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# PROPOSED QUARRY REALIGNMENT, PENRHYN QUARRY, BETHESDA

## **Archaeological Assessment**

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GAT Project No. 2098

Report No. 837

November 2009

# G2087 PROPOSED QUARRY REALIGNMENT, PENRHYN QUARRY, BETHESDA

Archaeological Assessment

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Report number: 837

Prepared for

SLR Consulting Ltd

By

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November 2009

Ymddiriedolaeth Archaeolegol Gwynedd  
Gwynedd Archaeological Trust

# **G2098 PROPOSED QUARRY REALIGNMENT PROJECT, BETHESDA, GWYNEDD**

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### **Gwynedd Archaeological Trust Report No. 837**

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## **G2098 PROPOSED QUARRY REALIGNMENT, PENRHYN QUARRY, BETHESDA, GWYNEDD**

### ***Summary***

*An archaeological assessment was carried out on land adjacent to Penrhyn Quarry in advance of a proposed quarry realignment. Several sites were identified within the area of the proposed realignment. The most significant are a prehistoric settlement and a possible medieval hafod. It is recommended that these two sites are avoided and preserved in situ. If this is not possible a comprehensive programme of excavation is recommended. Other minor sites were identified which could be recorded in advance of destruction. No sites were identified on the south-eastern side of the realignment area.*

### **1. INTRODUCTION**

Gwynedd Archaeological Trust has been asked by SLR Consulting Limited to carry out an archaeological assessment in advance of a proposed quarry realignment project at Penrhyn Quarry, Bethesda.

The proposed realignment comprises a c.6.4 ha. extension to the existing Penrhyn Quarry incorporating an area of upland to the south west of the current workings (centred on NGR SH61146396).

Gwynedd Archaeological Planning Service (GAPS) (ref. D1324) requested an archaeological assessment. This has been conducted in accordance with guidelines specified in *Standard and Guidance for Archaeological Desk Based Assessment* (Institute of Field Archaeologists, 1994, rev. 2001).

### **2. METHODOLOGY**

The desk-based assessment involved a study of the Historic Environment Record (HER) information for the study area. This included an examination of the core HER, and secondary information held within the record which includes unpublished reports, the 1:2500 County Series Ordnance Survey maps, and the National Archaeological Record index cards. The National Monuments Record (NMR) was checked for sites additional to the HER. Relevant manuscripts and maps within the Caernarfon Record Office were consulted. Secondary sources were examined, including the Inventories of the Royal Commission on Ancient and Historical Monuments for Wales (RCAHMW), and works held at the University of Wales Bangor library. Indices to relevant journals, including county history and archaeology society journals and national society journals such as *Archaeologia Cambrensis* were checked. RAF aerial photographs taken in 1947 and 1948 were consulted at RCAHMW. Information about Listed Buildings and Scheduled Ancient Monuments was obtained from Cadw: Welsh Historic Monuments.

The field survey assessment involved visiting the entire study area and assessing the sites identified during the desk-based study. Any additional sites noted were also assessed.

The aims of this stage of the work were to:

- verify the results of the desk based assessment
- identify any further archaeological sites which may exist as above ground features
- photograph and record the present condition of all sites noted.

The field survey, involving a walk over of the development area and its immediate surroundings, was carried out on 12<sup>th</sup> November 2009.

PRN numbers refer to unique numbers given to each known site on the Gwynedd Historic Environment Record (HER). Each site is allocated to a category of importance based upon a ranking divided into the following levels of importance: National (A); Regional (B); Local (C); Other (D); Sites requiring further investigation (E). This last classification is used for sites which cannot be assessed without

undertaking a further stage of assessment. By the end of the assessment there should be no sites remaining in Category E, unless they will not be affected by the proposed works. See Appendix I for a full definition of these categories.

### **3. LOCATION AND TOPOGRAPHY**

#### **3.1 General location**

The proposed realignment is a roughly rectangular area of 570 x 200m situated on the southern side of Gwaen Gynfi, a large expanse of mostly unenclosed peat bog to the south of Mynydd Llandegai (Fig. 1). The land rises from 275m OD at the north to around 400m at the south. The bog drains into the Afon Marchlyn Mawr which in turn runs into the Galedffrwd, a tributary of the Ogwen. The borders of the bog adjoining the quarry are better drained and consist of natural terraces and boulder fields.

#### **3.2 Geology and Topography**

The geology of the area consists of Cambrian slate. Most of Gwaen Gynfi consists of deep peat. The south-eastern margins of the bogs on the lower slopes of Carnedd y Filiast are characterised by periglacial boulder fields forming scarps up to 5 metres high and natural well-drained terraces.

#### **3.3 Statutory and non-statutory designations**

There are no Scheduled Ancient Monuments or listed buildings within 1km of the proposed realignment. The quarry and proposed realignment lie within the non statutory Dyffryn Ogwen Landscape of Historic Interest (No. 28 HLW (Gw) 10 Cadw 1998). It falls within Historic Landscape Character Area 41 – Moel y Ci/Gwaen Gynfi unenclosed uplands (Fig. 2 reproduced from GAT Report 351, 2000). See 4.5 below for further details.

The area is 0.6 km outside the Snowdonia National Park.

### **4. ARCHAEOLOGICAL BACKGROUND**

#### **4.1 Introduction**

The area around the proposed realignment contains two very different archaeological landscapes. To the east lies the extensive industrial landscape of Penrhyn slate quarries. The proposed realignment and the area to the west consist of the mostly unenclosed peat bogs and boulder fields of Gwaen Gynfi. A group of hitherto unrecognised cairns and standing stones were recorded on Gwaen Gynfi by Cymdeithas Archaeolog Llandegai a Llanllechid in 1987 (Caffell 1988). A survey was subsequently carried out by the society and Gwynedd Archaeological Trust as part of the 1989 Upland Survey programme. The bogs were found to show extensive signs of peat cuttings. A range of monuments were recorded on drier, raised ground, particularly around the boulder fields (GAT report 22 1993). The principal sites from this survey are shown on Fig. 1.

#### **4.2 Prehistoric and Roman activity**

A cairnfield consisting of 44 grassed over cairns, possibly dating from the Bronze Age lies at the north of Gwaen Gynfi (PRN 5671). Cairnfields are often assumed to be the result of field clearance. In this case, however, the sites are very closely bunched together and several exhibit the remains of a kerb of large stones, being a form more typical of bronze-age burial cairns. Local historian H.D. Hughes recorded that ‘on opening two or three old cairns there in 1856...workmen found in each a stone cist and quern’ (Hughes 1866, 34 trans Caffell 1988) again suggesting burial cairns.

Two ruined prehistoric settlements (PRNs 5670 and 5380) were recorded in the area. These comprise hut circles, enclosures delineated by low stone walls, trackways and small clearance cairns. Site 5380 falls within the proposed realignment. This is a settlement (Fig. 3) on relatively level ground at 370m OD beneath a 5m high natural scarp. A large post medieval multicellular sheepfold stands in the centre of the site. Both sites are described in detail in the gazetteer (below). Two further areas of wandering

wall and miscellaneous structures may also indicate less well-preserved settlements (PRNs 12430 and 12500).

