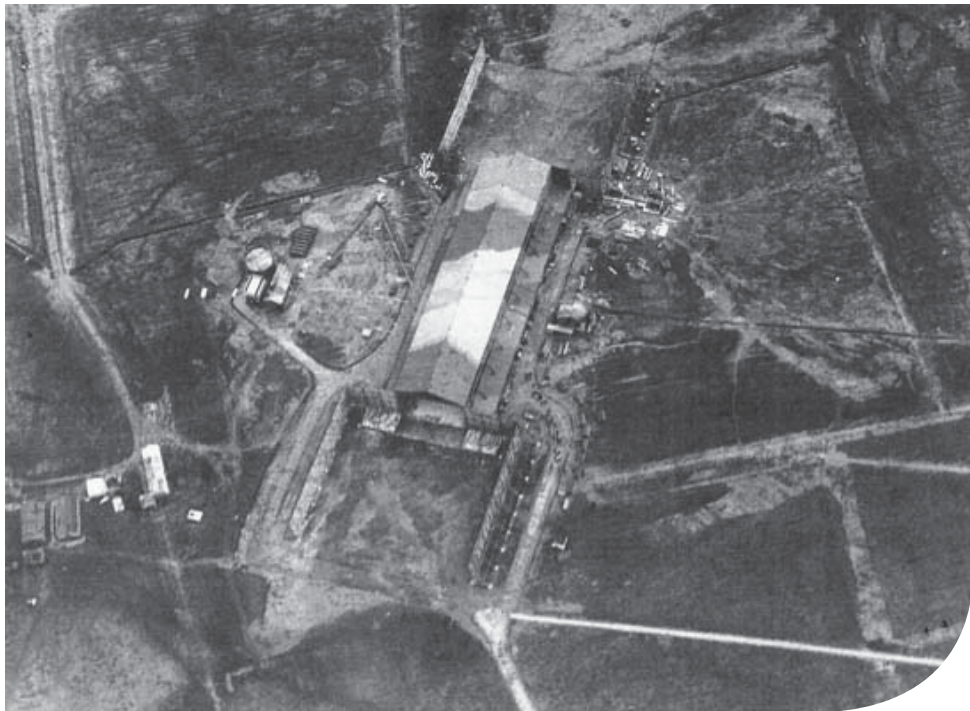


First World War Military Sites: Manufacturing and Research and Development

Part 1: Report and Gazetteer



Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust



Llywodraeth Cymru
Welsh Government

First World War Military Sites: Manufacturing and Research and Development

Part 1: Report and Gazetteer

Project No. G2180

Report No. 1302

Prepared for: Cadw

March 2016

Written by: Jane Kenney, Roland Flook and Anita Daimond

Illustration by: Jane Kenney

Cover photograph: View of airship shed at RNAS Llangefni taken from an airship in 1917
(courtesy of Anglesey Archives)

Cyhoeddwyd gan Ymddiriedolaeth Achaolegol Gwynedd
Ymddiriedolaeth Archaeolegol Gwynedd
Craig Beuno, Ffordd y Garth,
Bangor, Gwynedd, LL57 2RT

Published by Gwynedd Archaeological Trust
Gwynedd Archaeological Trust
Craig Beuno, Garth Road,
Bangor, Gwynedd, LL57 2RT

Cadeiryddes/Chair - Yr Athro/Professor Nancy Edwards, B.A., PhD, F.S.A.
Prif Archaeolegydd/Chief Archaeologist - Andrew Davidson, B.A., M.I.F.A.

Mae Ymddiriedolaeth Archaeolegol Gwynedd yn Gwmni Cyfyngedig (Ref Cof. 1180515) ac yn Elusen (Rhif Cof. 508849)
Gwynedd Archaeological Trust is both a Limited Company (Reg No. 1180515) and a Charity (reg No. 508849)

FIRST WORLD WAR MILITARY SITES: MANUFACTURING AND RESEARCH AND DEVELOPMENT

GAT PROJECT NO. G2180

GAT REPORT NO. 1302

Part 1: Report and Gazetteer

Contents

SUMMARY	4
1. INTRODUCTION	4
2. METHODOLOGY	5
2.1. Desk Top Study.....	5
2.2. Fieldwork	5
2.3. Report.....	5
2.4. Archiving	5
2.5. Public engagement	5
2.6. Copyright	8
3. RESULTS	9
3.1. Research and Development.....	9
3.2. Manufacturing.....	17
3.3. Frongoch Prisoner of War Camp (PRN 7883)	21
4. CONCLUSIONS	22
5. ACKNOWLEDGEMENTS.....	23
6. SOURCES	23
6.1. Published references.....	23
6.2. Unpublished reports	24
6.3. Websites.....	24
6.4. Record Offices and Archives	24
6.5. Newspapers	26
6.6. Other	26
7. APPENDIX I: Listed Buildings at Boston Lodge Works, Penrhyndeudraeth	27
8. APPENDIX II: Sites recorded in NMR for Cooke's Explosives Works	29
9. APPENDIX III: Gazetteer of research, development and manufacturing sites	33
9.1. Wireless Stations.....	33
9.2. Aircraft Sites	59
9.3. Other research	61
9.4. Manufacturing.....	61
10. FIGURES AND PLATES	65

FIGURES AND PLATES

Figures

- Figure 1. Location of sites studied under the research, development and manufacturing theme (with PRNs)
- Figure 2. Cefndu Transmitter Station (PRN 887) with recorded features shown on 1914 25 inch OS map (part of Caernarvonshire sheet XVI.06) (with PRNs of features mentioned in the text)
- Figure 3. 1914 25 inch OS map showing Transmitter House and other features built by that date (part of Caernarvonshire sheet XVI.06)
- Figure 4. Tywyn Receiver Station (PRN 888) with probable extent of aerial
- Figure 5. 6 inch OS map showing main receiver station buildings and Marconi Bungalows (part of Merionethshire sheet XLVI.SW, published 1948, revised 1938)
- Figure 6. The location of Llain y Gors Cottages and site of the aerial mast for the wireless station communicating with airships over the Irish Sea (PRN 60171), shown on the 1924 3rd edition 25 inch OS map (Anglesey sheet III.07)
- Figure 7. The location of Holyhead wireless station (PRN 60187) shown on 1924 map and modern photograph
- Figure 8. The location of RNAS Llangefni (PRN 58670) (extents of airship station in red)
- Figure 9. The location of Bangor Airfield (PRN 27310) (extents of airfield station in red)
- Figure 10. The location of Bangor Airfield on Glan Mor Isaf Farm (PRN 27310), shown on 1914 25 inch map (part of Caernarvonshire sheet VII.10)
- Figure 11. Glan Llyn and Hen Glan Llyn shown on the 25 inch OS map, Merionethshire sheets XXII.09 and 13 1901, with modern buildings superimposed
- Figure 12. Location of Cooke's Explosive Factory (PRN 21180) showing area in use in First World War (in pink)
- Figure 13. 6 inch map revised in 1913 (part of Merionethshire sheet XXXV.SW) showing the buildings of the explosives works that would have been used in the First World War, with modern digital mapping superimposed
- Figure 14. Boston Lodge Works as shown on shown on the 25 inch OS map, Caernarvonshire sheet XXXV.13 1917, with modern buildings superimposed
- Figure 15. Plan of Boston Lodge to accompany the agreement between the Ffestiniog Railway Company and the Board of Management for the creation of the National Shell Factory. Areas coloured blue were to be used for the shell factory. Caernarfon Record Office XD97/20916
- Figure 16. Location of Vulcan Works (in pink) shown on the 25 inch OS map, Anglesey sheet XXV.04 1918, with modern buildings superimposed
- Figure 17. Location of Aberfalls Margarine factory (PRN 60181)
- Figure 18. Aberfalls Margarine factory shown on 1914 map (Caernarvonshire sheet VII.07)

Plates

- Plate 1. View of Cefndu Transmitter Station (PRN 887), showing mast base PRN 61279 surrounded by stay anchors
- Plate 2. Mast base PRN 61279
- Plate 3. Stay anchor PRN 61276
- Plate 4. Base of mast, note open access hatch for maintenance and stay anchor to the left. Photograph dated 1912 but probably actually 1914 (The Marconi Company Ltd)
- Plate 5. View of Transmitter Station from the access road. Note the railway tracks (PRN 60177) by the road, Marconi Hall (PRN 58769) in the mid-ground and the aerial masts in the background. Photograph dated 1912 but probably actually 1914. (The Marconi Company Ltd)
- Plate 6. Probable blockhouse (PRN 10034) photographed in 1988, with causeways or railway trackbeds in front
- Plate 7. Probable blockhouse (PRN 60197)
- Plate 8. Interior of PRN 60197, showing gun loops
- Plate 9. Building PRN 60193 on summit of Cefndu
- Plate 10. Reservoir PRN 60216
- Plate 11. Post-1914 additions to main transmitter building PRN 58768, viewed from the west
- Plate 12. Main transmitter building (PRN 58768) in 2015, with former Power House (PRN 60176) in front
- Plate 13. Main transmitter building (PRN 58768) in 1914, with Power House (PRN 60176) in front (The Marconi Company Ltd)
- Plate 14. Power House (PRN 60176) in 1914 (The Marconi Company Ltd)
- Plate 15. The Marconi Hall (PRN 58769)
- Plate 16. The Marconi Hall (PRN 58769), main entrance
- Plate 17. Receiver station main buildings, Tywyn (PRN 60174)
- Plate 18. Marconi Bungalows, Tywyn (PRN 60173)

Plate 19. No. 7, Marconi Bungalows, Tywyn (PRN 60173) with render removed for repairs, showing original weather boards and part of a blocked window

Plate 20. The doorway at No. 8, Marconi Bungalows

Plate 21. The original circular window at No. 7, Marconi Bungalows, and part of a blocked window

Plate 22. Mast base PRN 60184

Plate 23. Mast base PRN 60185

Plate 24. Mobile phone mast and hut adjacent to mast base PRN 60185

Plate 25. Site of wireless aerial to the left of Llain y Gors Cottages (PRN 60171)

Plate 26. Llain y Gors Cottages: the cottage at the left end of the terraced cottages was used by the wireless operators, the separate building just beyond was a work shed (PRN 60171)

Plate 27. Llain y Gors Cottages as they were in the First World War (image courtesy of Mair and Roland Williams)

Plate 28. Letter in Daily Post from E Higgins about Holyhead Wireless Station (PRN 60187)

Plate 29. 1901 photograph of the Holyhead Wireless Station (The Marconi Company Ltd, obtained from www.oscarkilodxgroup.com)

Plate 30. View of airship shed taken from an airship in 1917, with gas plant to left of the shed (courtesy of Anglesey Archives)

Plate 31. View of airship station taken from an airship in 1918 (courtesy of Anglesey Archives (WM/2010))

Plate 32. Plan of RNAS Llangefni copied from Pratt and Grant 1998, p40 (used by permission of Mike Grant)

Plate 33. Main office complex at RNAS Llangefni in 1918 (courtesy of Anglesey Archives (WM/1609/17))

Plate 34. WJ Baker at RNAS Llangefni in 1917 with water tower behind (courtesy of Anglesey Archives (WM/2010))

Plate 35. Airship pilot in flying gear at RNAS Llangefni standing on veranda of accommodation hut (courtesy of Anglesey Archives (WM/1609/16))

Plate 36. An SS Zero type airship stationed at RNAS Llangefni (courtesy of Anglesey Archives (WM/2010))

Plate 37. View looking east over eastern part of the former Bangor Airfield (PRN 27310)

Plate 38. Slate fences were used when field boundaries were replaced on the decommissioning of Bangor Airfield (PRN 27310)

Plate 39. Emergency blast shelter now used as a bat roost (SH61894 38894)

Plate 40. Path/track that ran through the First World War factory (taken from cSH61822 38900)

Plate 41. Site of de-nitration plant (NPRN 85224) from south

Plate 42. Valley that contained the early explosives works, view from the north

Plate 43. Erecting shed with machine shop to the left at Boston Lodge used for the shell factory (PRN 60175)

Plate 44. North-west elevation of the erecting shed (PRN 60175)

Plate 45. Staff at Boston Lodge 1917 with lathes for turning shell-casings (Caernarfon Record Office XD97/20001a. Copyright Gwynedd Archives Service)

Plate 46. Inside machine shop at Boston Lodge (PRN 60175)

Plate 47. Remains of belt drives in the machine shop

Plate 48. Inside part of the erecting shed at Boston Lodge (PRN 60175)

Plate 49. Remains of belt drives in the erecting shed

Plate 50. Plan of the Vulcan Foundry (PRN 61325) shown on an engraved ledger page (Caernarfon Record Office 22284/2)

Plate 51. Staff at the Caernarfon Shell Factory. The caption to the photograph reads "Women munition workers at Caernarfon during the first World War. They were producing eighteen-pounder shells" (Caernarfon Record Office XS1497/7/8. Copyright Gwynedd Archives Service)

Plate 52. Apartment building on the site of the Vulcan Foundry

Plate 53. At least some of the walls of the National Tyre business are reused from the Vulcan Foundry buildings

Plate 54. Irish Republican painting (PRN 60178) by James Byrne from Dublin done while he was interned in Frongoch prisoner of war camp.

Plate 55. Paddy Fitzsimmons (nephew of James Byrne) and friends visiting Frongoch during a tour with their choir.

Plate 56. Section of a 6-key wooden B flat flute (PRN 60876) found at Railway Cottage, Frongoch

Plate 57. Crucifix in a bottle (PRN 61150) made in Frongoch prisoner of war camp.

Plate 58. Pages from notebook recovered from the Aberfalls Margarine Factory by Clifford (Beaver) Hughes. Top, ingredients used in September 1905; below, those used in June 1918.

FIRST WORLD WAR MILITARY SITES: MANUFACTURING AND RESEARCH AND DEVELOPMENT

GAT PROJECT NO. G2180

GAT REPORT NO. 1302

Part 1: Report and Gazetteer

SUMMARY

This report describes the results of a study, funded by Cadw, of First World War sites in north-west Wales coming under the theme of manufacturing and research and development. It focuses on the early use of aircraft in war in north-west Wales, both airships and aeroplanes, and the major advances in long wave telegraphy that were developed in the area. Munitions manufacturing and more general manufacturing during the war are also covered with specific sites identified. Over all 14 main sites and 108 features within these have been identified and included in the gazetteer (appendix III). Further work on the prisoner of war camp at Frongoch, Bala has also been included in this year's project and artefacts made by the prisoners were recorded. All the sites are included in an Access database to assist inclusion into the HER, and there is an accompanying MapInfo table of polygons defining the limits of those sites where these could be identified. The history and background of these sites is considered and their current condition was checked and recorded. Issues relating to scheduling these sites and specific sites proposed for scheduling are included in the confidential part 2 of this report.

1. INTRODUCTION

This project is part of a pan-Wales initiative to identify and record the most significant elements of twentieth century military architecture across the country and to inform designation and management priorities. With the centenary of the First World War, sites of this period are the focus of the project for 2014 to 2018. The 2013-14 phase of the project comprised a programme of baseline data collection and a pilot field study. From 2014 the project is to focus each year on a theme identified in the CBA publication *Modern Military Matters* (Schofield 2004). These are listed as:-

- Military landscapes
- Research and Development and manufacturing
- Infrastructure and support
- Operations
- Commemoration

'Military landscapes' was taken as the theme for 2014-15. For the year 2015-16 the theme was Research and Development and manufacturing. As north-west Wales has never been an important manufacturing area this theme was likely to contain fewer sites than those of other years but the area did contribute to munitions production with shell factories and an explosives works. There was also some important research and development carried out in the area, most significantly the development of long wave wireless telegraphy but also the development of airships for use in war. More speculative research was carried out in Llyn Tegid near Bala where sea lions were trained to hunt submarines.

Much of the work this year concentrated on outreach and obtaining information from the public. The number of new sites identified in this way was small but some significant sites were located.

As well as the main theme some work continued on the Frongoch prisoner of war camp near Bala as this is a site of international importance due to its significance to Irish history. This was also largely an outreach exercise with a successful event at Frongoch, which resulted in the identification of some artefacts related to the camp.

2. METHODOLOGY

Figure 1 shows all the main sites covered in this report.

2.1. Desk Top Study

The desk-based study started with the compilation of material from the Gwynedd Archaeological Trust Historic Environment Record (HER) and National Monuments Record (NMR). These were combined into a database with grid references allowing comparison to other source material through a Global Information System (GIS), in this case MapInfo. The third edition County Series maps were used to check the location and extent of sites just before or during the First World War. The information in the basic database was supplemented by and checked against available primary and secondary sources.

The number of sites already on the HER was small but more details, especially of the Cefn Du transmitter station site, were available on the NMR. Secondary sources were particularly useful in clarifying and understanding some of the sites.

Information on the shell factories was found by a thorough search of Gwynedd Archives, Caernarfon and Gwynedd Archives, Dolgellau provided images of Frongoch. Information gathered by other interested parties, especially on the Cookes Explosives Factory, was used with their permission.

Welsh Newspapers Online provided additional information and leads. Information obtained from the public was checked against newspaper reports and map evidence.

The areas of larger sites have been defined by polygons created in MapInfo and recorded in MapInfo tables with metadata as recommended by Gwynedd HER. Figure 1 shows the location of all the sites recorded in this phase of the project across north-west Wales.

2.2. Fieldwork

Fieldwork in this phase of the project was restricted to site visits to check current condition and survival of sites. These visits usually involved a brief walk-over of the site but in some cases access to a site was not necessary to confirm that little survived. Sites where map and other evidence suggested that little or nothing survived were not inspected on the ground.

2.3. Report

This report describes the background and methodology of the project, the results of the fieldwork and public engagement events. The confidential second part of the report provides recommendations for scheduling and future research. The report incorporates a gazetteer of sites (appendix III), which has been generated from the project database. An Access database accompanies this report and is designed to aid input into the HER.

2.4. Archiving

The digital archive generated from the project will be archived with the RCAHMW, who share with Historic Scotland a facility for the active curation of files. This archiving will be carried out at the end of the whole project in 2019.

2.5. Public engagement

Public engagement formed the focus of the project this year. At the outset of the project, Jane Kenney, Nina Steele and Anita Daimond met to develop a public engagement strategy based on using events as key foci for media narratives. This was accompanied by the identification of the need to contact specific groups such as historical societies and older people who may be able to share personal accounts and personal research. Welsh speaking older audiences were specifically identified as a group of people that should be targeted as there was significantly more potential that they would have first, or more probably, second hand local knowledge to share.

The initial plan was to hold 3 events:

- 1) Abergwyngregyn to be held during the summer,
- 2) GAT offices to coincide with the Open Doors festival - September
- 3) Frongoch, near Bala in the autumn.

This plan was revised when further research indicated an event on Anglesey would be more applicable than the planned Abergwyngregyn event. This changed event was re-scheduled for November. These events were structured to provide a geographical spread of activity linked to areas where there was specific First World War activity. They also used slightly different models of engagement based on a 'roadshow' approach.

In order to provide a consistent baseline of information, the First World War pages on the GAT website were up-dated to include sites studied this year. The purpose of the web presence was to act as a source of information on events and to request information from the public. The web presence was supported by social media and newspaper features on the project in both Welsh and English throughout the year. Initial discussions explored the merit of having project-specific social media but it was decided that the preferred approach would be to build on the existing social media presence of the Trust. The events provided key points of interest during the year which facilitated social media posts that illustrated dynamic project activity.

A flier was designed to request information from the public and to introduce the project. Specific fliers were also created to advertise each event. Fliers were distributed at events, including the Anglesey and Meirioneth agricultural shows, and sent to all Friends of GAT and other contacts. Some of the specific event fliers were distributed by post to local businesses and libraries in the areas covered and individually by hand. A concerted effort was made to ensure that information was included in the 'Papurau Bro' (Welsh language local newspapers). These Papurau Bro are printed and distributed monthly by the local Welsh speaking community. This meant advance contact with the specific local Papur Bro was required and the Welsh language information sent to the 'papur' well in advance of each event to ensure it was received in time for publication the following month. Agreement was secured for the Frongoch flier itself to be inserted within the Papur Bro for the Bala area.

Attempts were made to contact local history societies to encourage the sharing of information but this proved to be unproductive. Communication took the form of written contact; email and in some case letters. The low level of response, particularly given that societies had contact with GAT and the member of staff who made the contact, demands further consideration regarding how this type of engagement can be facilitated. It is notable that a project of this scale does not provide sufficient resources to enable staff to invest the time required over a long time period to nurture involvement. We therefore did not succeed in establishing the close liaison that is necessary to facilitate a significant amount of true participation from societies and members of the public.

Although the three main events differed in their specific focus they had a common aim, namely to share information about sites with people local and to encourage them to share their knowledge and information. Extensive specific displays were created for each event. These displays included photographs and maps of sites, images of people relevant to the local site(s) and written contextual information.

The first specific First World War event was held at the GAT office in conjunction with Cadw's Open Doors/Drysau Agored. The event took place on 26th September and included a display of manufacturing and research and development sites in Gwynedd and an introduction to the Historic Environment Record (HER). The event was attended by 20 people representing a spread of different ages. Despite this comparatively low turnout, people engaged fully with the displays and the HER. Indeed, at times, we filled our capacity in terms of physical space to enable people to engage with the material available in the HER. Most people spent a significant time at the event and discussed questions of interest with GAT staff. Feedback was positive from all the participants and some visitors who had also been involved in Open Doors elsewhere explained that their success had rested predominantly on the fact that they had hand distributed promotional fliers locally.

As a result of this event we identified the following considerations for the future;

- 1) Having Open doors bilingual branded template posters, banners and other publicity material, as done by CBA for the Festival of Archaeology would help with event promotion (It is notable that it was only in January 2016 that we were informed that this type of material did indeed exist – but we were unaware of this at the time)
- 2) Having public in the GAT building requires considerable staffing levels due to security needs, however, the increased engagement in the HER by those attending was a significant outcome from the day.
- 3) The merit/value of having a more dynamic activity associated with the day to attract a broader range of visitors was discussed; however, the nature of the space does not lend itself to this type of activity.
- 4) Another option to explore in future is to have an HER Open Day for a specific user group or society when numbers can be better forecasted.

5) Increased liaison with event organisers locally could serve to increase the profile of each event by pooling resources around publicity

The second event was related to the Frongoch prisoner of war camp held on 10th October at Ysgol Bro Tryweryn, Frongoch. There was a display about the camp with images of the German prisoners as well as the more famous Irish prisoners and mention of the site's origin as a whisky distillery and its use as a camp site for workmen building the Tryweryn Dam. Lyn Ebernezer, the main authority on the camp from a Welsh perspective, gave an afternoon talk in Welsh with simultaneous translation provided by 'Geiriau Gwyn' courtesy of AM Lord Dafydd Elis-Thomas, who introduced the talk. Leona Huey who is researching the site as part of her post-graduate studies at Bangor University was also present and engaged with attendees.

The event started at 11am with people arriving from the outset carrying material they were keen to share. One hundred people came to see the display or attend the talk, with many doing both. Many of these were local people but there was also a coach-load of 40 Irish visitors who had stopped to visit the site of the camp and were excited to find that there was a display about it. Some people brought objects made by prisoners to be recorded and items about the building of the Tryweryn Dam were also recorded. A large part of the organisation for this event was carried out by a volunteer, Paul Dicken, although unfortunately he was too unwell to attend on the day.

The large turnout for this event can be attributed to a number of factors

- 1) The immense interest locally and in Ireland regarding the site
- 2) Working in partnership with the school who hosted the event
- 3) The commitment of volunteer Paul Dicken in actively promoting the event in the locality by distributing flyers and speaking to local people
- 4) The Welsh language publicity and media presence that included not only the Papur Bro referred to previously but also an advance television S4C 'Heno' plug for the event and Radio Cymru interview given by Rhys Mwyn on the morning of the event.
- 5) The inclusion of a talk by a well-respected authority on the Frongoch camp and the profile proved by AM Lord Dafydd Elis-Thomas.

The final event was at Anglesey Archives on 4th November. This was held in the foyer to the Archives so that people visiting the archives could see the displays, as well as those who had come specifically. This included a display focusing on the airship station formerly on the site of Mona Airfield as well as other sites covered by the project. There was also a large screen for people to explore Archwilio. Information especially on the airship station was requested from the public and several people brought in images and letters related to the site which were recorded. Twenty people attended this event, and again most spent a considerable time looking at the display and talking to GAT staff.

It was evident that some visitors had invested many years and large sums of money in collecting postcards and letters. They had a strong attachment to this material. It raised issues regarding how we use and share their source material and how, with limited budget, we can access these types of sources of evidence to further our archaeological knowledge of the period. It also raised issues regarding how we can encourage people to share their in-depth knowledge and personally undertaken research with others, whilst still ensuring they maintain ownership. This event also illustrated the challenge in sifting out of people's stories and collections the information that is specifically archaeologically interesting or significant.

It was also evident how important it was to have Welsh speaking staff at this type of event as one contributor of information was evidently significantly more articulate and confident in the Welsh language. Indeed as he left, he expressed his gratitude that at least one member of staff had been able to spend time with him using his language of preference. It also demonstrated the need to have official paperwork worded using accessible language in both Welsh and English.

Information gathered at the events has been incorporated into the HER and relevant items are included in the results section of this report. A methodology for scanning and recording items to the accepted standards was developed and permission forms were used to ensure that there was clarity about how images acquired from the public could be used. The experience from the events led to a redevelopment of these permission forms to make them clearer and simpler. Some of the information gathered at events was, as predicted, shared by Welsh speakers and demonstrates the value of continuing to use Welsh language media to engage with the public.

In addition to the main events talks were given to local societies and Rob Evans spoke at a Day School on 12th March 2016 organised by Clwyd Powys Archaeological Trust on First World War practice trenches. A small display of the work on the First World War project carried out by all the Welsh Archaeological Trusts was presented at the Wales Remembers Partnership Day on 28th January. This event was attended by Jane Kenney and has already proved to be worthwhile as a networking opportunity due to the request for collaboration following on from a conversation held at the event.

In summary, the strategy to use events to structure a media presence did appear to be more successful than targeted contact with societies. However, a participatory dialogue that could be facilitated through social media did not emerge. Staff, in particular Anita Daimond, were required to identify the key messages, structure and narrative to be communicated through the various media outlets, but distributing the actual messages was undertaken largely by Rhys Mwyn. Although the use of Rhys Mwyn posting on social media and networking with other media did prove very fruitful, it may be worth exploring the success of a more dynamic approach that embeds the use of social media within the roles of GAT staff.

The experience gained through trying to encourage greater public participation within this project demonstrates the need to be an outward looking organisation that seizes opportunities for networking and partnership working. It also demonstrates the time and long-term investment that is required to work with local communities.

2.6. Copyright

The copyright of this report is held by Cadw and Gwynedd Archaeological Trust Ltd. The maps used in this report are reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Welsh Government. Licence Number: 100017916 (2016).

Historic Mapping, reproduced here, is covered under Crown Copyright and Landmark Information Group. All rights reserved. Gwynedd Archaeological Trust Ltd., on behalf of Welsh Government 2016. SAM polygon data in this report is based on Cadw's Historic Assets Data (Crown Copyright- Cadw).

3. RESULTS

3.1. Research and Development

See figure 1 for general location of sites

North-west Wales may have seemed distant from much of what was happening during the First World War but in some respects it was ideally situated for some of the most far reaching technological advances that occurred during the war. All wars accelerate the development of new technologies and at the start of the First World War it was air flight and wireless communication that were the new technologies ready for adaption to practical military uses. Aircraft were needed to protect shipping from U-boats and Anglesey, which guarded the main shipping lanes into Liverpool, was the obvious location to develop this technology. The hills of the north-west also look across the Atlantic towards America, with plenty of open land for extensive aerials, so the north-west was also an obvious choice for the development of long range wireless technology. The initial research and choice of sites for Marconi's wireless stations took place just before the war but their importance meant that further development of wireless telegraphy immediately became part of the war effort.

Marconi Wireless Stations

Historical background

Telegraph signals had depended on cables being laid, across oceans where necessary, to carry the signal, but during the late 1890s Guglielmo Marconi developed equipment for "wireless telegraphy" (Williams 1999, 10, 32-33). This led to Marconi's Wireless Telegraph Company receiving an order from the British Admiralty in 1900 for a number of coastal wireless stations to communicate with shipping. The main challenge was to develop a long wave transmitter powerful enough to communicate across the Atlantic. The first tests took place at Poldhu Cove, Cornwall in 1900, with stations across the Atlantic at Cape Cod, Massachusetts and Newfoundland, and later at Glace Bay, Ottawa, Canada. There was also an intermediate test station at Crookhaven, County Cork. In 1902 a message was received from Canada at the Poldhu station (Baker 1970, 63, 65, 79).

As trans-Atlantic tests took place it was realised that a long horizontal aerial laid out in an inverted L-shape and aligned on the distant receiving station would create a better signal. The Poldhu site was too restricted to build such an aerial so one was constructed at Clifden in Galway, Ireland in 1905, and in October 1907 the first publicly witnessed messages were exchanged across the Atlantic at the opening ceremony for the Clifden station. London and New York were the main markets for the messages to be transmitted on the new wireless telegraph service but the position of the test stations meant there were very long land telegraph lines linking them to these cities and this was causing technical problems. It was decided to move the stations closer to London and New York and on the British side a site between Llanrug and Waunfawr, near Caernarfon, was chosen for the transmitting station. It had been shown that the signal from transmitting and receiving stations interfered with each other so separate stations were more efficient for the very powerful transmitters necessary for trans-Atlantic communication. The receiver station was therefore situated a considerable distance away at Tywyn, south of Barmouth. This receiving and operations centre also controlled the transmitters remotely through a land-line that connected the two stations (Williams 1999, 45-6, 64-65, 77).

The Waunfawr Station was on the western side of a hill called Cefndu and although the station was often known as the Caernarfon Station it seems also to have been referred to as the Cefndu Station. Construction started on the transmitter station in 1912 and it was in service by 1914. The receiver station was built at Hafod y Bryn, just outside Tywyn, at about the same time, with its aerial extending up Escuan Hill (Williams 1999, 68, 75). In spring 1914 test transmissions had been received from Waunfawr by stations in Italy and Canada, with a full programme of test transmissions taking place in August 1914, just as war broke out. In July 1914 the receiver station received its first signals from an American station in New Jersey. On the out-break of war both stations were taken over by the Post Office, and they were later transferred to the Admiralty, but Marconi Company staff continued to run them, and control of the stations reverted to the company at the end of the war (Williams 1999, 69-70, 71, 76).

The vulnerability of the stations to attack by the enemy was considered early in the war as preparations were being made for troops to guard the Waunfawr station in October 1914 (North Wales Chronicle and Advertiser 30th October 1914, p7). However it was not until February 1915 that an advert was put out for reservists to create a local guard for the Tywyn station (Cambrian News and Merionethshire Standard 19th February 1915, p1).

Continual development of the equipment took place to make it more powerful and efficient, as well as a specific experimental section that worked at Waunfawr. The development of recording devices was important at Tywyn and included an early dictaphone machine which recorded signals on a wax disc. Waunfawr was aligned on a station in New Jersey, USA but its backwards direction covered Australia and in September 1918 it sent the first message to be received in Australia (Williams 1999, 70-71, 76).

After the war both stations continued to expand their services but eventually short wave radio took over from long wave for most functions. The transmitting station remained in service as a long wave station until 1928 and was then used as a relief station to cover heavy traffic peaks. It became redundant in 1939. The Tywyn station had already been closed in 1923 when long-wave reception was transferred to Brentwood in Essex (Williams 1999, 74, 78).

Waunfawr/Cefndu Transmitting Station (PRN 887)

The Transmitting Station was situated on the slopes of Cefn Du between Llanrug and Waunfawr (figure 2). The station buildings included a residential block for staff and the main building containing the transmitter hall (Williams 1999, 68). The original aerial was a twin wire aerial supported on lattice steel masts 300ft high. It was of inverted L-shape design lined up in the direction of the American station in New Jersey. Remains of the aerial and related structures are extensive and complex. Most of the area was inspected by Oxford North as part of a RCAHMW funded Upland Survey (Schofield 2008). This provides considerable detail about the surviving features, which can be supplemented by information from aerial photographs¹ and the 1914 25 inch OS map, which shows the earliest structures constructed on the site.

Williams (1999, 69) states that the aerial was 1100m long. However the sites recorded by Oxford North show that it was in fact very much larger and extended for about 2km. The first 1km running west-north-west to east-south-east up the hill slope formed one arm of the L and consisted of very high masts to support the aerial. At the top of the hill the aerial turned to run towards the north-east and the masts seem to have been smaller. The 1914 25 inch map shows that the hillside, which had been largely open, was fenced off defining the line of the aerial masts. One of these fences is still in use but the other has disappeared entirely with no trace visible on the aerial photographs.

Oxford North recorded 70 concrete bases. Each of the large masts extending directly up the hill from the transmitter house had a concrete foundation onto which the mast was bolted (plates 1 and 2), surrounded by stay anchors, trapezoidal concrete blocks used to guy the mast (plate 3). A photograph taken soon after the construction of the masts demonstrates the size of the masts and function of the stay anchors (plate 4). On the upper part of the site each mast had three concrete blocks forming the foundations. There are also stay anchors but for the recorded sites the stay anchors are not necessarily related to the mast foundations, suggesting that there are many more features still to be identified. The 1914 25 inch map shows the bases of the masts in the western part of the site, but not those further north-east, so presumably these were built later. Only the large western masts are also shown early photographs of the site (plate 5).

