Belfast Store, Gwaith Powdwr, Penrhyndeudraeth, Gwynedd
Standing Building Record

EAS Client Report 2016/04

Recorded by
I.P. Brooks

April 2016

Engineering Archaeological Services Ltd
Unit 2 Glanypwll Workshops
Ffordd Tanygrisiau
Blaenau Ffestiniog
Gwynedd
LL41 3NW

Registered in England No 286978

Belfast Store, Gwaith Powdwr , Penrhyndeudraeth, Gwynedd
Standing Building Recording

EAS Client Report 2016/04

Commissioned by

The National Trust
On behalf of
The North Wales Wildlife Trust

April 2016

Survey and Analysis
by
I.P. Brooks

Engineering Archaeological Services Ltd
Unit 2 Glanypwll Workshops
Ffordd Tanygrisiau
Blaenau Ffestiniog
Gwynedd
LL41 3NW

Registered in England No 286978

CONTENT

List of Figures

List of Plates

Belfast Store, Gwaith Powdr, Penrhyndeudraeth, Gwynedd

Grid Reference: SH 61829 38622

NPRN Number: 85211

Introduction

Referred to as a "Nitro Cotton Store" by the Royal Commission on the Ancient and Historical Monuments of Wales (http://coflein.gov.uk/en/site/85211/details/COOKE%27S+EXPLOSIVES+WORKS%3A+NITRO+COTTON+STORE/) the "Belfast Store" formed part of an extensive complex of buildings which formed the Cooke's Explosive Works, Penrhyndeudraeth which extended over an area of 28 Ha. The building now stands in the corner of the yard operated by Gews Ltd (Figure 1), however it is owned by the North Wales Wildlife Trust and The National Trust, currently, has a covenant on the building.

The production of explosives on the site started in 1865, however the site was sold to R.T. Cooke by The Ministry of Munitions in 1922. The complex was then sold on to ICI in 1958 who continued production until 1995 (Gwyn 2006, 138). At its height the complex covered an area of approximately 28 Ha.

It is intended to demolish the Belfast Store, thus The National Trust has commissioned this report, on behalf of the North Wales Wildlife Trust, prior to an application, to demolish the building. The aims were to record the standing building remains and to interpret the building as far as possible. No companion desktop research was commissioned.

Methodology

The ground floor and first floor plans were made by direct measurement. Photographs were taken with a Nikon D80 digital SLR camera at a resolution of 10.2 mega pixels. Where practical all the photographs included a metric scale. The elevations and detailed drawing of one of the trusses was made using a Leica TS06 total station with refectorless capability with the data being processed using NRG Engineering Surveying System v. 2016.00.

Survey Report

The surviving building consists of a single range 19.46 x 7.88 m in size, aligned NNE – SSW (Figure 2 and 3) and standing to a height of 7.92 m representing the full height of the building. It is largely constructed of coursed, stone slabs but the southern end of the building and the quoins on the windows are of brick.

The eastern elevation (Plates 1 – 3, Figure 4) consist of two main construction styles, whilst the majority of the building is constructed of coursed stone slabs, the southern end is largely constructed of red industrially produced bricks (Plate 2). This end of the building has a doorway leading into what is assumed to have been an office space and a first floor window with an iron framed casement window frame. It would appear that this brickwork represents a secondary phase of construction with the door having been added at a later date. This window is divided by two mullions and four transoms (all of iron) giving fifteen panes, with three panes on each side of the window forming the opening sections of this window. This window would appear to have been a late insertion into the building as is demonstrated by the panel of later brickwork below it. This suggests at least three phases of construction at this end of the

building. The bulk of the rest of the elevation is of stonework (Plate 3), however there are brick quoins around the centrally placed, blocked, first floor opening and on the north eastern corner of the building above the height of 2.23 m above the current ground level. It is not certain as to whether these features are part of the original design, however it would seem likely that they are part of one of the phases of modification of the building. The main doorway is place, in the northern half of the elevation. Set back in the wall, the ledged door only occupies the northern half of the opening, possibly suggesting the presence of double door in the original structure. It is set approximately 0.60 m above the current ground level and is approached by a set of rendered stones steps. The rest of the opening is now filled by a wooden partition. Both the door and the central, first floor opening have concrete lintels.

There are a series of iron fittings attached to this elevation. A series of six, iron bars, (Plate 4) each 1.40 m long with an iron ring at each end, were used to hold the roof structure in place. They are retained at their lower ends by iron studs into the stonework and at the upper ends were attached to the woodwork of the roof. There are also a series of metal fittings around the central blocked opening (Plates 5 and 6). There was clearly a major structure attached to the side of the building at this point and a film shot in 1960 shows a two storey bay attached to the building at this point (http://player.bfi.org.uk/film/watch-cookes-explosives-limited-an-account-of-explosives-manufacture-in-penrhyndeudraeth-1960/) (Plate 7).

