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**Bron Fedw Uchaf Hydro Scheme,  
Rhyd Ddu, Gwynedd.  
December 2014  
V 1.0**

aeon archaeology



Archaeological Assessment  
Project Code: A0049.1  
Report no. 0052

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# **Bron Fedw Uchaf Hydro Scheme, Rhyd Ddu, Gwynedd. December 2014**

Report no. 0052 v1.0

Archaeological Assessment

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Project Code: A0049.1

Date: 12/12/2014

Client: Greenearth Hydro Ltd

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## 1.0 NON-TECHNICAL SUMMARY

Aeon Archaeology was asked by Greenerth Hydro Ltd to carry out an archaeological assessment and field visit of a proposed hydro-electric scheme with turbine house, buried penstock (pipeline), and electrical cable connection. The proposed scheme intake is to be located on the southern bank of an unnamed tributary of the Afon Treweunydd, approximately 2.0km northeast of the village of Rhyd Ddu, Gwynedd and within the Snowdonia National Park Authority (SNPA).

The archaeological assessment identified eight archaeological sites within the 40.0m wide assessment corridor centred on the pipe route, all of which were post-medieval in date. The proposed scheme will directly impact upon only two archaeological features, a trackway (feature 4) and a field boundary wall (feature 8). Both of these features are considered to be of *local* importance. The photographs and descriptions provided within this report are considered commensurate with a basic archaeological record level and as such no further recommendations are made for assessment or mitigatory measures for these features.

In addition the proposed development scheme is expected to have a *high adverse indirect non-physical (visual)* impact upon the views north and southward from the Bron y Fedw railway (feature 1) resulting in an overall large adverse significance of effect. This impact is however time limited to the phase of construction.

It is possible that unknown remains are preserved at a buried level, although due to the lack of archaeological sites of all periods within 1.0km of the pipe route and due to the steepness of the upland slope, it is considered that this potential is low. This potential is reinforced by the archaeological assessment and watching brief carried out by GAT in 2000 and 2007 respectively which failed to find any unknown buried remains. As such, no further general assessment or mitigatory measures are proposed.



## 2.0 INTRODUCTION, AIMS AND PROJECT DESIGN

Aeon Archaeology was asked by Greenerth Hydro Ltd to carry out an archaeological assessment and field visit of a proposed hydro-electric scheme with turbine house, buried penstock (pipeline), and electrical cable connection. The proposed scheme intake is to be located on the southern bank of an unnamed tributary of the Afon Treweunydd, approximately 2.0km northeast of the village of Rhyd Ddu, Gwynedd and within the Snowdonia National Park Authority (SNPA) (figure 1).

The proposed scheme will consist of an intake weir located at **NGR SH 57738 54834** and a c.910.0m long buried penstock running southwest to a turbine house located at **NGR SH 57101 54314** and which will be installed on the eastern bank of the unnamed tributary. In addition a buried new power cable will run northeast from the turbine house for approximately 55.0m to an existing transformer at **NGR SH 57138 54353**. An existing trackway will be used to transport materials to site and construction access between the intake site and turbine house will be along the penstock route, which will be temporarily cleared of any boulders that will be reinstated upon the completion of works.

A mitigation brief was not prepared for this scheme by the SNPA Archaeologist as the work is being undertaken in advance of planning application as part of a feasibility study.

This archaeological assessment is for the proposed development area, which includes the water intake point, the penstock route, the turbine house, the water outflow, the power cable route, and a 40.0m wide assessment corridor centred on the proposed pipeline route.

As part of the archaeological assessment a 1.0km search area centred on the proposed route was utilised for a search of the Gwynedd Historic Environment Record (HER). This provided a background historical narrative of the area and included source material from the Gwynedd Archives and Record Office, Dolgellau. Information on Scheduled Ancient Monuments and Listed Buildings was obtained from Cadw.

The following report conforms to the guidelines specified in *Standard and Guidance for Archaeological Desk-based Assessment* (Institute of Field Archaeologists, 1994, rev. 2007).

The archaeological assessment considered the following:

- (i) The history of the site;
- (ii) The significance of any remains in their context both regionally and nationally;
- (iii) The potential impact of the proposed development on known sites of archaeological importance including their setting.

The archaeological assessment was undertaken in four stages:

- (i) Archival research
- (ii) Field visit/site walkover of all accessible areas
- (iii) Written report
- (iv) Project archive



**Plate 01:** Location of proposed turbine house, from the east. Scale 1.0m.

## **3.0 METHODS AND TECHNIQUES**

### **3.1 Archival research**

The archaeological assessment involved the study of the following records:

- The regional Historic Environment Record (Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor, LL57 2RT) was examined for information concerning the study area. This included an examination of the core HER, and secondary information held within the record which included unpublished reports, the 1:2500 County Series Ordnance Survey maps, and the National Archaeological Record index cards and aerial photography.
- The National Monuments Record (NMR RCAHMW, National Monuments Record of Wales, Plas Crug, Aberystwyth, SY23 1NJ) was checked for sites additional to the HER.
- Information about Listed Buildings and Scheduled Ancient Monuments from Cadw were examined in the regional HER. The Register of Outstanding and Special Historic Landscapes and the Register of Parks and Gardens was checked, and also the location of World Heritage Sites.
- Secondary sources were examined, including the Inventories of the Royal Commission on Ancient and Historical Monuments for Wales, and works held within the regional libraries.
- Results from previous archaeological work within the area was also reviewed.

### **3.2 Site walkover**

The site walkover was carried out on 9<sup>th</sup> December 2014 by Richard Cooke BA MA MCifA, archaeological contractor and consultant at Aeon Archaeology. The weather conditions were ideal for the field search being both bright and clear. All archaeological sites and view points were photographed using a digital SLR (Canon 550D) set to maximum resolution (72 dpi).

### **3.3 Assessment report**

All features identified from the archival research and site walkover were assessed and allocated to categories of international, national, regional/county, local and none/unknown importance as listed in section 6.0. These are intended to place the archaeological feature within a geographical context of importance and thus help inform the most suitable level of mitigatory response. The criteria used for allocating features to categories of importance are based on existing statutory designations and, for non-designated assets, the Secretary of State's non-statutory criteria for Scheduling Ancient Monuments; these are set out in National Planning Policy Framework (NPPF) and Welsh Office Circular 60/96.

### **3.4 Project archive**

A full archive including plans, photographs and written material was prepared. All plans, photographs and written descriptions were labelled and cross-referenced using Aeon Archaeology pro-formas. A draft copy of the report was sent to the client and upon written approval from them paper and digital copies of the report will be sent to the regional HER (x1) (Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor, LL57 2RT), the

Snowdonia National Park Authority (SNPA) Archaeologist (x3), and the Royal Commission on the Ancient and Historic Monuments in Wales (RCAHMW) (x1). Copies of all notes, plans, and photographs from the assessment are stored at Aeon Archaeology under the project code **A0049.1** with the originals being lodged in a suitable repository to be agreed with the archaeological curator.

Any artefacts arising from future phases of fieldwork will be lodged with the Gwynedd Museum and Art Gallery, Bangor, Gwynedd.

## 4.0 ARCHAEOLOGICAL AND TOPOGRAPHICAL BACKGROUND

### 4.1 Topographic Description

The proposed hydro-electric scheme intake is located on the southern bank of an unnamed tributary of the Afon Treweunydd, approximately 2.0km northeast of the village of Rhyd Ddu, Gwynedd and within the Snowdonia National Park Authority (SNPA).

The proposed scheme will consist of an intake weir located at NGR SH 57738 54834 and a c.910.0m long buried penstock running southwest to a turbine house located at NGR SH 57101 54314 and which will be installed on the eastern bank of the unnamed tributary. In addition a buried new power cable will run northeast from the turbine house for approximately 55.0m to an existing transformer at NGR SH 57138 54353.

The site lies within the parish of Betws Garmon Community, within the historic county of Caernarfonshire and unitary authority of Gwynedd. Mostly given over to rough pasture, the farmland is dominated by acid grassland within which there are cushions of gorse. The site is mostly enclosed by dry-stone walls although wooden post and wire fence has also been utilised in places. The land is primarily given over to hill sheep farming, although some cattle farming also takes place within the localised landscape, generally on the lower slopes.

The assessment area slopes from approximately 330m OD at the proposed hydro intake with the proposed turbine house lying at approximately 150m OD.

The bedrock geology is of the Nant Francon subgroup, a sedimentary bedrock that formed approximately 451 to 479 million years ago in the Ordovician Period within an environment previously dominated by shallow seas. The superficial deposits are of Devensian-Diamicton till, that formed up to 2 million years ago in the Quaternary Period when the local environment was dominated by Ice Age conditions (British Geological Survey).

