

# Mynydd Llandygai Microhydro Scheme

## Assessment Report



Ymddiriedolaeth Archaeolegol Gwynedd  
Gwynedd Archaeological Trust





# Mynydd Llandygai Microhydro Scheme

## Assessment Report

Project No. G2487

Report No. 1346

Prepared for: Coetir Mynydd

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Front cover: View from south west of Afon Galedffrwd down the valley taken from  
Pont Galedffrwd (PRN 23793). (photographic archive ref. G2487\_015)




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## **SUMMARY**

*Gwynedd Archaeological Trust was asked by Coetir Mynydd to carry out an archaeological assessment in advance of a proposed microhydro scheme at Mynydd Llandygai, Gwynedd. The scheme measures up to 1.2km in length and will be located along Afon Galedffrwd between a proposed turbine house and a proposed take-off dam. The archaeological assessment studied the proposed route of the scheme.*

*For much of the route it traversed a steeply sided heavily wooded valley through Parc yr Ocar, where little new archaeology was encountered. However fifteen features were identified, with the important Felin Fawr complex, which has been much studied in detail and the results noted elsewhere, treated as a single site. All the sites identified were of post medieval and modern date, and were associated with the industrial development of the wider area by the Penrhyn Estate from the late 18<sup>th</sup> century onwards. No sites of medieval or earlier date were identified within the study area, although the wider area was noted to be rich in prehistoric, particularly late prehistoric, archaeology.*

*Evidence of reservoirs, weirs and former pipelines, associated with earlier water management schemes associated with Felin Fawr were encountered. The Felin Fawr complex is a site of outstanding importance as the first slate mill, built in the years 1803-5, to work slate from the Penrhyn Quarries into decorative slate.*

*Two pedestrian bridge crossings were also noted within the valley itself in addition to evidence for former ochre mining and small scale quarrying, which must have increased activity in Parc yr Ocar during the 19<sup>th</sup> and early 20<sup>th</sup> centuries. It appears that the valley was also used as a transit route for workers from Mynydd Llandygai to reach the Penrhyn Quarry and the Felin Fawr Mill, and evidence of former path ways was noted.*

*At the southwestern end of the scheme the route opens out near Pont Galedffrwd, where remnants of the former small enclosure pastoral agriculture can be noted.*

*Remnants of the lost farmstead of Pen-y-Bont, of probable 18<sup>th</sup> century origin, were also observed in this area.*

*As the scheme is currently understood, none of the sites identified will be significantly impacted upon by the scheme, with the exception of the original pipeline route, Feature 9, which will be significantly impacted upon. Basic archaeological recording is recommended for two sites, and detailed recording for the original pipeline route, as this is to be significantly impacted by the scheme. Feature 9 will be modified as part of the scheme, but it is planned that this shall be in such a way as to enable the narrative of hydro-electric production on the site to be visible in the future.*

*However it is recommended that an archaeological watching brief is carried out during groundworks on the site, as it is thought likely that archaeological information, particularly associated with the industrial period might be encountered, and that there is some possibility of the presence of prehistoric archaeology. The location of access tracks and compounds are also currently unknown, and archaeological work may be required with any associated groundworks. It is recommended that impacts on designated sites should be avoided, and impacts on the wider historic landscape are minimised.*

# 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by *Coetir Mynydd* to carry out an archaeological assessment in advance of a proposed microhydro scheme at Mynydd Llandygai, Gwynedd (Figure 01). The scheme measures up to 1.2km in length and will be located along Afon Galedffrwd between a proposed turbine house (NGR SH61486630) and a proposed take-off dam (NGR SH60596544). The specific design of the microhydro pipeline, turbine house and take-off dam have not been confirmed, but the assessment will include the proposed scheme locations as detailed in Figure 01.

The pipeline will mostly traverse semi-improved land and woodland, whilst the turbine house will be located on the outskirts of an industrial estate and the take-off dam to the immediate south of Pont Galedffrwd.

The assessment conforms to the guidelines specified in the Chartered Institute for Archaeologists *Standard and Guidance for Historic Environment Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014). Gwynedd Archaeological Trust is a Chartered Institute for Archaeologists *Registered Archaeological Organisation*. The format of this design corresponds to the requirements of section 2.3 of MoRPHE (English Heritage 2015) and to MAP2 (English Heritage, 1991, *Management of Archaeological Projects*).

The assessment will be monitored by the Gwynedd Archaeological Planning Services (GAPS); the content of this and all subsequent reporting by GAT must be approved by GAPS prior to final issue.

## 1.1 Standards and Guidance

All work was planned, managed and undertaken by Gwynedd Archaeological Trust in accordance with the following standards and guidance:

- Cadw, 2011. *Conservation Principles for the sustainable management of the historic*

*environment in Wales*

- Chartered Institute for Archaeologists, 2014, *Code of Conduct*
- Chartered Institute for Archaeologists, 2014. *Standard and guidance for historic environment desk-based assessment*
- Conwy County Borough Council, 2013, *The Conwy Local Development Plan 2007 -2022*
- English Heritage, 1991. *Management of Archaeological Projects (MAP2)*
- English Heritage, 2006. *Management Of Research Projects in the Historic Environment (MORPHE)*
- Historic Environment Scotland, 2016. *Managing Change in the Historic Environment: Setting*
- Welsh Office, 1996, Circular 61/96 *Planning and the Historic Environment: Historic Buildings and Conservation Areas*
- Welsh Office, 1996, Circular 60/96 *Planning and Historic Environment: Archaeology*



## **2 METHODOLOGY**

### **2.1 Desk- based assessment**

A desk based assessment is defined as “a programme of study of the historic environment within a specified area or site on land, the intertidal zone or underwater that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage....Significance is to be judged in a local, regional, national or international context as appropriate” (ClfA 2014b, 4).