The northern elevation (Figure 5, Plate 8) has three opening, two on the first floor and one on the ground floor, all of which are shown as windows in the 1960 film of the works. Currently, however, the ground floor opening is occupied by double, ledged doors and the larger of the first floor openings has a complex structure of metal tubes and springs which appear to have swung out of the building to act as a luccum (a covered post extending from a building with a winch to allow the loading of materials to a higher floor). Whilst the smaller of the first floor openings and both corners of this elevation have red brick quoins, the larger opening is surrounded by grey, industrial brickwork showing that it has been modified at a late date. The ground floor opening now has a double, ledged, door set back near the inner surface of the wall and the return surfaces are covered in render. Scratched into this render, is the inscription “GR 99”. This date is after production had stopped on the site and may be related to works to make this building secure after it had been abandoned. (Plate 9)

It was not possible to record the western elevation in detail, because of the quantity of old vehicles and general junk along this elevation obscured the view. However, only limited features were noted (Plate 8) over the majority of this wall. There are similar iron retaining bars for the roof at regular intervals as on the eastern elevation. At the southern end of the elevation there are two opening: on the ground floor there is a doorway, which is surrounded by grey industrial brick (Plate 10), suggesting that it is a late modification of the building, and a window surrounded with red brick on the first floor.

The southern gable (Plate 11) also has two openings, a doorway on the ground floor and a blocked window on the first floor. The doorway is surrounded by grey, industrial bricks suggesting it is a late feature. The blocked window, however is both surrounded by, and blocked with red, machine made bricks. This blocking is probably related to the construction of the lean-too building seen both on the image from the 1960 film and on an aerial photograph taken in 1995 by C. Musson for the Royal Commission on the Ancient and Historical Monument in Wales (http://www.coflein.gov.uk/en/site/85184/images/COOKE%27S+EXPLOSIVE+WORKS%2C+PENRHYNDEUDRAETH/)

Inside, the ground floor (Figure 2) is divided into two rooms by a wall of grey industrial brick (Plate 12) similar to those around the doors in the western and southern elevations and to the surround of the larger opening in the northern elevation. It has a single centrally place door. This is a ledged door with a wooden handle and a later iron bolt on its northern side. The southern room consists of a relatively small space, little more than a corridor running across the southern end of the building, which was presumably used as an office.

Within the main room there are two staircases to the first floor, one adjacent to the wall dividing the ground floor and the other in the north eastern corner. That in the south western corner of the main room is a simple, straight, flight of wooden steps leading over the southern ground floor room. That in the north eastern corner (Plate 13) is also of wood, but has a quarter turn supported by dwarf brick walls. Adjacent to the turn in the stairs a steel "L" profile post supports the first floor. The rest of the first floor is supported by three "X" profile steel posts set in concrete plinths (Plate 14) and two "T" profiled posts, each partly set in each of the gable walls of the building (Plate 15). These posts support both lateral and transverse beams, each consisting of two "L" profile beams bolted together to form an inverted "T" profile beam. Between the posts the ceiling is also supported by three "I" section rolled steel beams which cross the width of the building. One of these beams is marked "Shelton Steel" with a weld mark (Plate 16). The Shelton Works in Hanley (Stoke of Trent) stopped making steel in 1978 having been formed as the Shelton Bar Iron works in 1841 and installing its first rolling mill in 1850 (http://www.thepotteries.org/shelton/dates.htm). The beams in the Belfast store, however are likely to be from the latter part of the production at the Shelton Works. There is some evidence that some at least two of the rolled steel beams were second hand when they were installed as they have a series of holes for fittings which do not appear to relate to the current building (Plate 17). The wooden floor above the steelwork was supported by a series of wooden joist which rest on the steelwork. It is possible that the first floor structure replaced an earlier structure as there is a disturbed area in the floor around the central post (Plate 18). This central post also marks the division between two finishes to the concrete floor of the building with the southern end having a series of parallel ridges whilst the northern half of the floor is smooth (Plate 19).

There appears to have been only limited electrical power to the building with the main switches located just inside the main doorway (Plate 20). This appears to have largely been used to power the two lights which hang from the ceiling (Plate 21).

The first floor is a single space (Plate 22), although the wooden floor only survives over part of the structure. This, however, allows the upper side of the floor support structure to be inspected (Plate 23) with the two "L" shaped beams bolted together to form the longitudinal and lateral supports. The larger of the openings in the southern gable contains a structure of iron pipes and springs (Plate 24) which appears to have swung out of the building to provide a means of winching materials into the upper floor. This clearly relates to the last phase of use of the building and is attached to the grey industrial brickwork which surrounds this opening.

There are two blocked opening on the first floor level. That in the eastern elevation (Plate 25) is blocked with grey industrial brick and appears to be related to the last phase of use of the building, that in the southern gables (Plate 26), however, is clearly from an earlier phase of modification having been whitewashed over the red bricks used for this modification.

The roof consists of six "Belfast Trusses" (Plate 27) which supported a light structure of boards covered by tar paper. Each of the trusses consists of a pair of tie-beams and segmental

arches (Plate 28) held together by a series of lattice work struts (Figure 6). This structure allowed relatively large spaces to be spanned by trusses constructed by short lengths of timber. A small section of the roof, itself, survives at the southern end of the building (Plate 29) showing the planking with the planks aligned with the curve of the roof and a series of lightweight purlins linking the trusses. The rest of the roof (Plate 30) has blown off and now rests on the hillside to the east of the building. Each of the trusses and the gable ends of the roof structure were held onto the walls by a series of iron straps (Plate 31) similar to those on the outside of the building.