### 4.2 Statutory and non-statutory designations

#### 4.2.1 Non-designated monument points from the Gwynedd Historic Environment Record (figure 1)

The Gwynedd Historic Environment Record (HER) maintains a register of non-designated archaeological sites represented as single point data or as polygons. These are identified through their Primary Reference Number (PRN). These include sites which are of archaeological/historical interest, artefact find spots, documentary evidence, and locations of past events such as archaeological projects.

There are 28 non-designated monuments within 1.0km of the proposed pipeline route (see appendix I) with the following lying within the 40.0m wide assessment corridor centred on the penstock route:

- (i) The post-medieval *Bron y Fedw Railway* (PRN: 29466).

The penstock route also lies within 100.0m of the following sites:

- (i) Approximately 37.4m southeast of the post-medieval *Bron y Fedw slate quarry* (PRN: 20195);
- (ii) Approximately 97.2m north of the unknown *Bron y Fedw terrace* (PRN: 29467).



#### 4.2.2 Scheduled Ancient Monuments

Scheduled monuments are those considered to be monuments of national importance. The Ancient Monuments and Archaeological Areas Act 1979 supports a formal system of Scheduled Monument Consent (SMC) for any work to a designated monument. Any works within a Scheduled area will require SMC; this includes non-invasive techniques such as geophysics or field-walking.

There are no Scheduled Ancient Monuments within 1.0km of the proposed pipeline route.

#### 4.2.3 Listed Buildings (figure 2)

The Secretary of State for Culture, Media and Sport holds a List of Buildings of Special Architectural or Historic Interest, considered to be of national importance. Compiled under the Planning (Listed Buildings and Conservation Areas) Act 1990, the List includes structures from boundary walls and telephone boxes to cathedrals. Listing gives statutory protection and restrictions apply. Consent may be required for works to, or that affect the setting of, a Listed Building and the Local Planning Authority conservation officer should be consulted if in doubt.

There are 2 Listed Buildings within 1.0km of the proposed pipeline route (see appendix I) but none lie within the 40.0m assessment zone centred on the pipe.

The pipe route lies within 500.0m of the following:

- (i) Approximately 340.0m north of the grade II *Clogwyn-y-gwin* Listed Building (LB: 21868);
- (ii) Approximately 390.0m northeast of the grade II *Pont Cwellyn* Listed Building (LB: 21279).

#### 4.2.4 National Monuments Record (figure 2)

The Royal Commission on the Ancient and Historic Monuments in Wales (RCAHMW) maintains the National Monuments Record (NMR) for Wales. This is a register of non-designated archaeological sites represented as single point data or as polygons. These are identified through their National Primary Reference Number (NPRN) and include sites which are of archaeological/historical interest, artefact find spots, documentary evidence, and locations of past events such as archaeological projects that are not statutorily protected.

There are 18 non-designated monument points within 1.0km of the pipeline route (see appendix I) but none lie within the 40.0m wide assessment zone centred on the pipe or within 100.0m.

#### 4.2.5 Historic Landscape Character Areas (HLCAs) (figure 3)

Cadw, National Resource Wales (formerly the Countryside Council for Wales), and the International Council of Monuments and Sites (ICOMOS UK) compiled the two volume Register of Landscapes of Historic Interest in Wales. This includes 58 landscapes of outstanding or special historic interest, which are considered to be the best examples of different types of historic landscapes in Wales. The Register provides information to decision makers and landscape managers, to help ensure that the historic character of the landscape is sustained, and that where change is contemplated, it is well-informed.

Historic Landscape Characterisation takes a closer look at the historic landscape by showing the processes that have shaped the landscape over centuries of human activity, contributing to its present character. Detailed characterisation studies have been compiled by the four Welsh Archaeological Trusts for all 58 areas on the Register. They are used by local government and developers to help assess the impact of development proposals on the historic landscape.

The proposed development area lies within the following Historic Landscape Character Areas (HLCAs):

- (i) The *gwyrfai valley slopes* Historic Landscape Character area (HLCA: 43).

#### 4.2.6 Historic Parks and Gardens

Cadw holds a Register of Historic Parks and Gardens of Special Historic Interest. These Registered landscapes are graded I, II\* or II, and include private gardens, public parks and other green spaces. They are valued for their design, diversity and historical importance. Inclusion on the Register brings no additional statutory controls, but there is a presumption in favour of conservation of the designated site. Local authorities are required to consult Cadw on applications affecting sites Registered as grade I or II\* and the Garden History Society on sites of all grades.

There are no historic parks and gardens within the 40.0m wide assessment corridor centred on the pipe route or within 1.0km of the proposed development area.