The site was earthed by two large rings of metal plates sunk into the ground around the main building. These were connected to other plates buried beneath the aerial, extending to the eastern boundary of the site. This earth system had a high electrical resistance and wasted power as heat. This sometimes caused the ground under the aerial to steam and melted snow in winter (Williams 1999, 69, 72). It is possible that this earth system or its removal accounts for some features that are seen on the ground under the aerial.

There were several buildings on the fringes of the aerial array, some outside the fences protecting the aerial. One of these (PRN 10034) (plate 6) was recorded on the HER as a construction for Territorial Army (TA) training (GAT 1993). There is also a note in the PRN 887 record that “the area [of the wireless station] was used by the TA who built huts, bunkers, platforms and causeways across the wet ground”. However there is no reference to the source for this use by the TA and all the buildings are laid out as if they relate to the wireless station. Many are linked by culverts, which may have carried communication cables. A clue to the function of at least some of the buildings is given in The North Wales Chronicle and Advertiser, which mentions the deployment of troops at the wireless station to guard it, with block houses being built to accommodate them (North Wales Chronicle and Advertiser 30th October 1914, p7). It is probable that the largely upstanding brick buildings, PRN 10034 and PRN 60197 (plates 7 and 8), were these block houses built in 1914. These two buildings can just be seen on an early photograph of the station (plate 5), confirming that they are not later structures. The identification is

¹ The modern Next Perspective aerial photographs supplied to the HER by National Resources Wales have been used.

further substantiated by the presence of gun loops in both these buildings for the soldiers to look out of and fire from in case of attack. Other entirely ruined buildings constructed of brick and mortared stone (PRN 60190, 60191, 60192 and 60212) may also be blockhouses as they seem to be distributed around the perimeter of the site to guard it. There seems to have been little cover at the north-eastern end of the site, but a concrete platform (PRN 61324) could have been the base of a shelter for guards, but it was of a different construction with the superstructure possibly made of asbestos.

PRN 60197 is built over the remains of a stone building with brick quoins and the remains of another in similar style survive on the top of Cefndu (PRN 60193) (plate 9). These may have been earlier communications buildings superseded when the blockhouses were built. However a small drystone shelter (PRN 61310) is probably an earlier shepherd's shelter rather than being related to the wireless station, as its construction is so different to the other buildings.

The aerial photographs show a variety of linear features running through the area. Oxford North identified several of these on the ground as tracks and others as stone-capped culverts that had probably carried power or communication cables. It is notable that most of the buildings are connected by these culverts. Some of the linear features are parts of a wall that used to run diagonally through the middle of the area. This is shown on the 25 inch OS maps but appears to be largely tumbled down by the time of the 1914 map. Many of the features recorded by Oxford North as "tracks" and probably other straight linear features are part of a railway system that was used to carry the materials for the massive masts across the boggy, rugged site.

A light railway was constructed from the Ceunant road and ran through the site (Williams 1999, 68-69). The railway (PRN 60177) ran next to the straight road up to the transmitter station, as shown on an early photograph (plate 5). The 1914 25 inch map shows the road as far as the mountain wall, with access to the transmitter house via a track running from Glan y Gors Farm (figure 3). The railway is not indicated on the map despite it being in place at the time the map was surveyed. Identification of the route of the railway through the site must therefore depend on evidence on the ground. The main "track" running through the north-eastern part of the site (PRN 60196) is a well-constructed, stone-built trackbed, which must be part of this railway system. Presumably the "tracks" running off it also had railway tracks to take material to each mast position. It is hard to see the railway running through the western part of the aerial but some of the linear features seem to be part of this system. There are also built causeways around the probable blockhouse (PRN 10034), which might be for foot traffic but resemble the PRN 60196 trackbed. Only a detailed survey of the site will help to clarify how this transport system functioned.

One other feature within the area is a small square reservoir (PRN 60216) (plate 10) that may have been designed to provide a supply of water in case of fire at the wireless station. There was probably at least one more reservoir as a large rectangular earthen platform (PRN 60215) nearby may be a covered reservoir.

Main transmitter building (PRN 58768)

The main building was divided into a transmitter hall and an experimental section where new machines and equipment were developed (Williams 1999, 68) (plates 11-13). The main eastern block of the building is that completed by 1914, as shown on the 1914 25 inch map (figure 3), but it was extended westwards during the life of the station. The original building consisted of a range aligned north-north-east to south-south-west, with a smaller building attached to the western side. The main range has an asymmetrical gabled slate roof sloping to single storey height on the eastern side, and two storeys high on the western side. The northern half of the roof is raised to accommodate the equivalent of a third floor at that end. The roof was originally all of slate but has now largely been replaced by corrugated sheets. The building is lit by small pane sash windows and there was a semi-circular window in the southern gable of the raised roof section. Several of the original windows, including the semi-circular window are now bricked-up.

The western range was replaced during the use of the building as a wireless station by three ranges running perpendicular to the main range. These have large window apertures most of which retain the original small paned windows. The gabled rooves of these ranges are roofed with corrugated sheets.

Next to the main building was the Power House (PRN 60176) (plate 14), which is shown on the 1914 25 inch map. The electricity of the station was generated at Cwm Dyli hydro-electric power station and supplied by the North Wales Power Company. The mains supply was 30,000 volts and this was stepped down to 440 volts at the wireless station Power House (PRN 60176) (Williams 1999, 69).

After the station was closed in 1939 the building was used by the war department, and then as a Catholic hostel. It was also used as a World War II evacuation centre, a storage depot, a boys holiday centre, a nightclub (well-remembered locally for its dubious reputation), and an equestrian centre. In 1994 it became the location of the Beacon indoor climbing wall, but this has now moved into Caernarfon. The transmitter house is no longer in use but externally retains almost all features that can be seen on a 1914 photograph of the building recently completed. The Power House is now a private dwelling and has lost some of the features that indicated its function but the building as a whole is externally largely unchanged.

Marconi Hall (PRN 58769)

The Marconi Hall (plates 15 and 16) was purpose-built residential accommodation for the engineers who worked at the wireless station. It was built in 1914 and officially opened 3 months before the start of the First World War. It is a two story residential block containing 16 bedrooms, a kitchen and dining room (Williams 1999, 68). The hall was not built when the 1914 25 inch map was surveyed, although the transmitter house was completed by this time.

The wireless station had a YMCA room opened in June 1915, which was presumably in the Marconi Hall. This room was probably the venue for a concert held at the wireless station in November 1915 (North Wales Chronicle and Advertiser 18th June 1915, p6 and 3rd December 1915, p6).

The hall was bought in 1975 by the CHAmois Club and converted into the Chamois Mountaineering Centre (www.chamois.org.uk), and is still in use. Externally it is unchanged from the 1914 photographs and a brief internal inspection suggested that many original features still survive inside.

Tywyn Receiver Station (PRN 888)

The station buildings (PRN 60174) were located on the outskirts of Tywyn at Hafod y Bryn and the aerials ran up the hill to the east of Escuan Hall (figure 4). The Waunfawr transmitters were controlled from Tywyn with receiving and transmitting operators sitting next to each other in the Tywyn station (Williams 1999, 75-78).

The main building (PRN 60174) is a single storey building, aligned nearly north-south (plate 17). It is built of brick with a slate roof. In the southern gable is a circular window, a feature that is common in Marconi buildings. The building has been converted into two private dwellings (Hafod y Bryn and Suilven), with the addition of new chimneys and an upper storey fitted into the roof space. The wireless station buildings are shown on the 6 inch map published in 1948 but revised in 1938 (figure 5). There was a power house near the main building (Williams 1999, 59), also shown on the 1948 map, which still exists although extended.

The Marconi Bungalows (PRN 60173) were built apparently after the First World War as staff accommodation for the Marconi Wireless Receiver Station (Williams 1999, 78). There is a row of 7 bungalows (plate 18) with the 8th opposite on the western side. They are of timber-framed construction with a hipped roof with diamond pattern slates. Most have been rendered, but No. 2 still has its timber weatherboard exterior exposed. When inspected (on 12/10/2015) No. 7 had the render removed and the weatherboards temporarily exposed before being recovered (plate 19). The rear of No. 8 also still has original weatherboarding, and this house has an original front door (plate 20). Nos 1-7 have fine gardens at the rear, but these are not shown on the 6" map revised 1938 and only appear on the map revised 1948, so the bungalows appear to not have originally been built with gardens.

Several of the bungalows have original features internally, especially doors and floor boards. No. 7 is largely unchanged internally and No. 2 is said to be unaltered, although it has had new windows. They all had a circular window, a characteristic of Marconi buildings. The one in No. 7 has been moved into a more recent extension (plate 21). The internal partitions are of asbestos panels, which has encouraged the original picture rails to be retained and used instead of drilling into the walls to fix items. The houses were originally 3 bedroomed and had an internal toilet. No. 7 has a coal shed that might be original but they never had outside toilets. The bungalows were sold off in 1923 and bought by local people, so they can only have been in use by the wireless station staff for a few years.

The aerial was of a horizontal directional type aligned on the New Jersey station and had 5 masts. It ran for 3km with a reserve aerial running parallel supported on wooden masts. There were also balancing aerials running perpendicular to the main aerial to detect signal from the Waunfawr station and cancel out any interference. These aerials were all replaced in 1920 by a more efficient system (Williams 1999, 75-76). Inspection of the hill led to the identification of two mast bases on Craig y Barcut but none were found further east. A 3km long aerial would probably reach to the summit of Corlan Fraith. This has a cairn (NPRN 54420) of probable Bronze Age

origins but capped with a concrete platform. However the platform is not related to the aerial but is an Ordnance Survey trigpoint of a platform bolt type levelled in 1956 (TrigpointingUK). It is assumed that the balancing aerial ran down the northern ridge from Craig y Barcut, aligned on the Waunfawr station. There may be other traces of the aerals but a much more thorough search would be required to find them.

The two bases found (PRN 60184 and 60185) were square concrete blocks to the top of which the masts were bolted to the top. They also had two iron uprights projecting from the top and had evidence of the masts being removed quite roughly from their foundations (plates 22 and 23). Both mast bases had evidence of fences surrounding them, with some concrete fence posts still lying on the ground around PRN 60185. There is also a small hut (plate 24) next to PRN 60185 currently used as part of a mobile phone mast set-up but aerial photographs show that the current hut post-dates 1986 and is not part of the Marconi Wireless Station. It is possible that the two mast bases found were related to the 1920 aerial and did not support the original aerial masts.

No other features related to the wireless station were identified with the exception of a reservoir that may have associated with it. A render-lined brick tank (PRN 60186) is set into hillside with an inflow pipe on the uphill side. It is now open and filled with rubbish, including parts of an old car, but appears to be a small reservoir or water tank. It seems rather too substantial for a water supply for a farm and may have supplied water to the wireless station in case of fire.

Unlike the Waunfawr station no evidence for blockhouses or other accommodation for guards was found. However the site was guarded during the war as the Cambrian News and Merionethshire Standard has an advert for "60 National Reservists, not under 38 or over 50, required for Local Guard at the Marconi Station, Towyn" (19th February 1915, p1).

Marconi Wireless Station, Llain Gors Cottages, Llaneilian (PRN 60171)

A wireless station was built by the Marconi Company near Amlwch specifically to provide wireless communications to the airships from RNAS Llangefni (PRN 58670). This was an 'X' type station meaning that it could both transmit and receive. The station was approved by the Admiralty in September 1915 and was in use by March 1916 (Sloan 2001, 89). The airship station communicated with the wireless operators by telephone. This was wireless telegraphy, not a radio signal carrying a human voice, so the wireless messages would be sent and received in Morse Code. The Marconi Company had been trialling a light weight wireless for use in airships since 1910 when one was used on the airship "America" in her failed attempt to cross the Atlantic (Evening Express, 20th August 1910, p3).

The exact location of the station had not previously been determined but Mr Roland Williams responded to a request by GAT for information on this site. It was located not at Amlwch but at Llaneilian. The aerial was in a field to the west of cottages called Llain y Gors, owned and occupied by Mr Williams' family. The western-most of the three cottages was used to billet the naval personnel who operated the wireless station (Williams 2015) (plates 25 to 27) (figure 6).

In the mid-1940s the field that had held the aerial was deep ploughed and copper wire that had been used to earth the aerial was recovered. This had been buried in the ground radiating out from the aerial and was reused in sea fishing tackle and for other purposes once recovered. No other remains of the station existed at that time. Mr Roland Williams relates a story of one of the naval personnel from the station who was returning from an evening spent at Amlwch and took a short cut that passed a quarry. Whether due to the dark or to drink he fell into the quarry and died of his injuries (Mr Roland Williams pers. comm.).

Wireless was also used to communicate with the aeroplanes that flew out of Bangor Airfield at Glan Mor Isaf Farm (PRN 27310). This airfield had its own wireless station (PRN 60180) in one of the farm buildings (Sloan 2001, 105). By 1918 this was probably a short wave wireless for transmitting Morse code, but speech transmission was being introduced to aircraft from 1917 (Wander, marconih heritage.org).

Marconi Wireless Station, Holyhead (PRN 60187)

Holyhead had one of the first fully operational Marconi wireless stations, which were commissioned by the British Admiralty as coastal stations to communicate with shipping. These were constructed in 1901. The Holyhead station exchanged signals with the SS Lake Champlain in May 1901, the first British ship to be fitted with wireless facilities (Williams 1999, 35-36). The Holyhead wireless station was operated from a house on Queen's Park. The house is now no. 66, but it was originally no. 21, and the mast stood in the paddock next to the house.

This station is generally said to have been closed down in 1903 (Williams 1999, 36) but Carnarvon and Denbigh Herald reported a possibility of it reopening in 1909, to be run by the Post Office, not the Marconi Company, to communicate with shipping (Carnarvon and Denbigh Herald, 13th August 1909, p3). No written confirmation has been found so far that this took place, but Mr E Higgins, in a letter to the Daily Post (January 10th 1992) (plate 28), describes the wireless station as still in use until 1920-22. He remembers as a boy looking through the window of no. 21 Queen's Park and watching sparks flying from the apparatus being used inside. The aerial was in the field next door, "known locally as Cae Polyn Mawr", and was "a very tall mast secured by long stays. There, a rather wild mule grazed to deter children from climbing the stays and the mast."

This demonstrates that the wireless station was indeed brought back into reuse and it seems probable that it was used during the First World War to communicate with shipping, but this has not yet been confirmed.

The house, No. 21, still exists as No. 66 Queen's Park. A photograph of 1901 (plate 29) shows the mast apparently just behind the Baker Street Mission Room (PRN 60179), which had just been built in 1900 (North Wales Express 20th April 1900, p5). The exact position of the mast is confused by the fact that the 1924 25 inch map shows mission room closer to the house than it is, but it is assumed that this is an error in the map. Although most of the surrounding area has been built over the location of the mast, immediately north-east of the mission room, remains as a small area of open grass (figure 7).

Aircraft in Gwynedd in the First World War

Royal Navy Air Station (RNAS) Llangefni/Anglesey (PRN 58670)

The use of submarines was a new development in the First World War (Phillips 2010, 21). The Germans had developed effective submarines and these seriously threatened shipping in the coastal waters around Britain and Ireland (Sloan 2001, 87). On 4th February 1915 German High Command announced that merchant shipping around Britain and Ireland was a legitimate target and started the U-boat campaign (Phillips 2010, 21). It was critical that Britain developed a response to this threat and aircraft formed an important part of this response. Warships were the only effective way to attack submarines but they were relatively slow and their ability to spot submarines was limited. Airships could spot submarines from above and signal their location to the warships as well as providing some bombing capability (Phillips 2010, 24).

There had been experiments with lighter than air aircraft in Europe and America throughout the second half of the 19th century but effective powered airships only began appearing from the turn of the century with the successful flight of the Zeppelin LZ1 in 1900 in southern Germany. The first British airship was flown in 1902 by Stanley Spencer from Crystal Palace to Eastcote near Harrow. He flew an improved, larger design at the Shrewsbury Show in 1906, and another airship was built and flown in Cardiff by Ernest Willows in 1907, but the technology was still very much experimental at the start of the War. A suitable airship had to be designed and a prototype was flown in March 1915, which became the SS (alternatively Submarine Scout, Submarine Spotter or Submarine Searcher) (Pratt and Grant 1998, 18, 19). Heavier than air aeroplanes were very new and unreliable and were not initially considered for the task of U-boat spotting at the start of the War (Phillips 2010, 24).

Airships were to patrol the Irish Sea spotting U-boats, with one station at Luce Bay, Wigtown, and another on Anglesey (Sloan 2001, 87-88). Land for the Anglesey airfield was requisitioned near Llangefni (figure 8). The station was formally commissioned on 26th September 1915, and was variously known as RNAS Bodffordd, Gwalchmai and Llangefni, but eventually became RNAS Anglesey (Phillips 2010, 25, Delve 2007, 204). The airship shed (PRN 60182) measured 323 x 120 feet and was 80 ft high and could hold four inflated airships. Two pairs of screens at each end of the shed protected the airships from gusts of wind as they were "walked" out of the shed (Pratt and Grant 1998, 39) (plate 30). The 260 acre site also included workshops, a gas producing plant, gas holders and accommodation huts (Sloan 2001, 88). The main gate was from the A5 near Druid's Farm and most of the accommodation and other huts (PRN 60183) were restricted to this south-eastern corner of the site (plates 31 to 35). Much of the land was still farmed and a small holding continued to function adjacent to the hangar and gas plant. A full size dummy U-boat target was also marked out in one corner of the landing ground for bombing and machine gun practice (Pratt and Grant 1998, 38-9, 41).

There seem to have been four SS airships at the station from the start (Sloan 2001, 88). During the War three Mark II SS airships (known as SSP (Pusher)) replaced two of the original SS airships, but the other two old airships continued in use (Sloan 2001, 95). In spring 1918 the existing airships were replaced by six of the new SS Zero type airships (plate 36) with Rolls Royce engines for speed and greater endurance. These were able to

carry an increased bombing payload of three 100lbs bombs or one 230lbs bomb (Sloan 2001, 99, 100). Most of the airships were built elsewhere but SSZ73 arrived in Llangefni as a kit and was assembled there in September 1918 (Pratt and Grant 1998, 46).

Communication with the airships was achieved by the means of a wireless relay station (PRN 60171) at Llanelian (Sloan 2001, 89, Pratt and Grant 1998, 39). The airship station would have contacted the wireless operators by telephone and they would relay messages to the airships in flight.

RNAS Llangefni was continually involved in research and development, as they took part in successful experiments with hydrophones suspended under the airships to detect submarines. Other experiments included the use of phosphorous on the sea to create a smoke screen and the use of hydrogen from the airship gas bag to help run the engine. The latter was considered dangerous and was not successful (Sloan 2001, 93-5).

There was only one fatal incident when on 22nd October 1916 an airship struck a cow on landing leading to damage and a series of difficulties resulting in the airship being blown out to sea and lost, with one man drowned (Sloan 2001, 90; Pratt and Grant 1998, 41). One airship from Llangefni was lost at sea on 17 October 1918, due to a torn gas envelope, but the crew were rescued (Phillips 2010, 39). There is reference in a diary by a Holyhead woman to a fatal accident of an airship over Anglesey on 9th November 1917 (Sloan 2001, 98). The diary makes it clear that this airship came from Lincolnshire and was not from RNAS Llangefni and Sloan has found no other evidence of this incident. However Delve (2007, 204) suggests this was a sortie from Llangefni that was lost. He also gives the date as 1916 and has probably confused this even with the fatal incident on 22nd October 1916.

One of the most famous incidents occurred when the engine failed on one of the airships while escorting a convoy of ships to Liverpool. A submarine had just been spotted but the airship had to give up the chase and was towed back to Wales by a trawler. The airship was brought into Llandudno's North Shore and moored next to the Hydropathic Hotel while awaiting the repair team from Llangefni. This was on 26th April 1918 when the beach was full of holiday makers and the bay full of pleasure boats, so a great many people had a chance to see the airship close-up (Pratt and Grant 1998, 37).

The airfield was still active in late 1918 but in early 1919 the airships were sold or decommissioned and men released. However the Admiralty did not sell the site until November 1920 when it was bought by Anglesey County Council for an isolation hospital (Sloan 2001, 112). No use was found for the airship hangar so it was dismantled (Sloan 2001, 112), but, probably before 1920, the hangar had been used by a timber merchant to store wood. In 1941 the land was requisitioned for a new airfield (RAF Mona) and the hospital was relocated into Llangefni. The construction of runways and hangars for the new airfield removed any remaining traces of the airship station. The site is now the home of the Anglesey Show and the Mona Flying Club (Evans and Steele 2012, 12).

The site of the airship shed (PRN 60182) is now partly under a runway so no upstanding remains survive but buried foundations are a possibility. The area of the main office complex (PRN 60183) has been covered by later airfield buildings and it is unlikely that anything from the airship station survives even buried underground.

Numerous photographs and other materials on the airship station are held in Anglesey Archives including an album created by Captain Joseph Snape, a clerk at the airship station (Anglesey Archives WM/2010), and another album (WM/1609/6-29) kept by Marie Williams of originally from Llangefni, who later moved to Holyhead. Additional images of life at the airship station were recorded during the Anglesey Archives event for this project.

Bangor Airfield, Glan Mor Isaf Farm (PRN 27310)

Fixed wing aeroplanes were still very new at the start of the First World War. In 1910 Robert Loraine was the first person to fly into Wales and most aeroplanes seen before the war were taking part in flying exhibitions (Sloan 2001, 17-28, 70). Research and development on aeroplanes was actively carried out in north-west Wales as William Ellis Williams of Bangor University developed a test plane ("Bamboo Bird"). The main aim was to study aerodynamics and it followed on from mathematical work Williams had done on longitudinal stability (Boyd 2011, 97, 104-5). There were considerable problems getting it to fly but a more powerful engine led to successful flights in 1911 (Boyd 2011, 111) and possibly again in 1913 (Sloan 2001, 35-46). Williams had a hangar (PRN 60172) built next to the cottage of Bwlch y Ffös Bach, Llanddona (SH56488053) and flew the plane on the sands of Red Wharf Bay (Sloan 2001, 38).

An increase in U-boat activity in 1917 led to a call for aeroplanes to assist the airships in spotting U-boats. Six aeroplanes were sent from London on 7th Nov 1917 but only two reached north Wales due to bad weather. One of the planes got to Anglesey, but crashed on landing and the pilot was killed (the first fatal flying accident in Gwynedd). The other made a forced landing on the Lafan Sands and the aeroplane was lost to the incoming tide (Sloan 2001, 97; Pratt and Grant 1998, 43-4).

The plan to introduce aircraft patrols continued in 1918 and by the summer eight aeroplanes from the 225 Squadron were operating from the airship station (Pratt and Grant 1998, 45). Pratt and Grant (1998, 45) say that these had no hangars, although Phillips (2010, 25) claims that a Bessoneau hangar was added to the airship station for the aeroplanes. However the ground at the airship station was considered too rough for planes to take off and land regularly and a better site was needed. This was found near Bangor and 50 acres of land on Glanmor Isaf Farm (figure 9) owned by the Penrhyn Estate, was requisitioned in June 1918 (Sloan 2001, 100-101) (plate 37). The landing ground was prepared in July 1918; involving the uprooting of hedges and the erection of four Bessoneau hangars to house the aircraft. The officers and men lived in tents and fuel and bombs were stored in trenches between two small woods. The wireless station for communicating with the planes (PRN 60180) was, however, in one of the farm buildings (Sloan 2001, 105). The tents proved inadequate for the winter so the squadron were billeted in outbuildings at nearby Penrhyn Castle. Hangars and some aircraft were damaged in the winter storms (Sloan 2001, 105, 107; Pratt and Grant 1998, 45).

The extent of the airfield is defined by the hedges that were removed. At the end of the war these were replaced by slate fences (plate 38) not used in other boundaries on the farm. The current presence of slate fences therefore shows which boundaries were removed. These are shown on figure 10 and define a roughly T-shaped area. It is possible that this shape may indicate that there were two runways, but formalised runways were probably unlikely for these small light planes. The land forming the eastern part of the T is far from flat, and pilots would have had to take care to avoid a large hollow, probably a glacial kettlehole, in this part of the site (figure 10).

On 1st April 1918 the Royal Naval Air Service was merged with the Royal Flying Corps and the Royal Air Force (RAF) was created, so Bangor airfield was set up under the authority of the RAF (Pratt and Grant 1998, 45). The only available aircraft were slow, obsolete training aircraft (Airco DH6s) and the pilots available were low grade as well (Sloan 2001, 101). The aeroplanes transferred from the airship station to the new airfield in August 1918. There were 18 aircraft in total and after the move the patrol flights, previously part of 255 Squadron, were reformed as 244 Squadron. The small two seater aircraft were often flown as single seaters so that they could carry bombs (Sloan 2001, 104, 105; Pratt and Grant 1998, 45).

On 14th August 1918, the day before the squadron moved to Bangor Airfield, one plane crashed killing one man and another was lost at sea with the crew presumed drowned (Pratt and Grant 1998, 45). There was a fatal crash at Bangor Airfield in September 1918, when plane crashed immediately after take-off. In October a plane was lost with its pilot over Caernarfon Bay, and there were several other crashes where planes were lost or damaged (Sloan 2001, 106; Pratt and Grant 1998, 45-6).

The 244 Squadron disbanded on 19th or 22nd January 1919, in May the land was returned to cultivation, and in June 1919 the hangars were removed (Pratt and Grant 1998, 46; Sloan 2001, 112). The farmer, Mr Ellis Pritchard put in a compensation claim as he complained that the field boundaries and the access road were not as good as before the RAF had taken over (War Compensation Court document, Bangor University Archives). Nothing but the slate fences is left to give any indication of the existence of the airfield. Some metal-detecting has been done on the site but apparently very little has ever been recovered (D Pritchard pers. comm.).

Sea lion training base, Glan Llyn (PRN 60188)

The threat of the U-boats was so serious that all possible means to develop detection devices were considered. The wilder shores of research in this direction involved the use of sea lions to detect submarines, although this was in a context where there was also an attempt to train seagulls to identify submarine periscopes and ideally defecate on them (Wilson 2006).

‘Captain’ Joseph Woodward, a music-hall sea lion trainer, suggested that his animals could be trained for the purpose of submarine detection, and he was given permission to develop experiments and trials which took place in public swimming baths in Glasgow and Westminster, at Lake Bala and finally in the sea on the Solent. The aim was to train the sea lions to follow the sound of a submarine without being distracted by passing fish and the trials were carried out between November 1916 and July 1917 (Wilson 2001). The trials in the Glasgow swimming baths had some success and the sea lions were moved to Glanllyn on Llyn Tegid (Lake Bala) for

open water trials. Stabling for about 50 sea lions, a carpenter's shop and the use of small boats were provided by the owner of Glanllyn, Sir Watkin Williams Wynn, for the duration of the trials between 30 March and 6 July 1917 (Wilson 2001, 442-443). There was some progress in the training and two sea lions trained in Llyn Tegid had the chance to chase a real submarine in the Solent in May and June 1917, but there were problems tracking the animals and their performance tended to deteriorate rather than improve over time with further training. Most importantly the hydrophone proved to be better at detecting submarines than the sea lions in a noisy real-life situation and the project was abandoned (Wilson 2001, 444).

Glanllyn, Llanuwchllyn was a hunting lodge for the Wynnstay Family from Ruabon but it was rented in 1950 and finally bought in 1964 by the Urdd for use as an outdoor centre (Urdd website: <http://www.urdd.cymru/>). Large new buildings have been constructed and additions made to the main house. The sea lions were presumably either kept in existing outbuildings, or more likely in purpose built but very temporary accommodation near the lake shore. This would not be recorded on maps and remains are unlikely to survive. Hen Glanllyn, the home farm just north-east of Plas Glanllyn, would perhaps have been a more likely place to stable sea lions than near the main house as there were more available outbuildings as well as an adjacent boat house and small harbour (figure 11).

3.2. Manufacturing

See figure 1 for general location of sites

North-west Wales was never a significant manufacturing area, quarries being the main form of industry; however it made a considerable contribution to the manufacturing of munitions for the War.

Penrhyndeudraeth Explosives Factory (PRN 21180)

The following is based on notes collected from various sources in the National Library of Wales by Tegwen Haf Parry of the Friends of Cooke's and also on Malaws and Parry 1995. It is notable that Tegwen's online collection of photos exemplifies the challenge associated with extracting archaeologically significant photographs from a personal archive of family and personal interest images.

The site, south-east of Penrhyndeudraeth, that is now the Gwaith Powdwr Nature Reserve, owned by the North Wales Wildlife Trust, was an explosives factory until 1995 (figure 12). Through most of its history it was known as Cooke's Explosives Ltd., after RT Cooke who bought the site in 1922. Cooke was a business man with coalmining interests in north-east England and a small explosives factory in Essex. He moved the whole explosives business to Penrhyndeudraeth in 1924 and expanded the site. When Cooke retired in 1955 the factory was bought by ICI but retained the name of Cooke's Explosives Ltd. The factory was closed in 1995, due to a decline in the demand for explosives by the coal mining industry.

However the factory had a long history manufacturing explosives before Cooke bought it. The first factory on the site was established in 1865 as the Patent Safety Guncotton Company. It was licenced in 1876 and became part of the New Explosives Company, manufacturing explosives from gun cotton, starch and india rubber. By 1908 it was the Steelite Explosives Company Ltd.

The factory's history during the First World War begins before the War when in 1912 Dr Oswald Silberrad set up a factory on the site to manufacture explosives based on Ammonium Perchlorate, which he had developed and patented. Silberrad was the managing director of the company which was named Ergite and Company Ltd. When the war started Silberrad persuaded the government that his explosives were suitable for war but the factory remained under his control. However his foreign sounding name led to suspicion and he had to publically deny rumours that the factory supplied explosives to Germany in a letter to Cambrian News and Merionethshire Standard (23rd October 1914).

In June 1915 when there was a serious explosion. No one was killed but Silberrad was injured and extensive damage done. The explosion was felt in Penrhyndeudraeth and a singing competition in a local chapel was interrupted as the windows of the chapel were blown out. The people of the town did not know the cause of the large explosion and assuming it was a German attack fled towards Porthmadog. When the news reached them of the real cause and they returned to the town they apparently found that many of the deserted houses had been looted (Parry, collection of local oral history). After the explosion, in July 1915, the Ministry of Munitions nationalised the factory and rebuilt it. The factory was re-opened after rebuilding in January 1916, was managed by the Factories Branch of the Explosives Supply Department, and was known as HM Factory Penrhyndeudraeth. After the War there was a dispute over compensation due to the company from the

government which seems not to have been resolved leading to the company going into liquidation in 1919 or 1920.

Many of the buildings were demolished when the site closed and those that remain post-date the purchase of the site by Cooke in 1922. The site was recorded by RCAHMW soon after the factory closed and before demolition of the buildings (Malaws and Parry 1995). The 6 inch map revised in 1913, though published in 1920, shows the extent of the explosive works at the start of the First World War (they are not shown on the 25 inch map published in 1916). It was restricted to a small, enclosed valley behind what is now the Waste Management Centre and Cooke's Cafe (figure 13). Some of the buildings were still standing when the RCAHMW recorded the site, such as the fitting shop (NPRN 85192) and the welding shop (NPRN 85191), but have since been entirely demolished. Several buildings shown on the map were not recorded by RCAHMW and were presumably demolished prior to the 1990s. One building on the map may be the same as the J2 Rollex Cartridging building (NPRN 85214) recorded by the Commission but it was not possible to determine whether there are any remains of this due to extensive brambles and other vegetation. There are several emergency blast shelters (plate 39) within the area of the early works that are now used as bat roosts. These seem not to have been recorded by the Commission and they appear later in date than the early factory. The path shown on the map on the western side of the site is still visible (plate 40), although all the buildings along it are gone. However the site of the de-nitration plant can be seen as a flat area covered in brick and stone rubble (NPRN 85224) (plate 41). The valley with its rock walls on either side can still be appreciated for its enclosed character so ideal for restricting damage in the case of an explosion (plate 42), but there is no possibility of comparing the earlier structures with the later buildings that do survive elsewhere within the Nature Reserve.

It is worth noting that there is currently a public engagement project being undertaken by the Woodcraft Folk in partnership with North Wales Wildlife Trust to share general information about this site. Given sufficient time and resources in order to collaborate fully, this is the type of partnership activity which could prove fruitful in terms of future outreach related activity.

Shell Factories

By Roland Flook

Historical background

In 1914 Britain was unprepared for large scale war with a shortage of munitions as well as of trained soldiers. The Ministry of Munitions was set up under Lloyd George to improve munitions supply. The production of shells was initially carried out by existing firms coordinated by Munitions Committees but it became clear that production needed to be focused on larger factories, and National Shell Factories were set up to achieve this. The National Shell Factories produced shell-casings, generally by machining metal bars supplied from elsewhere, and these were then sent to National Filling Factories, to be filled with explosives and have fuses fitted (Kenyon 2015).