The Belfast Truss was developed in the second half of the nineteenth century with the earliest advert for a curved wooden felted roof supported on bowstring girders found in The Dublin Builder for 1866 (Gould 2001, 78). It appears to have been particularly adopted by Anderson and Co. in Belfast from which it gets its name. The trusses were widely used up to the First World War when they largely went out of fashion, although later examples are known.

Discussion

The Belfast Store has clearly had a complex history of use and modification like many industrial buildings. An initial inspection of the easily available historic mapping of the area (Figure 7) would suggest that the building was initially constructed before the First World War, but after 1899. The building first appears of the Ordnance Survey map published in 1920 (although surveyed in 1913), but not on the earlier map published in 1901 (surveyed in 1889). At this phase it was likely to have been a stone built structure, probably with a Belfast Truss roof. It is not certain if this was a single storey building at this time or was divided into two floors. The supports for the first floor, however are probably the result of later modifications.

The walls of the building suggests at least three phases of modification, particularly at the southern end of the building. The use of red brick at the southern end of the building suggest a remodelling of this end with the addition of at least one door in the eastern elevation and probably the window in the southern gable. It is not certain if the red brick quoins to the other windows and the upper part of the northern corners of the building are also of this phase of construction or are part of the original design. A second phase of modification saw the insertion of the first floor window at the southern end of the eastern elevation.

The third phase of modification is marked by the use of grey industrial brick to divide the ground floor and modify the larger of the openings in the northern gable and the door at the southern end of the western elevation. It is likely that this phase also saw the insertion of the current floor structure which probably used rolled steel beams derived from elsewhere. It is not certain when the bay added to the eastern elevation seen on the 1960 film was constructed, but it is possible that the need for a more robust structure inside the building is related to the added structure outside.

The dating of these putative phases of modification is impossible with the current information, however, a detailed examination of the Cooke Explosive Works Archive held by the Gwynedd Archive Service in Dolgellau would assist in this matter.

Acknowledgements

This report was commissioned by K. Laws for the National Trust. Access to the building was organised by Rob Booth for The North Wales Wildlife Trust, whilst physical access was provided by Gews Ltd.

References

Anon. 1960 *Cooke's Explosives Ltd – an account of explosive manufacture in Penrhyndeudraeth*. Film on the http://player.bfi.org.uk website.

Gould, M.H 2001. A Historical Perspective on the Belfast Truss Roof. *Construction History 17, 75-87*

Gwyn, D. 2006 *Gwynedd Inheriting a Revolution. An Archaeology of Industrialisation in North West Wales*. Phillimore