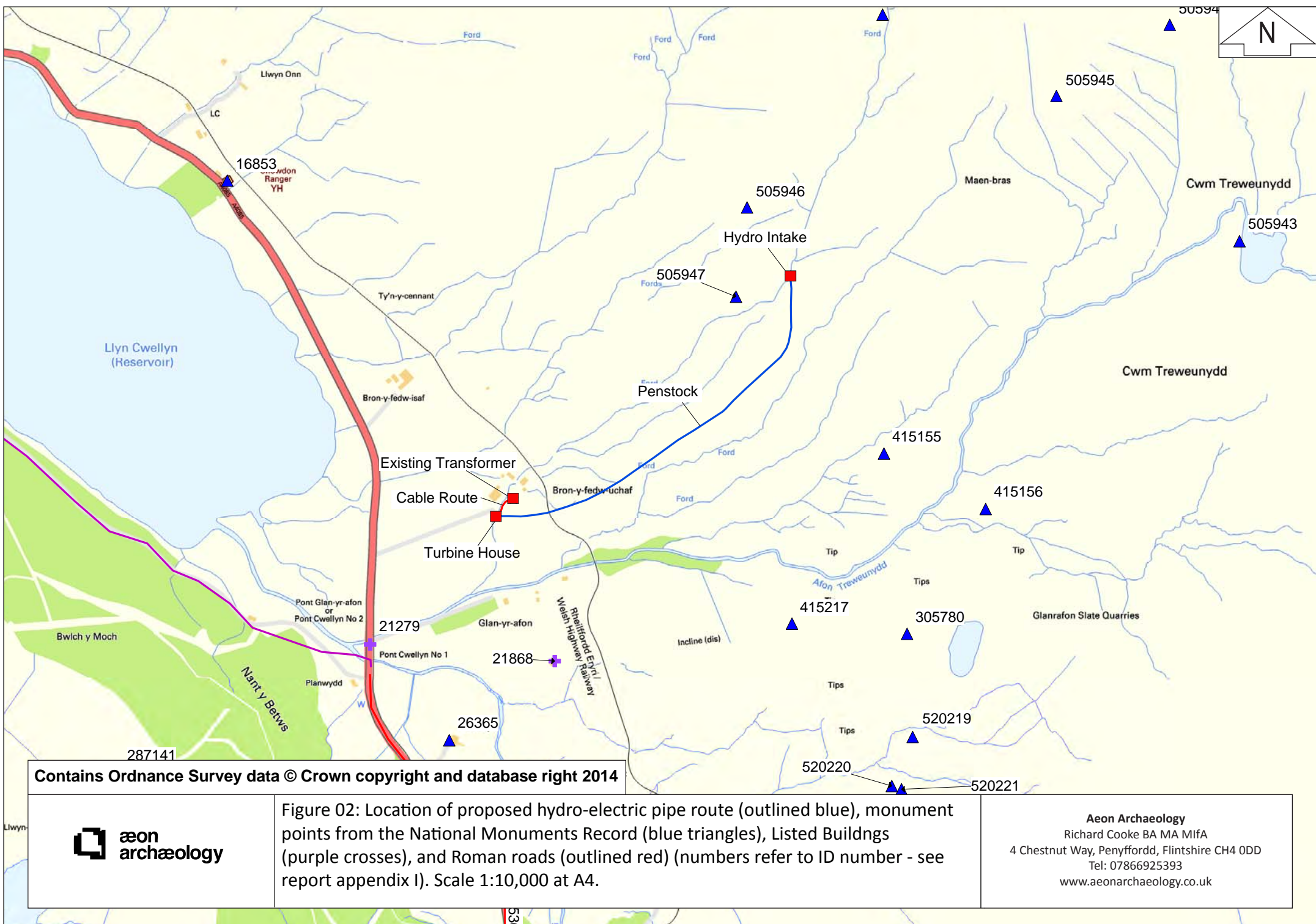
#### 4.2.7 Events

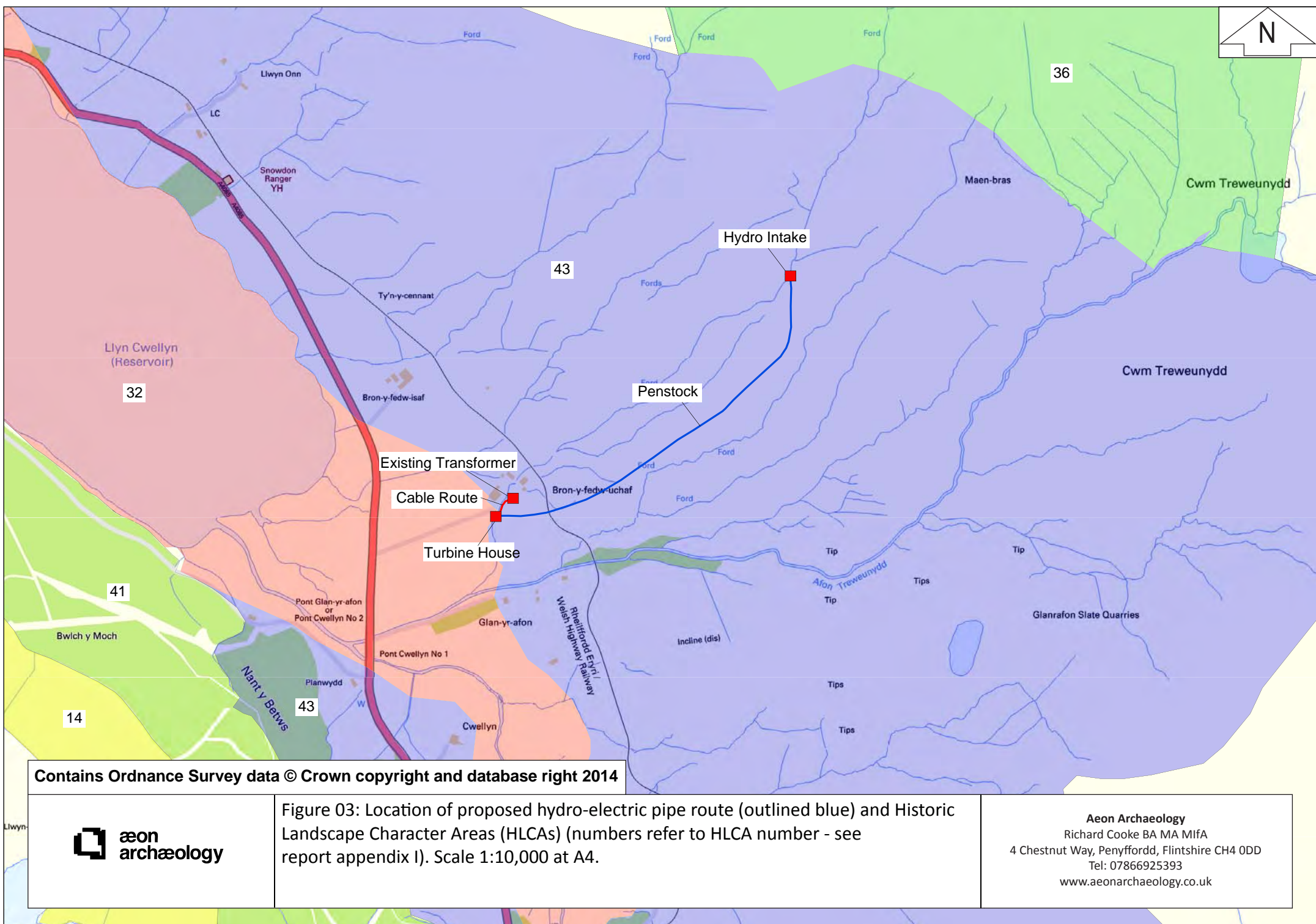
The location of the proposed pipeline route is included within the Historic Landscape Characterisation of Caernarfon-Nantlle carried out by the Gwynedd Archaeological Trust (GAT) in 2000 but no specific sites were identified as part of the work.

In addition an archaeological assessment was undertaken by GAT in 2000 (GAT report 364) prior to the construction of the Treweunydd hydro-power scheme for Shawater Ltd, located approximately 100.0m to the south. This report identified sixteen features, eleven of which were post-medieval in date and five were of unknown date. The assessment report was followed by a phase of archaeological watching brief in 2007 (GAT report 693) during the trenching of the hydro pipe but no additional sites were observed.









## 5.0 THE HISTORICAL CONTEXT

The following sections describe the known archaeological record within the general area of the proposed development. Sites are identified by their Primary Reference Number (PRN) which is the number by which they are identified in the Gwynedd Historic Environment Record (HER), or by their Scheduled Ancient Monument reference, Listed Building reference and/or their National Primary Reference Number (NPRN) if applicable. The intention of this section is to provide a historic and archaeological context to the site. This aids in establishing the relative importance of an archaeological feature within its landscape, as well as assessing the potential for unknown buried archaeological remains on the proposed development site.

The beginning and end of certain periods is a contentious issue. In the Gwynedd Historic Environment Record (HER) the following dates are used. This is a standard convention across all of the Welsh HERs.

**Table 1. Historic periods**

Palaeolithic (prehistoric)	500,000 BC – 10,001 BC
Mesolithic (prehistoric)	10,000 BC – 4,001 BC
Neolithic (prehistoric)	4,000 BC – 2,351 BC
Bronze Age (prehistoric)	2,350 BC – 801 BC
Iron Age (prehistoric)	800 BC – 47 AD
Romano-British	48 AD – 409 AD
Post-Roman (Early Medieval)	410 AD – 1065 AD
Medieval	1066 AD – 1539 AD
Post-Medieval	1540 AD – 1900 AD
Modern	1901 AD – 2050 AD

### 5.1 Prehistoric and Roman Period

The prehistoric period is poorly represented within the localised landscape and the only evidence of this era within 1.0km of the hydro scheme was an urn containing ashes within a stone cist (PRN: 3391) lying approximately 210.0m to the south of the proposed turbine location. The urn and cist were discovered by ploughing in 1864 on Glan yr Afon farm but neither has survived (Jenkins, 1899).

There are no other known prehistoric sites within the localised landscape, although a stone-built terrace (PRN: 29467) identified by GAT in 2000 (report 364) and lying approximately 100.0m to the southeast of the pipe route was initially thought to have been a prehistoric relict field system. The maintained watching brief during the breaching of this feature did not confirm this, or indeed whether the feature was structural or merely a stone clearance dump (GAT report 693).

The Roman period is also poorly represented and the only known Roman site within 1.0km of the pipeline route is the hypothesised route of the Segontium to Tomen y Mur Roman road (PRN: 17535) running southeast to northwest, and located approximately 410.0m southwest of the proposed turbine house location. It has been suggested that the course of the road lay on the west side of Llyn Cellyn, where there are some clear traces of a narrow terrace but it is doubtful if there was ever enough space for this to reach the north end of the lake (Margary, 1957).



## 5.2 Early Medieval, Medieval and Post-Medieval Periods

The Early Medieval period is also poorly represented within this part of northwest Wales and there are no known sites within 1.0km of the proposed pipeline. Sites from this era are particularly rare in north Wales, although they must have existed, and it is likely that sites were reused and built upon thus accounting for the lack of surviving physical remains.

Approximately 460.0m to the east of the proposed pipeline route a possible rectangular structure (PRN: 29472) comprising low grassed-over stony banks measuring <0.20m in height and forming a sub-rectangular plan measuring 7.0m by 4.5m in size with a northeast to southwest orientation was recorded in the GAT assessment report 364. The report described internal facing with an uneven hollowed interior, with traces of a track skirting the south side of the feature. The site was not recorded on any available maps but was thought to be the remains of a medieval structure (GAT report 364). No other medieval sites are known within the localised landscape.

The proposed route of the hydro-electric scheme is depicted in detail on the first, second and third edition 25" county series Ordnance Survey maps of 1889, 1900 and 1915 respectively (figures 4, 5, and 6). All four maps depict the area much as it exists today, with the A4085 depicted to the west, as well as the post-medieval Bron y Fedw railway (PRN: 29466). The railway was part of an ambitious scheme to demonstrate the ability of public narrow gauge railways and to connect the Gwyrfai valley and the Moel Tryfan area with Caernarfon in 1877. The Bron y Fedw section of the railway was an extension from Railway no.6 (from Dinas on the Caernarfon-Afon Wen line) to Rhyd Ddu (Boyd, 1972).

All three edition Ordnance Survey maps depict the farm of Bron Fedw Uchaf as well as the lower mountain trackway and two existing field walls. In addition, the first edition map of 1889 shows the two sections of sheep shelter wall with further sheep shelters being depicted north of the trackway by the production of the second edition map of 1900 (see section 7.0).