Hut circle settlements are usually dated to the Iron Age or Romano-British period although upland settlements of this type (i.e. small huts and wandering walls, a good example being at Cwm Ffriddlas Bethesda) may well date from the Bronze Age. Further research is needed in North Wales but it is likely that at least some upland settlement was abandoned after a change in to a wetter, cooler climate in the centuries 1,300 to 1,000 BC (For further discussion see Davies and Lynch, 2000 pp 91-5)

Two isolated hut circles without associated features were also recorded in the northern part of the survey area (PRNs 12638 and 12195).

### **4.3 Medieval**

Three sites may be of medieval date. The fragmentary foundations of a rectangular building perhaps with an internal division may be a medieval hafod (upland summer dwelling PRN 12327). This falls within the proposed realignment and is site 13 in the gazetteer and detailed plan (Fig. 3). A trackway appears to be associated with the possible hafod (PRN 12328, site 12 in gazetteer). Sheepfold 12384 is built over an earlier structure that the Upland Survey report suggests may be medieval.

### **4.4 Post Medieval and modern**

The development of Penrhyn quarry has dominated the Ogwen Valley throughout the 19<sup>th</sup> and 20<sup>th</sup> centuries. Its history and development are complex and are summarised below from several sources (Richards 1991, Lindsay 1974 and Cadw 1998).

The earliest extant record of quarrying in the area is in the rent-roll of Gwilym ap Griffith in 1413 where a number of tenants were paid 10d each for working 5,000 slates thus demonstrating that the industry was established albeit at a relatively low level by this date. The present quarry, established at a location called Cae Braich Y Cafn, dates from 1782 when Richard Pennant bought out the existing leases and the Penrhyn estate embarked on a rapid expansion of the slate quarrying industry. In 1784 Pennant secured a lease from the crown covering the hundred of Uchaf which included the parish of Llandegai and a lease from Bishop Warren for building the quay at Port Penrhyn. Initial piecemeal quarrying methods were improved in 1798 by an innovative gallery system where the working face was terraced at regular intervals allowing large numbers of men to work simultaneously. The slate was initially transported to a small quay at the mouth of the river Cegin by wagons. This was upgraded in 1801 with the construction of a horse-drawn tramway running to a new quay at Port Penrhyn. Expansion continued throughout the 19<sup>th</sup> century and the quarries at Penrhyn and Dinorwic dominated the industry. In 1862 there was record output from Penrhyn of 130,000 tons and 3,285 men were employed at the quarry. This in turn led to the development of the communities of Bethesda, Mynydd Llandegai, Tregarth and others including Lord Penrhyn's model village with 'no corrupting alehouse' at Llandegai. Steam locomotives were introduced in 1876.

The industry gradually declined in the latter parts of the 19<sup>th</sup> century culminating in the disastrous Penrhyn strike and lockout in 1900-03. Extraction has however continued throughout the 20<sup>th</sup> century with expansion to the south-west towards Gwaen Gynfi following a deep vein of high quality slate towards Marchlyn and Dinorwic. Gwaen Gynfi retains several features relating to the early years of the quarry. Llyn Owen y Ddol was constructed in the early 19<sup>th</sup> century to provide water for the quarry. Its original edge is marked by a bank to the east (PRN 12194). It was fed by three leats, PRNs 12196 12272 and 12446. The latter is a 1.1km construction, now dry, running from Marchlyn Mawr. This can be traced as a series of cuttings and stone piers and was designed to provide a constant gradual slope across the natural undulations along its course.

Another reservoir Llyn-y-mynydd, to the south of Mynydd Llandegai is now dry.

Three rock cannons are recorded at Gwaen Gynfi, one at the north and two at the south (Jones 2002, 95). A rock cannon or Cerrig Cannan is a rock or boulder which has been bored with holes which were loaded with black powder and ignited to make explosive sounds during celebrations. The holes were usually linked by shallow grooves that would be filled with black powder and covered with crushed

stone to act as fuses. The three at Gwaen Gynfi consist of 36 (PRN 12639), 8 and 28 (PRN 12640) holes.

The bog at Gwaen Gynfi is designated a Turbary (i.e. an area of bog where people had rights to cut peat for fuel) on the 1823 Penrhyn Estate map and the disused peat cuttings can still be seen as stepped areas in the peat. This area was an important source of fuel up to the 19<sup>th</sup> century.

There are four ruined sheepfolds within the study area probably of 18<sup>th</sup> or 19<sup>th</sup> century date. A complex multicellular fold overlies site 5380 and falls within the proposed realignment (Site 1 in the gazetteer). PRNs 12640 and 12409 are both simple two chamber sheepfolds and 12384 is designed to allow dipping in a dammed pool in the Afon Marchlyn Mawr. A small enclosure PRN 12349 may also be a sheepfold and falls within the proposed realignment (site 14).

A range of minor sites were recorded during the upland survey including undated enclosures, pens, walls and stone piles. A group of three shelters 12280, 12260 and 12197 were interpreted as WWII shooting butts constructed by soldiers on manoeuvres.

#### 4.5 Historic Landscape

The proposed realignment lies within the Dyffryn Ogwen Landscape of Historic Interest (No. 28 HLW (Gw) 10 Cadw 1998).

It falls within Historic Landscape Character Area 41 – Moel y Ci/Gwaen Gynfi unenclosed uplands (GAT Report 351, 2000). The key historic landscape characteristics of this character area are the unenclosed uplands in which there are a few smallholdings and early turbaries as well as the early nineteenth century water catchment systems for Penrhyn Quarry. The conservation priority is preservation of the open character of the area. The HLCA boundaries are shown on Fig.2.

The small addition land take of the quarry would not produce a significant impact on any of the key historic landscape characteristics and only a very slight impact on the open character of the area.

An Assessment of the Significance of the Impact of Development on Historic Landscape Areas on the Register of Landscapes of Historic Interest in Wales (ASIDOHL) is usually required as part of any survey and assessment work within a Landscape of Historic Interest. This is in accordance with the guidelines set out in Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process (Cadw 2007). In this case, however, the proposed realignment would only affect a small area on the boundary of the Landscape adjacent to the quarry representing a maximum of 1.5% of the HLCA. The proposed realignment is part of an already agreed expansion of the quarry and would only produce a very slight additional impact on the character area.

The proposed realignment and expansion will presumably change the effective boundary of HLCAs 14 Penrhyn Quarry and 41 Moel y Ci/Gwaen Gynfi unenclosed uplands. Key historic landscape characteristics of HCLA 14 are the 18<sup>th</sup> and 19<sup>th</sup> century industrial landscape and related structures. None of these will be directly affected and the characterisation records that the quarry is still in active production and expanding to the south-west. The very small additional land take will produce a very slight impact on HCLA 14.

