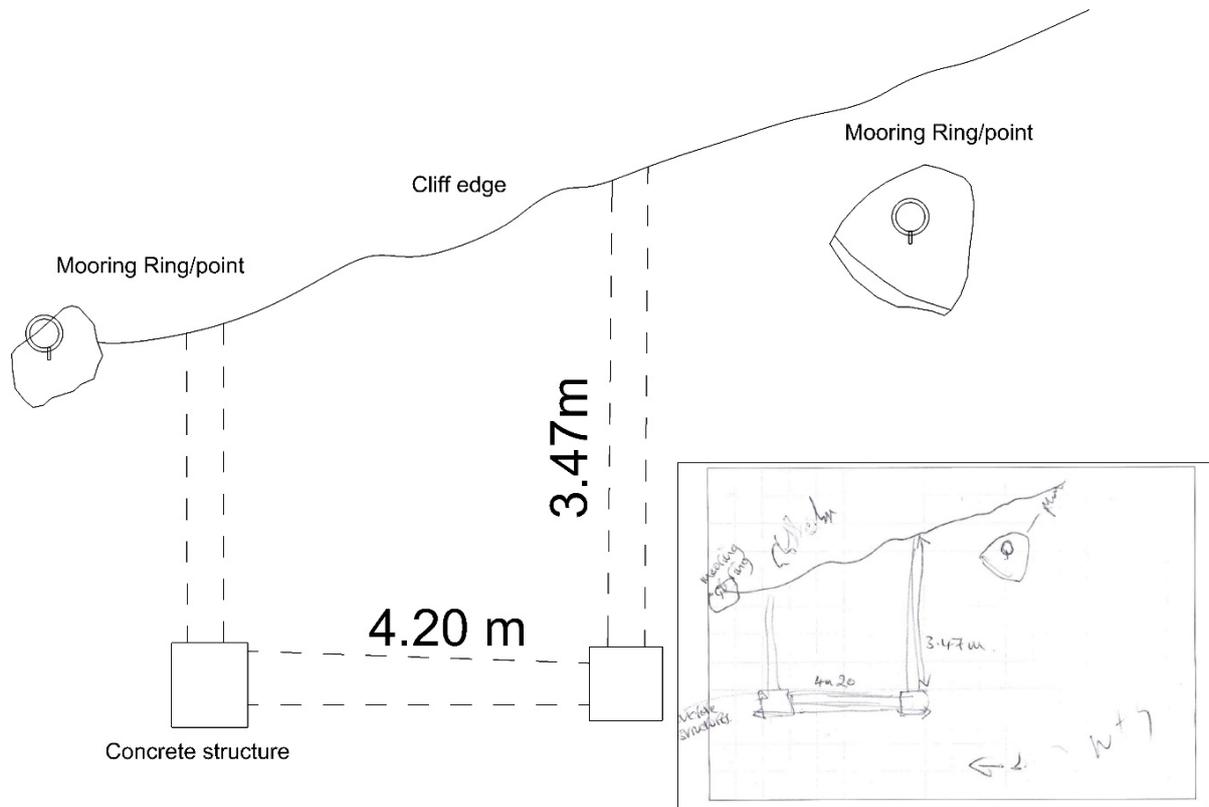


FIGURE 4.60: SKETCH PLAN OF REMAINS AT 'LOCATION A' NEWHAVEN WIRELESS STATION, SUSSEX

4.7.4.2 Location B

Location B lies 224m away from the stated position of the wireless station it consists of three large concrete blocks. Two of the blocks have central threaded metal bar sunk centrally into the concrete. The other labelled 'C' on the figure has two metal bars that have been bent over the edge and a raised concrete part at the top (Figure 4.61). The blocks are 1.5m square with a depth of 0.64m. There are also the remains of a wall to the west at the very extremes of the cliff that was too dangerous to measure.

A NRHE record (Pastscape: Monument No 1525230) details the presence of a tripod winch in this position which was active from the 19th to the early 20th Century, being used to haul blue boulders from the beach and sent via the port for use in the production of ceramics at the Staffordshire potteries. An aerial photograph from the 1940's showed the winch.

The tripod winch would have been very large with a 10m base. The tripod, despite its size, is not noted on any historic maps and also seems an odd placement considering the area of the cliffs here is only 1000m away from the breakwater built in 1890 with a full rail system, however this may account for the winch falling out of use when the breakwater was constructed.

The remains at 'Location B' are a less likely to be related to the wireless station. There is significant erosion at this site, as can be seen in Figure 4.62, which shows how the archaeology is hanging out over the cliff edge.