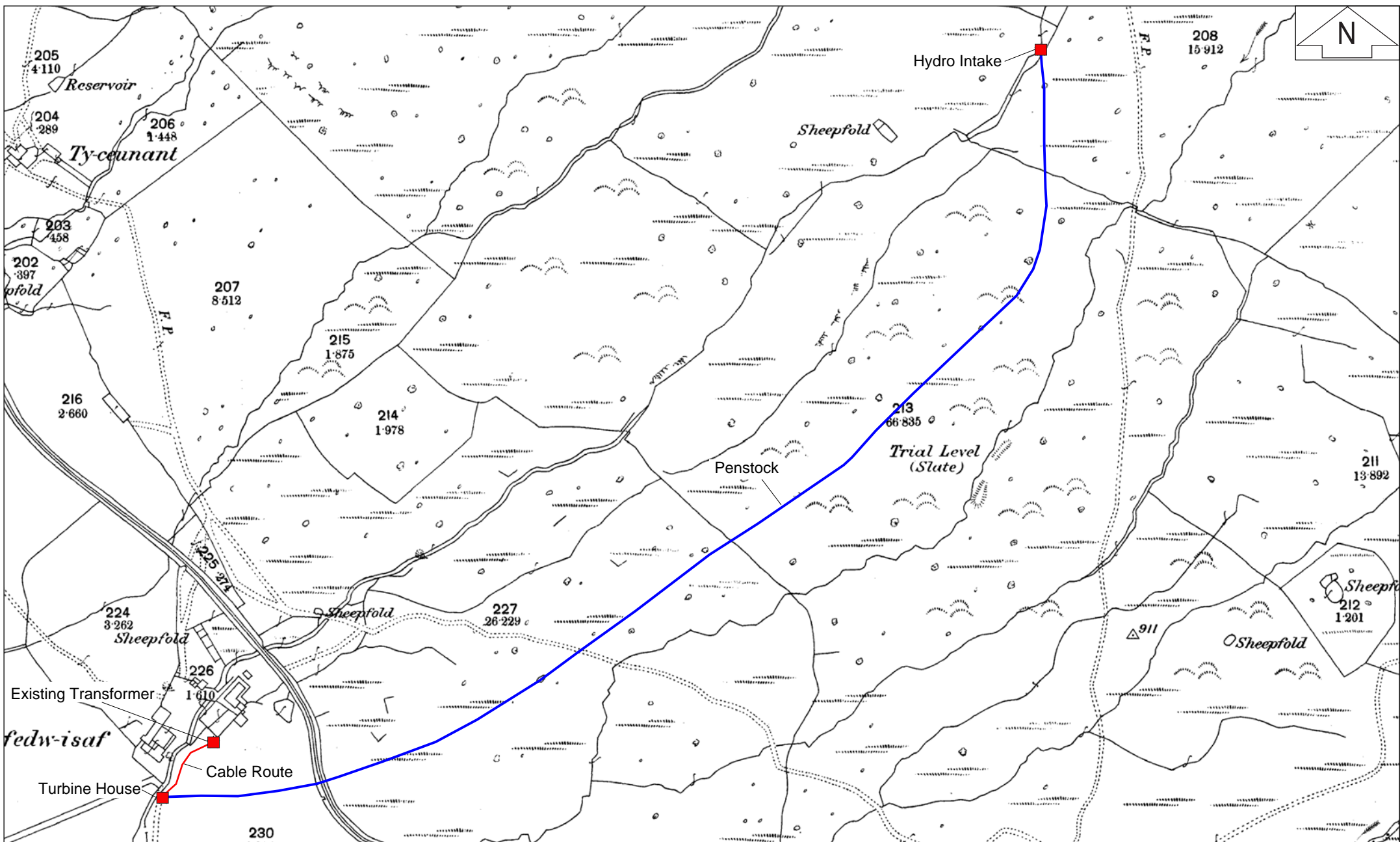


Figure 04: First Edition 25" County Series Ordnance Survey Map of 1889.

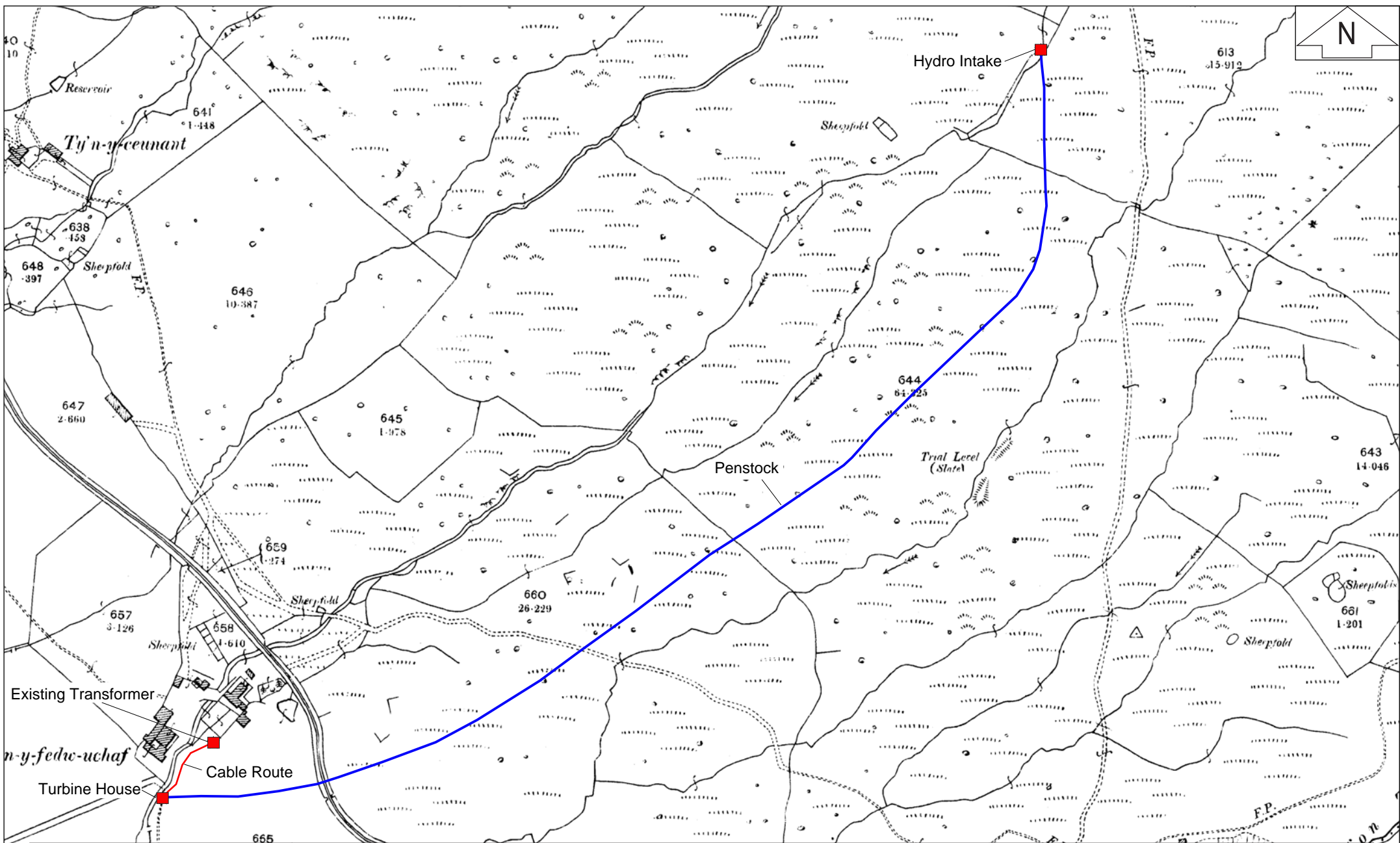


Figure 05: Second Edition 25" County Series Ordnance Survey Map of 1900.