The impact of the realignment on the two HCLAs and the wider Dyffryn Ogwen Landscape of historic Interest can be estimated as very slight mainly as a result of its very small additional land-take on the edge of the existing quarry thus producing a very localised effect. An ASIDOHL should be undertaken *in considering the implications of developments which are of such a scale that they would have more than a local impact on the area on the register* (Cadw 2007 p 10). It therefore should not be necessary to undertake a full ASIDOHL when considering the proposed realignment. It should be noted that this assessment refers only to the proposed realignment and not to the general quarry expansion to the south-west.

A copy of this report should be sent to Richard Kelly, Historic Landscapes Officer at CCW for consultation.



## **5 ARCHAEOLOGICAL AND HISTORIC ASSESSMENT**

### **5.1 Map regression and land ownership**

Quarrying had been carried out on the site of the present quarry by individual leesees until 1782 when Richard Pennant bought out the leases. He appears to have encroached on crown lands on several occasions but secured a lease of crown wastes in the hundred of Uchaf, including the parish of Llandegai in 1784. New workings were opened but mining rights were disputed. Enclosure acts of 1806 and 1808 resolved many doubts about the ownership of the commons but boundary disputes continued culminating in a parliamentary enquiry in 1824 (Lindsay 27-55).

The early enclosure of the area is recorded on the 1823 Penrhyn Estate “Map of the parish of Llandegai” (Fig 4, freehand transcription, map too fragile to copy). The red boundary shows the enclosed lands of the estate at the time of the General Survey in 1798. Several areas of inclosure of the common land in 1793, 1795 and 1800 are shown along with the site of Chwarel Goch from c1760. The beginnings of the Penrhyn quarry in Cae Braich y Cafn are also shown along with Llyn Meurig (soon to be buried beneath the quarry tips). The prehistoric settlement site is marked as a “pile of stones”. The tithe map of the parish of Llandegai (1841 Fig. 5) shows the rapid expansion of the quarry, (points of reference being Llyn Meurig (11) Llyn Owen y Ddol (d-shaped 5) and Tai’r-mynydd (5/6), the latter being the first buildings in Mynydd Llandegai. Subsequent Ordnance survey editions chart the expansion of the quarry in this area. These are transcribed on Fig. 1. Fig. 6 shows the 1889 edition, later editions are not shown there being little change apart from the expansion of the quarry.

### **5.2 Aerial Photographs**

Aerial photographs dating from 1947 and 1948 were examined at the NMR in Aberystwyth;

- 107 CPE/UK/1996 2331 13/04/1947
- 107 CPE/UK/1996 2332 13/04/1947
- 107 CPE/UK/1996 2333 13/04/1947
- 107 CPE/UK/2525 4100 24/03/1948
- 107 CPE/UK/2525 4101 24/03/1948

The settlement site was faintly visible and comparison with later photographs suggests there has been little change apart from a very slight deterioration in the condition of the multicellular sheepfold.

The most informative aerial photograph is Bluesky 2006 which shows the area of the proposed realignment and the settlement in detail (Plate 1). A transcription of this image was used as the basis for the site plan (Fig. 3). Getmapping aerial photography from 1999 was also examined.

### **5.3 Site Visit**

A site visit was carried out on the 13th November 2009. Weather conditions were initially good but heavy rain and gales developed during the visit which limited the opportunity for photographic recording. All major features were however photographed before the conditions deteriorated. The study area was walked in 10-15m parallel traverses and areas of archaeology were examined in greater detail. The sites were mostly as described in the upland survey report and no additional sites were discovered. All sites were reassessed and are described below. A plan (Fig. 3) was produced from a transcription of the Bluesky 2006 aerial photograph with additional details added from the site visit.

### **5.4 Environmental Remains and Soil Morphology**

The topsoils within the proposed realignment appear to be largely shallow and well drained. Deep waterlogged peat with good potential for the preservation of environmental remains is present on the north and western margins.

## 6. GAZETTEER OF SITES AND RECOMMENDATIONS FOR MITIGATION

This section lists and describes all sites recorded within the proposed realignment along with an assessment of impact and recommendations for mitigation.

<b>1</b>	<b>Multicellular Sheepfold</b>		<b>PRN 29989</b>
<b>Assessment of Importance</b>	<b>C</b>	<b>Impact:</b> Major	<b>Mitigation:</b> Avoidance or detailed recording
<p><b>Description:</b> The most obvious site in the area is a large well-preserved multicellular sheepfold (Plate 2). This is 29m in diameter and typically stands to a height of 1.5m. It consists of 18 cells arrayed around a central larger cell. There are entrances running into the central cell from the west and east but access between the cells is often solely by means of sheep creeps (i.e. low entrances c.0.8m high with a lintel carrying the wall over the top). This presumably facilitated dividing up the flocks and the entrances could be closed with a flat stone. Overlies part of PRN 1707</p>			
<b>NGR</b>	SH6089 6385		

<b>2 to 11</b>	<b>Prehistoric Settlement and Enclosures</b>		<b>PRN 5380 (Individual PRNs Below)</b>
<b>Assessment of Importance</b>	<b>A/B</b>	<b>Impact:</b> Major	<b>Mitigation:</b> Avoidance or detailed recording including a comprehensive programme of excavation
<p><b>Description:</b> Prehistoric settlement consisting of several elements:  Five enclosures or paddocks (PRNs 60373-7) (Sites 2-6) defined by wandering walls (Plate 3) typical of prehistoric settlement in this area. The walls are no more than 0.3m high and consist of roughly piled small stones linking, probably <i>in situ</i>, natural boulders. The interior of the enclosures are partially cleared of stone.  In the eastern corner of enclosure 4 are two linked, roughly built, small pens with dimensions of 9.0 x 5.0m and 2.5m x 2.0m (Plate 4). A narrow passage leads into enclosure 4.  A small hut circle (PRN 60378) (Site 7) with an overall diameter of 5.5m is built into the north-eastern wall of enclosure 5 (Plate 3). The hut circle is well defined with piled rubble walls 1.0m thick and an entrance on the north-west.  Two probable outlying paddocks (PRNs 60379 and 60380) (Sites 8-9) to the north-west are defined by natural scarps. There appears to have some clearance here, with stones piled among the natural boulders on the edge of the scarp. There may also have been some clearance (PRN 60381) (Site 10) to the north-east although the stone appears to have been dumped among the natural boulders as opposed to have been made into wandering walls. A 1.5m wide meandering trackway (PRN 12305) (Site 11) approaches the settlement from the north and runs into enclosure 3 and then passes through the south-eastern wall. It is not clear if this is contemporary with the settlement or a later path.  The settlement occupies a natural terrace within the boulder fields on the edge of the bogs to the north-west and west. The area is well-drained and sheltered by the higher ground to the south and south-east. The site was presumably partially cleared during the construction of the multicellular sheepfold.</p>			
<b>NGR</b>	SH6090 6388C		