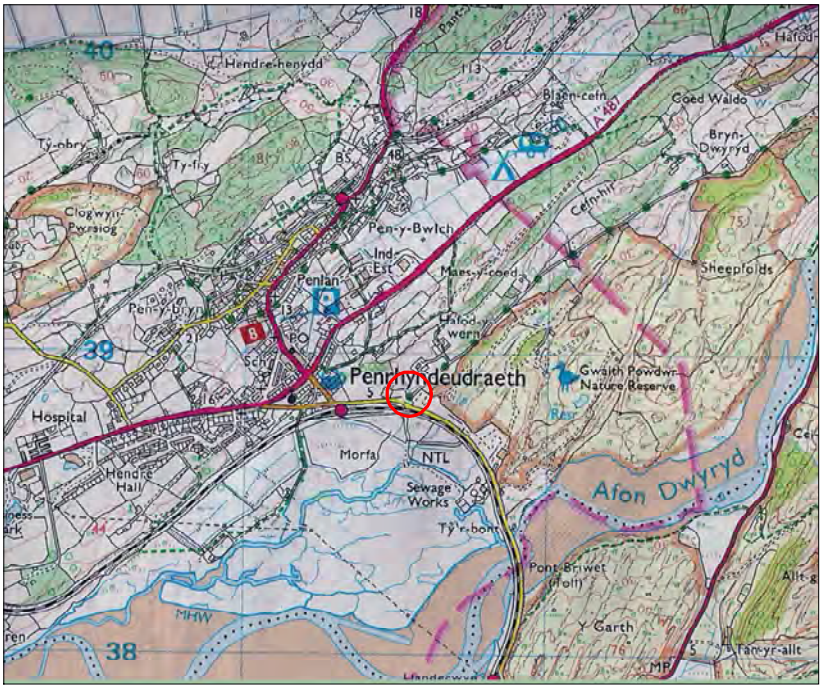

Figure 1: Location
Scale 1:25000

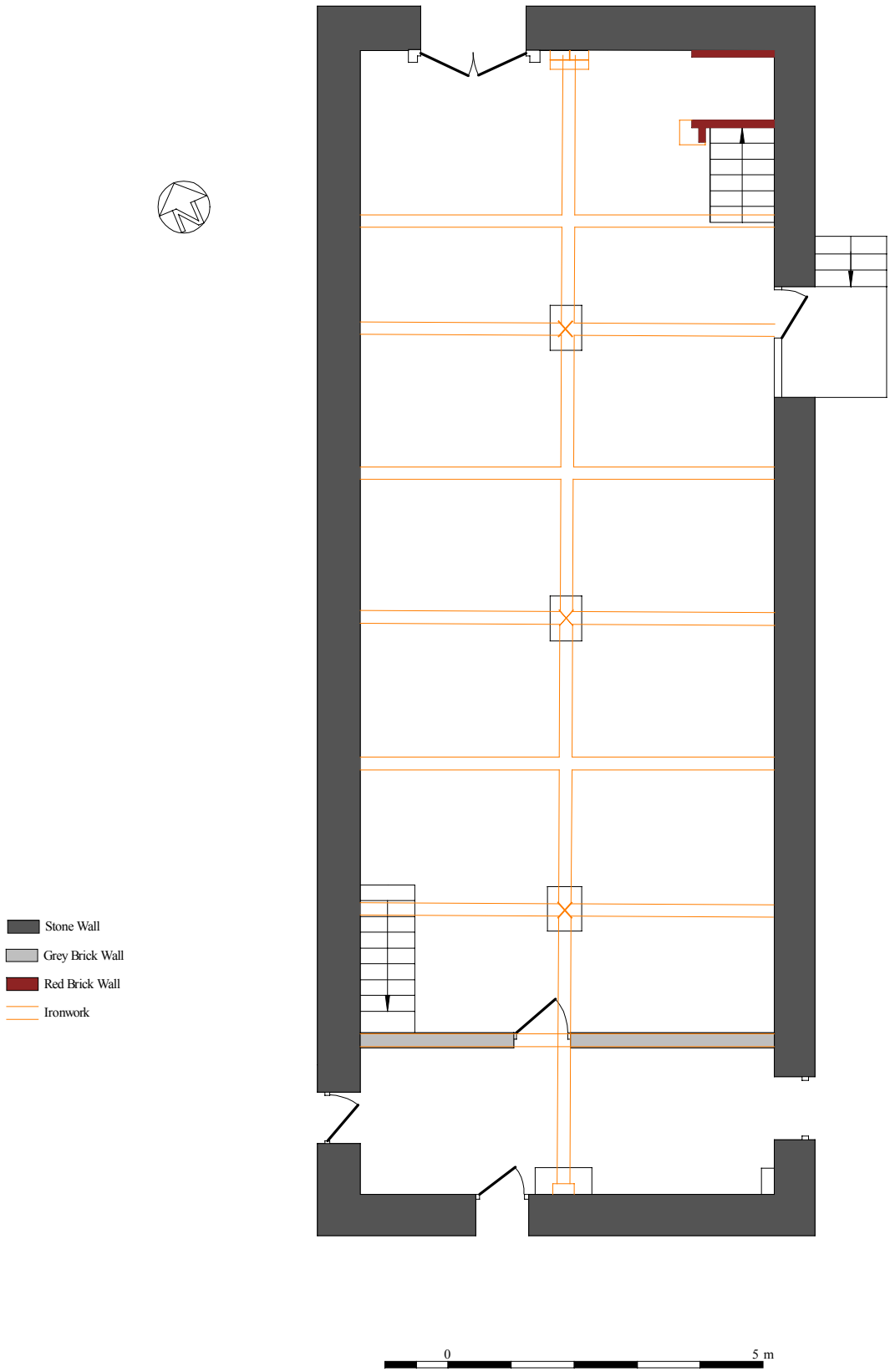

Figure 2: Ground Floor Plan
Scale 1:100