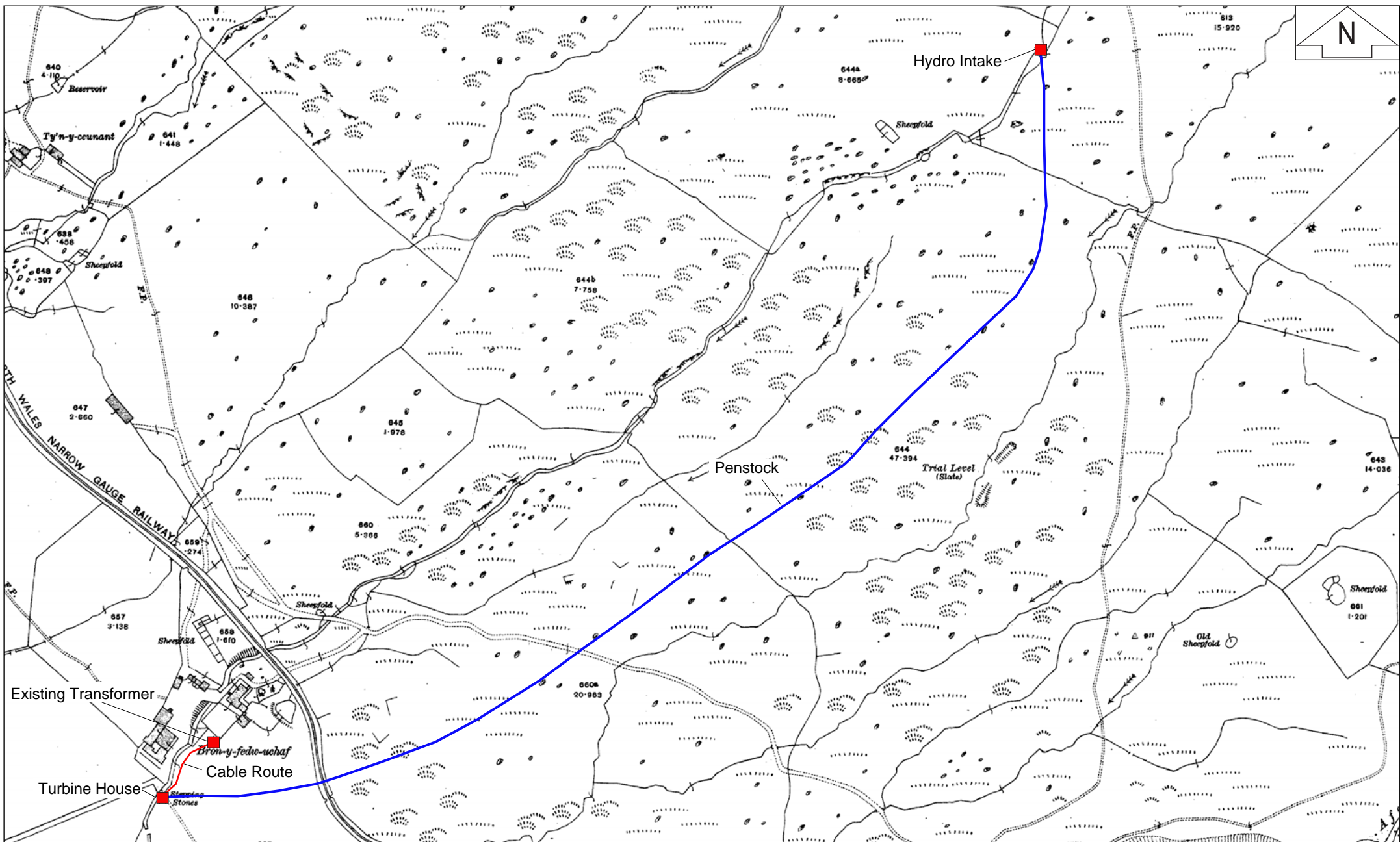


Figure 06: Third Edition 25" County Series Ordnance Survey Map of 1915.



## 6.0 ASSESSMENT OF HISTORICAL ASSETS

### 6.1 Definitions

Definitions of importance, impact, and significance of effect as used in the gazetteer (section 6.2) are listed below. Definitions of assessment and mitigation techniques as used in the gazetteer are listed in appendix II.

#### 1. Definition of Categories of importance

The following categories were used to define the importance of the archaeological resource.

Significance	Description
International (Very High)	Archaeological sites or monuments of international importance, including World Heritage Sites. Structures and buildings inscribed as of universal importance as World Heritage Sites. Other buildings or structures of recognised international importance.
National (High)	Ancient monuments scheduled under the Ancient Monuments and Archaeological Areas Act 1979, or archaeological sites and remains of comparable quality, assessed with reference to the Secretary of State's non-statutory criteria. Listed Buildings. Undesignated structures of national importance.
Regional/ County (Medium)	Conservation Areas Archaeological sites and remains which, while not of national importance, score well against most of the Secretary of State's criteria.
Local (Low)	Archaeological sites that score less well against the Secretary of State's criteria. Historic buildings on a 'local list'.
Negligible/None	Areas in which investigative techniques have produced no or only minimal evidence for archaeological remains, or where previous large-scale disturbance or removal of deposits can be demonstrated.
Unknown	Archaeological sites whose importance cannot be determined with the information currently at hand. This can include sites where the extent of buried remains is unknown.



## 2. Definition of Impact

The direct impact of the proposed development on each site was estimated. The impact is defined as follows:

<b>Magnitude</b>	<b>Direct Impacts</b>	<b>Indirect Impacts</b>
High Adverse	Complete removal of an archaeological site. Complete destruction of a designated building or structure.	Radical transformation of the setting of an archaeological monument. A fundamental change in the setting of a building.
Medium Adverse	Removal of a major part of an archaeological site and loss of research potential.  Extensive alteration (but not demolition) of a historic building or feature, resulting in an appreciable adverse change.	Partial transformation of the setting of an archaeological site (e.g. the introduction of significant noise or vibration levels to an archaeological monument leading to changes to amenity use, accessibility or appreciation of an archaeological site). Partial adverse transformation of the setting of a designated building.
Low Adverse	Removal of an archaeological site where a minor part of its total area is removed but the site retains a significant future research potential. Change to a historic building or feature resulting in a small change in the resource and its historical context and setting.	Minor change to the setting of an archaeological monument or historic building.
Negligible/ Neutral	No impact from changes in use, amenity or access. No change in the ability to understand and appreciate the resource and its historical context and setting.	No perceptible change in the setting of a building or feature.
Low Beneficial	Land use change resulting in improved conditions for the protection of archaeological remains or understanding/ appreciation of a historic building or place	Decrease in visual or noise intrusion on the setting of a building, archaeological site or monument. Improvement of the wider landscape setting of a building, archaeological site or monument.
Medium Beneficial	Land use change resulting in improved conditions for the protection of archaeological remains, or understanding/ appreciation of a historic building or place, including through interpretation measures (heritage trails, etc). Removal of harmful alterations to better reveal the significance of a building or structure, with no loss of significant fabric.	Significant reduction or removal of visual or noise intrusion on the setting of a building, archaeological site or monument; and Improvement of the wider landscape setting of a building, archaeological site or monument Improvement of the cultural heritage amenity, access or use of a building, archaeological site or monument.
High Beneficial	Arrest of physical damage or decay to a building or structure;	Exceptional enhancement of a building or archaeological site, its cultural heritage amenity and access or use

### 3. The significance of effect

The significance of effect is derived from the importance of the resource and the magnitude of the impact upon it.

**Very large** - A serious impact on a site of international or national importance with little or no scope for mitigation. These effects represent key factors in the decision making process.

**Large** - Lesser impacts on sites of national importance and serious impacts on sites of regional importance, with some scope for mitigation. These factors should be seen as being very important considerations in the decision making process.

**Moderate** - Moderate or minor impacts on sites of regional importance and minor to major impacts on sites of local or minor importance. A range of mitigatory measures should be available.

**Slight** - Negligible impacts on sites of regional, local or minor importance and minor and moderate impacts on minor or damaged sites. A range of basic mitigatory measures should be available.

**Neutral** - No perceptible effect or change to sites of all categories.

The significance of effect will be determined using the table below, a basic matrix combining archaeological value and magnitude of impact.

**Determination of Significance of Effect**

<b>Archaeological Value</b>	<b>International</b>	Neutral	Moderate or Large	Large or Very Large	Very Large
	<b>National</b>	Neutral	Moderate or Slight	Moderate or Large	Large or Very Large
	<b>Regional</b>	Neutral	Slight	Moderate	Moderate or Large
	<b>Local</b>	Neutral	Neutral or Slight	Slight	Moderate or Slight
	<b>Negligible</b>	Neutral	Neutral or Slight	Neutral or Slight	Slight
		<b>None</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
		<b>Magnitude of impact</b>			

## **7.0 SITE GAZETTEER – PHYSICAL IMPACTS**

The field walkover discovered 8 sites of archaeological and historic interest within the 40.0m wide assessment corridor, as listed below.

In accordance with Paragraph 128 of the National Planning Policy Framework and Welsh Office Circular 60/96 each heritage asset has been assigned a level of importance ranked from International through to National, Regional/County, Local, and None. If it is not possible to assess the importance of the site from the visible remains, then it is ranked Unknown with the suspected importance level placed in brackets if possible. Identified sites were also assigned a level of impact ranked from High through to Medium, and Low. Levels of impact can be considered as both adverse or beneficial, and can be direct (physically impacting upon a site) or indirect (indirectly physically impacting upon a site). The significance of effect is determined from the importance level of the resource and the magnitude of the impact upon it. Where it is expected that a site will be impacted upon by the proposed works then mitigation/assessment recommendations are provided. All archaeological/historical sites identified are depicted on figure 7.