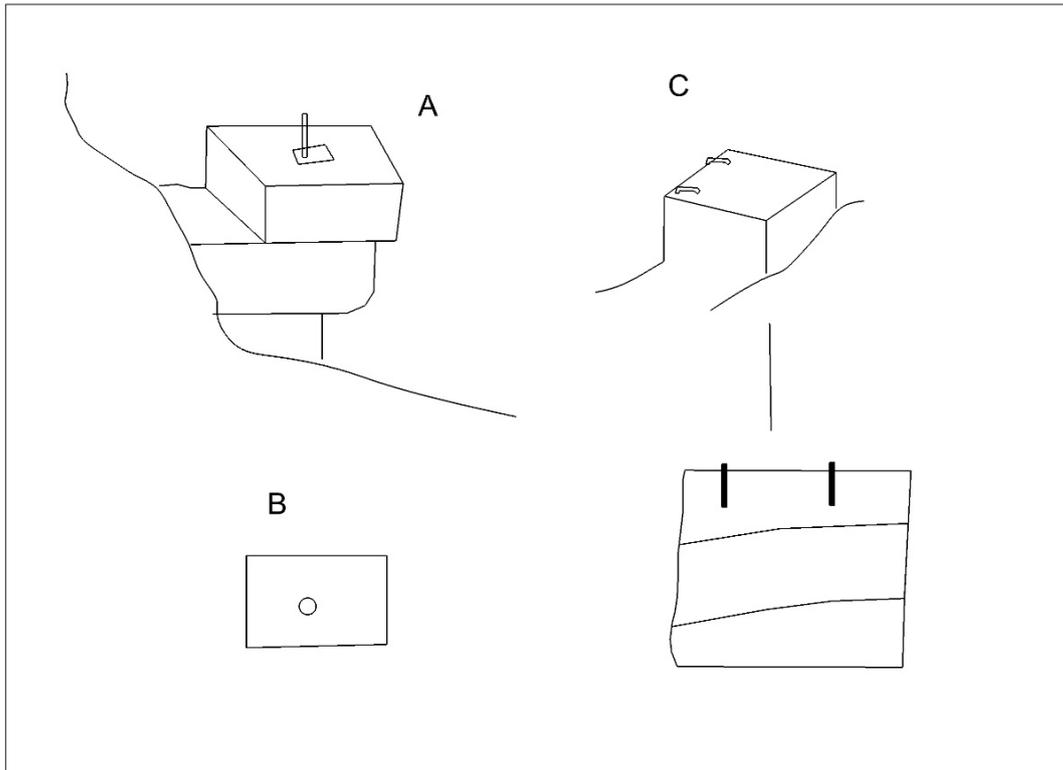


FIGURE 4.61: SKETCH PLAN OF REMAINS AT 'LOCATION B', NEWHAVEN SUSSEX



FIGURE 4.62: FIELDWORK 2017 - REMAINS HANGING DANGEROUSLY OVER CLIFF EDGE

4.7.5 Discussion and Future Work

Of the two positions 'Location A' presents the strongest evidence for being the position of the Newhaven wireless station. Although there are no plans or images of the wireless station yet discovered, this is a confident interpretation.

The Newhaven wireless station is located on an area of constant erosion from the sea and will be dislodged from its current position. This site and others nearby including Second World War remains and later military use are under threat from loss and without further recording of the sites and their relationship to each other the opportunity to gather this data will be lost. There may already be elements of the wireless station and other structures at the base of the cliff face, this area could be subject to a walk over survey to determine whether any features have eroded.

5 Discussion & Conclusions

The wireless stations visited and discussed in this report are all located along the south coast of England. These include Poldhu and Lizard, two of the stations that were crucial to the advancement of wireless, in particular the demonstration of its long-distance capabilities. Bolt Head and Prawle Point, both near Salcombe in Devon, are also included. Although not of the pivotal importance of those further west, these stations played important roles in highlighting the requirements and difficulties of ship-to-shore communications, as well as the emerging competition and control of the technology.

Culver downs gives a unique insight into a site that is used well past the First World War and also an example of more fixed construction and building. Newhaven gives the counter evidence of a temporary structure with very little remains on the ground unlike the other the archaeological evidence has helped to refine its position and shows the temporary nature and fragility of archaeological remains from the period.

Horsea was one of the first high powered stations and as such has a clear historical significance, the scale of the site and the masts can be contrasted with the smaller low powered coastal stations.

The sites provide examples of purpose built wireless stations of varying sizes along with examples of sites where buildings have been reused. The requirements for wireless stations to be positioned in coastal locations with good lines of sight, mean that old semaphore station sites or coastguard look-outs were adapted for use, or wireless stations positioned nearby.

Work as part of the wider Forgotten Wrecks of the First World War project has also noted the presence of wireless huts at the seaplane bases along the south coast, further research on these buildings both through historical records and archaeological remains could add considerably to understanding of the character of wireless huts and the physical remains they leave.

The archaeological work undertaken during the Forgotten Wrecks project has been an initial survey of some of the physical remains of the south coast's First World War wireless stations. While the archaeological potential for some of the sites has been flagged up in the report for Historic England *First World War Wireless Stations* (Phimester 2015), it is clear that field visits can often reveal the existence of what can be small and discrete features that it is not possible to discern from aerial imagery. There is a need to undertake more field surveys to locate remains and create a record of them, with some sites like Newhaven being so close the coast they can be under threat of loss from erosion.

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