<b>12</b>	<b>Trackway</b>		<b>PRN 12328</b>
<b>Assessment of Importance</b>	<b>C</b>	<b>Impact:</b> Major	<b>Mitigation:</b> Avoidance or detailed recording
<p><b>Description:</b> A 1.5m wide trackway meanders around natural boulders and up the natural scarps. It has been cleared of stones which are piled on either side.</p>			
<b>NGR</b>	SH 60986398		

<b>13</b>	<b>Possible Hafod</b>		<b>PRN 12327</b>
<i>Assessment of Importance</i>	<b>E</b>	<i>Impact:</i> Major	<i>Mitigation:</i> Avoidance or detailed recording including a comprehensive programme of excavation
<i>Description:</i> The remains of a rectangular enclosure or building (Plate 5) lie in stony ground just to the west of trackway 11. The structure is defined by spread rubble walls and has external dimensions of 6.0m x 2.5m. The eastern wall is almost destroyed. The interior is on two levels with the north end about 0.5m lower than the south. The original form of the structure is unclear. It could be a long hut or hafod but could also be interpreted as a simple shelter or animal pen.			
<b>NGR</b>	SH60976398		

<b>14</b>	<b>Sub-rectangular Enclosure</b>		<b>PRN 12349</b>
<i>Assessment of Importance</i>	<b>C</b>	<i>Impact:</i> Major	<i>Mitigation:</i> Avoidance or detailed recording
<i>Description:</i> A sub-rectangular enclosure with dimensions of 5.0mx 2.5m. Built from roughly coursed walling 1.0m high and 0.7m thick against natural boulders to the east. Probably a sheep pen.			
<b>NGR</b>	SH61066404		

<b>15</b>	<b>Stone Pile</b>		<b>PRN 12348</b>
<i>Assessment of Importance</i>	<b>E</b>	<i>Impact:</i>	<i>Mitigation:</i> Avoidance or detailed recording
<i>Description:</i> An oval grassed-over pile of stones with dimensions of 6.0m x 5.0m and about 0.3m high. It stands on a natural terrace between a boulder field and the quarry. The upland survey (in 1989) recorded "apparently more recently dumped stones on top". It is now fairly uniform. The site may be simple field clearance but could also be interpreted as a Bronze Age burial cairn. It therefore needs further assessment.			
<b>NGR</b>	SH61066397		

## 7. DISCUSSION AND MITIGATION

### 7.1 Discussion of archaeological potential

The area of the proposed realignment contains a well-preserved prehistoric settlement. The site is in unimproved uplands and has probably had some stone cleared from it in order to construct a later sheepfold. There has however been no widespread clearance or ploughing and below ground survival is probably good. Also nearby peat bogs have a good potential for the preservation of environmental remains. This type of site has rarely been excavated in Wales and therefore has a high potential for enhancing our understanding of prehistoric upland settlement in the area.

A trackway and possible hafod are probably medieval but require further assessment. Below ground preservation is again likely to be good.

The multicellular sheepfold is a good example of a monument that is a characteristic part of the uplands in Gwynedd. It is well preserved and retains most of its original features.

A pile of stones towards the north-east end of the area is mostly overgrown and requires further assessment. It is most likely to be field clearance but could be a Bronze Age burial cairn. Its position on a natural terrace that is visible across much of Gwaen Gynfi would support the latter interpretation.

An undated stone enclosure is probably one of many temporary enclosures and shelters relating to the area's traditional use as a sheepwalk.

The sites are concentrated on a natural, well-drained terrace that is partially sheltered by the scarp to the south-east. No sites were discovered on the terrace above the scarp. Given the lack of clearance and apparently shallow soils without substantial peat build-up here, the potential for undetected further archaeology is fairly low.

## 7.2 Scheme mitigation

The preferred mitigation for the scheme is avoidance of the archaeological remains and their preservation *in situ*. The upper terrace appears to contain little or no archaeology and the realignment could extend into this area without producing a major negative impact on the archaeology. The realignment should only extend as far as the top of the natural scarp in order to preserve the settlement within its setting in the landscape. Given the area's proximity to the settlement a watching brief would be recommended during topsoil stripping.

If the realignment is to affect the complete proposed area, preservation by record is the recommended mitigation. This would involve recording the remains to an appropriate level. In the case of the settlement and possibly the hafod and cairn, depending on further evaluation, this would involve a comprehensive programme of excavation. All major features such as the roundhouse should be fully excavated and lesser features such as the enclosures should be sampled in sufficient detail to record their character and function.

A detailed photographic, written and drawn record should be made of the sheepfold ensuring that its full three dimensional structure and functionality is recorded.

A basic record should be made of the rectangular shelter, trackway and the stone pile and possible hafod if further assessment shows them to be minor sites.

The realignment could remove most of the upper terrace without producing a major impact on the known archaeology. The scarp above the prehistoric settlement should be retained in order to retain the site in its original context i.e. on a naturally sheltered terrace. Given its proximity to the settlement there may be archaeology that is not visible on the surface. A watching brief should therefore be carried out during topsoil stripping.

## 8. ARCHIVE

The archive consists of copies of historic maps, plans and aerial photographs, with field notes and 26 digital images taken on the field visit.

Three copies of the bound report and principal digital material will be sent to the regional HER. A copy of the report will be provided to the National Monument Record, Royal Commission on the Ancient and Historic Monuments of Wales, Aberystwyth.

## 9. BIBLIOGRAPHY AND SOURCES CONSULTED

### 9.1 Primary, Cartographic and Photographic sources

#### Bangor University Archives

##### *Penrhyn Estate maps*

1823 map of the parish of Llandegai

#### Gwynedd Archives, Caernarfon

Llandegai Tithe Map 1839

Ordnance Survey 1:2500 1<sup>st</sup> Edition Caernarvonshire 1889 Sheets XII.2 and XII.6

Ordnance Survey 1:2500 2<sup>nd</sup> Edition Caernarfonshire 1900 Sheets XII.2 and XII.16

Ordnance Survey 1:2500 3<sup>rd</sup> Edition Caernarfonshire 1920 Sheets XII.2 and XII.6

Aerial Photographs located at the National Monuments Record, Aberystwyth

RAF Aerial Photographs

107 CPE/UK/1996 2331 13/04/1947  
107 CPE/UK/1996 2332 13/04/1947  
107 CPE/UK/1996 2333 13/04/1947  
107 CPE/UK/2525 4100 24/03/1948  
107 CPE/UK/2525 4101 24/03/1948

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## **APPENDIX I: DEFINITIONS OF ASSESSMENT TERMS**

### **Categories of Importance**

The following categories are used to define the importance of the archaeological resource. The criteria used for assessing the value of features was based upon those used by the Welsh Assembly Government when considering sites for protection as scheduled ancient monuments, as set out in the Welsh Assembly circular 60/96.

#### *Category A - Sites of National Importance.*

This category includes Scheduled Ancient Monuments and Listed Buildings of grade II\* and above, as well as those sites that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both.

Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

#### *Category B - Sites of Regional Importance*

This category includes grade II Listed Buildings and sites which would not fulfil the criteria for scheduling, but which are nevertheless of particular importance within the region. Preservation *in situ* is the preferred option for Category B sites, but if damage or destruction cannot be avoided, appropriate detailed recording might be an acceptable alternative.

#### *Category C - Sites of District or Local Importance*

These sites are not of sufficient importance to justify a recommendation for preservation if threatened, but nevertheless merit adequate recording in advance of damage or destruction.

#### *Category D - Minor and Damaged Sites*

These are sites, which are of minor importance, or are so badly damaged that too little remains to justify their inclusion in a higher category. For these sites rapid recording either in advance or during destruction, should be sufficient.

#### *Category E - Sites needing further investigation*

Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A-D, are temporarily placed in this category, with specific recommendations for further evaluation. By the end of the assessment there should be no sites remaining in this category, unless they will not be affected by the proposed works.

### **Definition of field evaluation techniques**

Field evaluation is necessary to allow the reclassification of the category E sites, and to allow the evaluation of areas of land where there are no visible features, but for which there is potential for sites to exist. Two principal techniques for carrying out the evaluation are geophysical survey and trial trenching, and these are further defined below. Other evaluation techniques include field survey and paleoenvironmental sampling.

#### *Geophysical survey*

This technique involves the use of a magnetometer, which detects variation in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetised iron oxides, which tend to be concentrated in the topsoil. Features cut into the subsoil and back-filled or silted with topsoil contain greater amounts of iron and can therefore be detected with the gradiometer. Strong readings can be produced by the presence of iron objects, and also hearths or kilns.

Other forms of geophysical survey are available, of which resistivity survey is the other most commonly used. However, for rapid coverage of large areas, the magnetometer is usually considered the most cost-effective method. It is also possible to scan a large area very rapidly by walking with the magnetometer, and marking the location of any high or low readings, but not actually logging the readings for processing.

#### *Trial trenching*

Buried archaeological deposits cannot always be detected from the surface, even with geophysics, and trial trenching allows a representative sample of the development area to be investigated. Trenches of an appropriate size can also be excavated to evaluate category E sites. These trenches typically measure between 20m and 30m long by 2m wide. The turf and topsoil is removed by mechanical excavator, and the resulting surface cleaned by hand and examined for features. Anything noted is further examined, so that the nature of any remains can be understood, and mitigation measures can be recommended.

#### **Definition of Mitigatory Recommendations**

Below are the measures that may be recommended to mitigate the impact of the development on the archaeology.

##### *None:*

No impact so no requirement for mitigatory measures.

##### *Detailed recording:*

This requires a full photographic record and measured survey prior to commencement of works.

Archaeological excavation may also be required depending on the particular feature and the extent and effect of the impact.

##### *Basic recording:*

Requiring a photographic record and full description prior to commencement of works.

##### *Strip, Map and Sample:*

The technique of Strip, Map and Sample involves the examination of machine-stripped surfaces to identify archaeological remains. The stripping is undertaken under the supervision of an archaeologist. Stripping and removal of the overburden is undertaken in such a manner as to ensure damage does not take place to surfaces that have already been stripped, nor to archaeological surfaces that have not yet been revealed.

Stripping is undertaken in as careful a manner as possible, to allow for good identification of archaeological features. A small team of archaeologists will be responsible for subsequently further cleaning defined areas where necessary. Complex sites which cannot be avoided will need to be fully excavated.

##### *Watching brief:*

This is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

##### *Avoidance:*

Features, which may be affected directly by the scheme, or during the construction, should be avoided. Occasionally a minor change to the proposed plan is recommended, but more usually it refers to the need for care to be taken during construction to avoid accidental damage to a feature. This is often best achieved by clearly marking features prior to the start of work.

##### *Reinstatement:*

The feature should be re-instated with archaeological advice and supervision.



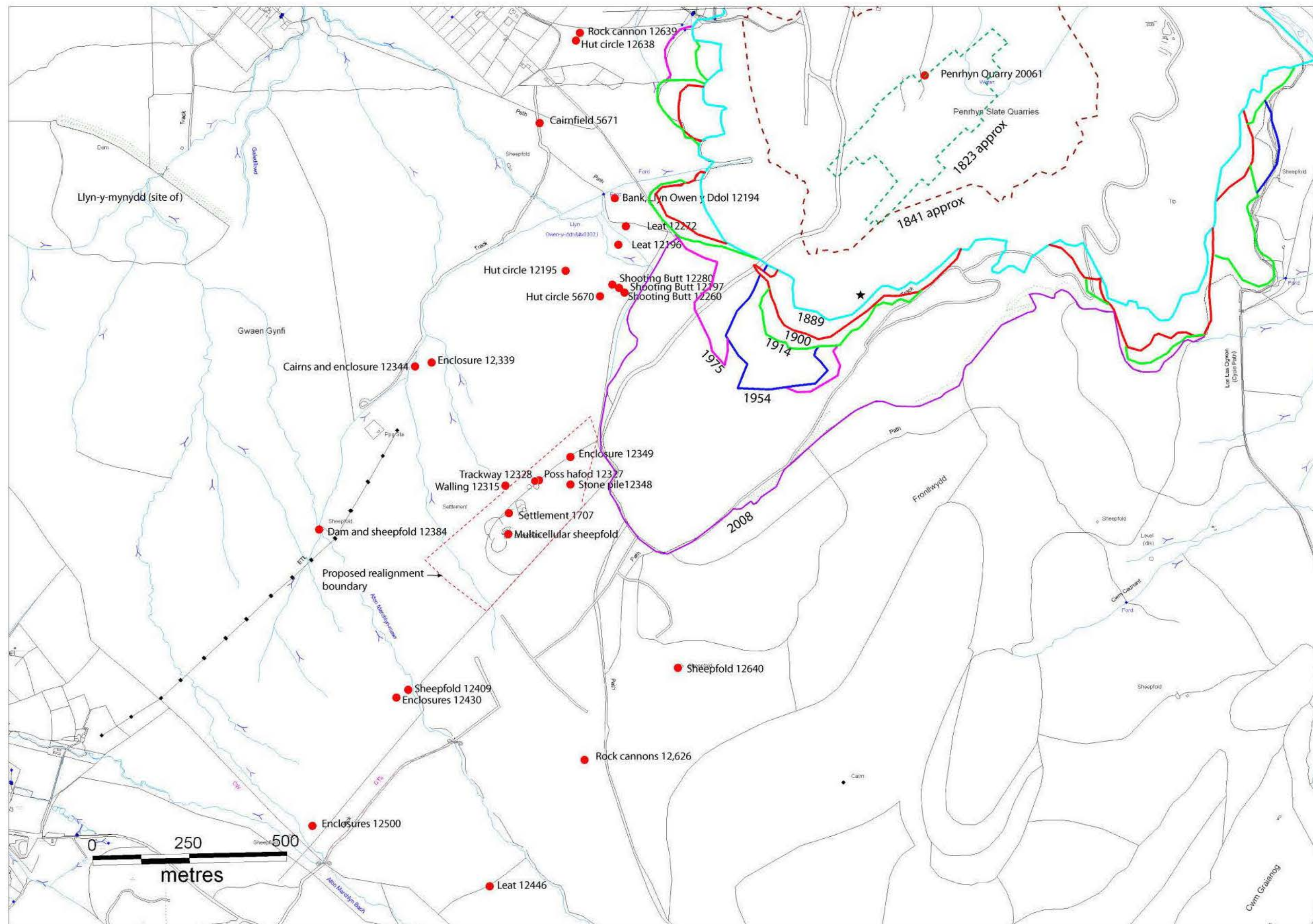


Fig. 1 Gwaen Gynfi showing proposed realignment boundary, principal archaeological sites and quarry development