<b>1. Bron y Fedw Railway</b>	<b>PRN:</b> 29466
<b>Figure:</b> 7	<b>Plate:</b> 2 and 3
<b>NGR:</b> SH 57216 54323	<b>Period:</b> Post-medieval
<p><b>Description</b></p> <p>The railway was part of an ambitious scheme to demonstrate the ability of public narrow gauge railways and to connect the Gwyrfaï valley and the Moel Tryfan area with Caernarfon in 1877. The Bron y Fedw section of the railway was an extension from Railway no.6 (from Dinas on the Caernarfon-Afon Wen line) to Rhyd Ddu (Boyd, 1972).</p> <p>The railway reopened to tourists in 2003 and runs from northwest to southeast across the study area. The proposed hydro scheme will involve the laying of the penstock through an existing culvert beneath the railway and as such there will not be any direct physical impact upon the railway. There will however be a high adverse indirect non-physical (visual) impact upon the views northeast and southwest from the railway. This impact will however be limited to the construction phase and it is not anticipated that there will be any further impact upon completion of the proposed scheme. As such there are no further recommendations for assessment or mitigatory measures.</p>	
<b>Category of importance:</b> Regional	
<b>Level of impact:</b> High adverse indirect non-physical (visual) (limited to construction phase)	
<b>Significance of effect:</b> Large adverse (limited to construction phase)	
<b>Recommendations for further assessment:</b> None	
<b>Recommendations for further mitigatory measures:</b> None	



**Plate 02:** Culvert beneath Bron y Fedw railway (feature 1), from the southwest. Scale 1.0m.





**Plate 03:** Bron y Fedw railway (feature 1), from the southeast. Scale 1.0m.

<b>2. Sheep Shelter</b>	<b>PRN:</b> 59989
<b>Figure:</b> 7	<b>Plate:</b> 4
<b>NGR:</b> SH 57266 54361	<b>Period:</b> Post-medieval
<p><b>Description</b></p> <p>A sheep shelter measuring approximately 5.0m in length orientated northwest to southeast then turns at a right angle and runs northeast for approximately 4.0m. The shelter is constructed from dry-bonded medium sized sub-angular stone cobbles measuring approximately 1.2m in height by 0.35m in width. The shelter is first depicted on the first edition 25" County Series Ordnance Survey map of 1889 (figure 4) and was most likely constructed with dual function as a sheep shelter and to clear the surrounding area of stone, thus improving the grazing land.</p> <p>The sheep shelter will not be impacted upon by the proposed scheme and as such no further assessment or mitigatory measures are proposed.</p>	
<b>Category of importance:</b> Local	
<b>Level of impact:</b> None	
<b>Significance of effect:</b> Neutral	
<b>Recommendations for further assessment:</b> None	
<b>Recommendations for further mitigatory measures:</b> None	



**Plate 04:** Sheep shelter (feature 2), from the northwest. Scale 1.0m.



<b>3. Sheep Shelter</b>	<b>PRN:</b> 59990
<b>Figure:</b> 7	<b>Plate:</b> 5
<b>NGR:</b> SH 57257 54350	<b>Period:</b> Post-medieval
<p><b>Description</b></p> <p>A sheep shelter measuring approximately 4.0m in length orientated northeast to southwest then turns at a right angle and runs northwest for approximately 4.0m. The shelter is constructed from dry-bonded medium sized sub-angular stone cobbles measuring approximately 1.3m in height by 0.45m in width. The shelter is first depicted on the first edition 25" County Series Ordnance Survey map of 1889 (figure 4) and was most likely constructed with dual function as a sheep shelter and to clear the surrounding area of stone, thus improving the grazing land.</p> <p>The sheep shelter will not be impacted upon by the proposed scheme and as such no further assessment or mitigatory measures are proposed.</p>	
<b>Category of importance:</b> Local	
<b>Level of impact:</b> None	
<b>Significance of effect:</b> Neutral	
<b>Recommendations for further assessment:</b> None	
<b>Recommendations for further mitigatory measures:</b> None	



**Plate 05:** Sheep shelter (feature 3), from the southwest. Scale 1.0m.

<b>4. Trackway</b>	<b>PRN:</b> 59991
<b>Figure:</b> 7	<b>Plate:</b> 6
<b>NGR:</b> SH 57405 54416	<b>Period:</b> Post-medieval
<p><b>Description</b>  A trackway of slate chippings and measuring approximately 2.5m in width runs from northwest to southeast connecting the farm of Bron Fedw Uchaf with the Glanrafon slate quarries in the east. The trackway is first depicted on the first edition 25" County Series Ordnance Survey map of 1889 (figure 4).</p> <p>The trackway will require breaching by the penstock route and as such it is expected that there will be a low adverse direct physical impact upon the feature resulting in a neutral or slight adverse significance of effect. This impact however will be limited to the construction phase and as such there will be no further impact upon completion of the scheme. Therefore there are no further recommendations for assessment or mitigatory measures aside from reinstatement upon completion of works.</p>	
<b>Category of importance:</b> Local	
<b>Level of impact:</b> Low adverse direct physical (limited to construction phase)	
<b>Significance of effect:</b> Neutral or slight adverse (limited to construction phase)	
<b>Recommendations for further assessment:</b> None	
<b>Recommendations for further mitigatory measures:</b> None/ reinstatement upon completion	



**Plate 06:** Trackway (feature 4), from the southeast. Scale 1.0m.

<b>5. Sheep Shelter</b>	<b>PRN:</b> 59992
<b>Figure:</b> 7	<b>Plate:</b> 7
<b>NGR:</b> SH 57423 54461	<b>Period:</b> Post-medieval
<p><b>Description</b></p> <p>A sheep shelter measuring approximately 5.0m in length, 0.3m in width, and 1.2m in height runs from northeast to southwest at this point. The shelter is constructed from dry-bonded medium sized sub-angular stone cobbles. The shelter is first depicted on the second edition 25" County Series Ordnance Survey map of 1900 (figure 5) thus being built sometime in the intervening years between the production of the first edition map in 1889 (figure 4). It was most likely constructed with dual function as a sheep shelter and to clear the surrounding area of stone, thus improving the grazing land.</p> <p>The sheep shelter will not be impacted upon by the proposed scheme and as such no further assessment or mitigatory measures are proposed.</p>	
<b>Category of importance:</b> Local	
<b>Level of impact:</b> None	
<b>Significance of effect:</b> Neutral	
<b>Recommendations for further assessment:</b> None	
<b>Recommendations for further mitigatory measures:</b> None	





**Plate 07:** Sheep shelter (feature 5), from the south. Scale 1.0m.

<b>6. Sheep Shelter</b>	<b>PRN:</b> 59993
<b>Figure:</b> 7	<b>Plate:</b> 8
<b>NGR:</b> SH 57442 54453	<b>Period:</b> Post-medieval
<p><b>Description</b></p> <p>A sheep shelter measuring approximately 6.0m in length, 0.3m in width, and 1.1m in height runs from northeast to southwest at this point. The shelter is constructed from dry-bonded medium sized sub-angular stone cobbles. The shelter is first depicted on the second edition 25" County Series Ordnance Survey map of 1900 (figure 5) thus being built sometime in the intervening years between the production of the first edition map in 1889 (figure 4). It was most likely constructed with dual function as a sheep shelter and to clear the surrounding area of stone, thus improving the grazing land.</p> <p>The sheep shelter will not be impacted upon by the proposed scheme and as such no further assessment or mitigatory measures are proposed.</p>	
<b>Category of importance:</b> Local	
<b>Level of impact:</b> None	
<b>Significance of effect:</b> Neutral	
<b>Recommendations for further assessment:</b> None	
<b>Recommendations for further mitigatory measures:</b> None	



**Plate 08:** Sheep shelter (feature 6), from the north. Scale 1.0m.



<b>7. Field Boundary Wall</b>	<b>PRN:</b> 59994
<b>Figure:</b> 7	<b>Plate:</b> 9
<b>NGR:</b> SH 57526 54498	<b>Period:</b> Post-medieval
<p><b>Description</b></p> <p>A field boundary wall measuring approximately 1.3m in height by 0.4m in width runs from southeast to northwest enclosing the northern side of the grazing field. The wall is constructed from dry-bonded single-skin medium sized sub-angular and sub-rounded cobbles. The wall has been reinforced with iron post and barbed wire along the top.</p> <p>The wall is first depicted on the first edition 25" County Series Ordnance Survey map of 1899 (figure 4) and will have the penstock passed through an existing sheep door in the wall, as such there will be no direct physical impact upon the feature. Therefore no further assessment or mitigatory measures are proposed.</p>	
<b>Category of importance:</b> Local	
<b>Level of impact:</b> None	
<b>Significance of effect:</b> Neutral	
<b>Recommendations for further assessment:</b> None	
<b>Recommendations for further mitigatory measures:</b> None	



**Plate 09:** Field wall (feature 7), from the southeast. Scale 1.0m.

<b>8. Field Boundary Wall</b>	<b>PRN:</b> 59995
<b>Figure:</b> 7	<b>Plate:</b> N.A.
<b>NGR:</b> SH 57739 54760	<b>Period:</b> Post-medieval
<b>Description</b> A field boundary wall measuring approximately 0.6m in height by 0.4m in width runs from southeast to northwest enclosing the northern side of the grazing field. The wall is constructed from dry-bonded single-skin medium sized sub-angular and sub-rounded cobbles.  The wall is first depicted on the first edition 25" County Series Ordnance Survey map of 1899 (figure 4) and will require breaching by the proposed scheme. This impact will however be limited to the width of the tracked excavator and as such the overall adverse direct physical impact is expected be low. No further assessment or mitigatory measures are proposed except for reinstatement upon the completion of works.	
<b>Category of importance:</b> Local	
<b>Level of impact:</b> Low adverse direct physical (limited to construction phase)	
<b>Significance of effect:</b> Neutral or slight adverse (limited to construction phase)	
<b>Recommendations for further assessment:</b> None	
<b>Recommendations for further mitigatory measures:</b> None / reinstatement upon completion	