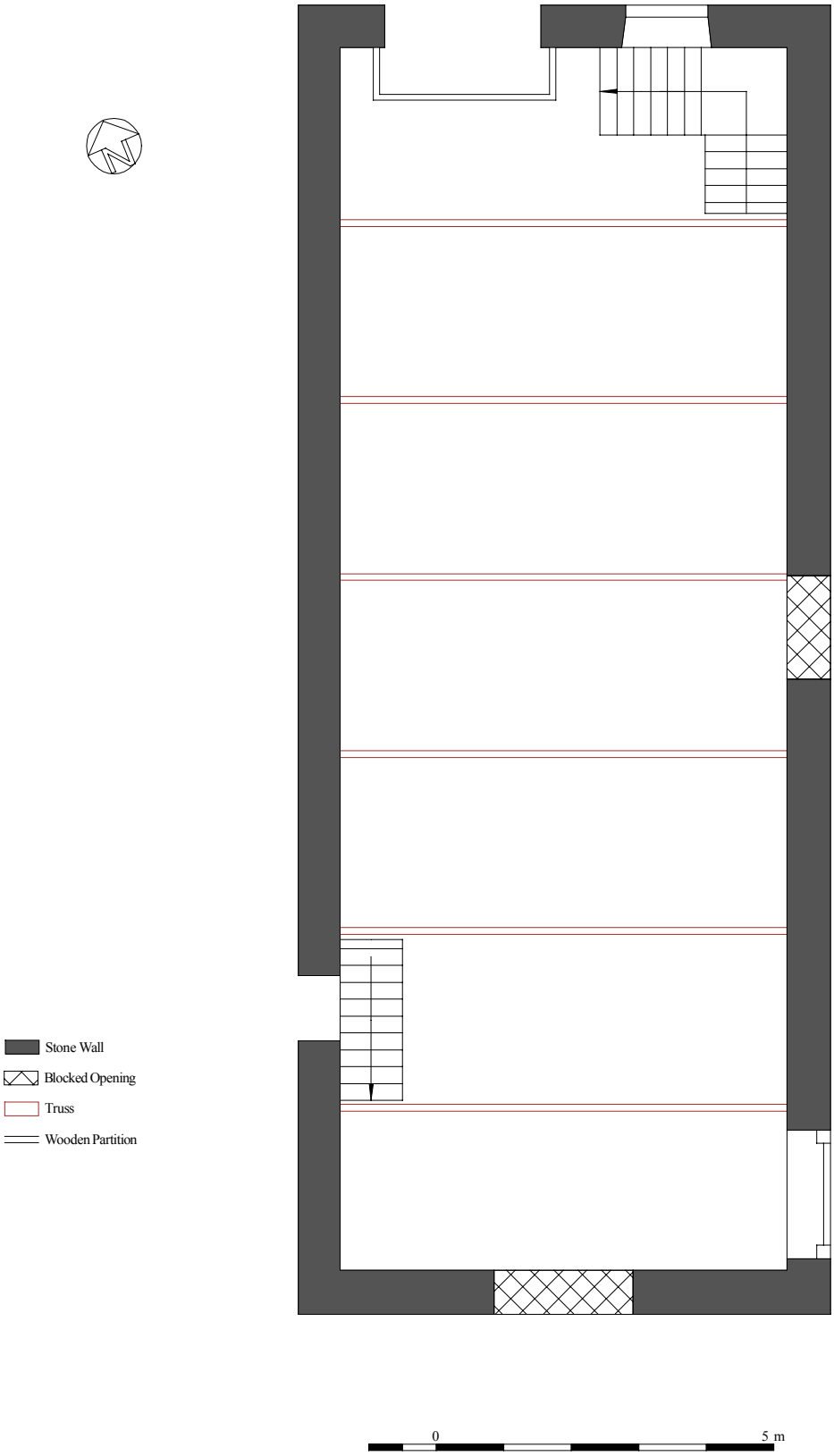

Figure 3: First Floor Plan
Scale 1:100

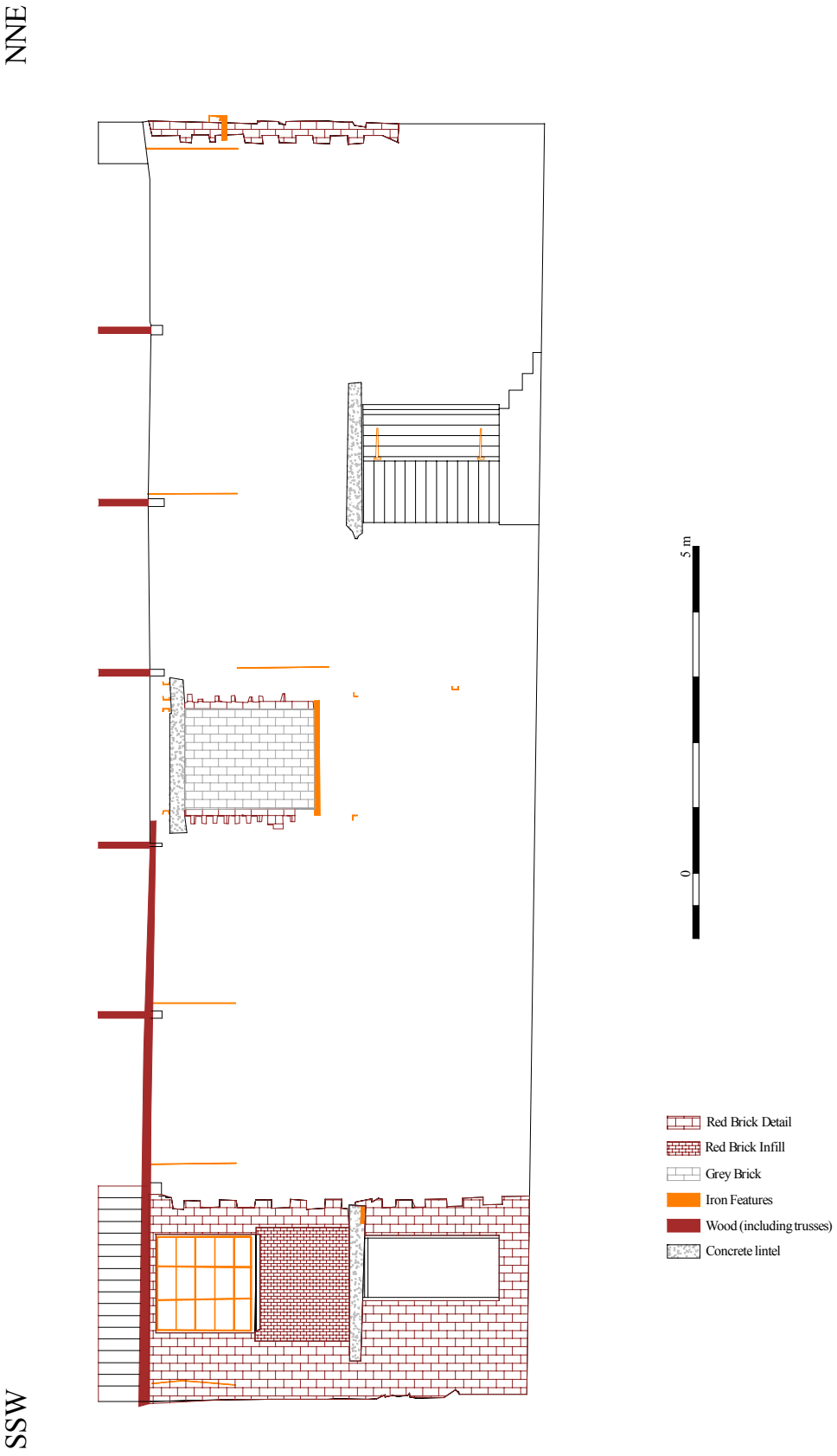

Figure 4: Eastern Elevation