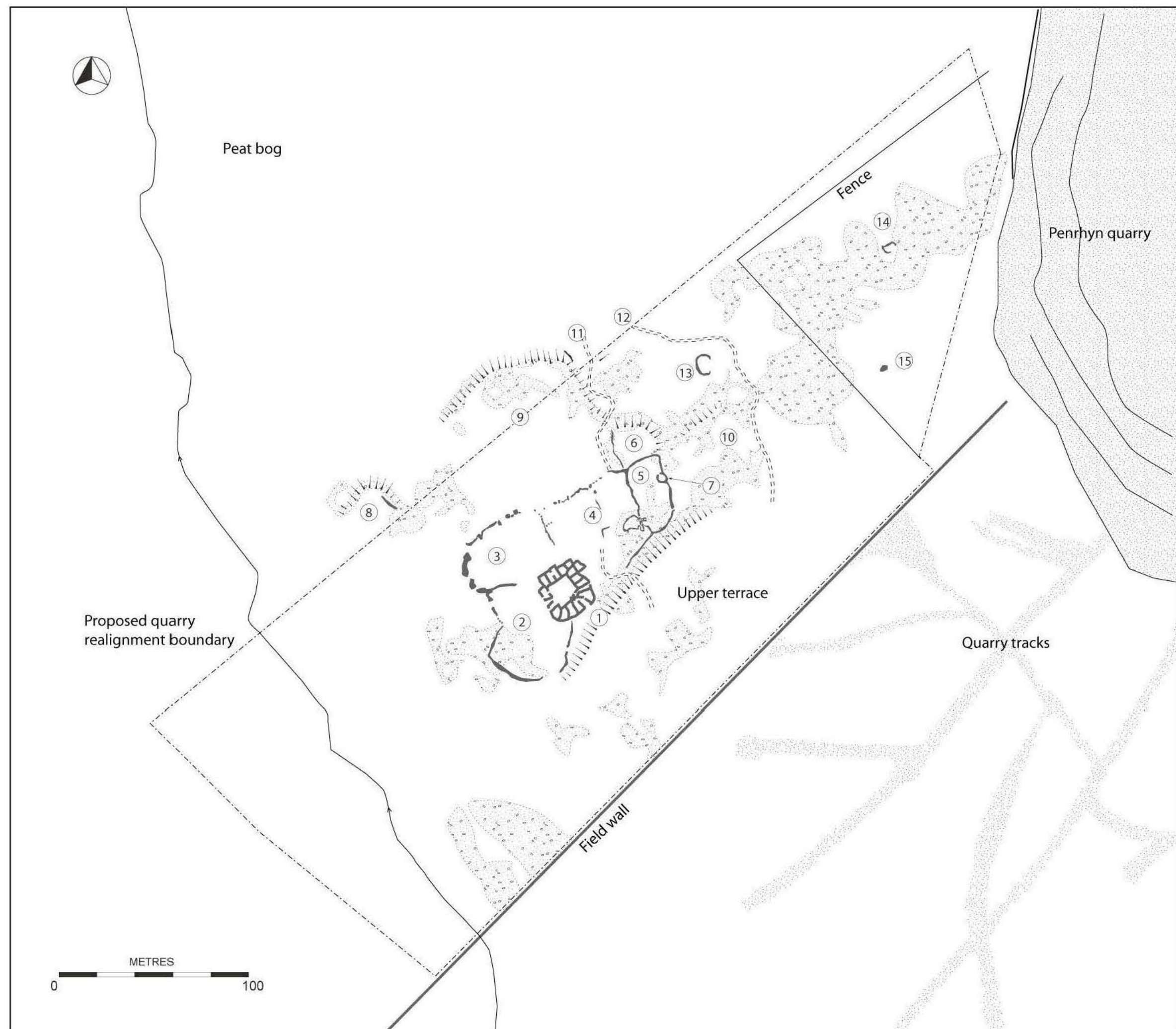
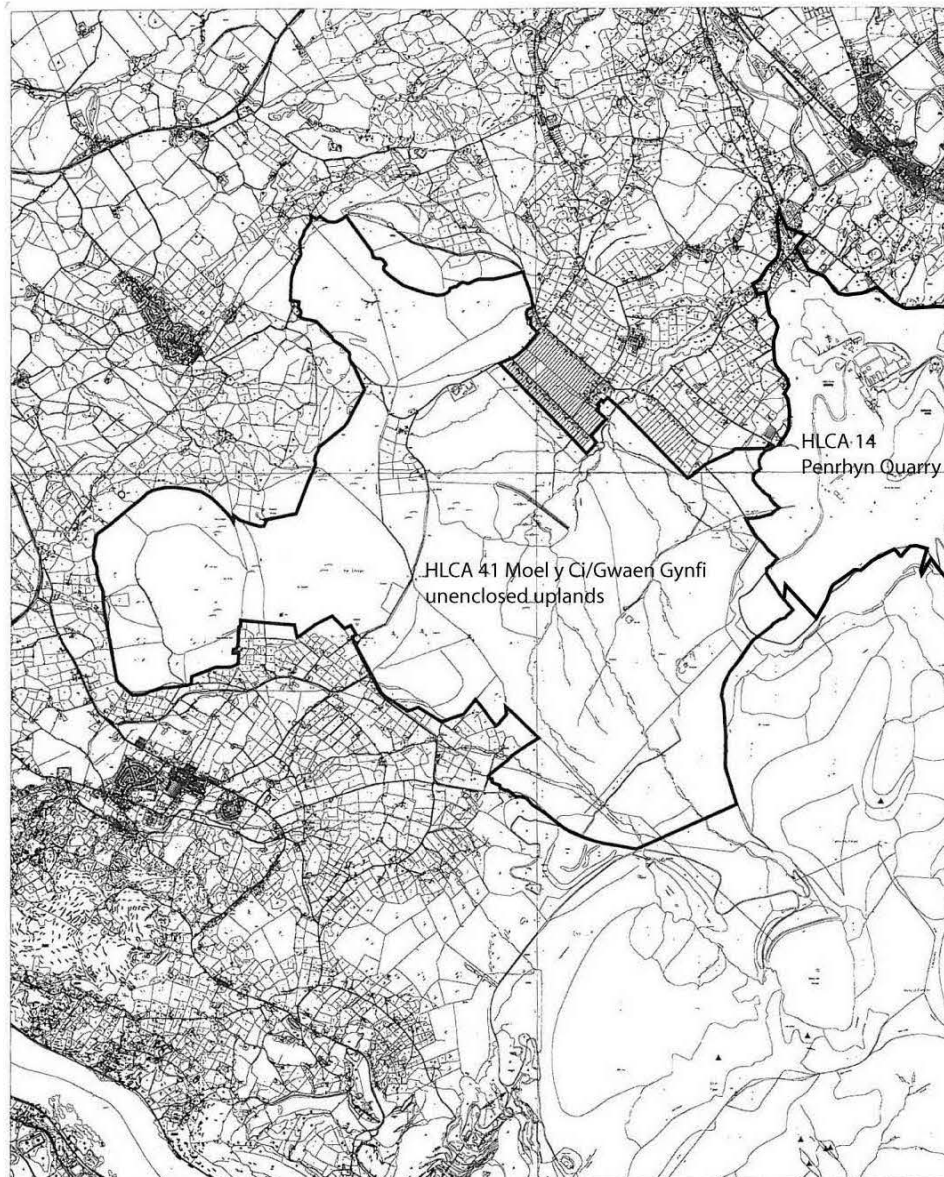