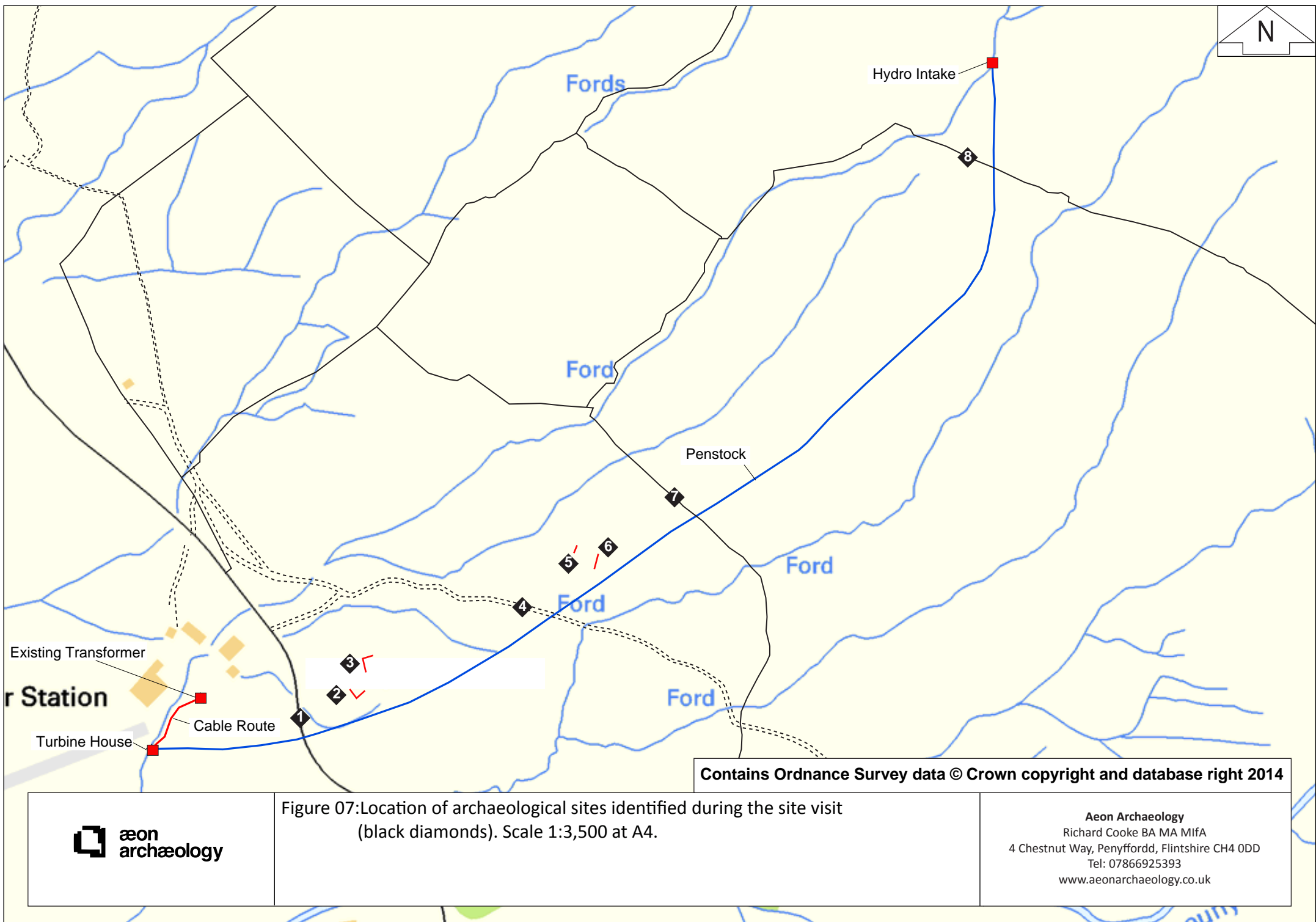


Table 2: Summary of archaeological features. <span>GREEN = no action required; RED= Action required</span>						
Number	Name	Importance	Impact	Significance of effect	Further Assessment	Mitigation Recommendations
<b>PHYSICAL DIRECT AND INDIRECT IMPACTS</b>						
1	Bron y Fedw Railway	Regional	High adverse indirect non-physical (visual) (limited to construction phase)	Large adverse (limited to construction phase)	None	None
2	Sheep Shelter	Local	None	Neutral	None	None
3	Sheep Shelter	Local	None	Neutral	None	None
4	Trackway	Local	Low adverse direct physical (limited to construction phase)	Neutral or slight adverse (limited to construction phase)	None	None – reinstatement upon completion
5	Sheep Shelter	Local	None	Neutral	None	None
6	Sheep Shelter	Local	None	Neutral	None	None
7	Field Boundary Wall	Local	None	Neutral	None	None
8	Field Boundary Wall	Local	Low adverse direct physical (limited to construction phase)	Neutral or slight adverse (limited to construction phase)	None	None – reinstatement upon completion

## 8.0 IMPACT AND RECOMMENDATIONS

### 8.1 Direct physical impact

#### *Construction phase*

The proposed development scheme is expected to have a *low adverse direct physical* impact upon two sites of archaeological importance (features 4 and 8) during the construction phase. Both of these features are post-medieval in date and are considered to be of *local* importance thus resulting in a *neutral or slight adverse* significance of effect.

#### *Completion phase*

The proposed development scheme is not expected to have any direct physical impact upon any known sites of archaeological and historical significance upon completion.

### 8.2 Indirect physical and non-physical (visual) impact

#### *Construction phase*

The proposed development scheme is expected to have a *high adverse indirect non-physical (visual)* impact upon the views north and southward from the Bron y Fedw railway (feature 1) resulting in an overall large adverse significance of effect. This impact is however time limited to the phase of construction.

#### *Completion phase*

The proposed development scheme is not expected to have any indirect physical or non-physical impacts upon any known sites of archaeological and historical significance upon completion.

### 8.3 Historic Landscapes

The proposed development site currently lies within the *gwyrfai valley slopes* Historic Landscape Character area (HLCA: 43). Due to the proposal to bury the hydro penstock it is not expected that there will be a loss or alteration to any of the historic landscape character area.

### 8.4 Site Specific Recommendations

The proposed scheme will directly impact upon only two archaeological features, a trackway (feature 4) and a field boundary wall (feature 8). Both of these features are likely to be of post-medieval date and as such are considered to be of *local* importance. The photographs and descriptions provided within this report should be considered commensurate with a basic archaeological record level and as such no further recommendations are made for assessment or mitigatory measures for these features.

### 8.5 General recommendations

The archaeological assessment did not identify any sites considered to be above local importance within the 40.0m wide assessment corridor or indeed within the localised landscape aside from the Bron y Fedw railway (feature 1) which is considered to be of regional importance. The majority of the features identified were dry-stone sheep shelters and field boundaries of post-medieval date. It is possible that unknown remains are preserved at a buried level, although due to the lack of archaeological sites of all periods within 1.0km of the



pipe route and due to the steepness of the upland slope, it is considered that this potential is low. This potential is reinforced by the archaeological assessment and watching brief carried out by GAT in 2000 and 2007 respectively which failed to find any unknown buried remains. As such, no further general assessment or mitigatory measures are proposed.

## 9.0 SOURCES

### *OS Maps*

1<sup>st</sup> edition 25 inch Ordnance Survey Map of 1889.

2<sup>nd</sup> edition 25 inch Ordnance Survey Map of 1900.

3<sup>rd</sup> edition 25 inch Ordnance Survey Map of 1915.

OS 1:10 000 Series sheet SH 55NE, SH 55SE, SH 55SW, and SH 55NW.