Scale 1:100

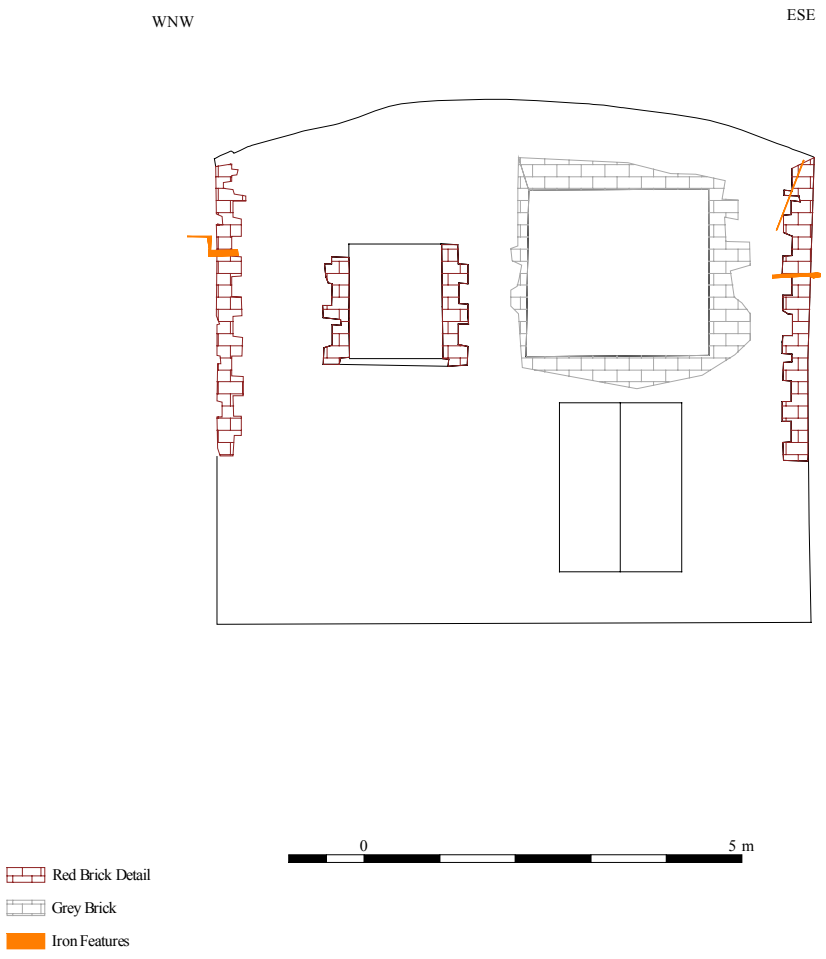

Figure 5: Northern Elevation
Scale 1:100

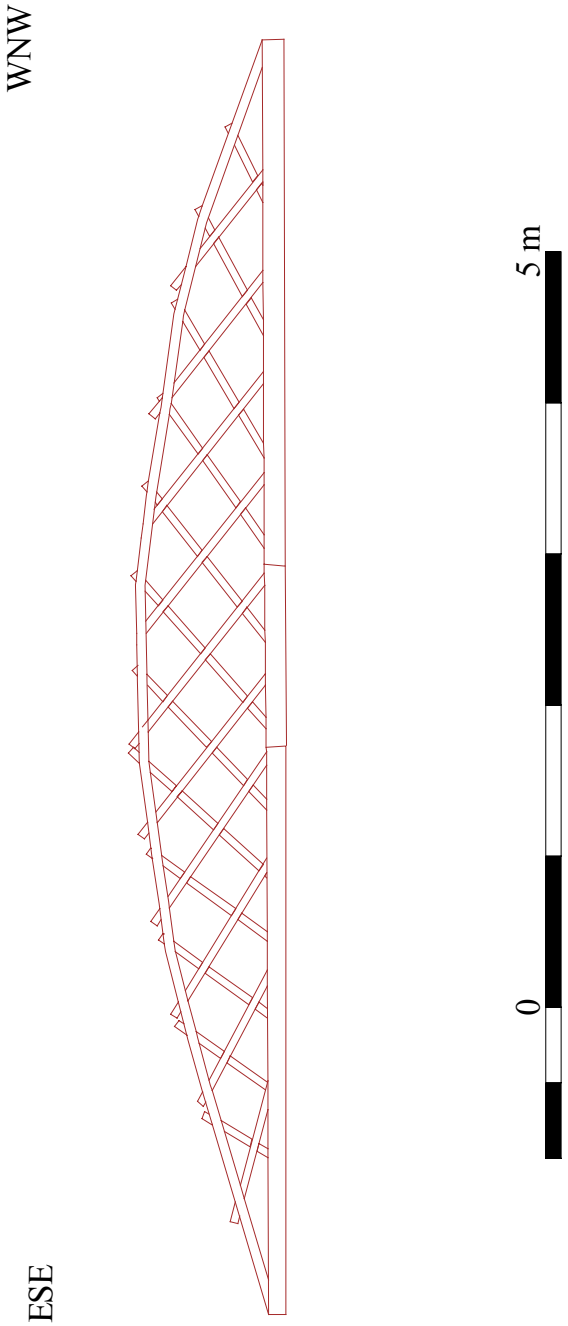

Figure 6: One of the Belfast Trusses
Scale 1:50

Published in 1901

Published in 1920

Figure 7: Extracts from the Ordnance Survey
Caernarvonshire XXXV SW Maps
Not to Scale