A local Board of Management, funded by and accountable to the Ministry of Munitions found suitable premises, machines and staff for the shell factories, which generally manufactured smaller calibre munitions, particularly 18 pound and 4.5-inch howitzer shells. Existing buildings such as railway workshops were used to house the new factories, with the main criteria being large floor space and cheap rents or the donation of the premises (Kenyon 2015; Paul Francis (Airfield Information Exchange website)). An inspection of suitable sites in North Wales led to National Shell Factories being set up at Caernarfon, Porthmadog (actually Penrhyndeudraeth) and Wrexham (Nicholson and Williams 1919, 110).

Boston Lodge National Shell Factory, Penrhyndeudraeth (PRN 60175)

In July 1915 the census of suitable sites in North Wales identified a site near Porthmadog where there were already 20 lathes and 5 drills available for use in shell production. As a result, Boston Lodge, the engineering workshops for the Ffestiniog Railway at Minffordd near Penrhyndeudraeth, was designated to become a National Shell Factory (figure 14). An agreement was signed on 22nd of October 1915, the North Wales Board of Management undertook to manage the factory on behalf of the Ministry, and they added four new lathes to those already available (XM10422/2).

A copy of the tenancy agreement with accompanying site plan (XD97/20916) dates the official takeover of the facility at Boston Lodge to 7th January 1916. On this plan (figure 15) the Shell Factory took over occupation of the erecting shop, the machine shop and its attached engine house and boiler house, as well as part of the smithy to the east. Document XD97/20042 also mentions that the Shell Factory occupied the "erecting and dismantling

sheds". Another document states that the painting shed was extended for accommodation for female hands (XD97/20954).

Boston Lodge produced 13 and 18 pound shells (Kenyon 2015, 147; Graces Guide website). Traffic into the National Shell Factory on a single day (3rd September 1917) included 18 slate wagons and 5 coal wagons filled with steel bars used for manufacture of the shell-casings (XD97/20130). The steel bars were machined into shape, which is why many lathes were required (XM10422/2).

It is not clear where the steel for the bars came from. Steel production in north Wales at the time was carried out at Brymbo and Shotton but the specification for steel for munitions was quite specific (Alford 1917), and rolling bar for 18lb shells was produced at the Cyfarthfa steel works at Merthyr Tydfil (Arming All Sides website). As Boston Lodge produced 18lb shell-casings it is possible the steel was obtained from Cyfarthfa, presumably brought in by ship to Porthmadog. At other sites the finished shells were painted but no reference was found to that at Boston Lodge. There was a painting shop at Boston Lodge, but this may have been solely for the railway.

The finished shells were sent to the National Shell Factory at Wrexham from the station at Minffordd (XD97/20928). There were no National Filling Factories in Wales and the shells must have been sent on from Wrexham, perhaps to the Filling Factory in Liverpool (Kenyon 2015, 153). Explosives from the factory at Penrhyndeudraeth must have travelled a similar route but the shell-casings and explosives could only be put together under controlled conditions in the Filling Factories. A letter records that 17.5 tons of shells were despatched to Wrexham during the week of December 20, 1916 and that the total tonnage of shells to Wrexham in the 12 months to March 31st 1918 was over 357 tons (XD97/20928). However the aim was for the output to be 500 shells a week initially rising to 3,900 shells a week, but the maximum was not attained and the total production was 107,373 18 pound and 16,230 13 pound shells (XM10422/2). This production consumed 50 tons of coal a month (Dec 21 1916) (XD97/20929).

Women were widely used in shell factories, despite the skilled work of machining metal, leading to some disputes and concern about male jobs and wages being undermined. Over 50 women were recruited to work in the Boston Lodge factory (Lloyd 2014, 51; Alexander 2012, 134). However other available workers were also used. There were many Belgian refugees who fled to Britain during the First World War and many worked in the armaments industry. There were two families totalling 7 people living in and supported by the town of Blaenau Ffestiniog. Two of these Belgian refugees worked at the Boston Lodge Shell Factory. They had a very low pay and there was a request from the town to the Ffestiniog Railway for free train passes to and from work at Boston Lodge for the Belgian workers. This was refused as the perk was reserved for former Belgian Railway workers only (XD97/20919). There was also a petition to the Ffestiniog Railway from the female staff for permission to use an early, untimetabled train from Porthmadog for the morning shift at Boston Lodge (XD97/20940 file 642). This was successful, but a small charge was made for the return journey and the arrangement only lasted during the winter, with the women having to walk in the summer (Alexander 2012, 135).

The tenancy of Boston Lodge for munitions production was terminated 30 April 1918 (XD97/20954). An auction was held on 28th March 1919 to dispose of the surplus equipment and machinery from Boston Lodge, including numerous lathes and drills, but also lavatory fittings and wash basins (Yr Herald Cymraeg, 18th March 1919, p1).

Most of the buildings at Boston Lodge are grade II listed buildings (appendix I and figure 14) and are therefore protected. This includes the machine shop and erecting shed that formed the main part of the shell factory. This degree of protection and use of the site by a heritage railway has meant that much has remained unchanged. The erecting shed, which was originally built as a corrugated iron structure blew down in 1901 and was rebuilt in stone. At the start of the War it was therefore quite a new building and probably looked much as it does today externally as it has been well-conserved (plates 43 and 44). The south-east side of the erecting shed now looks quite different as the building was extended in recent years into an area of an old quarry. Photographs of the shell factory work force taken during the war were taken in this quarry area and in one the rear of the erecting shed can be seen behind the rows of workers (<https://www.flickr.com/photos/63164772@N05/8063519166>) and in another the edge of the quarry can be seen (<https://www.flickr.com/photos/63164772@N05/8204321016/>).

Inside the machine shop and erecting shed are relatively unchanged. The machinery has been slightly up-dated but many of the same tasks are still carried out. A 1917 photograph (CRO XD97/20001a) (plate 45), probably in the erecting shed, shows staff with lathes powered from an overhead drive shaft by belts. The drive shaft is still in place in the erecting shed roof and the machine shop also still has remains of belt drives attached to the

ceiling (plates 46-49). The drive shaft in the erecting shed was used to power a lathe as late as the early 1990s (Tony Williams pers. comm.) but is almost certainly the one that was used during the First World War. The paint shop used for a canteen has long been demolished but the smithy also used for the shell factory still survives.

Vulcan Foundry, Bank Quay, Caernarfon (PRN 61325)

The North Wales Munitions Committee also chose a site in Caernarfon for a shell factory. This was located in the Vulcan Foundry (figure 16), owned by Humphrey Owen and Sons, and the agreement for the North Wales Board of Management to run the factory was signed on 22nd October 1915 (XM10422/2; Kenyon 2015, 147). It produced 13 and 18 pound shells and an output of 500 shells per week, rising to an optimistic 3000 per week was promised. However as most of the lathes were old the output was less than was hoped (XM10422/2). Little seems to be known about this shell factory. Little was found in the Gwynedd Archives except for a fine engraving on a headed ledger sheet shows the site of the foundry as it looked in 1925 (CRO 22284/2) (plate 50). There is also a photograph of some of the women who worked in the factory (plate 51) but this is posed in a photographer's studio and gives no information about the factory. The machine tools, plant and equipment from the factory was sold off by auction on 27th March 1919 (Yr Herald Cymraeg, 18th March 1919, p1).

There are almost no traces of the factory left at present (figure 16). New apartments have been built over most of the site (plate 52). A National Tyres and Autocare business seems to be reusing parts of some fragments of the original buildings, though considerably altered (plate 53). Unlike Boston Lodge there is no chance that any of the First World War machinery might survive.

Other factories producing for the war effort

As well as making weapons and munitions it was critical to keep the population fed and clothed during the war, often with supplies limited by lack of imports.

Large quantities of road stone quarried in north Wales were exported to France for use in the war. Some, especially at the Penmaenmawr quarries, was quarried with the assistance of German prisoners of war (Nicholson and Lloyd-Williams 1919, 117). The demand for slate fell steeply during the war but some slate was used to roof huts at training camps such as Kinmel Camp (Nicholson and Lloyd-Williams 1919, 117-8).

Welsh woollen flannels were in high demand from the armed forces as well as other woollen goods such as socks and blankets, but most of the main woollen mills were in mid Wales (Nicholson and Lloyd-Williams 1919, 119-121).

Jerkin leather for aviators clothing was manufactured in Llanrwst (Nicholson and Lloyd-Williams 1919, 122). Tanning had been important in Llanrwst for centuries with documentary evidence of a tanning trade from at least the 16th century (Rowley 2014, 68). By the 1960s the tannery (PRN 61400) was located next to the church but the 25 inch maps show that the main tannery building here was not built by the First World War. Although tanning may have taken place in a building next to the river there is a suggestion that the tannery was originally located near Plas Isaf (NPRN 27728), home of the Salisbury family (Rowley 2014, 68). No evidence has been found for this project of where near Plas Isaf the tannery might have been or whether it was located there in the First World War, but tanning clearly took place somewhere in the town and made a significant contribution to the war effort.

During the First World War Welsh expats in America set up the Lloyd George American Relief Fund to help Welsh workers made unemployed by the changes caused to industry by the War. In Blaenau Ffestiniog this also helped the war effort as the fund set up a sock knitting industry to employ young women who could not leave their homes due to family responsibilities to look for work in the new munitions factories and elsewhere. Part of the market buildings (PRN 61398) were converted to a workroom with seven knitting machines, later increased to 20 knitting machines with finishing and winding machines. Knitting started 7th July 1915 and older women were also employed hand knitting in their own homes. The workroom could output 1,700 pairs of socks per week, but production was not the main aim. This was a charitable institution and invalids and those in most distress were employed in preference to the able bodied (Nicholson and Lloyd-Williams 1919, 192, 195-6). The People's Collection Wales has a photograph of the women who worked in this knitting factory (<http://www.peoplescollection.wales/items/32562>).

There were also knitting workrooms in Talysarn, near Penygroes and Bethesda. In Talysarn the workroom was in the band room (PRN 61399) and opened in 15th September 1915 with 6 machines. The Bethesda workroom

was opened in January 1916 (Nicholson and Lloyd-Williams 1919, 192, 196), but its location has not yet been established.

Aberfalls Margarine Factory, Abergwynnregyn (PRN 60181)

One food factory that worked throughout the First World War was the Aberfalls Margarine Factory at Abergwynnregyn (figures 17 and 18). This made soap as well as margarine and was located next to the railway. It opened between 1900 and 1912, and was owned and run by the Pure Margarine Company. It reused a building originally built by the Penrhyn Estate for writing slate production (NMR NPRN 303145), which later became a woollen factory and more recently as a small brewery (Abergwynnregyn website: <http://www.abergwynnregyn.co.uk/>). A notebook recovered from the factory by Clifford (Beaver) Hughes shows that it worked throughout the war. The book records the composition of each batch of margarine and the best margarine, containing butter and yolk, was soon discontinued once the war started (plate 58).

Margarine may seem like a minor item when there is a war but it could be of significance to moral when it was in short supply as many food-stuffs were. When the Swiss Legation inspecting prisoner of war camps visited Frongoch Camp near Bala on 27th June 1919 the German prisoners complained that from April 12th to June 12th 1919 they were short of 50 full daily rations and part of 7 daily rations of margarine. The inspectors, however were not particularly sympathetic and it was recorded that “the prisoners have never been short of essential foodstuffs and certainly looked none the worse for the want of margarine...It all comes from being cooped up and idle, one loses all sense of proportion” (National Archives, Kew FO383/206).

3.3. Frongoch Prisoner of War Camp (PRN 7883)

Frongoch Camp, north of Bala, was set up to take German prisoners in 1915. The German prisoners were moved out for a short period in 1916 and replaced by Irish prisoners (Huey 2013), with the Germans returning in 1917. The camp is particularly significant because of the Irish prisoners held after the Easter Rising. This site is of considerable significance in Irish history as the freedom that the prisoners were allowed within the camp enabled many contacts to be formed and essentially led to the creation of the Irish Republican Army. The prisoners were able to discuss tactics, methods of bomb making, recruitment and political objectives, so that Frongoch became known in Ireland as the ‘University of Revolution’ (O’Mahony 1987).

There are numerous artefacts made by prisoners from the camp that have been preserved. Items made by the Irish prisoners were often sent home to their families and many of these are in Kilmainham Jail Museum in Dublin and other museums across Ireland. Joanna Brück of Bristol has studied many of these items (Brück 2015). It seemed likely that some items remained in the local area and one of the aims of the event held at Frongoch in October 2015 was to encourage local people to bring items to be recorded. Three items were brought and have been recorded and are listed below. All were recorded photographically and by notes. They have been allocated separate PRNs as findspots. As there is much interest in the items made by Irish prisoners of war it was valuable to find one item that was probably made by a German prisoner.

PRN 60178

Irish Republican Painting, Findspot, Frongoch
SH9041339240A

A painting by James Byrne from Dublin done while he was interned in Frongoch prisoner of war camp. The painting shows the Irish tricolour and the Fenian sunburst flag on a black background with a ribbon above painted with “Irish Republic” and a smaller one below with “1916” (plate 54). The painting is owned by his nephew, Paddy Fitzsimmons of Dublin (plate 55).

PRN 60876

Flute, Findspot, Railway Cottage, Frongoch
SH9014639403A

One section of a 6-key wooden B flat flute found during an extension in c. 1995 to Railway Cottage (marked on the Ordnance Survey 2nd edition map of 1901 as Glan-dwr). The house is located adjacent to the site of the Frongoch Internment Camp and the find may be associated.

The flute is made from wood, with patches of red discolouration visible on the rear of the instrument (plate 56). The keys appear to be made of silver, and the jointed connections are held together with iron pins (now slightly rusted). The pads on the keys are still present but now corroded. The seal at the top of the section (if one was

originally present) appears to have corroded away, leaving a ridged area of wood, and an incised ring is visible at the end, probably indicating the location of a now-lost ferrule.

The find is the body of a B flat flute, which is a small-sized flute often referred to as a band flute, slightly longer and wider than a piccolo. The instruments were used in bands, both military bands with mixed instruments and in band with solely flutes of different sizes. These flutes were used throughout the twentieth century and could have been played by Irish or German internees, or British soldiers or the occupants of the house. Flute bands are more of a British phenomenon, and Irish fife and drum bands were common, but there is no way to confidently attribute the flute to a particular group of people (J. Nex, musical instruments curator, Centre for Research Collections, Edinburgh University Library, pers. comm.). Similar examples are listed below.

PRN 61150

Crucifix Bottle, Findspot, Frongoch

SH9041339240A

Bottle with crucifixion scene placed inside (plate 57). The bottle is considered to have been made by Prisoners of War at Frongoch, probably German.

A clear glass bottle, possibly from the Frongoch Whisky Distillery, containing a simple cross made from plain wood, with a hand-drawn/painted paper Christ and a paper title banner with INRI handwritten on it. INRI is the Latin expression *Iesvs Nazarenvs Rex Ivdæorvm* – Jesus of Nazareth, King of the Jews (Stiver, D.; www.crosscrucifix.com). The scene is surrounded by coloured paper trees/flowers and is accompanied by the *Arma Christi* – the Arms of Christ (*ibid.*) which in this case comprise the ladder (one of the instruments of passion (*ibid.*)), the rod and sponge, the spear, and the pincers for removing the nails (*ibid.*). Each item was fixed into the base but the pincers have become detached. The tools are coloured black and red. The bottle is sealed with a lid wrapped in pale brown paper with a red decoration and secured with string.

Crucifixion scenes placed inside bottles are reportedly a German or east European tradition (Jones, S. D., www.sdjones.net).

The findspot is approximate and is based on the location of Frongoch Internment Camp. The exact location of the find is not known and it is not clear whether it was left at Frongoch or gifted to the owners.

4. CONCLUSIONS

While the number of sites located for this year's theme is relatively small they are of considerable importance. The production of shells was vital for the war effort and the development of long wave wireless transmission was of world-wide importance. Although airships had a fairly short useful life after the First World War fixed wing aircraft went on to be of vital importance in the Second World War and later. Developments in north-west Wales played a small part in that by demonstrating the usefulness of aeroplanes for many tasks. Fortunately for the sea lions they were never used again in war but attempts to use them in the First World War gives a colourful insight into the desperation of the times.

The long wave transmitter and receiver stations near Waunfawr and Tywyn (PRNs 887 and 888) are clearly of national, if not international, importance as part of the history of the development of radio and trans-Atlantic communications. It should be pointed out that while there were other Marconi wireless stations in Britain for communicating with shipping and aircraft these two sites were the only long wave trans-Atlantic wireless stations functioning in Britain during the First World War. The survival of features at the transmitter station site is better than at the receiver station, with the former having not only well preserved buildings but surviving aerial mast bases, stay anchors, the light railway used to construct the site, and remains of probable defensive blockhouses. This site had received some detailed study on the ground, but the present project has contributed a clear boundary to the area and additional interpretation of buildings and remains of the light railway. Further survey work next year will aid in the full understanding of this complex site.

While the Royal Navy Air Station Llangefni (PRN 58670) is a site of national importance all above ground remains have been destroyed and any possible surviving buried remains are unlikely to add significantly to the documentary information that is preserved in Anglesey Archives and in personal collections. Bangor Airfield (PRN 27310) can be considered to be of regional importance, but very little survives here.

The whole of the Penrhyndeudraeth Explosives Factory (PRN 21180) is a highly significant site but few features relating to the First World War survive. The National Shell Factories are of national importance, with related buildings surviving well at Boston Lodge National Shell Factory (PRN 60175) as these are all listed. However very little survives of the Vulcan Foundry, Bank Quay, Caernarfon (PRN 61325), so its importance is only as a historical location. The other factories and manufacturing sites highlighted in the report are essentially of local or regional importance but their identification contributes to the recognition of the full range of manufacturing directly related to the war effort.

The site of Frongoch internment camp (PRN 7883) is of international importance, because of its significance in Irish history, but very little still survives on the surface. The current project has informed both local people and visitors about the site and has contributed towards a raising of its profile, which will continue in 1916 with the 100th anniversary of the Easter Rising and the incarceration of the Irish in the camp, with several bodies organising events. Information on some artefacts from the camp not previously recorded has also been collected.

This project has combined historical research and archaeology. Most of the sites were known by local historians but in several cases these had made little attempt to precisely locate the sites on the ground. By locating the sites they can be incorporated into the HER. This can form a focus for research and through Archwilio allow the public to become aware of what was happening during the First World War in their area. It is also vital to inform development control and enable the better preserved sites to be protected or recorded if threatened in future.

5. ACKNOWLEDGEMENTS

Many people have assisted this project with information and advice as well as being involved in the planning and delivery of events. The project was funded by Cadw and the authors would like to thank Ian Halfpenney and Jonathan Berry of Cadw for their advice, particularly for John's hint to look at sea lions in Llyn Tegid. Thanks to Dafydd Pritchard at Glan Mor Isaf, to Tony Williams of Ffestiniog Railways for showing JK around Boston Lodge and to Jean Napier for a tour of her house at Marconi Bungalows and to her neighbours for access to their house and information about the remains on the hill. All the people who provided information and images are thanked including: Mair and Roland Williams for information about the wireless station at Llanelian; Llew Williams for the copy of a letter about Holyhead wireless station; Dewi Roberts, Gordon Owen and Peter Brindley for images brought in at the Anglesey Archives event; Paddy Fitzsimmons, Dusty Rhodes and Aeron Jones for artefacts brought in the Frongoch event; Tegwen Haf Parry and Friends of Cooke's for information on the explosives factory, and Beaver Hughes for information on the margarine factory. For help with events and field visits thanks are due to the following people: Rhys Mwyn for general assistance and media campaigns, Emily La Trobe-Bateman for advice and help at events, Angharad Stockwell for help at the Open Doors event, Rob Evans for talking at CPAT day school and helping at the Anglesey Archives event, Matt Rimmer for assisting with the visit to Tywyn and advice and information, Hayden and Amanda for hosting the Anglesey Archives event and providing facilities and assistance, Jano Owen, headmistress of Ysgol Bro Tryweryn, for hosting the Frongoch event in the school, Lyn Ebenezer for giving his well-received talk, and Dafydd Ellis Thomas for introducing Lyn and for providing a translator. Particular thanks are due to Paul Dicken for organising the Frongoch event and Ann Huws for huge amounts of last minute translation. Anita Daimond and Nina Steele provided organisation, technical assistance, planning, advice and help at events. Roland Flook undertook considerable research on Boston Lodge and other sites. This report was edited by Andrew Davidson.

6. SOURCES

6.1. Published references

- Alford, L.P. (editor), 1917. *Manufacture of Artillery Ammunition*, first edition, McGraw Hill Book Company Inc, New York
- Alexander, J., 2012. What Did You Do in the War Granny, Ffestiniog Railway Magazine, No. 218134-5
- Baker, W.J., 1970. *A History of the Marconi Company* (reprint 2002, Routledge, Oxford)
- Boyd, T. J. M., 2011. One Hundred Years of G. H. Bryan's *Stability In Aviation*, *Journal of Aeronautical History*, 97-114
- Brück, J., 2015. 'A good Irishman should blush every time he sees a penny': Gender, nationalism and memory in Irish internment camp craftwork, 1916–1923, *Journal of Material Culture*, 1-24
- Delve, K., 2007. *The Military Airfields of Britain: Wales and West Midlands*, The Crowood Press, Marlborough

- Kenyon, D., 2015. *First World War National Factories: An archaeological, architectural and historical review*, Research Report Series no. 76-2015, Historic England
- Lloyd, H. (ed.), 2014. *The First World War – A Great War?*, Friends of St Julitta's Church, Capel Curig
- Nicholson, I. and Lloyd-Williams, T., 1919. *Wales, Its Part in the War*
- O'Mahony, S. 1987. *Frongoch: University of Revolution*. Dublin. FDR Teoranta
- Phillips, A., 2010. *Defending Wales: the coast and sea lanes in wartime*, Amberley, Stroud
- Pratt, D. and Grant, M., 1998. *Wings Across the Border Volume I*, Bridge Books, Wrexham
- Rowley, P. (ed), 2014. *Ffordd yr Orsaf, Llanrwst, Station Road Volume 4 part 2 Plas yn Dre to Bank Buildings*, Llanrwst and District Historical Society
- Schofield, J., 2004. *Modern military matters. Studying and managing the twentieth-century defence heritage in Britain: a discussion document*, Council for British Archaeology
- Sloan, R., 2001. *Early Aviation in North Wales*, Gwasg Carreg Gwalch, Llanrwst (2nd edition)
- Williams, H., 1999. *Marconi and his Wireless Stations in Wales*, Gwasg Carreg Gwalch, Llanrwst
- Williams, R., 2015. Cysylltiad Cwmni Marconi a Llanelian, *Yr Arwydd*, issue 368, p17
- Wilson, D. A. H., 2001. Sea Lions, Greasepaint and the U-Boat Threat: Admiralty Scientists Turn to the Music Hall in 1916, *Notes Rec. R. Soc. Lond.* 55 (3), 425-455
- Wilson, D. A. H., 2006. Avian Anti-Submarine Warfare Proposals In Britain, 1915-18: The Admiralty And Thomas Mills, *International Journal of Naval History*, vol 5, No. 1, 1-25

6.2. Unpublished reports

- GAT, 1993. *The Uplands Survey Project: archaeological fieldwork in the Gwynedd uplands between 1983 and 1992*, unpublished GAT Report No 22
- Huey, L. M., 2013. *Frongoch 1916*, unpublished B.A History and Archaeology dissertation, Bangor University
- Malaws, B. A. and Parry, M., 1995. *Cooke's Explosives Works, Penrhyndeudraeth, Merioneth*, NPRN 85184, unpublished report by RCAHMW held in NMR
- Evans, R. and Steele, N., 2012. 20th Century Military Airfields in Gwynedd, Part 1: Report & Gazetteer, unpublished GAT report 1053
- Schofield, P., 2008. *Uplands Initiative Field Projects 2007-8, Snowdonia (North West) Survey Area*, Oxford Archaeology North report for the Uplands Archaeology Initiative, RCAHMW (more detailed descriptions of Cefndu sites on Coflein)

6.3. Websites

- Abergwyngregyn website: <http://www.abergwyngregyn.org.uk/> (accessed 01/07/2015 when the information was on the site; last viewed 04/03/2016 when the information on the margarine factory had been removed)
- Arming All Sides website: http://armingallsides.on-the-record.org.uk/case_studies/restricting-profits/ (accessed September 2015)
- CHAmois Mountaineering Club: www.chamois.org.uk (accessed December 2015)
- Coflein: the online database for the National Monuments Record of Wales: <http://www.coflein.gov.uk/>
- Francis, Paul: Airfield Information Exchange website: www.airfieldinformationexchange.org (accessed September 2015)
- Graces Guide website: www.gracesguide.co.uk (accessed September 2015)
- Jones, S. D., www.sdjones.net: <http://www.sdjones.net/FolkArt/bottlestory.html> (last viewed 21/01/2016)
- People's Collection Wales: <http://www.peoplescollection.wales/>
- Stiver, D.; www.crosscrucifix.com: <http://www.crosscrucifix.com/glossaryhome.htm> (last viewed 21/01/2016)
- TrigpointingUK: <http://trigpointing.uk/trig/7660> (accessed 20/01/2016)
- Urdd website: <http://www.urdd.cymru/> (accessed January 2016)
- Wander, T. The Marconi Company: Wireless Goes to War 1914 -1918: <http://marconiheritage.org/ww1intro-3.html> (accessed 25/01/2016)

Flickr

- Boston Lodge Works (Ffestiniog railway) October 1915 posted by Martin Pritchard, photograph of workers at the shell factory (<https://www.flickr.com/photos/63164772@N05/8063519166>)
- Boston Lodge Porthmadog munitions workers in 1915 posted by Martin Pritchard <https://www.flickr.com/photos/63164772@N05/8204321016/>

6.4. Record Offices and Archives

Anglesey Archives

WSM/292/1-4 – copy of photograph of RNAS Llangefni and other images from the station
 WSM/239 – postcard of airship flying over Caernarfon
 WDD/2509 – photograph of an airship over Menai Bridge
 WM/2010/1 – Joseph Snape's album of photographs of RNAS Llangefni, also including hand-drawn programmes for concerts etc.
 WM/2010/4 – certificate for transfer to reserves of Joseph Snape, including biographical information
 WSM/286 – photograph of airship
 WSM/287 – RNAS crew at town clock
 WSM/260 – images of airships and the airship station RNAS Llangefni
 WM/1609 – Album of photographs of RNAS Llangefni collected by Marie Williams
 WM/1349 – Part of an aeroplane that crashed at Gwalchmai 7th Nov 1917

Bangor University Archives

Indemnity Act 1920 War Compensation Court re Glanmor Isa Farm: proof of Mr Ellis Pritchard (dated 1921)

Gwynedd Archives, Caernarfon Record Office

PYO Add. 2010, appears to be the agreement for the hire and removal of machinery from Pen yr orsedd to be used at Boston Lodge, 1916-04-07
 XD/20032 (file 613), discussions about installation of electric light at Boston Lodge 1916-17, 1916-1917
 XD97/20001a, - photo - no text description but labelled "BL/P/02B" shows women & men in work clothes by their machines in Boston Lodge "c12/1917"
 XD97/20031 (file 606), rebuilding paintshop 1916-17, 1916-17
 XD97/20002b, contains a list of early maps and pc's of some of these maps,
 XD97/20004, Boston Lodge Foundry and products
 XD97/20005a, photo of Boston Lodge works staff 1917
 XD97/20007, late and early plans and photos of the works, various
 XD97/20008a, 1971 architects plan
 XD97/20039, scale architect's plan of the site showing Boston Lodge works 1926, 1926
 XD97/20042, report of Boston Lodge buildings and equipment - notes the Shell Factory, 1939?
 XD97/20127, regarding scrap wagons
 XD97/20130, gives totals for number of slate wagons loaded with steel bars for the Shell Factory (1917)
 XD97/20218, stores and materials - details of sundry costs at NSF included
 XD97/20308 file 3266, prices of stores and materials, 1914
 XD97/20546c, supply of cotton waste
 XD97/20562 file 774, surplus govt machinery sale
 XD97/20916, tenancy agreement and plan of premises at Boston Lodge for government occupation, 1916
 XD97/20919, 1916 - reference to Belgian refugee workers, low paid, town support, earning £1 per week - request for free passes
 XD97/20922, 1916 - regarding transshipping of shells
 XD97/20923, 1916 - regarding brass tubes
 XD97/20928, 1916-17 - regarding shipping shells from Porthmadog to Wrexham
 XD97/20929, 1916-17 document stating total coal required for the month for Boston Lodge National Shell Factory
 XD97/20931, 1917 - re shells for Wrexham from Boston Lodge
 XD97/20933, 1917 - re not loading steel bars into wooden wagons
 XD97/20939, 1917-18 - supply of pb alloy and anti-friction metal Boston Lodge
 XD97/20940 file 642, petition of munitions workers travelling to Boston Lodge to Ffestiniog Railway asking for changes to railway schedule to accommodate working times at Boston Lodge
 XD97/20948, 1918 - bundle of letters concerning post-war conversion of engineering shop Boston Lodge
 XD97/20951, 1918 - bundle of letters giving total carriage account, and other expenses – Boston Lodge
 XD97/20954, termination of NSF tenancy - 30 April 1918, 1918
 XD97/490177, 500177 S 1129A BL - drawing of machine for Shell Factory,
 XM10422/2, appears to be a post war report summarising the production details and with totals, not dated
 XS1497/7/4, photo - labelled "Munitions Works - Vulcan Works Bank Quay, 1914-18"
 XS3066/215b, photo label in pencil says "Maggie Mobberley Nee Jones (standing) with two friends. They worked at Aber Margarine during the First World War" no date.
 XS1497/7/8, shows staff of munitions firm Caernarfon (Humphrey Owen and Son - 'Vulcan Works') standing in a group - posed, in their 'uniforms', inside a building (possibly in the factory but with a decorated draped backdrop so no details of NSF visible)

Gwynedd Archives, Dolgellau Record Office

X/Plans R/49: [1865] Cambrian Railways Plans and Sections

ZDER/312 Plan of Cooke's Explosives Works (1948)

ZDER/ Plans and Costing Manual for Cooke's Explosives Works (1945-1954)

National Archives, Kew

London FO383/206, inspection report from Swiss Delegation inspecting Frongoch prisoner of war camp

6.5. Newspapers

Accessed through Welsh Newspapers Online (<http://welshnewspapers.llgc.org.uk/en/home>)

Cambrian News and Merionethshire Standard

Carnarvon and Denbigh Herald

Evening Express

North Wales Chronicle and Advertiser

North Wales Express

Accessed through Cymru1914.org (<http://cymru1914.org/en/browse/newspapers>)

Yr Herald Cymraeg

Copy of cutting

Daily Post (January 10th 1992)

6.6. Other

Notes by Tegwen Haf Parry of the Friends of Cooke's from various sources in the National Library of Wales and oral history

7. APPENDIX I: LISTED BUILDINGS AT BOSTON LODGE WORKS, PENRHYNDEUDRAETH

All grade II listed buildings.

Record No.	Name	NGR	Interior	Exterior
14411	Former Erecting Shop at Boston Lodge	SH58403780	The interior has a wide aisled roof and retains line shafting for belt drives.	Single-storey range of slatey rubble with slate roof, now with roof-lights; old photographs show that there was formerly a chimney. To the centre are 2 full-height, half-glazed door entrances through which run railway tracks. At the extreme right hand end is the carriage works, the front part of which is modern; lower part-glazed entrance to the left section with tall iron framed flanking windows.
14412	Former Machine Shop at Boston Lodge	SH58403780	Interior now converted to offices.	Of local slate rubble construction with slate roofs. It is 2-storey with wide eaves, bracketed to gable end, and small-pane sashes (25 and 30-pane); 3-original windows to the ground floor, replacement copies above. Rebuilt and extended to the left, which is cement-rendered with modern windows except one original window to first floor. Lean-to at rear with further small-pane sash windows.
14413	Former Iron Foundry and Smithy at Boston Lodge	SH58403780	The interior of the iron foundry retains deep brackets in one wall indicating position of the cupola hood. At rear are lateral chimneys and segmental arches into deep lean-to chambers.	Built of local slatey rubble with corrugated iron roof and wide eaves, bracketed to gable end. 4-bay iron foundry has voussoir-arched openings, 3 of which are filled in to base and given small-pane windows but the left hand one retains boarded door. Stepped back to left is 5-bay, slate-roofed, smithy which has similar round-arched openings of which alternate ones remain open as split boarded doors while the rest are converted, as in the foundry, into windows. Railway track at front with turntables to either end.
14414	Crane at S End of Boston Lodge Railway Works	SH58403780		Late C19 cast-iron crane set in base of massive slate blocks on central cast-iron pivot with frame supporting large gear wheels and shoe for gib (timber gib missing). Manufactured by 'H & J Ellis, Engineers, Manchester'. The crane would have been used to load goods to and from wagons on the siding.
14415	Locker Room Block at Boston Lodge	SH58403780	The interior is now a locker room.	Rectangular single-storey block of local slate rubble construction with hipped slate roof. The front NE elevation has a plain-panelled timber gabled porch to the R with arched entrance and glazed side lights; 12-pane sash window to the NW return (R). The rear elevation has a central catslide outshut with multi-pane window; 2 modern timber windows to the R and L of this.