### *Sources*

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Chisholm, H. 1911. *Encyclopaedia Britannica*

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English Heritage, 2011. *The Settings of Heritage Assets*

GAT report 364, 2000. *Treweunydd Hydro-Power Scheme Desk Based Assessment*

GAT report 693, 2007. *Treweunydd Hydro-Power Scheme Archaeological Watching Brief*

Gwynedd Historic Environment Record (HER)

Jenkins, D.E.1899. *Beddgelert – It's Facts, Fairies and Folklore*

Margary, I.D. 1957. *Roman Roads in Britain*

NMR Site Record Cards

RCAHMW, 1960. *Inventory Caernarvonshire Vol.II*

The Institute for Archaeologists, 1994 (revised 2009) *Standard and Guidance for Archaeological Desk-Based Assessment*

## APPENDIX 1: SCHEDULED AND NON-SCHEDULED SITES WITHIN 1.0KM

Undesignated monuments within 1.0km of the proposed development area as listed on the Gwynedd HER (figure 1)

PRN	Name	Type	Broadclass	Period
1974	Cwellyn House, Betws Garmon	House	Domestic	Post-Medieval
3391	Cist with Urn - Findspot, Glan Yr Afon	Cist	Religious, Ritual and Funerary	Prehistoric
4036	Natural Glacial Feature, Maen Bras	Natural feature	Unassigned	Unknown
6133	Enclosure, Afon Trewunydd	Enclosure	Agriculture and Subsistence	Unknown
9582	Bryn Cwlllyn	Building	Unassigned	Unknown
9691	Bryn Cwellyn Quarry	Hut	Industrial	Modern
9693	Bryn Cwellyn Quarry	Spoil heap	Industrial	Modern
9694	Bryn Cwellyn Quarry	Spoil heap	Industrial	Modern
9695	Bryn Cwellyn Quarry	Spoil heap	Industrial	Modern
9696	Bryn Cwellyn Building	Building	Unassigned	Unknown
9697	Bwlch-y-moch Barn	Building	Unassigned	Unknown
9698	Bwlch-y-moch Barn	Building	Unassigned	Unknown
17536	Part of Roman Road, Segontium - Tomen y Mur	Road	TRANSPORT	Roman
20195	Slate Quarry, Bron Y Fedw	Slate quarry	Industrial	Post-Medieval
20196	Glanrafon Slate Quarry, Betws Garmon	Slate quarry	Industrial	Post-Medieval
21592	Ffridd Isa Mine	Copper mine	Industrial	Post-Medieval
21945	Glanrafon Viaduct, Afon Treweunydd	Viaduct	Industrial	Post-Medieval
29466	Railway, Bron y Fedw	Railway	Transport	Post-Medieval
29467	Terrace, Bron y Fedw	Terraced ground	Unassigned	Unknown
29468	Drain, Bron y Fedw	Drain	Water Supply and Drainage	Post-

				Medieval
29469	Terrace and Walling, Bron y Fedw	Terraced ground	Unassigned	Unknown
29470	Enclosure, Bron y Fedw			
29471	Sheepfold and Sorting Pens, Bron y Fedw	Sheep fold	Agriculture and Subsistence	Post-Medieval
29472	Rectangular Structure, Cwm Treweunydd	Structure	Unassigned	Medieval
29473	Sheepfold and Droeway, Cwm Treweunydd	Sheep fold	Agriculture and Subsistence	Post-Medieval
29474	Terrace and Enclosures, Cwm Treweunydd	Terraced ground	Agriculture and Subsistence	Post-Medieval
29475	Sheepfold, Cwm Treweunydd	Sheep fold	Agriculture and Subsistence	Post-Medieval
57237	Building, E of Glan-yr-afon	Building	Unassigned	Post Medieval

**Listed Buildings within 1.0km of the proposed development area (figure 2).**

Number	Name	Locality	Grade
21279	Pont Cwellyn No 1 and Pont Cwellyn No 2 (also known together as Pont Glan-yr-afon)	Pont Cwellyn	II
21868	Beudy & Ysgubor	Clogwyn-y-gwin	II

**NMR Monument Points within 1.0km of the proposed development area (figure 2)**

<b>NPRN</b>	<b>Name</b>	<b>Broadclass</b>	<b>Type</b>	<b>Period</b>
16853	Snowdon ranger youth hostel	Commercial	Hostel	Post medieval
26292	Clogwyn-y-gwin; clogwyn y gwyn	Domestic	Farmhouse	Post medieval?
26365	Cwellyn	Domestic	House	Post medieval?
31361	Colgwyn-y-gwin, outbuildings	Agriculture and subsistence	Outbuilding	Post medieval?
287141	North east of llwyn-y-forwyn peat cutting	Agriculture and subsistence	Peat cutting	Post medieval
305780	Glanrafon quarry, capel garmon	Industrial	Slate quarry	Post medieval;19th century
415155	Cwm treweunydd sheep fold	Agriculture and subsistence	Sheep fold	Post medieval
415156	Glanafon quarry, enclosure	Agriculture and subsistence	Enclosure	Post medieval
415217	Glanrafon slate quarrymen's barracks	Industrial	Barracks	Post medieval;19th century
505925	Maen-bras, sheep fold i	Agriculture and subsistence	Sheep fold	Post medieval
505943	Cwm treweunydd, dam	Water supply and drainage	Dam	Post medieval
505944	Llyn ffynnon-y-gwas, sheep fold iii	Agriculture and subsistence	Sheep fold	Post medieval
505945	Llyn ffynnon-y-gwas, sheep fold iv	Agriculture and subsistence	Sheep fold	Post medieval
505946	Maen-bras, sheep fold ii	Agriculture and subsistence	Sheep fold	Post medieval
505947	Maen-bras, sheep fold iii	Agriculture and subsistence	Sheep fold	Post medieval
520219	Clogwyn-y-gwyn, sheepfold i	Agriculture and subsistence	Sheep fold	Post medieval
520220	Clogwyn-y-gwyn, trial slate mine	Industrial	Slate quarry	Post medieval
520221	Clogwyn-y-gwyn, sheepfold ii	Agriculture and subsistence	Sheep fold	Post medieval



**Historic Landscape Character areas (HLCAs) within 1.0km of the proposed pipeline route (figure 3)**

<b>HLCA</b>	<b>HLCA name</b>	<b>Landscape</b>
14	Mynydd cilgwyn-moel tryfan-moel smytho	GW9
32	Llyn y gadair	GW9
36	Unenclosed mountain (north carneddau)	GW6 & GW10
41	Gwyrfai valley afforested slopes	GW9
43	Gwyrfai valley slopes	GW9
44	Unenclosed mountain	GW9

## APPENDIX 2: DEFINITIONS OF FURTHER ASSESSMENT AND MITIGATORY MEASURES

### 1. Definition of field evaluation techniques

Field evaluation is sometimes necessary when the importance of an identified archaeological feature cannot be ascertained via an archaeological desk based assessment alone. There are several different techniques but the three most common are geophysical survey, trial trenching, and supervised metal detector survey:

#### *Geophysical survey*

This technique is a non-intrusive form of archaeological field evaluation. It utilises a magnetometer which detects differences within the earth's magnetic field caused by the presence of iron in the soil. This iron often takes the form of magnetised iron oxides in the topsoil which have been re-deposited into lower archaeological features through cutting and backfill. A magnetometer can also detect iron artefacts within the soil and the presence of burnt stone material such as on hearths, kilns, and burnt mounds.

#### *Trial trenching*

Where a site is suspected to contain more subtle archaeological features such as pits, a geophysical survey may not be appropriate due to its lack of sensitivity in detecting these features. Indeed, trial trenching can also be utilised when anomalies have been identified during the geophysical survey and clarification is required in order to identify them. Trial trenches usually measure 20m by 2m although can vary in size if targeting geophysical anomalies. Trenches are excavated using a mechanical tracked excavator and supervised by an archaeologist. The topsoil and subsoil are removed onto buried features or if absent, on to the natural glacial substrata. Any archaeological remains found are usually evaluated and recorded prior to backfilling of the trench, so that further site specific mitigatory recommendations can be made.

#### *Supervised Metal Detector Survey*

Some types of underlying substrata and bedrock can mask the results of investigation techniques such as geophysical survey. In such instances an archaeologically supervised metal detector survey can be undertaken. This involves the supervision of metal detectorists by a suitably qualified archaeologist and the spatial mapping of artefacts as they are discovered. This technique can give a geographical spread of metal finds and thus be indicative of 'hotspot' areas which may require further investigation by trial trenching for example.

### 2. Definition of Mitigatory Recommendations

None:

No further action is required.

Detailed recording:

A photographic and concise descriptive record is required, along with a digital survey.

Basic recording:

A photographic and basic descriptive record is required.

Watching brief:

Monitoring is required by a suitably qualified archaeologist during the proposed development. An archaeological watching brief is divided into four categories according to the IFA, 2001.

*Institute for Archaeologists 2001 Standard and Guidance for an archaeological watching brief:*

- comprehensive (present during all ground disturbance)
- intensive (present during sensitive ground disturbance)
- intermittent (viewing the trenches after machining)
- partial (as and when seems appropriate).

**Avoidance:**

These features should be avoided by the proposed development and any ancillary works including the establishment of compound and material lay-down areas. It may be necessary to surround the feature with a barrier and/or signage to avoid accidental damage.

**Reinstatement:**

These features should be reinstated to their original location and condition. Supervision by an archaeologist is required.