Plate 1: The eastern elevation

Plate 2: Southern end of the eastern elevation

Plate 3: Northern end of the eastern elevation

Plate 4: Details of the iron straps attaching the roof to the walls

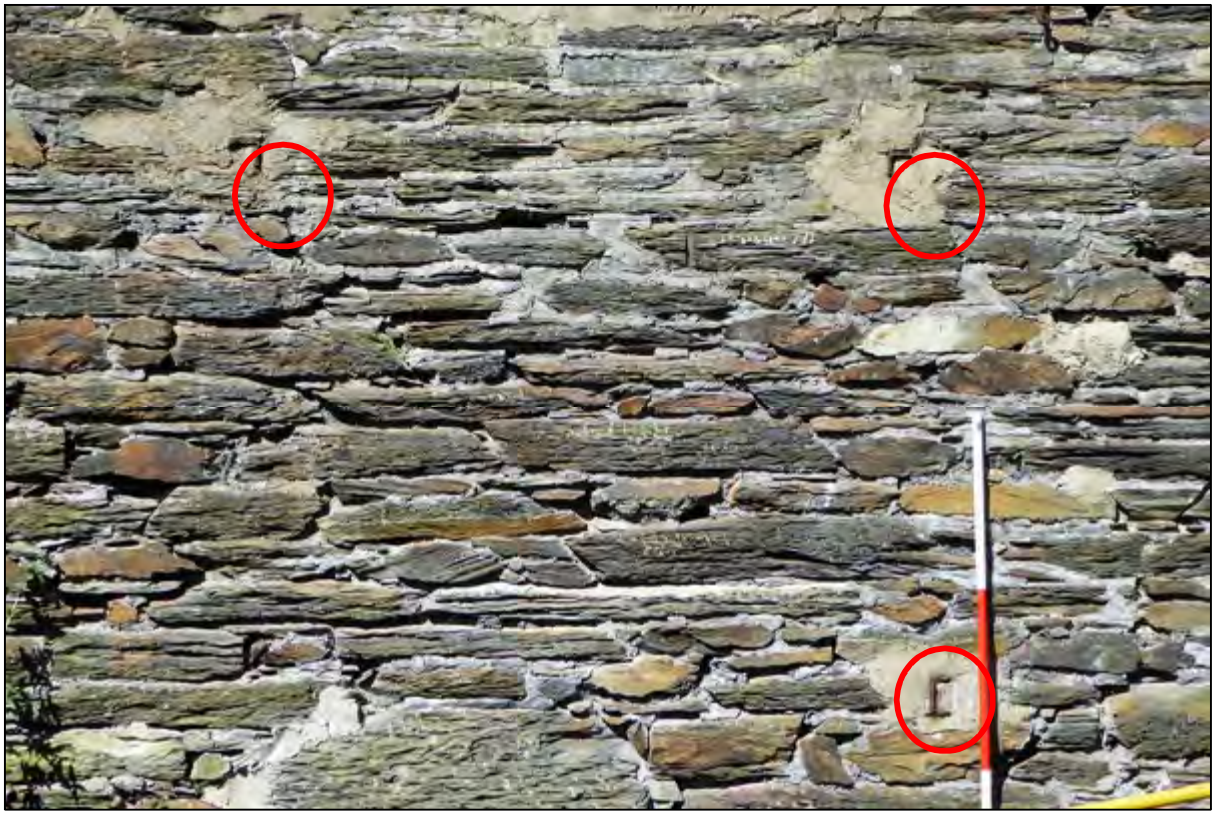

Plate 5: Details of the metal fittings on the eastern elevation

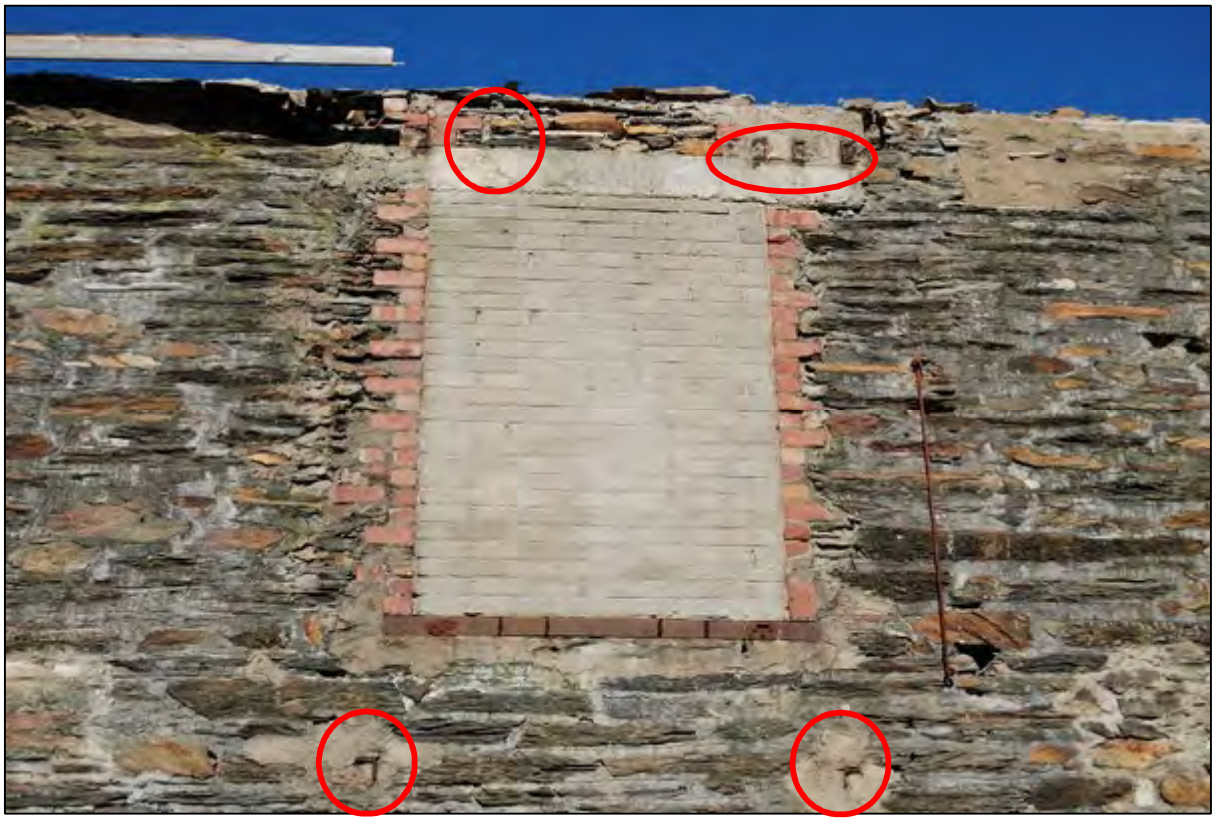

Plate 6: Blocked opening and metal fittings on the eastern elevation

Plate 7: Screen grab from the 1960 film “Cooke’s Explosives Ltd – an account of explosive manufacture in Penrhyndeudraeth.”

Plate 8: The northern and western elevations

Plate 9: Graffiti scratched into the return of the northern door

Plate 10: Doorway at the southern end of the western elevation

Plate 11: The southern gable

Plate 12: Ground floor, looking south

Plate 13: The north eastern staircase

Plate 14: Typical supporting post

Plate 15: Steel post in the northern gable wall

Plate 16: Manufacturer's stamp on one of the rolled steel beams.

Plate 17: Evidence for possible previous use of the rolled steel beams

Plate 18: Disturbed area around the base of the central post

Plate 19: Differential floor finish between the two ends of the main ground floor room

Plate 20: The power supply to the building

Plate 21: One of the ground floor lights

Plate 22: The first floor looking south

Plate 23: The upper side of the floor supports

Plate 24: Mechanism in the larger, first floor opening in the northern gable

Plate 25: Blocked opening in the eastern face

Plate 26: Blocked opening at the southern end of the first floor.

Plate 27: The “Belfast Trusses”

Plate 28: The underside of one of the trusses

Plate 29: The surviving portion of the roof structure

Plate 30: Remains of the roof

Plate 31: Iron straps holding the roof structure