Record No.	Name	NGR	Interior	Exterior
14416	Nos 1 & 2 Boston Lodge	SH58403780		This prominent range, although altered, is the oldest at Boston Lodge because it was originally the barrack building to house some of the workforce brought in to build the Cob; there was also a comparable barracks on the Porthmadoc side. Tall, 3-storey stone building with painted rendered elevations and boulder plinth; hipped slate roof with wide eaves and cement rendered chimney stacks to ends and centre. 3 + 3-window west front with modern cross-frame, small-pane, windows and drip-edges at sill level. Irregular window arrangement at rear and entrances up steps to either end.
14417	Former Brass Foundry at Boston Lodge Railway Works	SJ58403780		Single-storey, built of local slatey rubble with slate roof and wide eaves, bracketed to gable end. 3-bay front with central boarded door flanked by 4-light transomed windows. 1970's extension to right now links with Oil Store.
14418	Former Oil Store at Boston Lodge Railway Works	SH58403780		Single-storey, built of local slatey rubble with slate roof and wide eaves, bracketed to gable end. The north front has boarded door to left and 2-light timber window to right with transom and pointed arched heads to the glazing. The west gable end has small blocked roundel and projecting masonry at the north corner which originally formed the springing for an arch that formerly spanned the railway line at this point.
14419	Former Manager's Office at Boston Lodge Railway Works	SH85803790		Of local slatey rubble with slate roof. The whitewashed rendered front has offset gabled timber porch with pendant and finial and part-trellised sides; flanking 2-light window. Left end, beside track, has unhorned 16-pane sash window.

8. APPENDIX II: SITES RECORDED IN NMR FOR COOKE'S EXPLOSIVES WORKS

NPRN	Site Name	Description	Broad class	Site Type	Period	Form	Eastings	Northings
85184	Cooke's Explosive Works, Penrhyndeudraeth	Cooke's Explosive Works originate from 1865 when explosives were manufactured from guncotton, starch and india rubber in an area now known as Cooke's valley. The site covers twenty-eight hectares (70 acres) and RT Cooke bought the area from the Ministry of Munitions in 1922 and it was sold to Imperial Chemical Industries in 1958.	Industrial	Explosives Factory	Post Medieval	Complex	261900	338850
85185	Cooke's Explosives Works: Incorporating Mill		Industrial	Crushing Mill	Post Medieval	Mechanical Structure	261640	338870
85186	Cooke's Explosives Works: Boiler House	Marine-type boilers; one no longer in use.	Industrial	Building	Post Medieval	Building	261720	338780
85187	Cooke's Explosives Works: Storehouse	Used for storage of ceramic and general fittings etc connected with De-nitration plant.	Industrial	Storehouse	Post Medieval	Building	261740	338800
85188	Cooke's Explosives Works: K3 Rollex Cartridging		Industrial	Explosives Workshop	Post Medieval	Building	261890	338740
85189	Cooke's Explosives Works: Offices		Industrial	Office	Post Medieval	Building	261800	338750
85190	Cooke's Explosives Works: Lead Workshops	Lead panels for floors are produced and repaired.	Industrial	Explosives Workshop	Post Medieval	Building	261760	338730
85191	Cooke's Explosives Works: Welding Shop		Industrial	Welding Shop	Post Medieval	Building	261750	338730
85192	Cooke's Explosives Works: Fitting Shop		Industrial	Fitters Workshop	Post Medieval	Building	261770	338740
85193	Cooke's Explosives Works: Testing Station	Used for testing ignition of explosives.	Industrial	Enclosure	Post Medieval	Other Structure	262220	338990
85194	Cooke's Explosives Works: Ballistic Pendulum	Strength of explosives checked.	Industrial	Building	Post Medieval	Building	262210	339010
85195	Cooke's Explosives Works: Burning Ground		Industrial	Enclosure	Post Medieval	Other Structure	262190	338950
85196	Cooke's Explosives Works: Z1 Talley Mixing House		Industrial	Building	Post Medieval	Building	261930	338550
85197	Cooke's Explosives Works: Mcroberts Mixing House	No longer in use.	Industrial	Building	Post Medieval	Building	261910	338570
85198	Cooke's Explosives Works: Z2	Destroyed by explosion 1988.	Industrial	Building	Post	Ruin	261970	338610

	Talley Mixing House				Medieval			
85199	Cooke's Explosives Works: N. A. B. Injector House	Houses N.A.B. injector plant for production of Nitroglycerine: Nitric and Sulphuric Acids injected into glycerine/glycol mix.	Industrial	Building	Post Medieval	Building	262120	338790
85200	Cooke's Explosives Works: Acid Centrifuge House	Separates Acidic Nitroglycerine from Refuse Acid.	Industrial	Building	Post Medieval	Building	262110	338790
85201	Cooke's Explosives Works: Water Centrifuge House		Industrial	Building	Post Medieval	Building	262100	338780
85202	Cooke's Explosives Works: Labyrinth		Industrial	Building	Post Medieval	Building	262090	338780
85203	Cooke's Explosives Works: Nitrating Acid Unit		Industrial	Building	Post Medieval	Other Structure	262100	338760
85204	Cooke's Explosives Works: Charge House		Industrial	Building	Post Medieval	Building	262080	338750
85205	Cooke's Explosives Works: Soda Dissolving Plant		Industrial	Building	Post Medieval	Building	262080	338740
85206	Cooke's Explosives Works: Refrigeration Plant		Industrial	Building	Post Medieval	Building	262040	338720
85207	Cooke's Explosives Works: Old 'C1' House		Industrial	Building	Post Medieval	Building	262040	338630
85208	Cooke's Explosives Works: 'C' House		Industrial	Building	Post Medieval	Building	262020	338690
85209	Cooke's Explosives Works: Refuse Acid Storage		Industrial	Building	Post Medieval	Other Structure	262100	338740
85210	Cooke's Explosives Works: Ingredients Preparation Plant		Industrial	Building	Post Medieval	Building	261830	338690
85211	Cooke's Explosives Works: Nitro Cotton Store		Industrial	Building	Post Medieval	Building	261820	338620
85212	Cooke's Explosives Works: Old Raw Materials Store		Industrial	Storehouse	Post Medieval	Building	261830	338630
85213	Cooke's Explosives Works: Raw Materials Store		Industrial	Storehouse	Post Medieval	Building	261850	338660
85214	Cooke's Explosives Works: J2 Rollex Cartridging		Industrial	Building	Post Medieval	Building	261920	338800
85215	Cooke's Explosives Works: Magazine Incline	Used for carrying cartridged explosives from cartridging area to packing house, continues above packing house as part of an extensive system serving various magazines. The gauge is 760mm, F/B rail is used. There is a winch house at SH 61953897.	Transport	Railway	Post Medieval	Earthwork	261900	338880

		Railway runs NE from NGR given. B.A.Malaws, 31 March 1995.						
85216	Cooke's Explosives Works: K1 Biazzi Cartridging		Industrial	Building	Post Medieval	Building	261910	338870
85217	Cooke's Explosives Works: J7 Hand Cartridging		Industrial	Building	Post Medieval	Building	261880	338790
85218	Cooke's Explosives Works: 'K' Packing House		Industrial	Building	Post Medieval	Building	261910	338920
85219	Cooke's Explosives Works: Glycerine Storage		Industrial	Building	Post Medieval	Building	261860	338550
85220	Cooke's Explosives Works: Old Glycol Storage		Industrial	Building	Post Medieval	Other Structure	261870	338540
85221	Cooke's Explosives Works: Glycol And Glycerine Mixing House, Penrhyndeudraeth		Industrial	Building	Modern	Building	261850	338540
85222	Cooke's Explosives Works: Railway Incline, Klondyke		Transport	Railway	Post Medieval	Earthwork	261870	338550
85223	Cooke's Explosives Works: Laboratory		Industrial	Building	Post Medieval	Building	261820	338650
85224	Cooke's Explosives Works: De-Nitration Plant		Industrial	Tower	Post Medieval	Complex	261780	338800
85225	Cooke's Explosives Works: P16 Ardeer Packer		Industrial	Building	Post Medieval	Building	261680	338890
85227	Cooke's Explosives Works: Fire Station		Industrial	Building	Post Medieval	Building	261790	338690
85228	Cooke's Explosives Works: Canteen		Industrial	Building	Post Medieval	Building	261780	338700
85229	Cooke's Explosives Works: Stretcher Post		Industrial	Building	Post Medieval	Building	261620	338840
85230	Cooke's Explosives Works: Printing Shop		Industrial	Printing Works	Post Medieval	Building	261580	338840
85231	Cooke's Explosives Works: Main Gate		Industrial	Gatehouse	Post Medieval	Building	261550	338830
85232	Cooke's Explosives Works: Old Manager's House		Domestic	Dwelling	Post Medieval	Building	261560	338820
85233	Cooke's Explosives Works: Store Building 51		Industrial	Storehouse	Post Medieval	Building	261620	338820
85234	Cooke's Explosives Works: P7	Surrounding blast walls removed, building latterly used as	Industrial	Building	Post	Building	261750	338930

	Hand Cartridging	informal store.			Medieval			
85235	Cooke's Explosives Works: Bath House		Health and Welfare	Bath House	Post Medieval	Building	261820	338750
85236	Cooke's Explosives Works: Laundry		Industrial	Building	Post Medieval	Building	261800	338760
85238	Cooke's Explosives Works: D1 Discharging House	The Discharging House is part of Cooke's Explosive Works (NPRN 85184) in Cooke's Valley. The factory originated in 1865 and it was in use until 1995. Source: David Gwyn & Merfyn Williams (1996) 'A Guide to the Industrial Archaeology of North West Wales'. Association for Industrial Archaeology. Claire Parry, RCAHMW, 18 November 2011.	Industrial	Building	Post Medieval	Building	262010	338580
85300	Cooke's Explosives Works: Glycol Storage		Industrial	Explosives Store	Post Medieval	Other Structure	261870	338560
85442	Atlas Mixer House, Cooke's Explosives Works		Industrial	Building	Post Medieval	Ruin	261930	338530

9. APPENDIX III: GAZETTEER OF RESEARCH, DEVELOPMENT AND MANUFACTURING SITES

9.1. Wireless Stations

PRN 887 NPRN 405838

Marconi Wireless Transmitting Station, Cefndu

NGR: SH534607 C

Location: Llanrug, Gwynedd

HER Description

Building and concrete bases of aerial masts of Marconi's transmitting station on the slopes of Cefndu, Llanrug, near Caernarfon. The transmitters, operated by remote control from the receiving and operation centre at Tywyn (PRN 888), were part of Marconi's transatlantic long wave wireless telegraph service from London to New York from 1914 to 1923. It remained in service as a long wave station until 1928 and then used as a relief station to cover heavy traffic peaks. It became redundant in 1939 and was used by the war department, and then as a Catholic hostel. It is now privately owned and called Plas y Celyn.

The transmitter originally comprised a twin wire aerial supporter on lattice steel masts 300ft high lined up in the direction of the American station in New Jersey. According to GEC-Marconi no plan exists of the site but the layout is at least partly preserved by the concrete bases of the dismantled masts.

The area was used by the TA who built huts, bunkers, platforms and causeways across the wet ground, making a very confusing pattern on the map. A site visit is needed to establish exactly which squares on the map are mast base supports. The NW edge of this area was visited in 1988 as part of the upland survey and some of the TA constructions recorded (FW25-46, PRN 10034). Part of the adjacent hillside had been 'drained' by crudely cut machine trenches which were open in 1988. The area of the masts was proposed as a wind farm site in Feb'92. See file T 257. 'Caernarfon remained the most important long wave station in the country up to opening of the post office transmitting station at Rugby in 1924'. <1>

NMR Description

The remains of the first successful Marconi long wave transmitting station are situated on the west-northwest slopes of Cefn Du, to the west of Llanberis. Much of the complex has survived on the hillside due in most part to the rugged nature of the concrete constructed footings. The site is extensive, ranging up to 2 sq. km in area. It was approached from the west, from the village of Waunfawr. The transmitter house still exists at the end of the entry drive and on the high ground to the east, there are the substantial remains of numerous radio mast bases, access tracks and ancillary buildings. The station was in use between 1912 and 1938 and was for many years the most important long wave station in Britain, handling imperial and international communications.

Source: Williams, H., Marconi and his Wireless Stations in Wales, Gwasg Carreg Gwalch, Llanrwst, 1999.

Notes for current project

The Transmitting Station was situated the slopes of Cefn Du between Llanrug and Waunfawr. The station buildings included a residential block for staff and the main building containing the transmitter hall (Williams 1999, 68). Remains of the aerial and related structures are extensive and complex. Most of the area was inspected by Oxford North as part of an Upland Survey (Schofield 2008), and they recorded 70 concrete bases. There were several buildings on the fringes of the aerial array, most of which were probably blockhouses for troops guarding the wireless station during the First World War. Several of these buildings are joined by culverts that probably carried power or communication cables. Many of the features recorded by Oxford North as "tracks" are part of a light railway system that was used to carry the materials for the massive masts across the site.

Sources

<http://www.marconicalling.co.uk/introstring.htm>; <http://www.chamois.org.uk/cmc/history.shtml>;

Gwyn, D., 2006. Gwynedd: Inheriting a Revolution, Phillimore, Chichester; Schofield, P., 2008. Uplands Initiative Field Projects 2007-8, Snowdonia (North West) Survey Area, Oxford Archaeology North; Williams, H., 1999. Marconi and his wireless stations in Wales, Carreg Gwalch, Llanrwst

PRN 888

Marconi Wireless Station Site of Tywyn

NGR: SH596002

Location: Tywyn, Gwynedd

HER Description

Possible site of Towyn operating and receiving centre for Marconi's transatlantic long wave wireless telegraph service between London and New York from 1914-1923. The transmitting station, operated by remote control from Towyn, was on the slopes of Cefndu, Llanrug, Caernarfon (PRN 887). The station was dismantled early in 1923 after its receiving circuits were transferred to the newly-built (1922) central receiving station at

Brentwood, Essex. The original aerial was a twin aerial supported on lattice steel masts 300ft high lined up in the direction of the New Jersey station. Later, frame aerials were used (not sure if this relates to towyn and/or caernarfon). <1> Needs more work to discover if this is/was the site, and if anything contemporary remains.

NMR Description

Notes for current project

The wireless receiver station buildings (PRN 60174) were located on the outskirts of Tywyn at Hafod y Bryn and the aerials ran up the hill to the east of Escuan Hall. The aerial ran for 3km with a reserve aerial running parallel supported on wooden masts. There were also balancing aerials running perpendicular to the main aerial to detect signal from the Waunfawr station and cancel out any interference. These aerials were all replaced in 1920 by a more efficient system (Williams 1999, 75-76). Inspection of the hill led to the identification of two mast bases on Craig y Barcut but none were found further east. A 3km long aerial would probably reach to the summit of Corlan Fraith.

Sources

Williams, H., 1999. Marconi and his wireless stations in Wales, Carreg Gwalch, Llanrwst

PRN 10034

TA Constructions (possible blockhouse), Plas y Celyn

NGR: SH5345360916

Location: Llanrug, Gwynedd

HER Description

Territorial Army constructions to the NNE of Plas y Celyn (formerly the Marconi Club). Ruined square, brick building shown on OS. It is approached and surrounded by a network of raised trackways and made of stone, now partly grassed over. Generally 1m side and 0.3m high, with prominent edging stones. <1>

NMR Description

Notes for current project

Brick building with gun loops that is probably a blockhouse for troops guarding the wireless station during the First World War.

Sources

GAT, 1993. *The Uplands Survey Project: archaeological fieldwork in the Gwynedd uplands between 1983 and 1992*, unpublished GAT Report No 22

PRN 58768 NPRN

Wireless transmitter house, Plas y Celyn

NGR: SH5331860770

Location: Llanrug, Gwynedd

HER Description

NMR Description

The transmitter house still exists at the end of the entry drive (part of NPRN 405838)

Notes for current project

The main building was divided into a transmitter hall and an experimental section where new machines and equipment were developed (Williams 1999, 68). The original building, completed by 1914, consisted of a range aligned north-north-east to south-south-west, with a smaller building attached to the west side. The main range has an asymmetrical gabled slate roof sloping to single storey height on the east side, and two storeys high on the west side. The northern half of the roof is raised to accommodate the equivalent of a third floor at that end. The roof was originally all of slate but has now largely been replaced by corrugated sheets. The building is lit by small pane sash windows and there was a semi-circular window in the southern gable of the raised roof section. Several of the original windows, including the semi-circular window are now bricked-up.

The western range was replaced during the use of the building as a wireless station by three ranges running perpendicular to the main range. These have large window apertures most of which retain the original small paned windows. The gabled rooves of these ranges are roofed with corrugated sheets.

After the station was closed in 1939 the building was used by the war department, and then as a Catholic hostel. It was also used as a World War II evacuation centre, a storage depot, a boys holiday centre, a nightclub (well-remembered locally for its dubious reputation), and an equestrian centre. In 1994 it became the location of the Beacon indoor climbing wall, but this has now moved into Caernarfon. The transmitter house is no longer in use but externally retains almost all features that can be seen on a 1914 photograph of the building recently completed.

Sources

Williams, H., 1999. Marconi and his wireless stations in Wales, Carreg Gwalch, Llanrwst

PRN 58769**Marconi Hall, Plas y Celyn****NGR:** SH5318460801**Location:** Llanrug, Gwynedd**HER Description****NMR Description****Notes for current project**

The Marconi Hall was purpose-built residential accommodation for the engineers who worked at the wireless station. It was built in 1914 and officially opened 3 months before the start of the First World War. It is a two story residential block containing 16 bedrooms, a kitchen and dining room (Williams 1999, 68). The hall was not built when the 1914 25 inch map was surveyed, although the transmitter house was completed by this time. The hall was bought in 1975 by the CHAmois Club and converted into the Chamois Mountaineering Centre (www.chamois.org.uk), and is still in use. Externally it is unchanged from the 1914 photographs and a brief internal inspection suggested that many original features still survive inside

Sources

<http://www.chamois.org.uk/cmc/history.shtml>;

Williams, H., 1999. Marconi and his wireless stations in Wales, Carreg Gwalch, Llanrwst

PRN 60171 NPRN**Marconi Wireless Station, Llain Gors Cottages, Llaneilian****NGR:** SH4687592505 C**Location:** Llaneilian, Ynys Mon**HER Description****NMR Description****Notes for current project**

A wireless station built by the Marconi Company to provide wireless communications to the airships from RNAS Llangefni (PRN 58670). This was an 'X' type station meaning that it could both transmit and receive. The station was approved by the Admiralty in September 1915 and in use by March 1916. The aerial was in a field to the west of cottages called Llain y Gors. The western-most of the three cottages was used to billet the naval personnel who operated the wireless station (Williams 2015). No remains of the aerial now exist.

Sources

Sloan, R., 2001. Early Aviation in North Wales, Gwasg Carreg Gwalch, Llanrwst (2nd edition)

R Williams, 2015. Cysylltiad Cwmni Marconi a Llaneilian, Yr Arwydd, issue 368, p17 (and pers. comm. 10/01/2016)

PRN 60173 NPRN 420927**Marconi Bungalows, Tywyn****NGR:** SH5950500183**Location:** Tywyn, Gwynedd**HER Description****NMR Description**

The Marconi Bungalows were built after the First World War to house staff operating the nearby Marconi radio receiving station. There are eight dwellings, nos. 1-7 in a row and no.8 to the west. Each is of timber-framed construction under a hipped roof with diamond pattern slates; bungalows 2 and 7 still retain something of their original horizontal timber weatherboarded appearance whilst the others have painted roughcast walls. To the east is the original radio station building, now converted into two dwellings, Hafodybryn and Suilven.

Notes for current project

The Marconi Bungalows were built after the First World War as staff accommodation for the Marconi Wireless Receiver Station (Williams 1999, 78). There is a row of 7 bungalows with the 8th opposite on the western side. They are of timber-framed construction with a hipped roof with diamond pattern slates. Most have been rendered, but No. 2 still has its timber weatherboard exterior exposed. When inspected No. 7 had the render removed and the weatherboards temporarily exposed before being recovered. The rear of No. 8 also still has original weatherboarding, and this house has an original front door.

The bungalows were sold off in 1923 and bought by local people.

Sources

Gwyn, D., 2006. Gwynedd: Inheriting a Revolution, Phillimore, Chichester, 181;

Williams, H., 1999. Marconi and his wireless stations in Wales, Carreg Gwalch, Llanrwst

PRN 60174**Tywyn Wireless Receiver Station, main building**

NGR: SH5957600230

Location: Tywyn, Gwynedd

HER Description**NMR Description****Notes for current project**

The main building is a single storey building, aligned nearly north-south. It is built of brick with a slate roof. In the southern gable is a circular window. The building has been converted into two private dwellings (Hafod y Bryn and Sulven), with the addition of new chimneys and an upper storey fitted into the roof space.

Sources

Williams, H., 1999. Marconi and his wireless stations in Wales, Carreg Gwalch, Llanrwst

PRN 60176**Power house, Plas y Celyn**

NGR: SH5329960750

Location: Llanrug, Gwynedd

HER Description**NMR Description****Notes for current project**

Next to the main transmitter building was the Power House, which is shown on the 1914 25 inch map. This stepped down the mains electricity supply to 440 volts so that it could be used in the wireless station (Williams 1999, 69).

The Power House is now a private dwelling and has lost some of the features that indicated its function but the building as a whole is externally largely unchanged.

Sources

Williams, H., 1999. Marconi and his wireless stations in Wales, Carreg Gwalch, Llanrwst

PRN 60177**Railway, route of, Plas y Celyn**

NGR: SH5306260822

Location: Llanrug, Gwynedd

HER Description**NMR Description****Notes for current project**

A light railway was constructed from the Ceunant road and ran through the wireless transmitter site to supply materials for constructing the aerial masts (Williams 1999, 68-69). The railway ran next to the straight road up to the transmitter station, as shown on an early photograph. Feature (PRN 60196) in the north-eastern part of the site is a well-constructed, stone-built trackbed, which must be part of this railway system. It is hard to see the railway running through the western part of the aerial but some of the linear features seem to be part of this system.

Sources

Williams, H., 1999. Marconi and his wireless stations in Wales, Carreg Gwalch, Llanrwst

PRN 60180**Wireless Station, Bangor Airfield, Glan Mor Isaf Farm**

NGR: SH61997234 A

Location: Llanllechid, Gwynedd

HER Description**NMR Description****Notes for current project**

Bangor Airfield at Glan Mor Isaf Farm (PRN 27310) had its own wireless station in one of the farm buildings to communicate with the aeroplanes (Sloan 2001, 105). By 1918 this was probably a short wave wireless for transmitting Morse code, but speech transmission was being introduced to aircraft from 1917 (Wander, marconih heritage.org).

It is not known which building was used.

Sources

Sloan, R., 2001. Early Aviation in North Wales, Gwasg Carreg Gwalch, Llanrwst (2nd edition);

Wander, T. The Marconi Company: Wireless Goes to War 1914 -1918 (<http://marconih heritage.org/ww1intro-3.html> accessed 25/01/2016)

PRN 60184**Aerial base, Tywyn Wireless Station****NGR:** SH6009400232**Location:** Tywyn, Gwynedd**HER Description****NMR Description****Notes for current project**

A square concrete block with an iron plate bolted to the top and with two iron uprights projecting from the top. The aerial base was welded to the plate but had been cut off possibly by a disc grinder. The uprights were also bent, presumably when the aerial was removed. The modern aerial photographs show a rectangular earthwork around the aerial base measuring about 8.3m by 9.3m. This was not noticed on the ground but probably indicates a former fence around the aerial.

Sources

Pers. comm. Matt Rimmer, NextPerspective APs

PRN 60185**Aerial base, Tywyn Wireless Station****NGR:** SH6058400246**Location:** Tywyn, Gwynedd**HER Description****NMR Description****Notes for current project**

A square concrete block with 2 iron uprights and a square of bolts. The iron plate supporting the aerial has been removed. There is a square iron plate loose at the base of the block but this is not the aerial plate. There are concrete fence posts lying on the ground around the aerial base and it is surrounded by a low earthen bank defining an area c.13m by 13m. This was presumably a fenced enclosure. An aerial photograph of 1986 (Lib No 8606/6886, frame 40, sortie J A Story, date 01/10/1986) shows that this was a square enclosure clipped by the recent constructions in relation to a phone mast on the site. Next to the mobile phone mast is a hut with rendered walls and concrete roof. The 1986 photo shows 2 aerials with a small hut between them, much smaller than the present hut. Despite the rather ancient appearance of the current hut it was clearly not part of the Marconi Wireless Station.

Sources

Pers. comm. Matt Rimmer;

aerial photograph (Lib No 8606/6886, frame 40, sortie J A Story, date 01/10/1986)

PRN 60186**Reservoir, possibly related to Marconi Wireless Station****NGR:** SH5979000193**Location:** Tywyn, Gwynedd**HER Description****NMR Description****Notes for current project**

Render lined brick tank set into hillside with an inflow pipe on uphill side. Now open and filled with rubbish including parts of an old car. Appears to be a small reservoir or water tank. Could be for a farm but seems possible that it is related to the wireless station, possibly to provide water for cooling or in case of fire.

Sources**PRN 60187****Marconi Wireless Station, Holyhead****NGR:** SH24428285 A**Location:** Holyhead Urban, Ynys Mon**HER Description****NMR Description****Notes for current project**

Holyhead had one of the first fully operational Marconi wireless stations, which were commissioned by the British Admiralty as coastal stations to communicate with shipping. These were constructed in 1901. The Holyhead wireless station was operated from a house on Queen's Park. The house is now no. 66, but it was originally no. 21, and the mast stood in the paddock next to the house.

This station is generally said to have been closed down in 1903 (Williams 1999, 36) but Carnarvon and Denbigh Herald reported a possibility of it reopening in 1909, to be run by the Post Office, not the Marconi Company, to

communicate with shipping. This must have taken place as Mr E Higgins, in a letter to the Daily Post (January 10th 1992), describes the wireless station as still in use until 1920-22.

Sources

Daily Post (Jan 10th 1992);

Williams 1999

<http://www.holyhead.com/marconi/>;

<http://www.oscarkilodxgroup.com/history.html>;

Carnarvon and Denbigh Herald 13th August 1909, p3

PRN 60189 NPRN 505571

Cefn Du, Radio Station, Culvert I

NGR: SH5397060226

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A stone-capped culvert or drain shown on RCAHMW Aerial Photographic interpretation. There are several brick-built buildings sat adjacent to its alignment. It is probably associated with services provided to the adjacent radio station. The site is shown on the RCAHMW Aerial Photographic interpretation. West end is SH 53399 60463. East end is SH 54615 60397. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

A stone-capped culvert or drain

Sources

PRN 60190 NPRN 505572

Cefn Du, Radio Station, Building I

NGR: SH5367960404

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A brick and mortared stone constructed building. It measures 7m long by 4.5m wide. There are two sections of double-thickness wall remaining and standing up to 1m high by 0.3m wide. It is possibly the remains of a pumping station or associated with the adjacent radar station. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

A brick and mortared stone constructed building.

Possibly a blockhouse for troops guarding the wireless station during the First World War.

Sources

PRN 60191 NPRN 505573

Cefn Du, Radio Station, Building II

NGR: SH5387860255

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A brick and mortared stone constructed building. It measures 8m long by 5.5m wide. It is completely collapsed and survives as ruinous foundations with a pile of stone in one corner. It is possibly the remains of a pumping station or associated with the adjacent radar station. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

A brick and mortared stone constructed building.

Possibly a blockhouse for troops guarding the wireless station during the First World War.

Sources

PRN 60192 NPRN 505577

Cefn Du, Radio Station, Building III

NGR: SH5445760272

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A brick and mortared stone constructed building. It measures 7m long by 4.5m wide. A single corner of double-

thickness wall stands to 1m high, with the remaining walls ruined. Much of the construction material has been displaced to the north and downslope of the structure. It is possibly the remains of a pumping station or associated with the adjacent radar station. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

A brick and mortared stone constructed building.

Possibly a blockhouse for troops guarding the wireless station during the First World War.

Sources

PRN 60193 NPRN 505598

Cefn Du, Radio Station, Building IV

NGR: SH5482660377

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A rectangular structure constructed of mortared stones with brick quoins and located on the summit of Cefn Du. It measures approximately 6m long by 4m wide with walls standing up to 1.2m high. The structure has an entrance on the west side with a possible brick and stone blast wall. The structure is mostly collapsed. Some of the collapsed brick walls have shooting slots or ventilation ports in them, indicating this structure could most likely be a part of the adjacent radio station, or alternatively a shooting hide or a WWII defensive structure. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

Collapsed building recorded by Upland Survey: "A rectangular structure constructed of mortared stones with brick quoins and located on the summit of Cefn Du. It measures approximately 6m long by 4m wide with walls standing up to 1.2m high. The structure has an entrance on the west side with a possible brick and stone blast wall. The structure is mostly collapsed. Some of the collapsed brick walls have shooting slots or ventilation ports in them".

The slots are probably gun loops and this is probably a blockhouse for troops guarding the wireless station during the First World War.

Sources

PRN 60194 NPRN 505599

Cefn Du, Radio Station, Concrete Base I

NGR: SH5484660585

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small concrete anchoring block for a radio mast. It is trapezoidal in shape and measures 4m long by 3m wide and up to 0.5m high with protruding iron attachments. To the west of this feature is a small concrete stanchion measuring 1.5m square by 0.25m high with six protruding iron bars. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60195 NPRN 505600

Cefn Du, Radio Station, Concrete Base II

NGR: SH5477360626

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small concrete anchoring block for a radio mast. It measures 2.5m long by 1.5m wide and has upright iron bolts on top. The concrete is formed of pebble and flint and is upstanding to 0.2m. 20m to the east of the first block are two further associated concrete bases. These bases each measure 1m square. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60196 NPRN 505601
Cefn Du, Radio Station, Trackway I
NGR: SH5488160699
Location: Llanrug, Gwynedd

HER Description

NMR Description

A long revetted trackway running from the building on the hill crest on the north of Cefn Du (NPRN 505602) and curves around the contours of the hill to a concrete base (NPRN 505600). East of the base the revetted track becomes a double ditched trackway heading downslope to the north-east. The trackway presumably gave access and provided utilities to the radio station from the Llanberis side of the mountain. The site is shown on the RCAHMW Aerial Photographic interpretation and measures up to 170m long. West end is SH 54632 60591, East end is SH 55198 60912. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

A long revetted linear structure running from the summit of Cefn Du curving down the hill to the east. Probably part of a light railway that ran through the site to carry materials for building the masts.

Sources

PRN 60197 NPRN 505602
Cefn Du, Radio Station, Building V
NGR: SH5462460593
Location: Llanrug, Gwynedd

HER Description

NMR Description

A ruinous rectangular brick-built building measuring 11m long by 9m wide and upstanding to 2m high. The structure is built on top of an earlier mortared stone (with brick window quoins) building. The earlier building has one cell surviving and is upstanding to the east of the brick structure. The walls have ventilation holes 3/4 of the way up and an entrance on the south side. The structures are related to radar station but the function uncertain. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

A derelict building probably related to the wireless station. Recorded by Upland Survey: "A ruinous rectangular brick-built building measuring 11m long by 9m wide and upstanding to 2m high. The structure is built on top of an earlier mortared stone (with brick window quoins) building. The earlier building has one cell surviving and is upstanding to the east of the brick structure. The walls have ventilation holes 3/4 of the way up and an entrance on the south side."

The "ventilation holes" are probably gun loops and this is likely to be a blockhouse for troops guarding the wireless station during the First World War.

Sources

PRN 60198 NPRN 505603
Cefn Du, Radio Station, Concrete Base III
NGR: SH5466060589
Location: Llanrug, Gwynedd

HER Description

NMR Description

A small concrete anchoring block for a radio mast. The block is triangular with the corners removed and measures 4m long. It is constructed of concrete made with tiny pebbled inclusions. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60199 NPRN 505604
Cefn Du, Radio Station, Concrete Base IV
NGR: SH5458260623
Location: Llanrug, Gwynedd

HER Description

NMR Description

A series of three concrete blocks for a radio mast. They are arranged in a triangle on a platform cut into the hillside and located to the west of a radio building (NPRN 505602). Each base measures 2m square and is up to 0.2m high. Each has eight iron bolts in the raised centre. The northern edge of the platform is bordered by a

unmortared boulder stone wall measuring 7m long. P.J. Schofield, OANorth, 7th June 2007

Notes for current project

Three concrete blocks forming base for a radio mast.

Sources

PRN 60200 NPRN 505767

Cefn Du, Radio Station, Concrete Base V

NGR: SH5503860601

Location: Llanberis, Gwynedd

HER Description

NMR Description

A small square concrete block for a radio mast. It measures 1m square by 0.4m high. P.J. Schofield, OANorth, 27th June 2007

Notes for current project

Concrete base for a radio mast.

Sources

PRN 60201 NPRN 505768

Cefn Du, Radio Station, Concrete Base VI

NGR: SH5491160628

Location: Llanrug, Gwynedd

HER Description

NMR Description

A series of three concrete blocks for a radio mast. They are arranged in a triangle on a platform cut into the hillside. Each base is 2.5m square and has eight protruding metal bolts in the centre. The southernmost base is upstanding by 0.5m from the hillside in its southern corner. Directly to the north is a small circular mortared wall cut into the hillside directly below the bases. It measures 4m long and is 1m high. It is set around an ancillary 0.5m square concrete base with visible protruding RSJ. The immediate surrounding area also has at least three trapezoidal anchoring bases. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 27th June 2007

Notes for current project

Three concrete blocks forming base for a radio mast.