Fig. 3 The proposed quarry realignment showing archaeological sites. Detailed plan from aerial photograph transcription and site visit



### Historic Landscape Characterisation - Arfon

Historic Landscape Character Area:  
41 - Moel y Ci/Gwaen Gynfi unenclosed uplands

Scale: 1/30,000

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Fig.2 Historic landscape character areas 41 and 14 (From GAT Report 351, 2000)

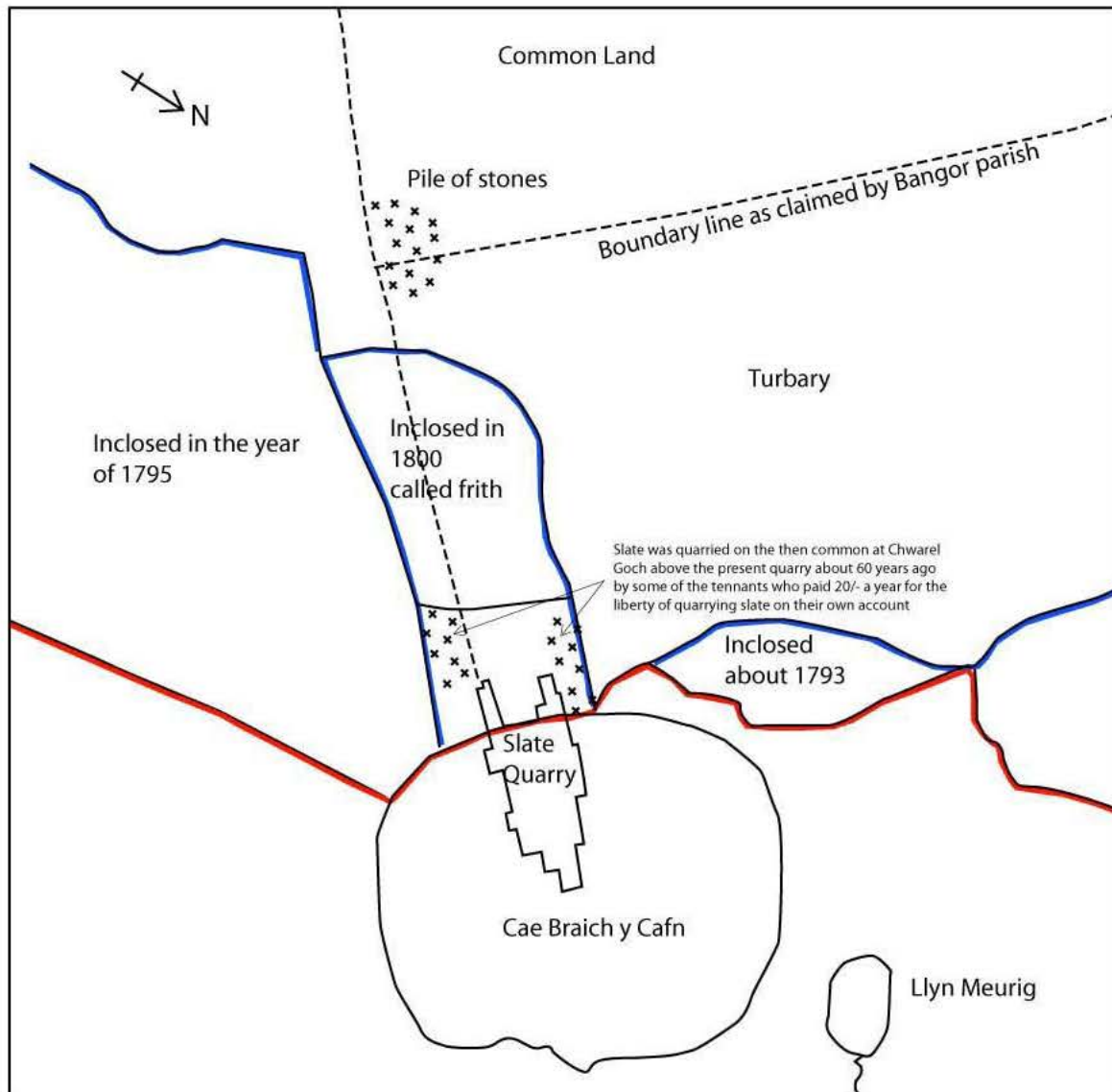


Fig.4 Free-hand transcription of part of Penrhyn Estate "Map of the Parish of Llandegai" 1823