Sources

PRN 60202 NPRN 505769

Cefn Du, Radio Station, Trackway II

NGR: SH5487860648

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small access track leading from a large access track (NPRN 505601) to a concrete radio mast base (NPRN 505768). It measures 86m long by 2m wide and is slightly sunken by 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. North end is SH5485660677. South end is SH5491560622. P.J. Schofield, OANorth, 27th June 2007

Notes for current project

A trackway or part of the light railway system leading to a mast base.

Sources

PRN 60203 NPRN 505770

Cefn Du, Radio Station, Trackway III

NGR: SH5493960639

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small access track leading from a large access track (NPRN 505601) to a concrete radio mast anchoring base (NPRN 505771). It measures 160m long by 2m wide and is slightly sunken by 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. North end is SH5488360696. South end is SH5500660583. P.J. Schofield, OANorth, 27th June 2007

Notes for current project

A trackway or part of the light railway system leading to a mast base.

Sources

PRN 60204 NPRN 505771

Cefn Du, Radio Station, Concrete Base VII

NGR: SH5499960591

Location: Llanberis, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 2m long by 1.5m wide and 0.25m high. P.J. Schofield, OANorth, 27th June 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60205 NPRN 505772

Cefn Du, Radio Station, Concrete Base VIII

NGR: SH5490560724

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2.5m wide and up to 0.4m high. P.J. Schofield, OANorth, 27th June 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60206 NPRN 505782

Cefn Du, Radio Station, Concrete Base IX

NGR: SH5478960671

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small square concrete block for a radio mast. It measures 1m square and is level with the current ground surface. P.J. Schofield, OANorth, 8th October 2007

Notes for current project

Concrete base for a radio mast.

Sources

PRN 60207 NPRN 505783

Cefn Du, Radio Station, Cable

NGR: SH5480160715

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small length of iron tensioning cable and connector joint exposed in peat and undergrowth. It measures 2.5m long with a 2inch diameter. It is associated with the radio station. P.J. Schofield, OANorth, 8th October 2007

Notes for current project

A small length of iron tensioning cable and connector joint exposed in peat and undergrowth.

Sources

PRN 60208 NPRN 505784

Cefn Du, Radio Station, Concrete Base X

NGR: SH5479360804

Location: Llanrug, Gwynedd

HER Description

NMR Description

A sub-oval quarry scoop measuring 12m long by 7m wide with a pair of concrete radio mast bases within it. The bases each measure 2m square, have a circle of iron bolts and are mostly moss covered. They both lie level with the current ground surface. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 8th October 2007

Notes for current project

A small quarry scoop with two concrete radio mast bases within it.

Sources

PRN 60209 NPRN 505785

Cefn Du, Radio Station, Trackway IV

NGR: SH5485560795

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A sinuous access track leading from a large access track (NPRN 505601) to a concrete radio mast base (NPRN 505784). It measures at least 270m long by 2m wide and is sunken up to 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. West end is SH5471460852. East end is SH5495760754. P.J. Schofield, OANorth, 8th October 2007

Notes for current project

A trackway or part of the light railway system leading to a mast base.

Sources

PRN 60210 NPRN 505786

Cefn Du, Radio Station, Concrete Base XI

NGR: SH5486860767

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 4m long by 2.5m wide and up to 0.3m high. P.J. Schofield, OANorth, 8th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60211 NPRN 505788

Cefn Du, Radio Station, Concrete Base XII

NGR: SH5451660650

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A small square concrete block for a radio mast. It measures 1.2m square and is level with the current ground surface. P.J. Schofield, OANorth, 8th October 2007

Notes for current project

Concrete base for radio mast.

Sources

PRN 60212 NPRN 505789

Cefn Du, Radio Station, Building VI

NGR: SH5447060638

Location: Llanrug, Gwynedd

HER Description**NMR Description**

Ruinous foundations of a probable relay station building. The building measures 9m long by 6.5m wide and with walls surviving up to 1m high. The structure is mostly collapsed but was constructed of both mortared stone and brick. This structure is adjacent a culvert (NPRN 505790) which possibly relates to a relay/power cable. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 8th October 2007

Notes for current project

Ruinous foundations of a building

Possibly a blockhouse for troops guarding the wireless station during the First World War.

Sources

PRN 60213 NPRN 505790

Cefn Du, Radio Station, Culvert II

NGR: SH5428760703

Location: Llanrug, Gwynedd

HER Description

NMR Description

A sunken linear structure. The site is probably a culvert used for relay or a power cable conduit. Shown on RCAHMW Aerial Photographic interpretation. It is orientated roughly north-west/south-east and runs up Cefn Du for some 570m towards a building near the summit (NPRN 505602). West end is SH5403460808. East end is SH5457160628. P.J. Schofield, OANorth, 8th October 2007

Notes for current project

A sunken linear structure, probably a culvert used for relay or a power cable conduit.

Sources

PRN 60214 NPRN 505851

Cefn Du, Radio Station, Concrete Base XIII

NGR: SH5352860605

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 4m square by up to 0.6m high. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60215 NPRN 505852

Cefn Du, Radio Station, Platform

NGR: SH5360960641

Location: Llanrug, Gwynedd

HER Description

NMR Description

A large rectangular earthen platform that probably consists of covered reservoir for the nearby generating plant of the radio station. It measures 60m long by 56m wide and is up to 2m high on the downslope (western) side. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

A large rectangular earthen platform that is probably a covered reservoir.

Sources

PRN 60216 NPRN 505853

Cefn Du, Radio Station, Reservoir

NGR: SH5357360586

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small intact reservoir measuring 17m square and with banks up to 0.6m high. It has a brick inspection hatch and a sluice gate on its eastern side. The site may have been associated with the nearby generating plant of the radio station. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

A small reservoir. Recorded by Upland Survey: "A small intact reservoir measuring 17m square and with banks up to 0.6m high. It has a brick inspection hatch and a sluice gate on its eastern side." Possibly designed to provide a supply of water in case of fire at the wireless station.

Sources

PRN 60217 NPRN 505854

Cefn Du, Radio Station, Scoop

NGR: SH5364660660

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small quarried scoop measuring 20m in diameter and 0.5m deep. It has anchoring wire set within it and is associated part of the radio station. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

A small quarried scoop with anchoring wire set within it.

Sources

PRN 60218 NPRN 505855

Cefn Du, Radio Station, Concrete Base XIV

NGR: SH5355160684

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60219 NPRN 505856

Cefn Du, Radio Station, Concrete Base XV

NGR: SH5357460703

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 0.9m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 60220 NPRN 505857

Cefn Du, Radio Station, Concrete Base XVI

NGR: SH5356060737

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1.1m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61262 NPRN 505858

Cefn Du, Radio Station, Culvert III

NGR: SH5370660764

Location: Llanrug, Gwynedd

HER Description

NMR Description

A linear bank that is most probably an underground power cable culvert associated with the radio station. It is orientated north-west /south-east and runs for over 230m. The bank is also 3m wide and up to 0.5m high. The site is shown on the RCAHMW Aerial Photographic interpretation. West end is SH5360260811. East end is SH5382160713. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

A linear bank probably an underground power cable culvert.

Sources

PRN 61263 NPRN 505859

Cefn Du, Radio Station, Concrete Base XVII

NGR: SH5376960772

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1.2m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61264 NPRN 505860

Cefn Du, Radio Station, Concrete Base XVIII

NGR: SH5385560747

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61265 NPRN 505861

Cefn Du, Radio Station, Concrete Base XIX

NGR: SH5383160666

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 0.9m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61266 NPRN 505862

Cefn Du, Radio Station, Concrete Base XX

NGR: SH5381360602

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 0.9m high. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61267 NPRN 505863

Cefn Du, Radio Station, Concrete Base XXI

NGR: SH5379160521

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61268 NPRN 505864

Cefn Du, Radio Station, Concrete Base XXII

NGR: SH5370960546

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61269 NPRN 505865

Cefn Du, Radio Station, Concrete Base XXIII

NGR: SH5372860629

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61270 NPRN 505866

Cefn Du, Radio Station, Concrete Base XXIV

NGR: SH5374660685

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61271 NPRN 505867

Cefn Du, Radio Station, Concrete Base XXV

NGR: SH5375760576

Location: Llanrug, Gwynedd

HER Description

NMR Description

A concrete radio station antenna mast base. It measures 2.8m square and is up to 0.2m high. It has 16 iron screw threaded bolts arranged in a circle at the centre. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

A concrete radio station antenna mast base.

Sources

PRN 61272 NPRN 505868

Cefn Du, Radio Station, Concrete Base XXVI

NGR: SH5374660531

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A small rectangular radio mast anchoring point measuring 2m long by 1.5m wide and up to 0.3m high. It has a pair of iron cables exiting from the centre. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

A small rectangular radio mast anchoring point.

Sources

PRN 61273 NPRN 505869

Cefn Du, Radio Station, Concrete Base XXVII

NGR: SH5375960592

Location: Llanrug, Gwynedd

HER Description

NMR Description

A pair of rectangular concrete bases associated with the radio station. Each measure 2m long by 0.7m wide and up to 0.3m high. Part of a chain link also survives. P.J. Schofield, OANorth, 11th October 2007

Notes for current project

A pair of rectangular concrete bases.

Sources

PRN 61274 NPRN 505870

Cefn Du, Radio Station, Concrete Base XXVIII

NGR: SH5402760712

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 12th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61275 NPRN 505871

Cefn Du, Radio Station, Concrete Base XXIX

NGR: SH5400660622

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 12th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61276 NPRN 505872

Cefn Du, Radio Station, Concrete Base XXX

NGR: SH5398560556

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is marked on the current OS mapping. P.J. Schofield, OANorth, 12th October 2007

Notes for current project

Concrete stay anchor for a radio mast. Recorded by Upland Survey: "A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high."

Sources

PRN 61277 NPRN 505873

Cefn Du, Radio Station, Concrete Base XXXI

NGR: SH5396360466

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1.1m high. P.J. Schofield, OANorth, 12th October 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61278 NPRN 505874

Cefn Du, Radio Station, Concrete Base XXXII

NGR: SH5399460491

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

An octagonal concrete base with apertures on the north, west, south and east sides; a hollow centre; and wooden and iron fittings remaining on the top. It measures 2m long by 2m wide and is up to 1.1m high. It is associated with the radio station. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 12th October 2007

Notes for current project

An octagonal concrete base with fittings on top.

Sources

PRN 61279 NPRN 505875

Cefn Du, Radio Station, Concrete Base XXXIII

NGR: SH5401760495

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A concrete radio station antenna mast base. It measures 2.8m square and is up to 0.25m high. It has 16 iron screw threaded bolts arranged in a circle at the centre. There is a further concrete base set 5m to the north of the first. This has 6 iron bolts set within it and measures 1m long by 0.5m wide and up to 0.3m high. The latter structure may have been used for earthing. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 12th October 2007

Notes for current project

A concrete radio station antenna mast base. Recorded by Upland Survey: "It measures 2.8m square and is up to 0.25m high. It has 16 iron screw threaded bolts arranged in a circle at the centre."

Sources

PRN 61280 NPRN 505876

Cefn Du, Radio Station, Concrete Base XXXIV

NGR: SH5400560450

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A small rectangular radio mast anchoring point measuring 2m long by 1.5m wide and up to 0.5m high. It has a pair of iron cables exiting from the centre. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 12th October 2007

Notes for current project

A small rectangular radio mast anchoring point.

Sources

PRN 61281 NPRN 505877

Cefn Du, Radio Station, Concrete Base XXXV

NGR: SH5404860445

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1.2m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61282 NPRN 505878

Cefn Du, Radio Station, Concrete Base XXXVI

NGR: SH5407060525

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1.2m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61283 NPRN 505879

Cefn Du, Radio Station, Concrete Base XXXVII

NGR: SH5409160603

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61284 NPRN 505880

Cefn Du, Radio Station, Concrete Base XXXVIII

NGR: SH5411360685

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1.1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61285 NPRN 505881

Cefn Du, Radio Station, Concrete Base IXL

NGR: SH5406160656

Location: Llanrug, Gwynedd

HER Description

NMR Description

A concrete radio station antenna mast base. It measures 2.8m square and is up to 0.6m high. It has 16 iron screw threaded bolts arranged in a circle at the centre. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A concrete radio station antenna mast base.

Sources

PRN 61286 NPRN 505882

Cefn Du, Radio Station, Concrete Base XL

NGR: SH5407660706

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small rectangular radio mast anchoring point measuring 2m long by 1.5m wide and up to 0.3m high. It has a pair of iron cables exiting from the centre. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A small rectangular radio mast anchoring point.

Sources

PRN 61287 NPRN 505883

Cefn Du, Radio Station, Concrete Base XLI

NGR: SH5412160642

Location: Llanrug, Gwynedd

HER Description

NMR Description

A flat-topped concrete base or capping for a drain. It measures 1m square by up to and 0.2m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A flat-topped concrete base or capping for a drain.

Sources

PRN 61288 NPRN 505884

Cefn Du, Radio Station, Concrete Base XLII

NGR: SH5429660649

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61289 NPRN 505885

Cefn Du, Radio Station, Concrete Base XLIII

NGR: SH5434260637

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small rectangular radio mast anchoring point measuring 3m long by 1.5m wide and up to 0.3m high. It has a pair of iron cables exiting from the centre. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A small rectangular radio mast anchoring point.

Sources

PRN 61290 NPRN 505886

Cefn Du, Radio Station, Concrete Base XLIV

NGR: SH5437960622

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1.1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61291 NPRN 505887

Cefn Du, Radio Station, Concrete Base XLV

NGR: SH5432860590

Location: Llanrug, Gwynedd

HER Description

NMR Description

A concrete radio station antenna mast base. It measures 2.8m square and is up to 0.25m high. It has 16 iron screw threaded bolts arranged in a circle at the centre. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A concrete radio station antenna mast base with screw threaded bolts.

Sources

PRN 61292 NPRN 505888

Cefn Du, Radio Station, Concrete Base XLVI

NGR: SH5431960562

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61293 NPRN 505889

Cefn Du, Radio Station, Concrete Base XLVII

NGR: SH5435960536

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61294 NPRN 505890

Cefn Du, Radio Station, Concrete Base XLVIII

NGR: SH5436160489

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61295 NPRN 505891

Cefn Du, Radio Station, Concrete Base IL

NGR: SH5433260448

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61296 NPRN 505892

Cefn Du, Radio Station, Concrete Base L

NGR: SH5429060442

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61297 NPRN 505893

Cefn Du, Radio Station, Concrete Base LI

NGR: SH5424960477

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61298 NPRN 505894

Cefn Du, Radio Station, Concrete Base LII

NGR: SH5424260521

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61299 NPRN 505895

Cefn Du, Radio Station, Concrete Base LIII

NGR: SH5427060562

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61300 NPRN 505896

Cefn Du, Radio Station, Concrete Base LIV

NGR: SH5430560502

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A concrete radio station antenna mast base. It measures 2.8m square and is up to 0.25m high. It has 16 iron screw threaded bolts arranged in a circle at the centre. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A concrete radio station antenna mast base with screw threaded bolts.

Sources

PRN 61301 NPRN 505897

Cefn Du, Radio Station, Concrete Base LV

NGR: SH5427960412

Location: Waunfawr, Gwynedd

HER Description**NMR Description**

A concrete radio station antenna mast base. It measures 2.8m square and is up to 0.25m high. It has 16 iron

screw threaded bolts arranged in a circle at the centre. There is a further rectangular block located 5m to the east of the base. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A concrete radio station antenna mast base with screw threaded bolts.

Sources

PRN 61302 NPRN 505898

Cefn Du, Radio Station, Concrete Base LVI

NGR: SH5430960461

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A small rectangular radio mast anchoring point measuring 1m long by 0.5m wide and up to 0.2m high. It has a group of four iron threaded bolts protruding from the top. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A small rectangular radio mast anchoring point.

Sources

PRN 61303 NPRN 505899

Cefn Du, Radio Station, Concrete Base LVII

NGR: SH5422560383

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61304 NPRN 505900

Cefn Du, Radio Station, Concrete Base LVIII

NGR: SH5426760370

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A rectangular radio mast anchoring point measuring 2m long by 1.5m wide and up to 0.4m high. It has a pair of iron cables exiting from the centre. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A rectangular radio mast anchoring point.

Sources

PRN 61305 NPRN 505901

Cefn Du, Radio Station, Concrete Base LIX

NGR: SH5431060364

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 2m wide by up to 0.8m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61306 NPRN 505902

Cefn Du, Radio Station, Concrete Base LX

NGR: SH5434860345

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A small square concrete radio mast base measuring 0.5m square by up to 0.2m high. It has the footings for a small mast protruding from the top. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A small square concrete radio mast base.

Sources

PRN 61307 NPRN 505903

Cefn Du, Radio Station, Concrete Base LXI

NGR: SH5454060340

Location: Waunfawr, Gwynedd

HER Description

NMR Description

An area measuring 25m square that consists of the footings for a radio station mast or pylon. It incorporates two square concrete bases on the eastern side, each measuring 2.5m square and with 4 large iron screw threaded bolt within a central recess. On the western side are two small concave hollows each measuring 2.5m deep with the remnants of a dry stone wall 1m wide by up 0.3m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

An area measuring 25m square that contains of the footings for a radio station mast.

Sources

PRN 61308 NPRN 505904

Cefn Du, Radio Station, Concrete Base LXII

NGR: SH5457960519

Location: Waunfawr, Gwynedd

HER Description

NMR Description

An area measuring 20m square that consists of the footings for a radio station mast or pylon. It incorporates four square concrete bases each measuring 2m square by 0.4m high and each with four iron screw threaded bolts in the middle. The south-western base is the same but stands up to 1m high. The site is partially shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

An area measuring 20m square that contains of the footings for a radio station mast.

Sources

PRN 61309 NPRN 505905

Cefn Du, Radio Station, Concrete Base LXIII

NGR: SH5447560456

Location: Waunfawr, Gwynedd

HER Description

NMR Description

A large square concrete base that consists of the footings for a radio station mast or pylon. It measures 5m square by up to 0.2m high. There is an iron screw threaded bolt located in each corner. The base is surrounded by at least seven concrete anchoring points each measuring 1m square and with protruding iron attachments. There is also a line of small anchoring points extending in a line from the base in a north-north-east/south-south-west orientation for up to 160m (80m either side). The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 10th December 2007

Notes for current project

A large square concrete base for a radio station mast.

Sources

PRN 61310 NPRN 505954

Cefn Du, Radio Station, Shelter

NGR: SH5496660794

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small rectangular drystone shelter that is probably associated with radio station. It measures 4m long by 3m wide and survives up to 1m high. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

A small rectangular drystone shelter, probably an earlier shepherd's shelter rather than being related to the wireless station, as its construction is so different to the other buildings in the area.

Sources

PRN 61311 NPRN 505955

Cefn Du, Radio Station, Concrete Base LXIV

NGR: SH5506260767

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 1m wide and is partly covered in undergrowth. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61312 NPRN 505956

Cefn Du, Radio Station, Trackway V

NGR: SH5504860789

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small access track leading from a large access track (NPRN 505601) to a concrete radio mast anchoring base (NPRN 505955). It measures 50m long by 2m wide and is slightly sunken by 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Access track or light railway leading to radio mast base.

Sources

PRN 61313 NPRN 505957

Cefn Du, Radio Station, Concrete Base LXV

NGR: SH5497360894

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 1m wide and is partly covered in undergrowth. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61314 NPRN 505958

Cefn Du, Radio Station, Trackway VI

NGR: SH5501360860

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small access track leading from a large access track (NPRN 505601) to a concrete radio mast anchoring base (NPRN 505957). It measures 122m long by 2m wide and is slightly sunken by 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Access track or light railway leading to radio mast base.

Sources

PRN 61315 NPRN 505959

Cefn Du, Radio Station, Trackway VII

NGR: SH5503560872

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A small access track leading diagonally downslope from a large access track (NPRN 505601) towards a concrete radio mast anchoring base (NPRN 505960). It measures 120m long by 2m wide and is slightly sunken by 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Access track or light railway leading to radio mast base.

Sources

PRN 61316 NPRN 505960

Cefn Du, Radio Station, Concrete Base LXVI

NGR: SH5503160931

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A series of three concrete blocks for a radio mast. They are arranged in a triangle on a platform cut into the hillside. Each base is 2m square by 0.2m high and has a circle of eight protruding metal bolts in the centre. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Three concrete blocks forming base for a radio mast.

Sources

PRN 61317 NPRN 505961

Cefn Du, Radio Station, Trackway VIII

NGR: SH5508560894

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A small access track leading from a large access track (NPRN 505601) to a concrete radio mast anchoring base (NPRN 505960). It measures 112m long by 2m wide and is slightly sunken by 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Access track or light railway leading to radio mast base.

Sources

PRN 61318 NPRN 505962

Cefn Du, Radio Station, Concrete Base LXVII

NGR: SH5519160769

Location: Llanrug, Gwynedd

HER Description**NMR Description**

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 1m wide and is partly covered in undergrowth. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61319 NPRN 505963

Cefn Du, Radio Station, Trackway IX

NGR: SH5513460816

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small access track leading from a large access track (NPRN 505601) to a concrete radio mast anchoring base (NPRN 505962). It measures 112m long by 2m wide and is slightly sunken by 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Access track or light railway leading to radio mast base.

Sources

PRN 61320 NPRN 505964

Cefn Du, Radio Station, Concrete Base LXVIII

NGR: SH5513260817

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small rectangular concrete radio mast anchoring base. It measures 1m long by 0.5m wide and up to 0.25m high. It has an iron chain protruding from the centre of it. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

A small rectangular concrete radio mast anchoring base.

Sources

PRN 61321 NPRN 505965

Cefn Du, Radio Station, Concrete Base LXIX

NGR: SH5510960896

Location: Llanrug, Gwynedd

HER Description

NMR Description

A large fan-shaped concrete radio mast anchoring base. It measures 5m long by 3m wide and is up to 0.4m high. Surrounding outcrop and scree stone material has been quarried/moved away to clear an area for this base. Some of the cleared material may be related to a cairn recorded in this general vicinity in 1920 (NPRN 505504). The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

A large fan-shaped concrete radio mast stay anchor.

Sources

PRN 61322 NPRN 505966

Cefn Du, Radio Station, Concrete Base LXX

NGR: SH5502461028

Location: Llanrug, Gwynedd

HER Description

NMR Description

A trapezoidal concrete radio mast anchoring base. It measures 3m long by 1m wide and is partly covered in undergrowth. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Concrete stay anchor for a radio mast.

Sources

PRN 61323 NPRN 505967

Cefn Du, Radio Station, Trackway X

NGR: SH5509360972

Location: Llanrug, Gwynedd

HER Description

NMR Description

A small access track leading from a large access track (NPRN 505601) to a concrete radio mast anchoring base (NPRN 505966). It measures 205m long by 2m wide and is slightly sunken by 0.2m. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

Access track or light railway leading to radio mast base.

Sources

PRN 61324 NPRN 505968

Cefn Du, Radio Station, Building VII

NGR: SH5522160970

Location: Llanrug, Gwynedd

HER Description

NMR Description

The concrete base for a radio station building. It measures 7m square by up to 0.2m high. The original superstructure may have been constructed of asbestos. Fragmentary evidence remains of broken glass and ceramic transformer and power line insulators across the site. The site is shown on the RCAHMW Aerial Photographic interpretation. P.J. Schofield, OANorth, 13th December 2007

Notes for current project

The concrete base for a building.

May have been for troops guarding the wireless station.

Sources

9.2. Aircraft Sites

PRN 27310 NPRN 407790

Glan Mor Isaf Airfield, Bangor

NGR: SH62207231

Location: Llanllechid, Gwynedd

HER Description

NMR Description

The establishment of the airfield required the removal of hedges to form grass runways and the construction of four Bessonau hangars on the grass. Staff were housed in tents. Stores, fuel and ammunition stored in nearby woodland protected by sandbags and were also under canvas. Operations were controlled from farm buildings, which were used for a wireless room and as an aircrew briefing centre.

Event and Historical Information: In May 1918, The Admiralty requisitioned 50 acres of land comprising the majority of the Glan-y-Mor Isaf Farm, between Bangor and Abergwyngregin to establish a base for anti-submarine land-based aircraft. Two flights from 255 Squadron arrived under the control of 77 Wing, 14 Group based at Haverfordwest in June 1918. In August of the same year, 244 Squadron arrived equipped with eighteen De Havilland 6 fighter bombers organised into three flights, 521, 522 and 530. Two of the flights were based at Bangor and the other at Tallaght, Dublin. The Bangor aircraft undertook 1.5 hour patrols over Anglesey and Liverpool Bay. The airfield had a great many problems including serviceability of the aircraft, availability of pilots, and the persistent heavy rains and strong winds. Soon after the armistice on 22 January 1919, 244 Squadron was disbanded. All the airfield's hangars, tents, stores and equipment were removed by road to Bangor railway stations. In May 1919, the land was released and returned to farming.

Notes for current project

Land on Glanmor Isaf Farm owned by the Penrhyn Estate, was requisitioned in June 1918 for an airfield for spotter planes to support airships from Llangefni in their search for German U-boats (Sloan 2001, 100-101). The landing ground was prepared in July 1918; involving the uprooting of hedges and the erection of four Bessoneau hangars to house the aircraft. The officers and men lived in tents and fuel and bombs were stored in trenches between two small woods.

The 244 Squadron that flew from the airfield disbanded on 19th or 22nd January 1919, in May the land was returned to cultivation, and in June 1919 the hangars were removed (Pratt and Grant 1998, 46; Sloan 2001, 112). Nothing but the slate fences replacing hedges that had been removed is left to give any indication of the existence of the airfield.

Sources

Delve, K., 2007. The Military Airfields of Britain: Wales and West Midlands, The Crowood Press, Marlborough; Sloan, R., 2001. Early Aviation in North Wales, Gwasg Carreg Gwalch, Llanrwst (2nd edition); Pratt, D. and Grant, M., 1998. Wings Across the Border Volume I, Bridge Books, Wrexham

PRN 58670 NPRN 407782

RNAS Llangefni (site of), near Llangefni

NGR: SH4176075578 C

Location: Bodffordd, Ynys Mon

HER Description

NMR Description

The present day Mona airfield is built on the same site, and hence there is very little surviving evidence of the earlier airship station. The station was constructed during the summer of 1915. It necessitated hedges being removed; the construction of an airship shed 36m (120ft) x 969m (318ft) long; the building of wooden and corrugated iron roofed workshops, gas production sheds and accommodation huts.

Event and Historical Information: The development of Royal Naval Air Station (RNAS) Llangefni was an Admiralty initiative to provide a deterrent to enemy submarines operating in the Irish Sea through the deployment of airships adapted for sea patrol (a second station was established at Cheriton Carew, Milton, see NPRN 309962). Llangefni was commissioned on 26 September 1915 as part of 14 Group when airship SS18 arrived from Kingsnorth. The airship was joined by SS24, SSW25 and SS32. The airship patrolled an area extending from Anglesey to Morecambe Bay and Dublin, and also undertook experiments in the deployment of hydrophones. In June 1917, the Llangefni airships were replaced with Mark IIs (SSP1, SSP5 and SSP6) and in November, two Airco DH 4 aircraft were also deployed. On 6 June 1918, eight Airco DH6s were deployed into two flights (521 and 522) from 255 Squadron and remained until 15 August. RNAS Llangefni received six of the new SS Zero type airships (Z31, Z33-35, Z50-1, and Z72-3) equipped with Rolls Royce engines for speed and greater endurance and able to carry an increased bombing payload of three 100lbs bombs or one 230lbs bomb. On 29 June 1919, Z35 broke the endurance record for an airship through a flight which encompassed Scotland. At the end of the war, RNAS Llangefni was passed to the Government Disposal Board in 1920. It was bought by Anglesey County Council and the buildings used for awhile as a small local hospital. The airship shed and associated buildings were demolished and sold.

Notes for current project

The site of the former WW1 Royal Naval Airship Station Llangefni. Previously recorded as part of PRN 29448. The station was formally commissioned on 26th September 1915, and included a large airship shed (PRN 60182) that could hold four inflated airships. The 260 acre site also included workshops, a gas producing plant, gas holders and accommodation huts (Sloan 2001, 88). The main gate was from the A5 near Druid's Farm and most of the accommodation and other huts (PRN 60183) were restricted to this south-eastern corner of the site. The airfield was still active in late 1918 but in early 1919 the airships were sold or decommissioned and men released. However the Admiralty did not sell the site until November 1920 when it was bought by Anglesey County Council for an isolation hospital (Sloan 2001, 112). No use was found for the airship hangar so it was dismantled (Sloan 2001, 112), but, probably before 1920, the hangar had been used by a timber merchant to store wood. The construction of runways and hangars for RAF Mona in 1941 removed any remaining traces of the airship station.

Sources

Delve, K., 2007. The Military Airfields of Britain: Wales and West Midlands, The Crowood Press, Marlborough; Sloan, R., 2001. Early Aviation in North Wales, Gwasg Carreg Gwalch, Llanrwst (2nd edition); Phillips, A., 2010. Defending Wales: the coast and sea lanes in wartime, Amberley, Stroud; Pratt, D. and Grant, M., 1998. Wings Across the Border Volume I, Bridge Books, Wrexham

PRN 60182

Airship hangar (site of), RNAS Llangefni

NGR: SH4138775845

Location: Bodffordd, Ynys Mon

HER Description

NMR Description

Notes for current project

The airship shed measured 323 x 120 feet and was 80 ft high and could hold four inflated airships. Two pairs of screens at each end of the shed protected the airships from gusts of wind as they were "walked" out of the shed. There was a gas plant to produce hydrogen for the airships immediately to the north-west of the shed (Pratt and Grant 1998, 39-40).

The area has been entirely leveled and is now partly under a runway so no upstanding remains survive but buried foundations are a possibility.

Sources

OS 25 inch map 1920;

Pratt, D. and Grant, M., 1998. Wings Across the Border Volume I, Bridge Books, Wrexham

PRN 60183**Airship Station Complex (site of), RNAS Llangfni****NGR:** SH4167975297**Location:** Bodffordd, Ynys Mon**HER Description****NMR Description****Notes for current project**

Location of offices, accommodation etc for airship station. The main gate was from the A5 near Druid's Farm and most of the accommodation and other huts were restricted to this south-eastern corner of the site (Pratt and Grant 1998, 38-9, 41). Three small structures are shown on 1920 25 inch map but nothing else survives by 1920. This area has now been covered by airfield buildings and it is unlikely that anything from the airship station survives even buried underground.

Sources

OS 25 inch map 1920;

Pratt, D. and Grant, M., 1998. Wings Across the Border Volume I, Bridge Books, Wrexham

9.3. Other research**PRN 60188 NPRN****Sea lion training base, Glan Llyn****NGR:** SH88753183 A**Location:** Llanuwchllyn, Gwynedd**HER Description****NMR Description****Notes for current project**

Sea-lions were trained to track submarines initially in swimming baths in Glasgow and London but open-water trials were carried out in Llyn Tegid. Accommodation was provided at Glanllyn including stabling for about 50 sea lions. The training took place between 30 March and 6 July 1917, then the project moved to sea trials on the Solent (Wilson 2001, 442-447). The home farm at Hen Glanllyn is perhaps a more likely location for the sea lion pens than close the the main house.

Sources

Wilson, D. A. H., 2001. Sea Lions, Greasepaint and the U-Boat Threat:

Admiralty Scientists Turn to the Music Hall in 1916, Notes Rec. R. Soc. Lond. 55 (3), 425-455

9.4. Manufacturing**PRN 21180 NPRN 85184****Cooke's Explosives Works****NGR:** SH61763871**Location:** Penrhyndeudraeth, Gwynedd**HER Description****NMR Description**

Cooke's Explosive Works originate from 1865 when explosives were manufactured from guncotton, starch and india rubber in an area now known as Cooke's valley. The site covers twenty-eight hectares (70 acres) and RT Cooke bought the area from the Ministry of Munitions in 1922 and it was sold to Imperial Chemical Industries in 1958.

By the 1970s the factory supplied ninety per cent of the explosives for the coal industry in the form of nitroglycerine-based explosive products. Work ceased at the factory during 1995 and in 1996 the surviving structures were mainly of light timber construction that was surrounded by concrete walls. The works retained some mixing and incorporating mills, and cartridge machines, although by 1999 the site had been cleared and landscaped.

Notes for current project

The explosives factory was known for most of its history as Cooke's Explosives Ltd., after RT Cooke who bought the site in 1922 and expanded it. When Cooke retired in 1955 the factory was bought by ICI but retained the name of Cooke's Explosives Ltd. The factory was closed in 1995.

However the factory had a long history manufacturing explosives before Cooke bought it. The first factory on the site was established in 1865 as the Patent Safety Guncotton Company. It was licenced in 1876 and became part of the New Explosives Company, manufacturing explosives from gun cotton, starch and india rubber. By

1908 it was the Steelite Explosives Company Ltd.

In 1912 Dr Oswald Silberrad set up a factory on the site to manufacture explosives based on Ammonium Perchlorate. The company was named Ergite and Company Ltd. When the First World War started the company made explosives for the government but after a serious explosion in June 1915 the Ministry of Munitions nationalised the factory, rebuilt it, and it became a National Explosives Factory known as HM Factory Penrhyndeudraeth.

The site was recorded by RCAHMS soon after the factory closed and before demolition of many of the buildings (Malaws and Parry 1995).

The site that is now the Gwaith Powdwr Nature Reserve, owned by the North Wales Wildlife Trust.

Sources

Malaws, B., Cooke's Explosives Works, Penrhyndeudraeth, Merioneth 1995, FI file;

G1315, Report No.198;

Gwyn, D. & Williams, M. 1996, A Guide to the Industrial Archaeology of North West Wales, p39;

Cocroft, W. D., 2000. Dangerous Energy: The archaeology of gunpowder and military explosives manufacture, English Heritage; Caernarfon Record Office:

X/Plans R/49 [1865] Cambrian Railways Plans and Sections,

ZDER/312 Plan of Cooke's Explosives Works (1948),

ZDER/ Plans and Costing Manual for Cooke's Explosives Works (1945-1954)

PRN 60175

Boston Lodge National Shell Factory

NGR: SH5847237854

Location: Penrhyndeudraeth, Gwynedd

HER Description

Listed Building Descriptions

Boston Lodge was originally one of the two barracks built for the workforce constructing The Cob in 1808-11, William Madocks' major engineering project. It was widened in 1836 by the addition of the lower Cob to carry the new road and the original embankment was then converted to carry the new Ffestiniog Railway which was built as a narrow-gauge slate railway to connect the quarries at Blaenau Ffestiniog with the harbour at Porthmadoc. Boston Lodge was used to provide stabling for the horse-drawn railway but following introduction of steam locomotives in 1863, which in itself was a technological achievement given the gradients on this line, it was enlarged and converted into a locomotive works and yard; it was most unusual for such a small railway to be building its own carriages and locomotives. Boston Lodge retains this use because although the line was closed in 1946 it reopened in 1954 as a private steam railway. It is widely recognised as one of the world's historic railways and is believed to be the oldest surviving railway company. The name of the works derives from the fact that Madocks was MP for Boston, Lincolnshire.

Ref no 14411: Former Erecting Shop. The interior has a wide aisled roof and retains line shafting for belt drives.

Ref no 14412: Former Machine Shop. Interior now converted to offices.

Notes for current project

Part of the Ffestiniog Railway engineering workshops at Boston Lodge, Minffordd were taken over in October 1915 for use as a National Shell Factory to produce the casings for smaller munitions. The Shell Factory took over occupation of the erecting shop, the machine shop and its attached engine house and boiler house, as well as part of the smithy to the east. It produced 13 and 18 pound shells casings from steel bars machined into shape. The finished shells were sent to the National Shell Factory at Wrexham then on to a filling factory somewhere in England.

The tenancy of Boston Lodge for munitions production was terminated 30 April 1918 and surplus machinery was disposed of in an auction on 28th March 1919.

The machine shop and erecting shed are relatively unchanged from when they were used for the shell factory. The drive shaft that ran the lathes is still in place in the erecting shed roof and the machine shop also still has remains of belt drives attached to the ceiling.

Sources

Martin Pritchard :<https://www.flickr.com/photos/63164772@N05/8063519166/>

PRN 60181 NPRN 303145

Aberfalls Margarine Factory, Abergwyngregyn

NGR: SH65217319

Location: Aber, Gwynedd

HER Description

NMR Description

Former rail-served margarine factory, opened between 1900 and 1912 in the buildings of a former Writing Slate

Manufactory (nprn 303148)

B.A.Malaws, RCAHMW, 12 December 2001.

Notes for current project

The Aberfalls Margarine Factory made soap as well as margarine and was located next to the railway. It opened between 1900 and 1912, and was owned and run by the Pure Margarine Company. It reused a building originally built by the Penrhyn Estate for writing slate production, which later became a woollen factory and more recently as a small brewery.

Sources

http://www.abergwynnwgryn.co.uk/html/body_margarine_works.html

PRN 61325 NPRN

Vulcan Factory, Bank Quay, Caernarfon

NGR: SH47866295 C

Location: Caernarfon, Gwynedd

HER Description

NMR Description

Notes for current project

A National Shell Factory was set up in the Vulcan Foundry, owned by Humphrey Owen and Sons, and the agreement for the North Wales Board of Management to run the factory was signed on 22nd October 1915 (XM10422/2). It produced the casings for 13 and 18 pound shells. The machine tools, plant and equipment from the factory was sold off by auction on 27th March 1919 (Yr Herald Cymraeg, 18th March 1919, p1).

There are almost no traces of the factory left. New apartments have been built over most of the site. A National Tyres and Autocare business seems to be reusing parts of some fragments of the original buildings, though considerably altered.

Sources

Caernarfon Record Office XM10422/2

PRN 61398 NPRN 410658

Market Hall, Blaenau Ffestiniog

NGR: SH6978445941

Location: Ffestiniog, Gwynedd

HER Description

NMR Description

Notes for current project

The Market Hall is recorded by the NMR (NPRN 410658) as "built between 1861 and 1864 by Owen Roberts of Dolgareddu. The architect was Owen Morris of Porthmadog. It is a two-storeyed stone building with a slate roof."

During the First World War a sock knitting factory was set up in Blaenau Ffestiniog probably in buildings forming part of the Market Hall. This was set up by the Lloyd George American Relief Fund to employ young women who could not leave their homes due to family responsibilities to look for work in the new munitions factories and elsewhere. Part of the market buildings were converted to a workroom with seven knitting machines, later increased to 20 knitting machines with finishing and winding machines. Knitting started 7th July 1915 and older women were also employed hand knitting in their own homes. The workroom could output 1,700 pairs of socks per week, but production was not the main aim. This was a charitable institution and invalids and those in most distress were employed in preference to the able bodied (Nicholson and Lloyd-Williams 1919, 192, 195-6). The People's Collection Wales has a photograph of the women who worked in this knitting factory (<http://www.peoplescollection.wales/items/32562>).

Sources

Nicholson, I. and Lloyd-Williams, T., 1919. Wales, Its Part in the War

PRN 61399 NPRN 419239

Tal y Sarn Bandroom

NGR: SH4897553057

Location: Llanllyfni, Gwynedd

HER Description

NMR Description

Notes for current project

Recorded on the NMR (NPRN 419239) as a bandroom with a photograph showing the front of the building. This has a large plaque saying "Nantlle Vale Royal Silver Band". The NMR dates the building to the 19th century but provides no description.

During the First World War a sock knitting factory or workroom was set up in bandroom by the Lloyd George American Relief Fund to employ young women who could not leave their homes due to family responsibilities to look for work in the new munitions factories and elsewhere. The workroom was opened on 15th September 1915 with 6 machines (Nicholson and Lloyd-Williams 1919, 192, 196)

Sources

Nicholson, I. and Lloyd-Williams, T., 1919. Wales, Its Part in the War

PRN 61400

Llanrwst Tannery

NGR: SH79706163 A

Location: Llanrwst, Conwy

HER Description

NMR Description

Notes for current project

Tanning was important in Llanrwst for centuries with documentary evidence of a tanning trade from at least the 16th century (Rowley 2014, 68). By the 1960s the tannery was located next to the church and made boots and shoes and gloves. During the First World War jerkin leather for aviators clothing was manufactured in Llanrwst (Nicholson and Lloyd-Williams 1919, 122). The 25 inch maps show that the main tannery building here was not built by the First World War. Although tanning may have taken place in a building next to the river there is a suggestion that the tannery was originally located near Plas Isa, the most important house in the town (Rowley 2014, 68). No evidence has been found for this project of where near Plas Isa the tannery might have been or whether it was located there in the First World War, but tanning clearly took place somewhere in the town and made a significant contribution to the war effort.

Sources

Nicholson, I. and Lloyd-Williams, T., 1919. Wales, Its Part in the War;

Rowley, P, (ed), 2014. Ffordd yr Orsaf, Llanrwst, Station Road Volume 4 part 2 Plas yn Dre to Bank Buildings, Llanrwst and District Historical Society

10. FIGURES AND PLATES

Figures

- Figure 1. Location of sites studied under the research, development and manufacturing theme (with PRNs)
- Figure 2. Cefndu Transmitter Station (PRN 887) with recorded features shown on 1914 25 inch OS map (part of Caernarvonshire sheet XVI.06) (with PRNs of features mentioned in the text)
- Figure 3. 1914 25 inch OS map showing Transmitter House and other features built by that date (part of Caernarvonshire sheet XVI.06)
- Figure 4. Tywyn Receiver Station (PRN 888) with probable extent of aerial
- Figure 5. 6 inch OS map showing main receiver station buildings and Marconi Bungalows (part of Merionethshire sheet XLVI.SW, published 1948, revised 1938)
- Figure 6. The location of Llain y Gors Cottages and site of the aerial mast for the wireless station communicating with airships over the Irish Sea (PRN 60171), shown on the 1924 3rd edition 25 inch OS map (Anglesey sheet III.07)
- Figure 7. The location of Holyhead wireless station (PRN 60187) shown on 1924 map and modern photograph
- Figure 8. The location of RNAS Llangefni (PRN 58670) (extents of airship station in red)
- Figure 9. The location of Bangor Airfield (PRN 27310) (extents of airfield station in red)
- Figure 10. The location of Bangor Airfield on Glan Mor Isaf Farm (PRN 27310), shown on 1914 25 inch map (part of Caernarvonshire sheet VII.10)
- Figure 11. Glan Llyn and Hen Glan Llyn shown on the 25 inch OS map, Merionethshire sheets XXII.09 and 13 1901, with modern buildings superimposed
- Figure 12. Location of Cooke's Explosive Factory (PRN 21180) showing area in use in First World War (in pink)
- Figure 13. 6 inch map revised in 1913 (part of Merionethshire sheet XXXV.SW) showing the buildings of the explosives works that would have been used in the First World War, with modern digital mapping superimposed
- Figure 14. Boston Lodge Works as shown on shown on the 25 inch OS map, Caernarvonshire sheet XXXV.13 1917, with modern buildings superimposed
- Figure 15. Plan of Boston Lodge to accompany the agreement between the Ffestiniog Railway Company and the Board of Management for the creation of the National Shell Factory. Areas coloured blue were to be used for the shell factory. Caernarfon Record Office XD97/20916
- Figure 16. Location of Vulcan Works (in pink) shown on the 25 inch OS map, Anglesey sheet XXV.04 1918, with modern buildings superimposed
- Figure 17. Location of Aberfalls Margarine factory (PRN 60181)
- Figure 18. Aberfalls Margarine factory shown on 1914 map (Caernarvonshire sheet VII.07)

Plates

- Plate 1. View of Cefndu Transmitter Station (PRN 887), showing mast base PRN 61279 surrounded by stay anchors
- Plate 2. Mast base PRN 61279
- Plate 3. Stay anchor PRN 61276
- Plate 4. Base of mast, note open access hatch for maintenance and stay anchor to the left. Photograph dated 1912 but probably actually 1914 (The Marconi Company Ltd)
- Plate 5. View of Transmitter Station from the access road. Note the railway tracks (PRN 60177) by the road, Marconi Hall (PRN 58769) in the mid-ground and the aerial masts in the background. Photograph dated 1912 but probably actually 1914. (The Marconi Company Ltd)
- Plate 6. Probable blockhouse (PRN 10034) photographed in 1988, with causeways or railway trackbeds in front
- Plate 7. Probable blockhouse (PRN 60197)
- Plate 8. Interior of PRN 60197, showing gun loops
- Plate 9. Building PRN 60193 on summit of Cefndu
- Plate 10. Reservoir PRN 60216
- Plate 11. Post-1914 additions to main transmitter building PRN 58768, viewed from the west
- Plate 12. Main transmitter building (PRN 58768) in 2015, with former Power House (PRN 60176) in front
- Plate 13. Main transmitter building (PRN 58768) in 1914, with Power House (PRN 60176) in front (The Marconi Company Ltd)
- Plate 14. Power House (PRN 60176) in 1914 (The Marconi Company Ltd)
- Plate 15. The Marconi Hall (PRN 58769)
- Plate 16. The Marconi Hall (PRN 58769), main entrance
- Plate 17. Receiver station main buildings, Tywyn (PRN 60174)
- Plate 18. Marconi Bungalows, Tywyn (PRN 60173)

- Plate 19. No. 7, Marconi Bungalows, Tywyn (PRN 60173) with render removed for repairs, showing original weather boards and part of a blocked window
- Plate 20. The doorway at No. 8, Marconi Bungalows
- Plate 21. The original circular window at No. 7, Marconi Bungalows, and part of a blocked window
- Plate 22. Mast base PRN 60184
- Plate 23. Mast base PRN 60185
- Plate 24. Mobile phone mast and hut adjacent to mast base PRN 60185
- Plate 25. Site of wireless aerial to the left of Llain y Gors Cottages (PRN 60171)
- Plate 26. Llain y Gors Cottages: the cottage at the left end of the terraced cottages was used by the wireless operators, the separate building just beyond was a work shed (PRN 60171)
- Plate 27. Llain y Gors Cottages as they were in the First World War (image courtesy of Mair and Roland Williams)
- Plate 28. Letter in Daily Post from E Higgins about Holyhead Wireless Station (PRN 60187)
- Plate 29. 1901 photograph of the Holyhead Wireless Station (The Marconi Company Ltd, obtained from www.oscarkilodxgroup.com)
- Plate 30. View of airship shed taken from an airship in 1917, with gas plant to left of the shed (courtesy of Anglesey Archives)
- Plate 31. View of airship station taken from an airship in 1918 (courtesy of Anglesey Archives (WM/2010))
- Plate 32. Plan of RNAS Llangefni copied from Pratt and Grant 1998, p40 (used by permission of Mike Grant)
- Plate 33. Main office complex at RNAS Llangefni in 1918 (courtesy of Anglesey Archives (WM/1609/17))
- Plate 34. WJ Baker at RNAS Llangefni in 1917 with water tower behind (courtesy of Anglesey Archives (WM/2010))
- Plate 35. Airship pilot in flying gear at RNAS Llangefni standing on veranda of accommodation hut (courtesy of Anglesey Archives (WM/1609/16))
- Plate 36. An SS Zero type airship stationed at RNAS Llangefni (courtesy of Anglesey Archives (WM/2010))
- Plate 37. View looking east over eastern part of the former Bangor Airfield (PRN 27310)
- Plate 38. Slate fences were used when field boundaries were replaced on the decommissioning of Bangor Airfield (PRN 27310)
- Plate 39. Emergency blast shelter now used as a bat roost (SH61894 38894)
- Plate 40. Path/track that ran through the First World War factory (taken from cSH61822 38900)
- Plate 41. Site of de-nitration plant (NPRN 85224) from south
- Plate 42. Valley that contained the early explosives works, view from the north
- Plate 43. Erecting shed with machine shop to the left at Boston Lodge used for the shell factory (PRN 60175)
- Plate 44. North-west elevation of the erecting shed (PRN 60175)
- Plate 45. Staff at Boston Lodge 1917 with lathes for turning shell-casings (Caernarfon Record Office XD97/20001a. Copyright Gwynedd Archives Service)
- Plate 46. Inside machine shop at Boston Lodge (PRN 60175)
- Plate 47. Remains of belt drives in the machine shop
- Plate 48. Inside part of the erecting shed at Boston Lodge (PRN 60175)
- Plate 49. Remains of belt drives in the erecting shed
- Plate 50. Plan of the Vulcan Foundry (PRN 61325) shown on an engraved ledger page (Caernarfon Record Office 22284/2)
- Plate 51. Staff at the Caernarfon Shell Factory. The caption to the photograph reads "Women munition workers at Caernarfon during the first World War. They were producing eighteen-pounder shells" (Caernarfon Record Office XS1497/7/8. Copyright Gwynedd Archives Service)
- Plate 52. Apartment building on the site of the Vulcan Foundry
- Plate 53. At least some of the walls of the National Tyre business are reused from the Vulcan Foundry buildings
- Plate 54. Irish Republican painting (PRN 60178) by James Byrne from Dublin done while he was interned in Frongoch prisoner of war camp.
- Plate 55. Paddy Fitzsimmons (nephew of James Byrne) and friends visiting Frongoch during a tour with their choir.
- Plate 56. Section of a 6-key wooden B flat flute (PRN 60876) found at Railway Cottage, Frongoch
- Plate 57. Crucifix in a bottle (PRN 61150) made in Frongoch prisoner of war camp.
- Plate 58. Pages from notebook recovered from the Aberfalls Margarine Factory by Clifford (Beaver) Hughes. Top, ingredients used in September 1905; below, those used in June 1918.

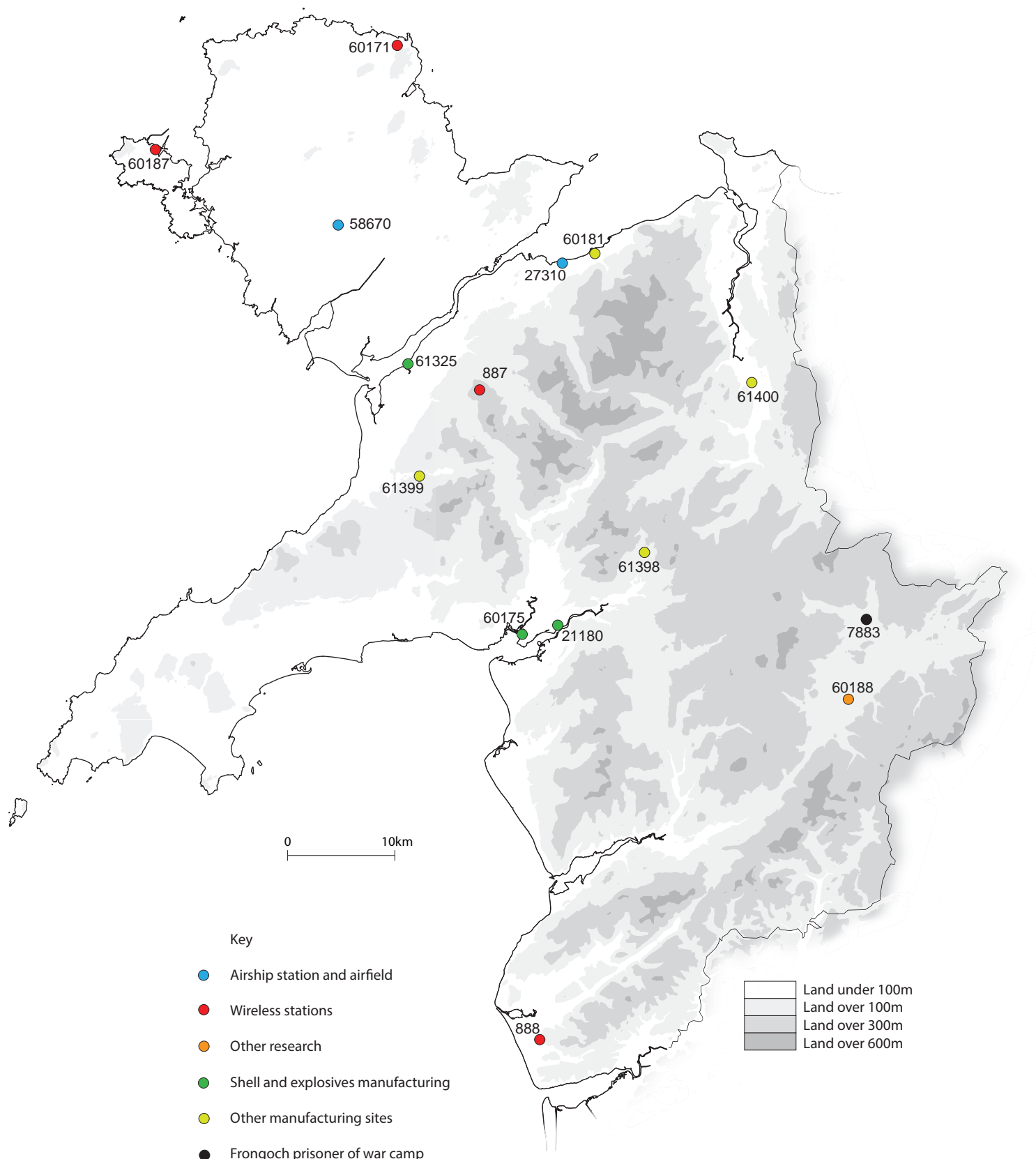


Figure 1. Location of sites studied under the research, development and manufacturing theme (with PRNs)

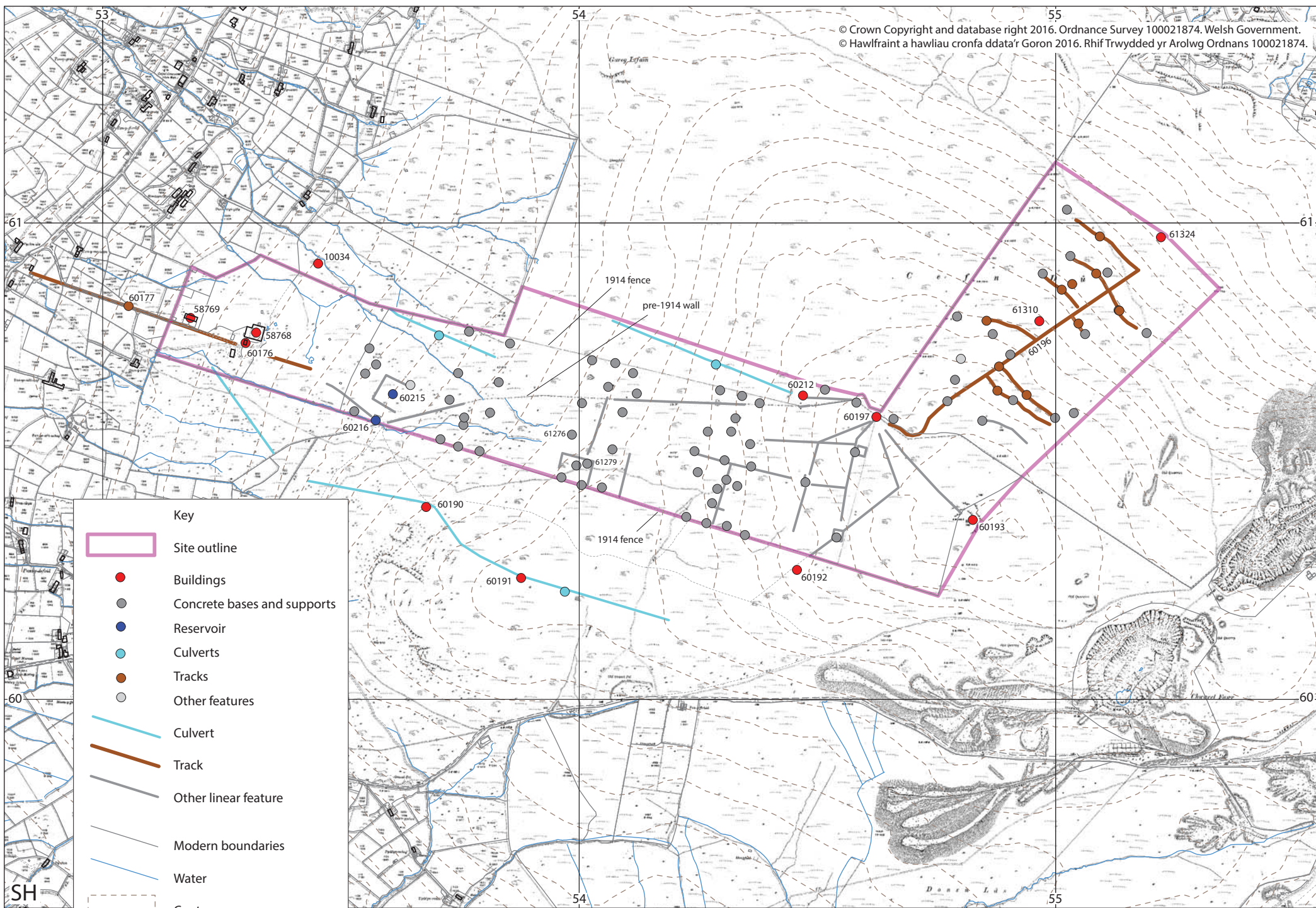


Figure 2. Cefndu Transmitter Station (PRN 887) with recorded features shown on 1914 25 inch OS map (part of Caernarvonshire sheet XVI.06) (with PRNs of features mentioned in the text)

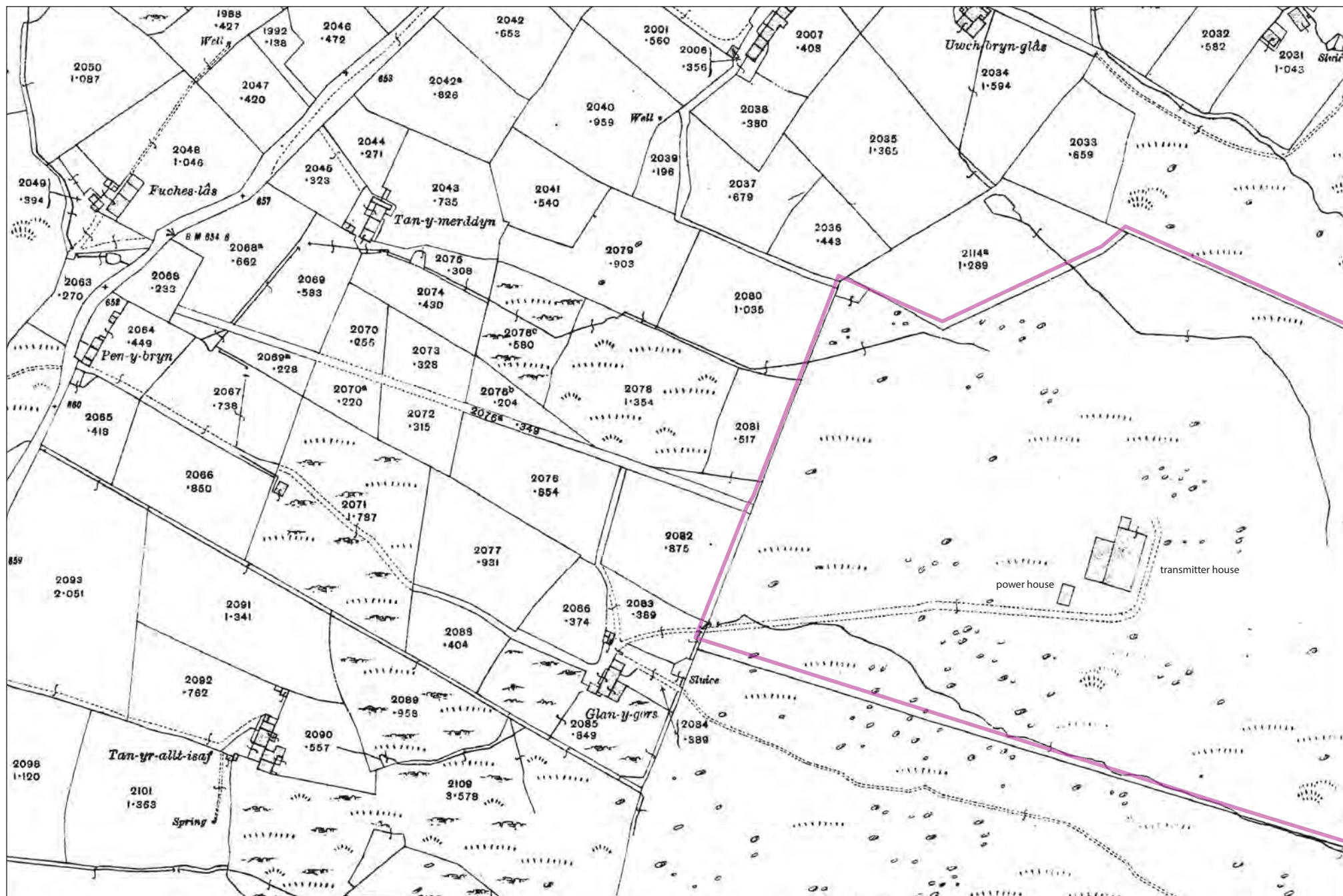


Figure 3. 1914 25 inch OS map showing Transmitter House and other features built by that date (part of Caernarvonshire sheet XVI.06)

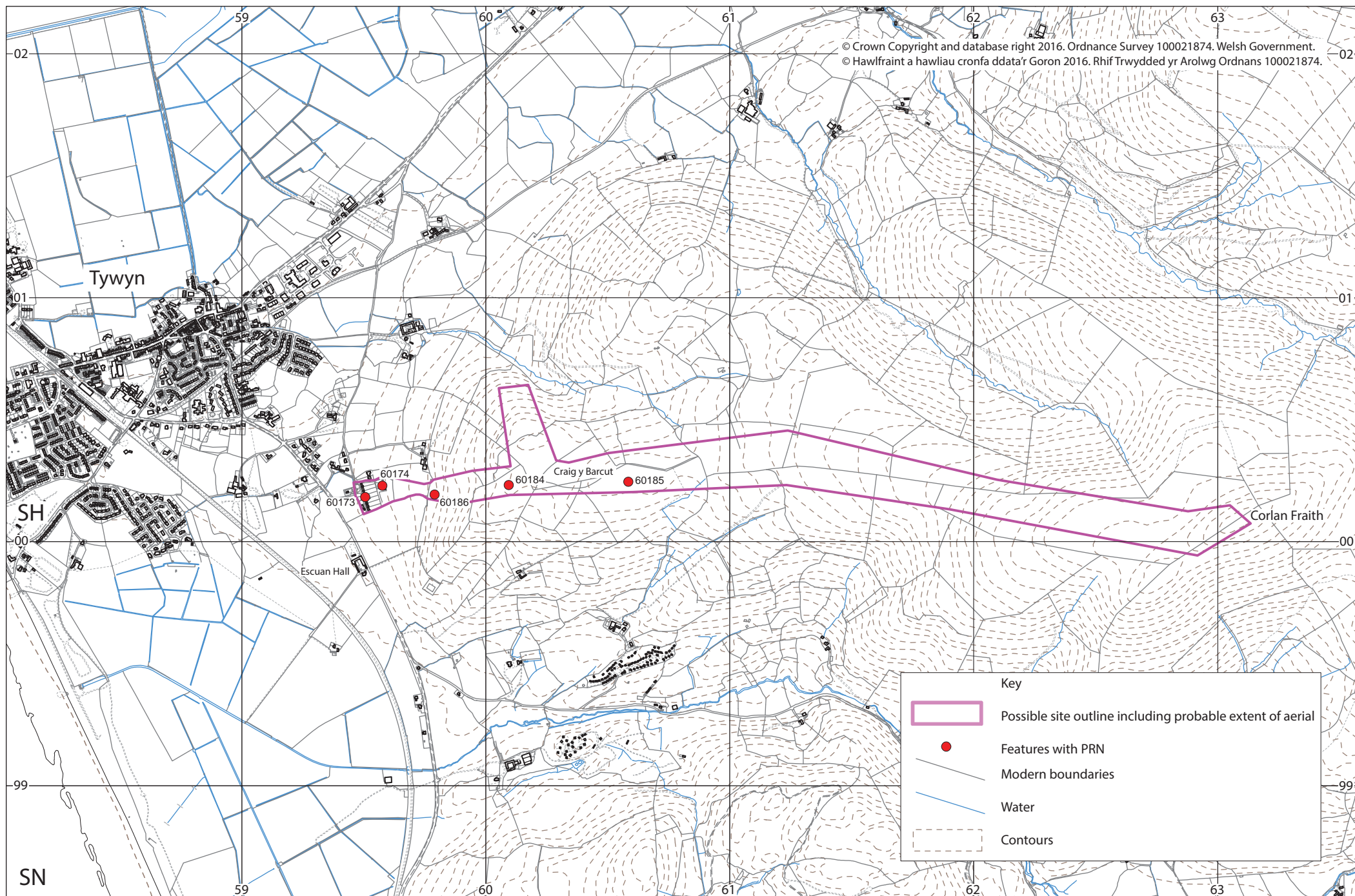


Figure 4. Tywyn Receiver Station (PRN 888) with probable extent of aerial

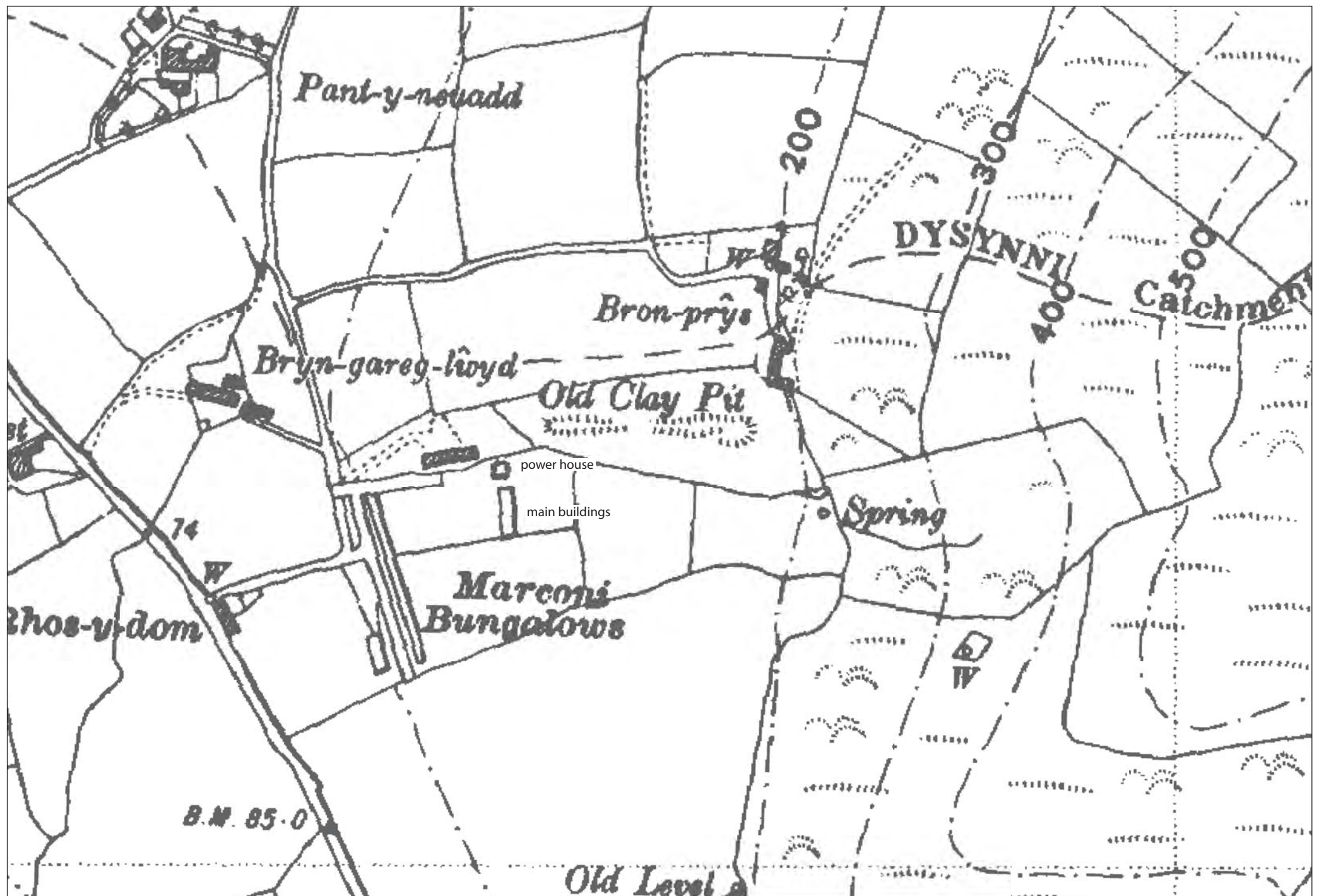


Figure 5. 6 inch OS map showing main receiver station buildings and Marconi Bungalows (part of Merionethshire sheet XLVI.SW, published 1948, revised 1938)