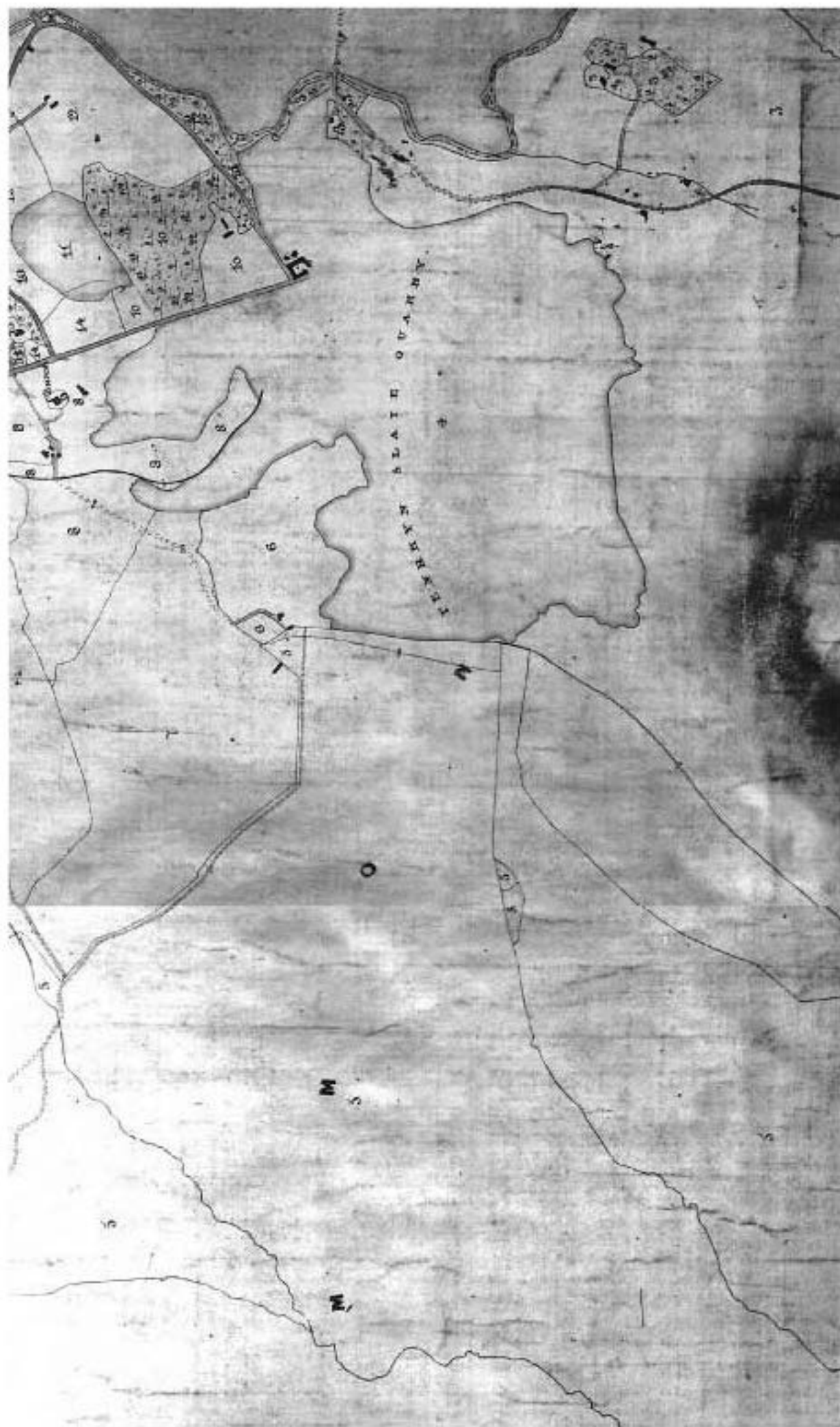


Fig. 5 Part of the 1841 tithe map of the parish of Landegai

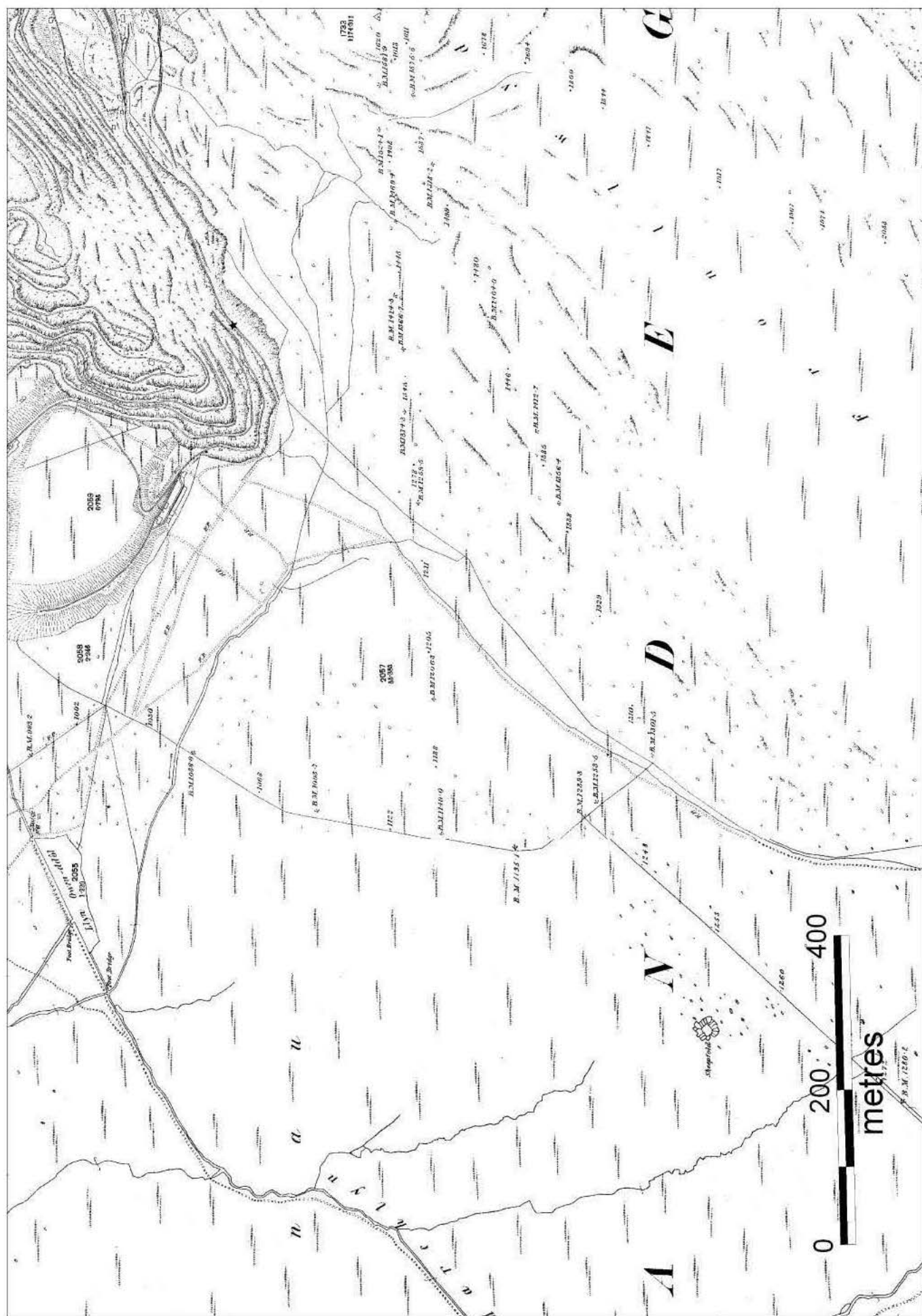


Fig. 6 25 inch to the mile Ordnance Survey map 1889





Plate 1 Aerial photograph of the proposed realignment area ( © GeoPerspectives and COWI A/S 2006)





Plate 2 Multicellular sheepfold (Site 1)



Plate 3 Roundhouse (Site 7) and meandering walls of enclosure 5





Plate 4 Pens in enclosure 4



Plate 5 Possible Hafod (Site 13)





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