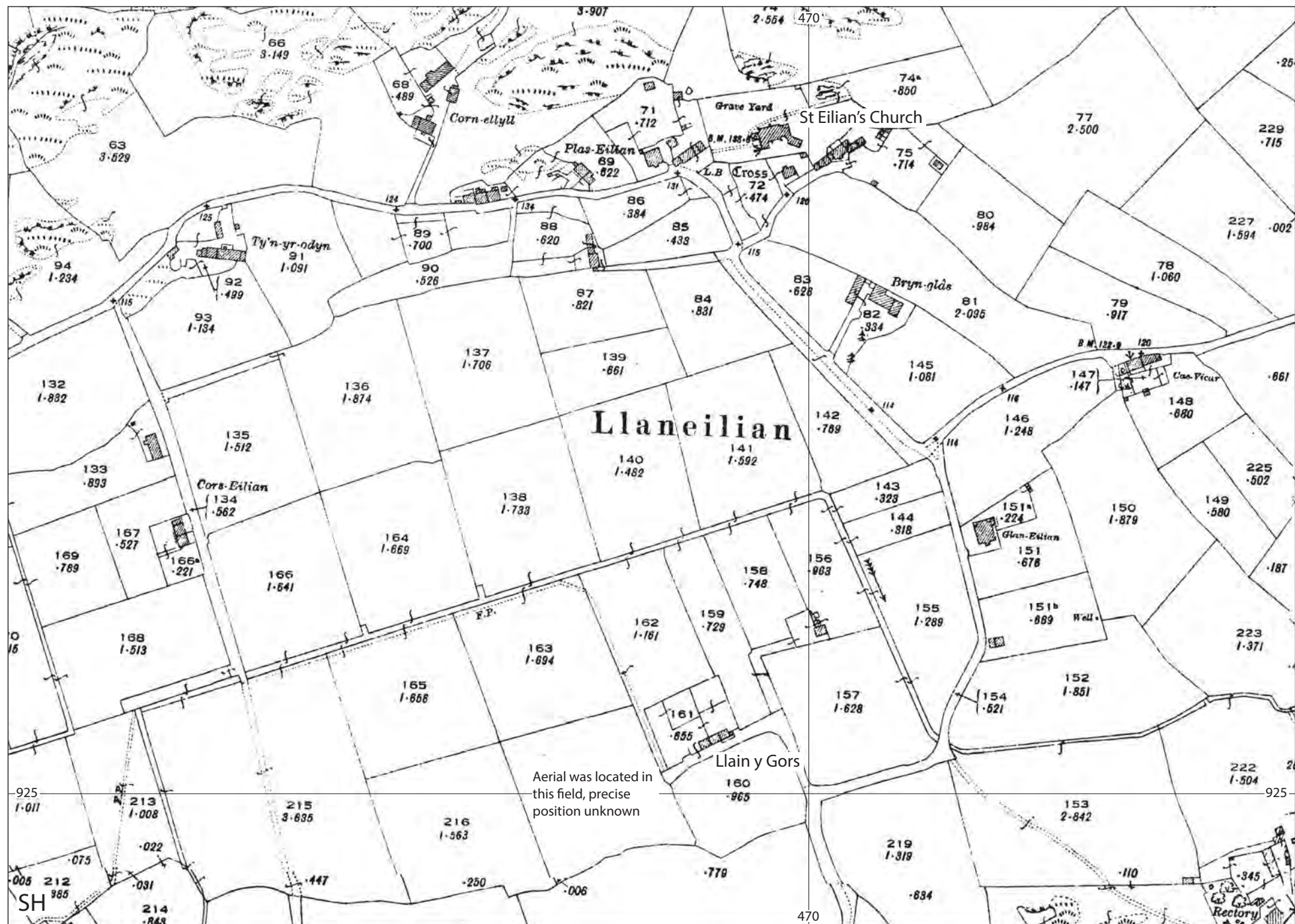
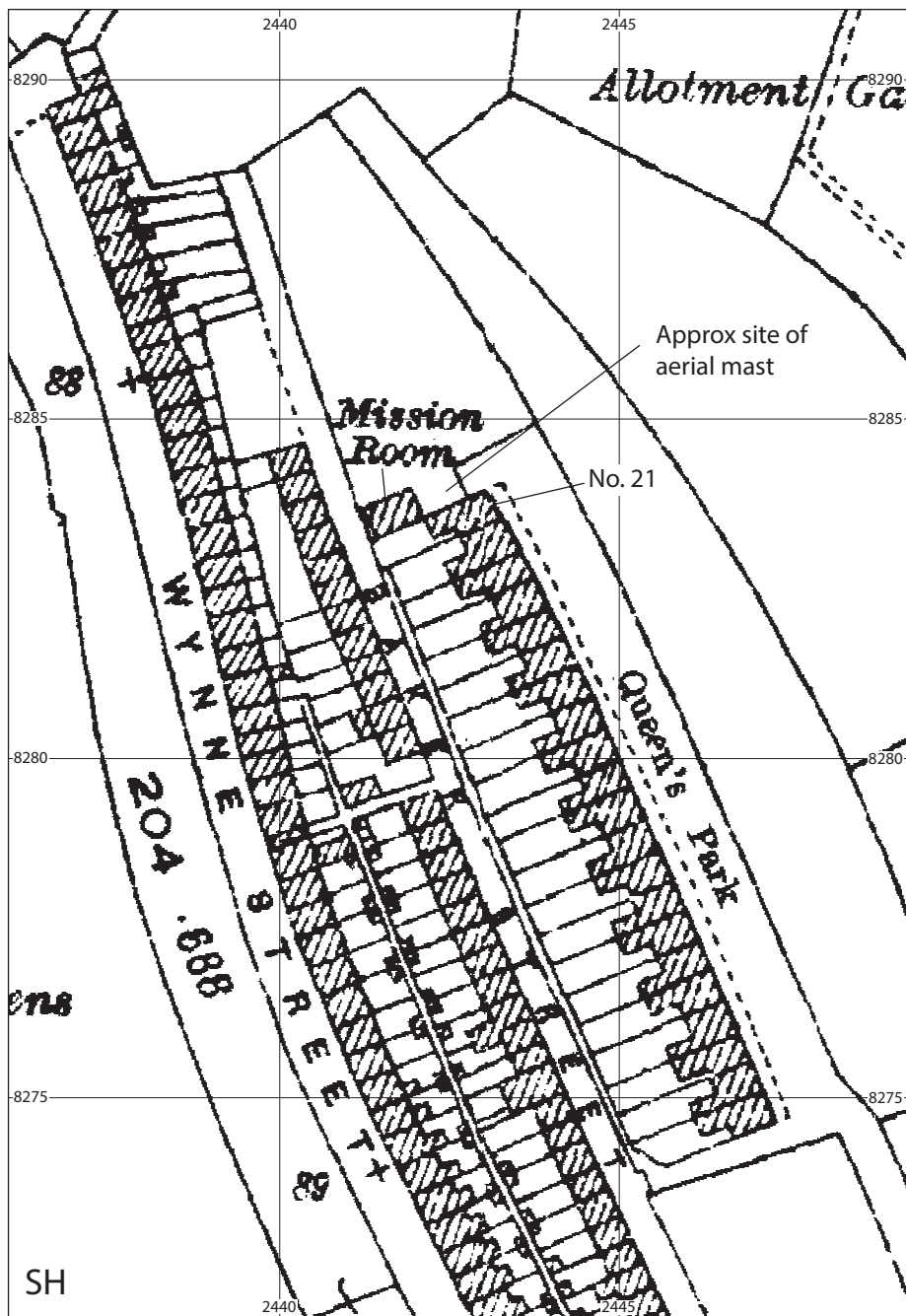


Figure 6. The location of Llain y Gors Cottages and site of the aerial mast for the wireless station communicating with airships over the Irish Sea (PRN 60171), shown on the 1924 3rd edition 25 inch OS map (Anglesey sheet III.07)



1924 3rd edition 25 inch OS map (Anglesey sheet XI.03)



Modern aerial photograph © Next Perspectives. Welsh Government 2016

Figure 7. The location of Holyhead wireless station (PRN 60187) shown on 1924 map and modern photograph

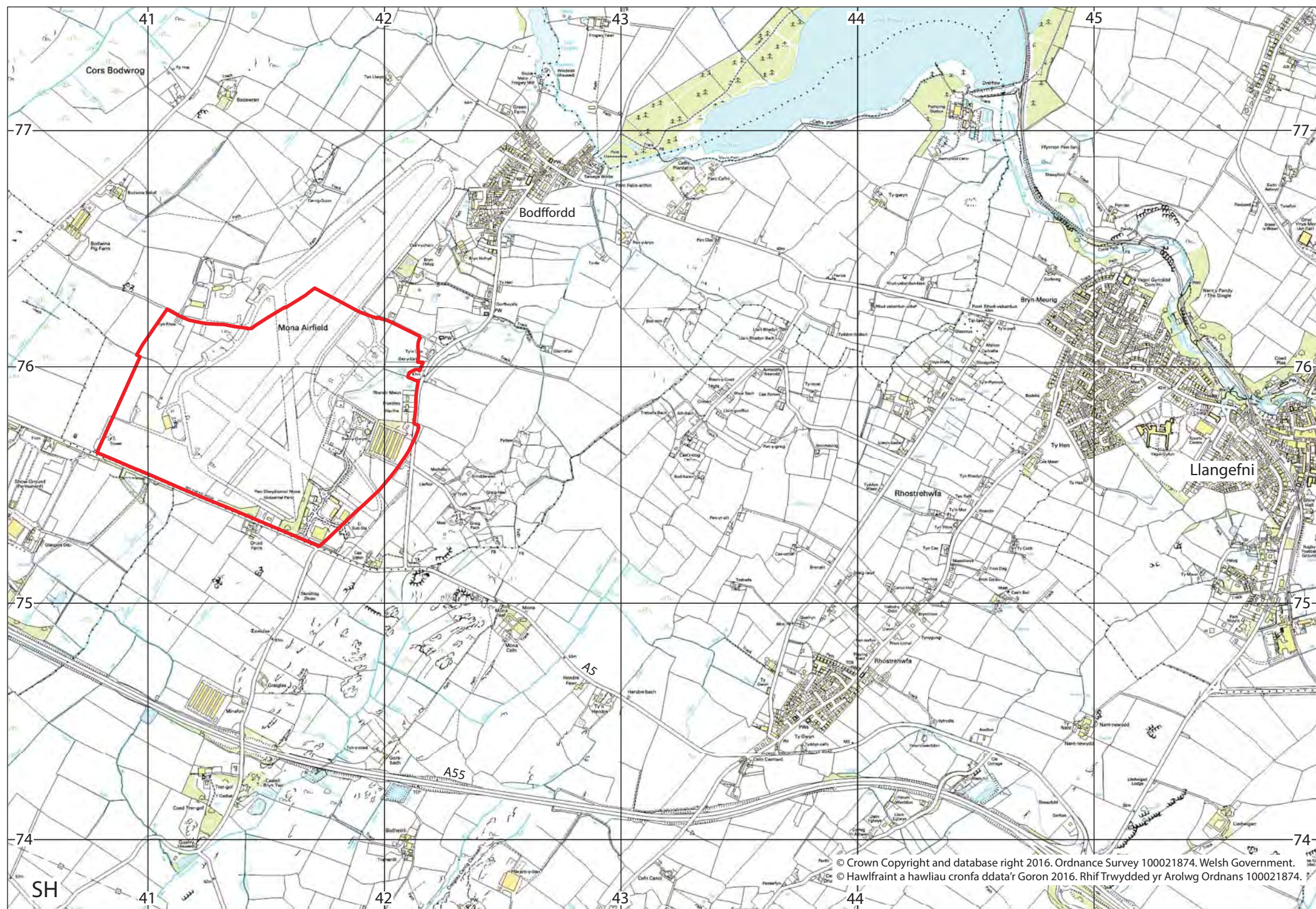


Figure 8. The location of RNAS Llangefni (PRN 58670) (extents of airship station in red)

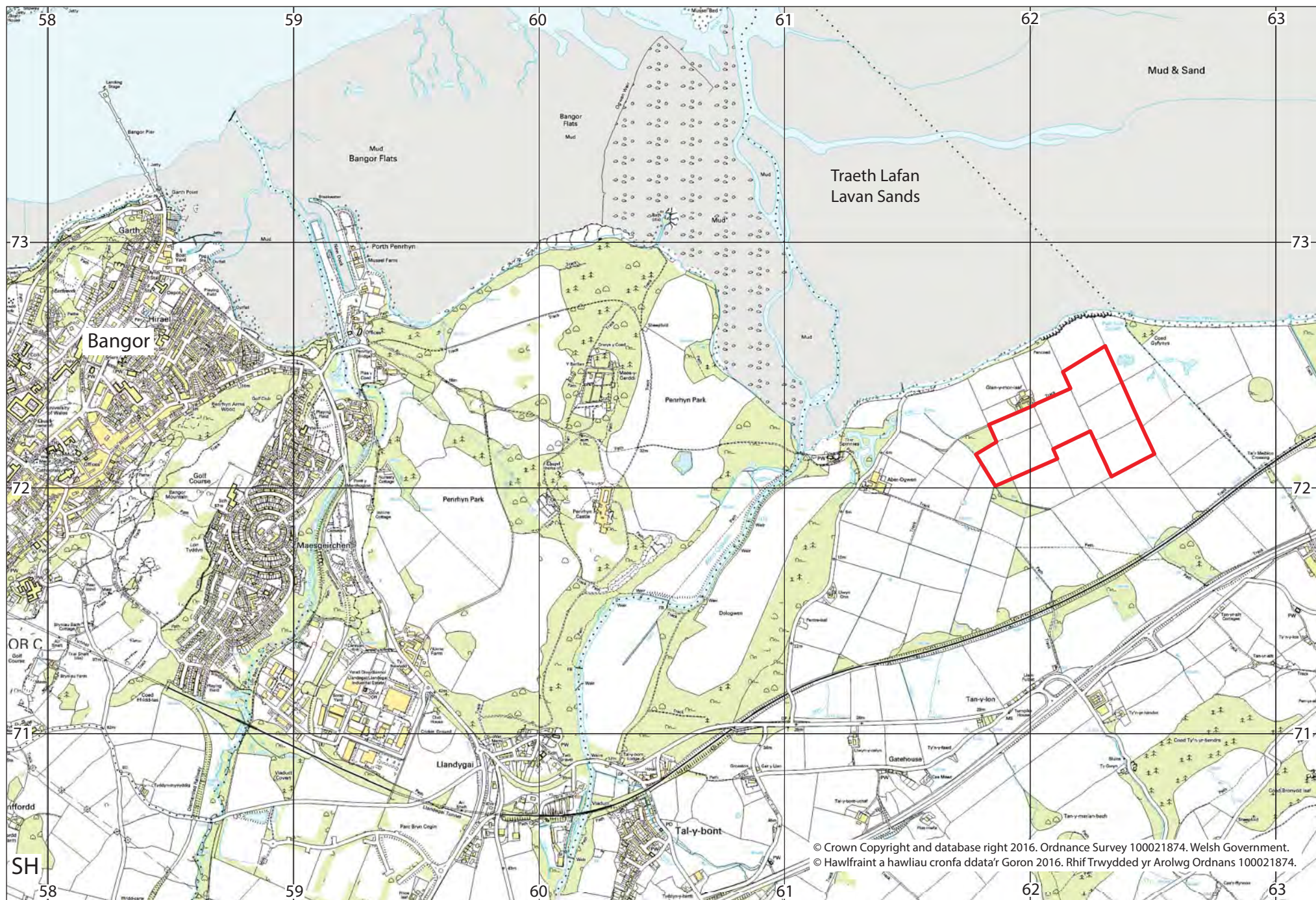
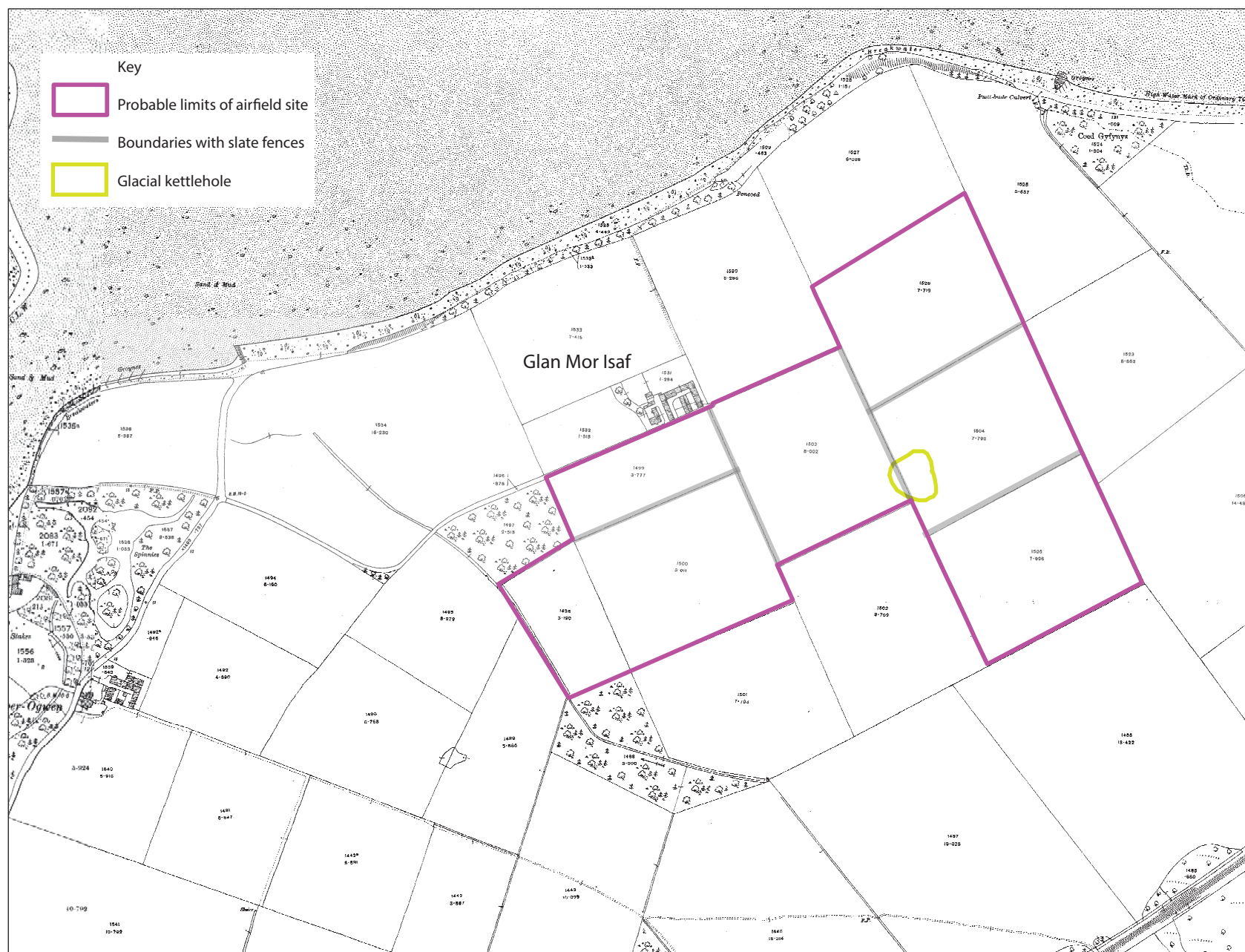


Figure 9. The location of Bangor Airfield (PRN 27310) (extents of airfield station in red)



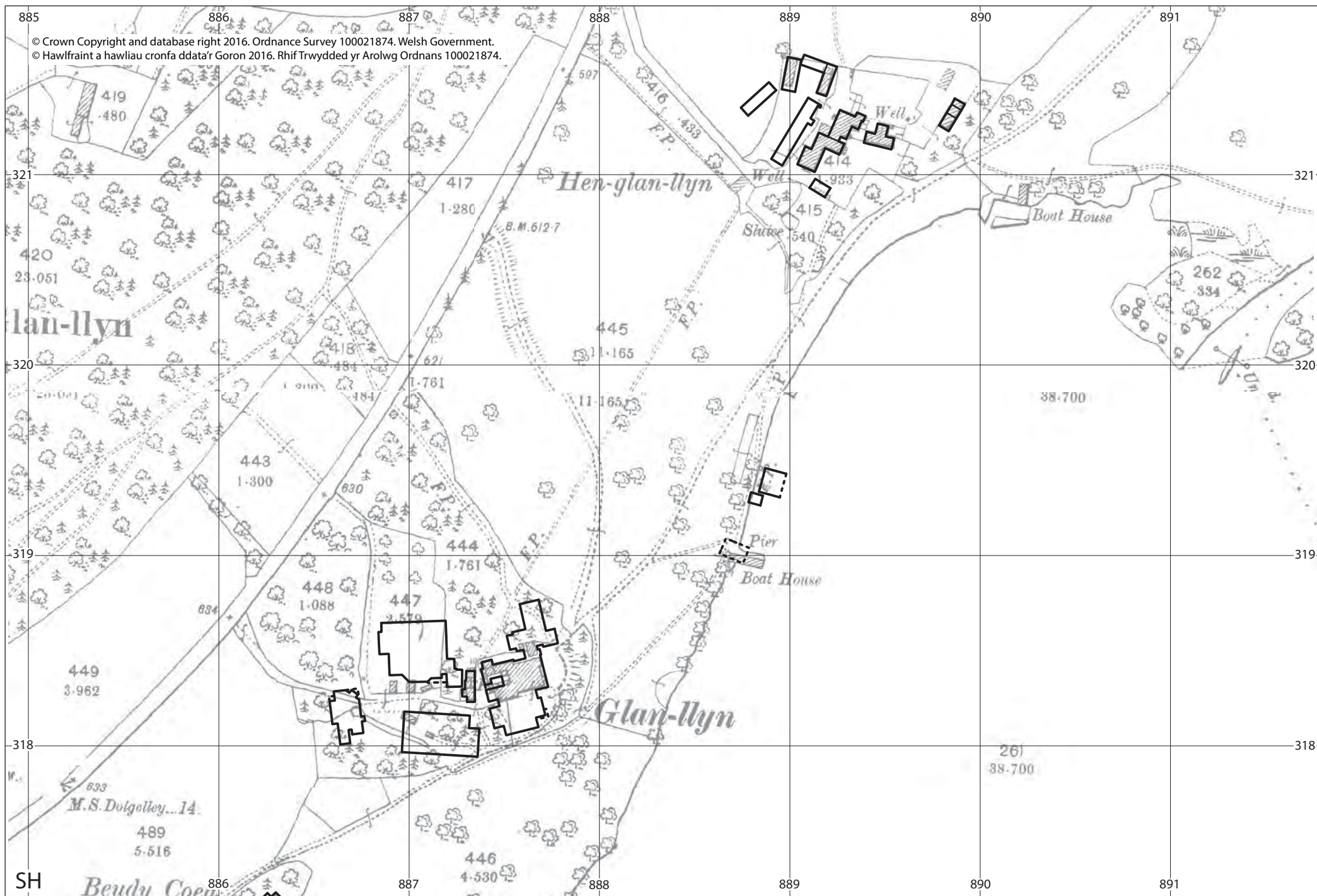
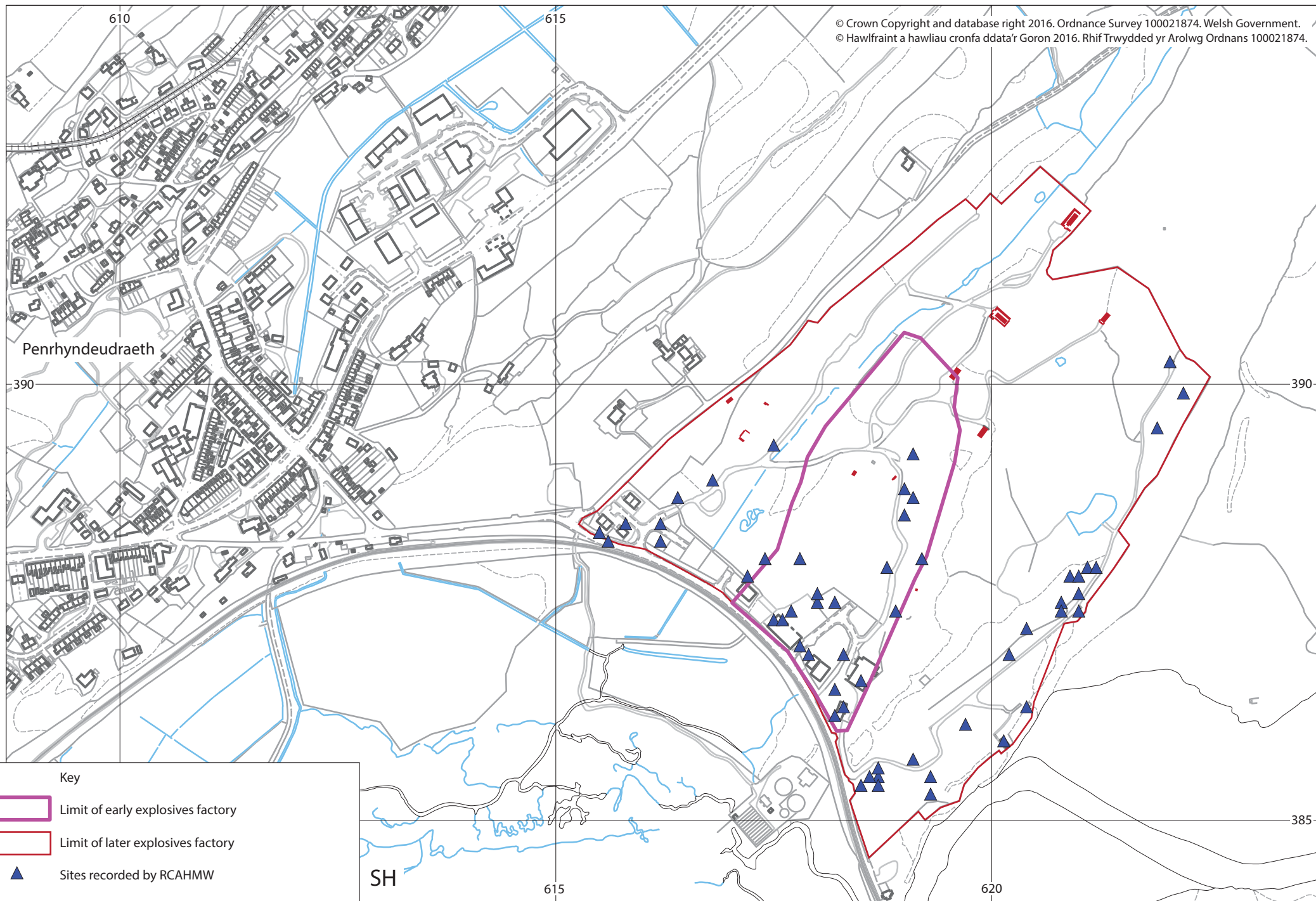


Figure 11. Glan Llyn and Hen Glan Llyn shown on the 25 inch OS map, Merionethshire sheets XXII.09 and 13 1901, with modern buildings superimposed



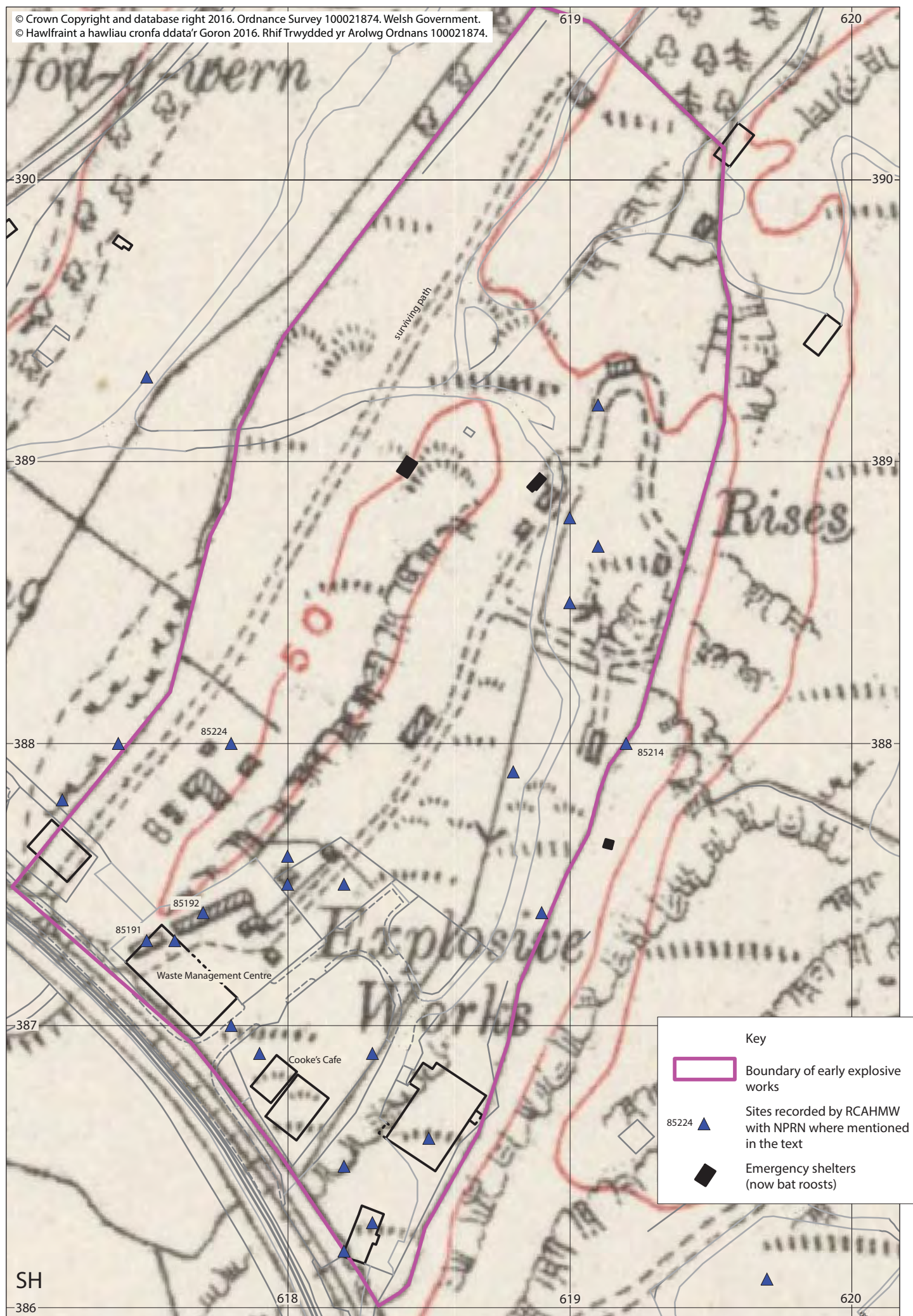


Figure 13. 6 inch map revised in 1913 (part of Merionethshire sheet XXXV.SW) showing the buildings of the explosives works that would have been used in the First World War, with modern digital mapping superimposed

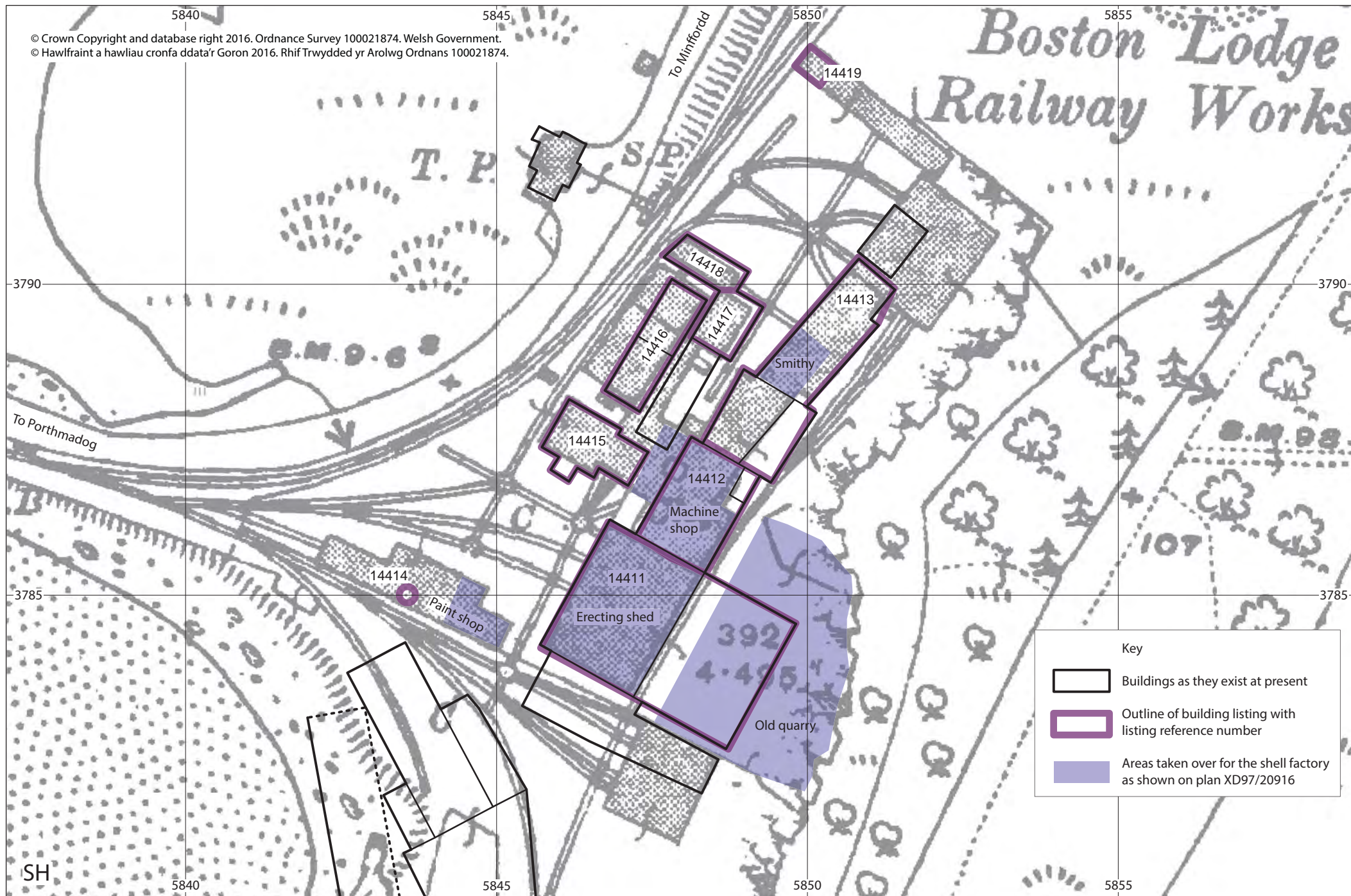


Figure 14. Boston Lodge Works as shown on the 25 inch OS map, Caernarvonshire sheet XXXV.13 1917, with modern buildings superimposed

PLAN OF BOSTON LODGE LOCOMOTIVE WORKS FESTINIOG RAILWAY.

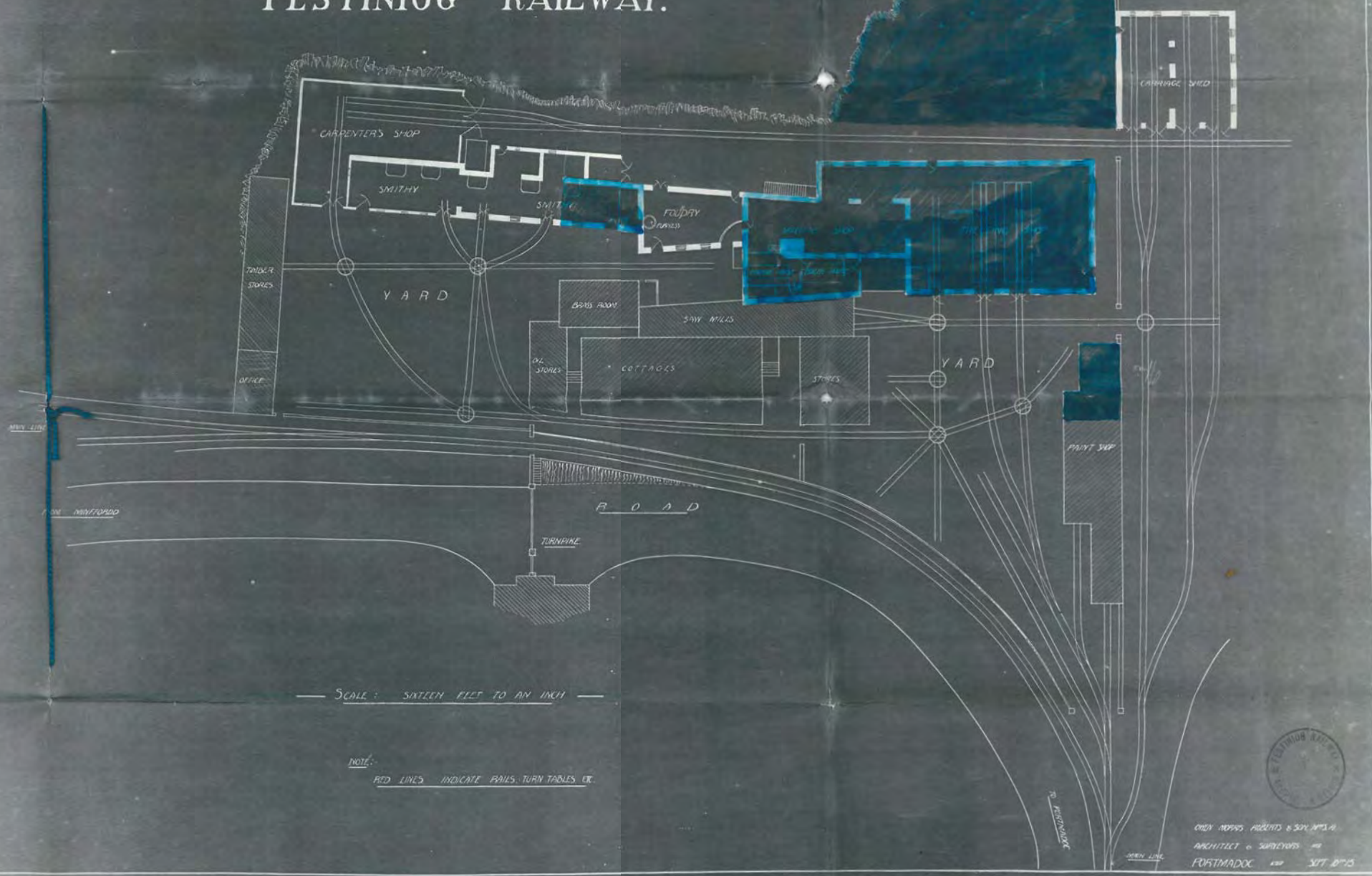


Figure 15. Plan of Boston Lodge to accompany the agreement between the Ffestiniog Railway Company and the Board of Management for the creation of the National Shell Factory. Areas coloured blue were to be used for the shell factory. Caernarfon Record Office XD97/20916



Figure 16. Location of Vulcan Works (in pink) shown on the 25 inch OS map, Anglesey sheet XXV.04 1918, with modern buildings superimposed

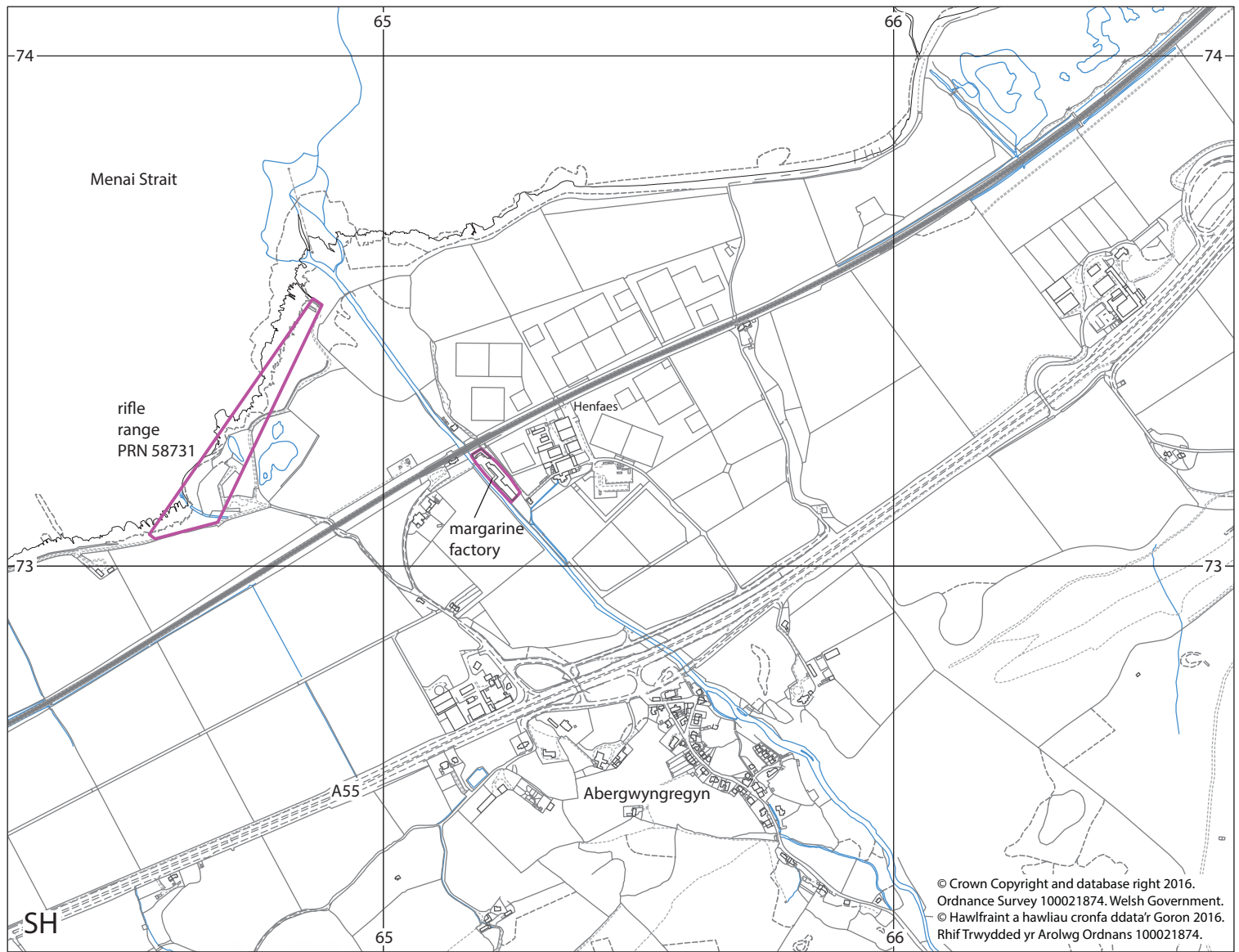


Figure 17. Location of Aberfalls Margarine factory (PRN 60181)

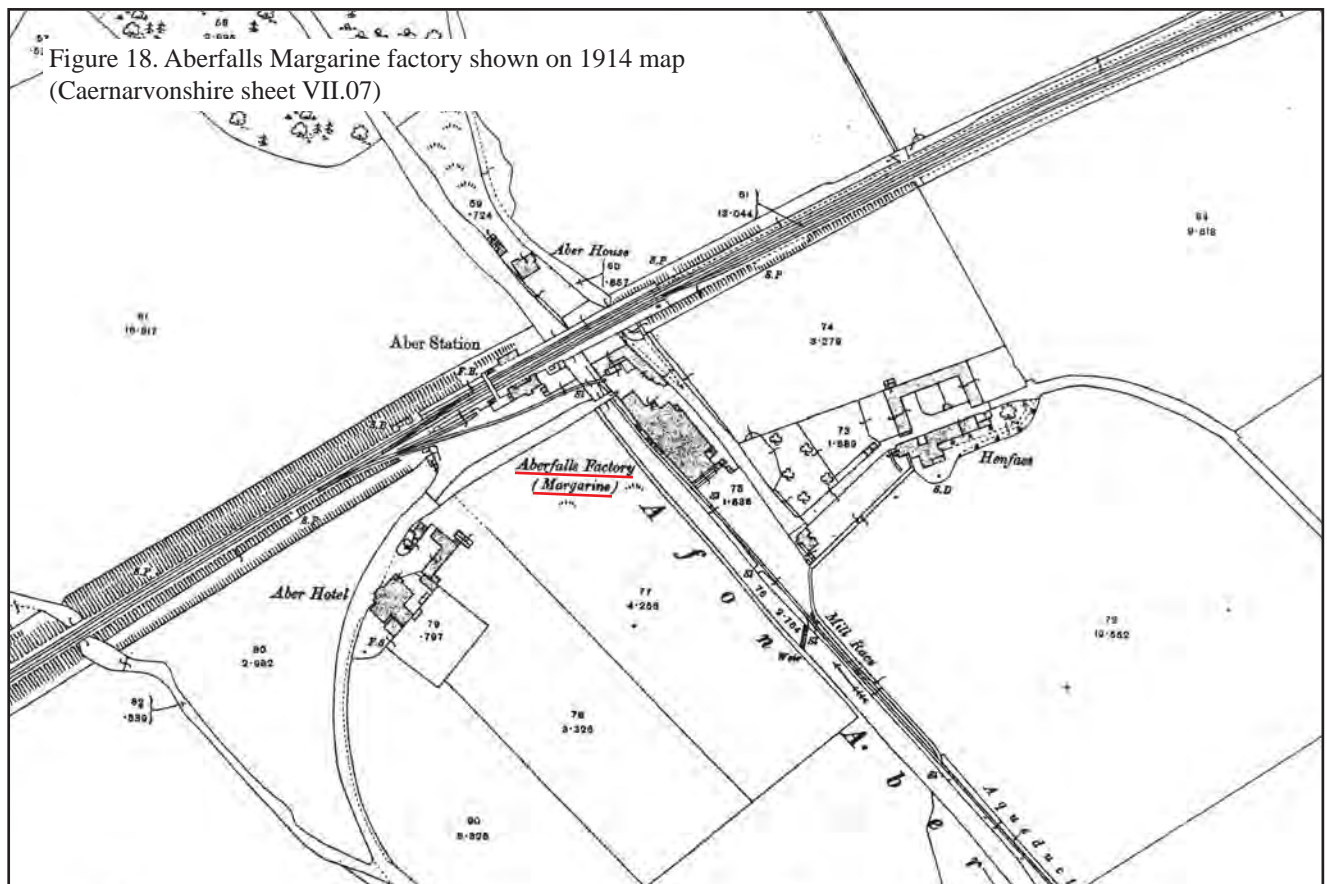


Plate 1. View of Cefndu Transmitter Station (PRN 887), showing mast base PRN 61279 surrounded by stay anchors

PRN 61279



Plate 2. Mast base PRN 61279

Plate 3. Stay anchor PRN 61276





Plate 4. Base of mast, note open access hatch for maintenance and stay anchor to the left. Photograph dated 1912 but probably actually 1914
(The Marconi Company Ltd)



Plate 5. View of Transmitter Station from the access road. Note the railway tracks (PRN 60177) by the road, Marconi Hall (PRN 58769) in the mid-ground and the aerial masts in the background. Photograph dated 1912 but probably actually 1914.
(The Marconi Company Ltd)



Plate 6. Probable blockhouse (PRN 10034) photographed in 1988, with causeways or railway trackbeds in front

Plate 7. Probable blockhouse (PRN 60197)



Plate 8. Interior of PRN 60197, showing gun loops



Plate 9. Building PRN 60193 on summit of Cefndu



Plate 10. Reservoir PRN 60216



Plate 11. Post-1914 additions to main transmitter building PRN 58768, viewed from the west



Plate 12. Main transmitter building (PRN 58768) in 2015, with former Power House (PRN 60176) in front



Plate 13. Main transmitter building (PRN 58768) in 1914, with Power House (PRN 60176) in front (The Marconi Company Ltd)



Plate 14. Power House (PRN 60176) in 1914 (The Marconi Company Ltd)



Plate 15. The Marconi Hall (PRN 58769)



Plate 16. The Marconi Hall (PRN 58769),
main entrance



Plate 17. Receiver station main
buildings, Tywyn (PRN 60174)



Plate 18. Marconi Bungalows,
Tywyn (PRN 60173)



Plate 19. No. 7, Marconi
Bungalows, Tywyn (PRN 60173)
with render removed for repairs,
showing original weather boards
and part of a blocked window



Plate 20. The doorway at No. 8, Marconi Bungalows



Plate 21. The original circular window at No. 7,
Marconi Bungalows, and part of a blocked window



Plate 22. Mast base PRN 60184



Plate 23. Mast base PRN 60185



Plate 24. Mobile phone mast and hut adjacent to mast base PRN 60185



Plate 25. Site of wireless aerial to the left of Llain y Gors Cottages (PRN 60171)

Plate 26. Llain y Gors Cottages: the cottage at the left end of the terraced cottages was used by the wireless operators, the separate building just beyond was a work shed (PRN 60171)



Plate 27. Llain y Gors Cottages as they were in the First World War (image courtesy of Mair and Roland Williams)

ITOR

WRITE TO: Daily Post, PO Box 48, Old Hall Street, Liverpool L69 3EB. Name and address must be given. Letters may be edited.

nt an 'affront'

assemble) and a six-inch Howitzer which bore a plaque saying "property of Birmingham Parks."

When enemy paratroops were reported landing in the area we piled into the furniture van armed with sticks to go and round them up.

The Lewis gun was later mounted on a tripod surrounded with sandbags and manned 24 hours a day, although we couldn't fire it during the hours of darkness.

One day the CO received a message from a nearby RAF station. The pilot congratulated us on our aim, but asked us to confine our shooting to enemy planes as his Blenheim had been hit.

When enemy planes passed over the barracks we placed white canvas strips on the ground in the shape of an arrow pointing in the direction the plane had gone. This was to help our own pilots if one happened to be in the vicinity.

There were no anti-aircraft guns or searchlights at this time in Pembroke Dock and so enemy planes could drop their bombs unmolested, and on August 19, 1940, I watched a plane drop a stick of bombs on the oil tanks which were to burn for 23 days and claim the lives of five Cardiff firemen.

In true Dad's Army fashion, I was sent equipped with flat-nosed shovels and six men to help fight the fires.

After many farcical incidents, our furniture van came to grief under a low bridge at Pontypridd.

Harry Hartill,
Pontypridd, Mid-Glamorgan.

Magic sparks

MR CAVE, of Llaingoch, Holyhead, who referred to the Marconi Station in Queen's Park, Holyhead (*Letters*, December 23), is correct.

Many times as a young boy, I stood looking through the front windows at No. 21 fascinated by the sparks when the apparatus was being used.

Next to the house, in a field which was known locally as Cae Polyn Mawr, was a very tall mast secured by long stays. There, a rather wild mule grazed to deter children from climbing the stays and mast.

I was born in 1911, eight houses further down in what was then No. 14 (now 52). The station was operational then until about 1920-1922. On a clear day from our front bedroom window we could see the masts at Waunfawr.

Sometimes we could feel the dynamos reverberating through the houses, and from our front door we could hear them humming.

Eric Higgins, Chester.

Rejoicing

THE Bishop of Durham can rejoice at Christmas time with your correspondent Mr T Idwal Owen and me and countless other believers because Christmas "is a time to affirm and celebrate the underlying glory of the whole world and the eternally promised glory of that world in and through the God who has become one of us, to be one with us and at one for us".

The words are taken from the Bishop's Christmas sermon for 1984.

It is true that he believes that the truth of God becoming man does not depend upon the virginal conception; but surely we shall be judged, not on our views about this, but rather on whether we have responded with love and forgiveness amid this mysterious and contradictory life which Christians believe is given by the God and Father of our Lord Jesus Christ.

(Rev) David Hugh Rees,
Meliden, Prestatyn.

Plate 28. Letter in Daily Post from E Higgins about Holyhead Wireless Station (PRN 60187)

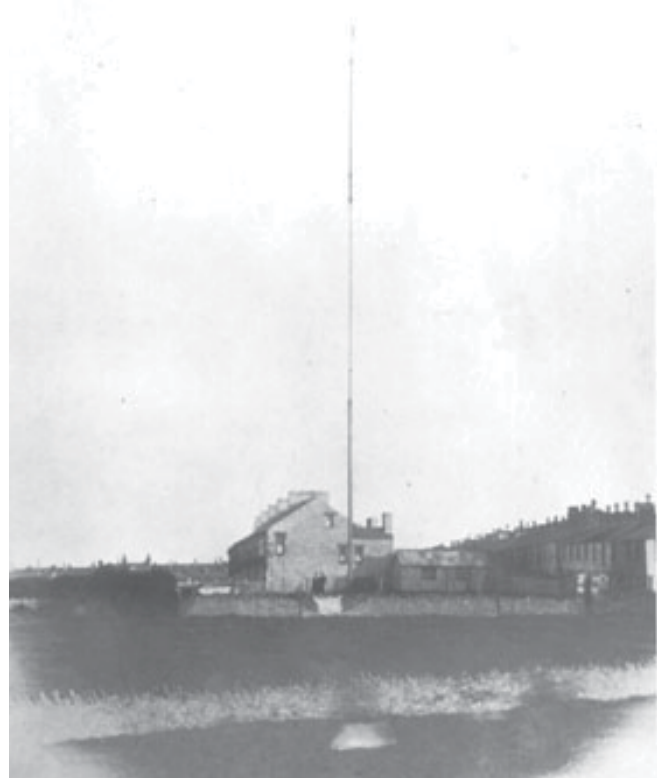


Plate 29. 1901 photograph of the Holyhead Wireless Station (The Marconi Company Ltd, obtained from www.oscarkilodxgroup.com)

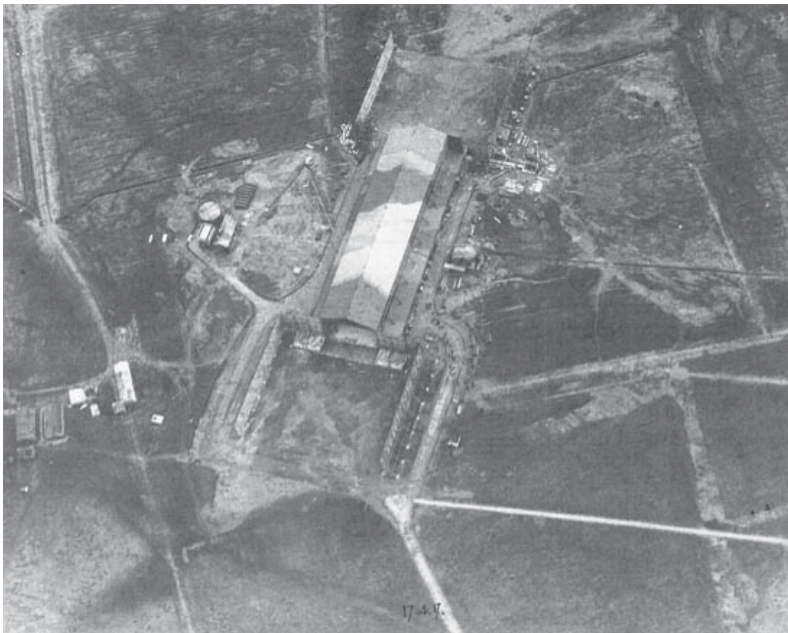


Plate 30. View of airship shed taken from an airship in 1917, with gas plant to left of the shed (courtesy of Anglesey Archives)

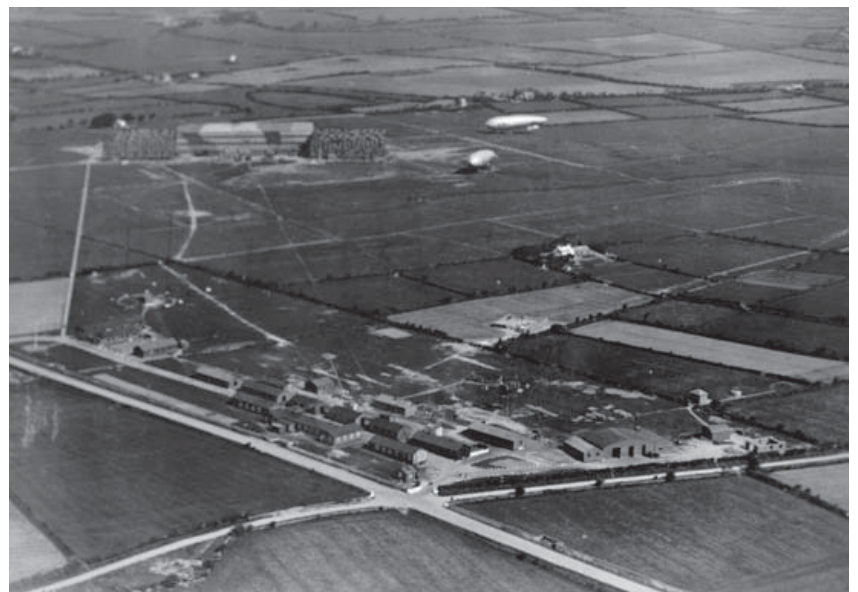


Plate 31. View of airship station taken from an airship in 1918 (courtesy of Anglesey Archives (WM/2010))

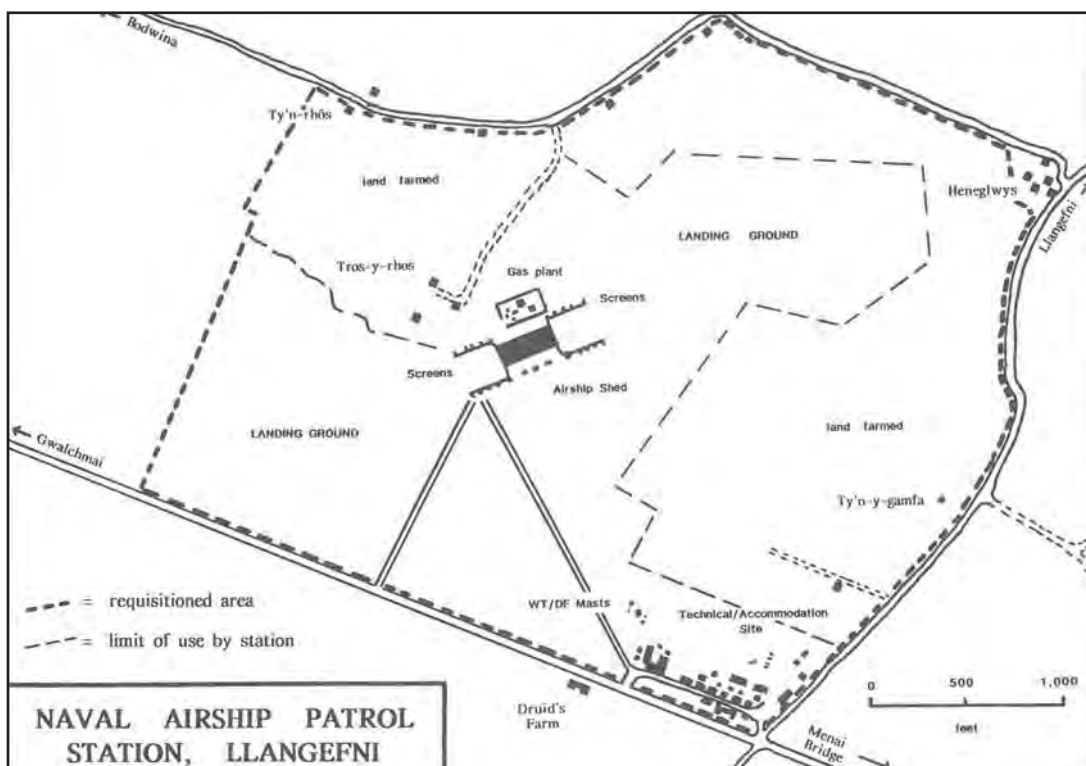


Plate 32. Plan of RNAS Llangefni copied from Pratt and Grant 1998, p40 (used by permission of Mike Grant)



Plate 33. Main office complex at RNAS Llangefni in 1918 (courtesy of Anglesey Archives (WM/1609/17))



Plate 35. Airship pilot in flying gear at RNAS Llangefni standing on veranda of accommodation hut (courtesy of Anglesey Archives (WM/1609/16))



Plate 34. WJ Baker at RNAS Llangefni in 1917 with water tower behind (courtesy of Anglesey Archives (WM/2010))



Plate 36. An SS Zero type airship stationed at RNAS Llangefni (courtesy of Anglesey Archives (WM/2010))



Plate 37. View looking east over eastern part of the former Bangor Airfield (PRN 27310)



Plate 38. Slate fences were used when field boundaries were replaced on the decommissioning of Bangor Airfield (PRN 27310)



Plate 39. Emergency blast shelter now used as a bat roost (SH61894 38894)



Plate 40. Path/track that ran through the First World War factory (taken from cSH61822 38900)



Plate 41. Site of de-nitration plant (NPRN 85224) from south



Plate 42. Valley that contained the early explosives works, view from the north



Plate 43 Erecting shed with machine shop to the left at Boston Lodge used for the shell factory (PRN 60175)

Plate 44. North-west elevation of the erecting shed (PRN 60175)



Plate 45. Staff at Boston Lodge 1917 with lathes for turning shell-casings (Caernarfon Record Office XD97/20001a. Copyright Gwynedd Archives Service)





Plate 46. Inside machine shop at Boston Lodge (PRN 60175)

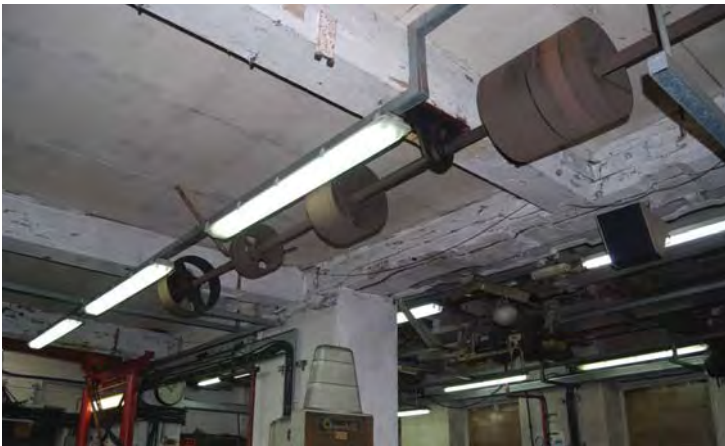


Plate 47. Remains of belt drives in the machine shop



Plate 48. Inside part of the erecting shed at Boston Lodge (PRN 60175)



Plate 49. Remains of belt drives in the erecting shed



Plate 50. Plan of the Vulcan Foundry (PRN 61325) shown on an engraved ledger page (Caernarfon Record Office 22284/2)



Plate 51. Staff at the Caernarfon Shell Factory. The caption to the photograph reads “Women munition workers at Caernarfon during the first World War. They were producing eighteen-pounder shells” (Caernarfon Record Office XS1497/7/8. Copyright Gwynedd Archives Service)



Plate 52. Apartment building on the site of the Vulcan Foundry



Plate 53. At least some of the walls of the National Tyre business are reused from the Vulcan Foundry buildings



Plate 54. Irish Republican painting (PRN 60178) by James Byrne from Dublin done while he was interned in Frongoch prisoner of war camp.



Plate 55. Paddy Fitzsimmons (nephew of James Byrne) and friends visiting Frongoch during a tour with their choir.



Plate 56. Section of a 6-key wooden B flat flute (PRN 60876) found at Railway Cottage, Frongoch



Plate 57. Crucifix in a bottle (PRN 61150) made in Frongoch prisoner of war camp.



Llywodraeth Cymru
Welsh Government



Gwynedd Archaeological Trust
Ymddiriedolaeth Archaeolegol Gwynedd

Craig Beuno, Ffordd y Garth, Bangor, Gwynedd. LL57 2RT
Ffon: 01248 352535. Ffacs: 01248 370925. email: gat@heneb.co.uk