The desk-based assessment will involve a study of the following resources:

1. The regional Historic Environment Register (HER, Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the study area. This will include an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held within the. A list of archaeological assets will be prepared for the report using information from the HER; this will include information sourced from within a 100m assessment buffer either side of the route to examine any potential impact (Figure 01). This information will be used to prepare a gazetteer and incorporate information from the walkover survey if any previously unidentified receptors are also located;
2. The National Monuments Record (NMR RCAHMW, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be checked for sites additional to the HER, and if required additional supporting information will be examined at the NMR.
3. On-line catalogue search of the National Library of Wales; and
4. Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives (Gwasanaeth Archifau Gwynedd, Cyngor Gwynedd, Caernarfon LL55 1SH) and at the Bangor University Department of Manuscripts (Bangor University, Bangor, Gwynedd, LL57 2DG).

5. Light Detection and Ranging (LiDAR) data will be examined from the Lle Geo-Portal at <http://lle.gov.wales/home> digital terrain modelling and information on potential surface features.

## **2.2 Walk-over survey of the proposed development site**

Part of the assessment involved a walkover of the footprint of the proposed development. The aims of this stage of the work were to:

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

The walkover survey of the area of the proposed development was conducted in overcast and somewhat wet conditions on Wednesday 16th November 2016, with a further visit to record some of the features on Saturday 19<sup>th</sup> November. The walkover area consisted of three topographic areas: the steep sided valley of the Afon Galedffrwd running southwest northeast, and the valley opening out at both ends, the southwestern take-off point near the former Pen-y-Bont into improved pastureland, and also in the proposed turbine house area close to the former slate mill at Felin Fawr.

A descriptive record was maintained on GAT *pro formas*. A photographic record was made of the site, including all identified features and field boundaries. A complete table of metadata with details of each image, including descriptions and directions of shot, was produced using Microsoft Access; a total of 41 images were taken (archive ref. G2487\_001 to G2487\_041; cf. Appendix III);

### **2.3 Data processing and report compilation**

A copy of this report will be sent to the client and to Gwynedd Archaeological Planning Services. It will be to the Historic Environment Record located at the Gwynedd Archaeological Trust. Submission of digital information to the Royal Commission on the Ancient and Historical Monuments of Wales will be undertaken in accordance with the RCAHMW Guidelines for Digital Archives Version 1 (2015). Digital information will include the photographic archive and associated metadata.

## 3 RESULTS

### 3.1 Desk-Based Assessment

#### 3.1.1 *Location and Geological Summary*

The hills of Moel y Ci and Parc Drysgol are composed of lavas and related rocks of the Pre and Early Cambrian period. This forms part of the Padarn Ridge running from Bethesda to Penygroes, including those of the Padarn Tuff Formation. Immediately to the south-east are of much greater economic importance as these are slates (Smith and George, 1961), exploited in the Ogwen valley by the Penrhyn Quarry and in Nant Peris by the Dinorwic Quarry. These are formed by Green mudstones of the Llanberis Slates Formation.

The hard geology has been much eroded and shaped by glaciation. This formed the major valleys and the small corries in which the Marchlyn lakes developed. On the more level ground and in the valleys gleyed soils have developed over the boulder clay, with podsolised soils on the better drained slopes (Ball 1963). The vegetation is restricted to heather and rough grass on the hills and a rich marshland community built on peat within the boggy plateau.

The soils to the east of the study area are typical Brown Earths of the Denbigh 1 Association, changing to Cambic Stagnogley soils of the Cegin Association to the west of the Afon Galedffrwd (Soil Survey of England and Wales 1980).

#### 3.1.2 *Statutory and Non Statutory Designations*

The assessment area is located within *Ogwen Valley Landscape of Outstanding Historic Interest in Wales* (Ref: HLW (Gw)) which is described as 'The classic glaciated valley in north Snowdonia, containing contrasting evidence of prehistoric and later land use, superimposed by the extensive and visually dramatic remains of the recent and continuing industrial exploitation of slate. The area includes: Neolithic and Bronze Age funerary and ritual monuments; Iron Age hillforts and concentrations of relict settlements and field systems; large and extensive remains of 19<sup>th</sup> and 20<sup>th</sup> centuries slate quarries, tips, attendant settlements and transport systems, Penrhyn Castle and Park; Telford's Holyhead Road; historic literary and social associations' (Cadw/ICOMOS 1998, 108).

There are no Scheduled Monuments (SM) within the study area, but Slate Gwaliau (CN297; SH61486642), a wall associated with the industrial complex, lies immediately to the north of the scheme. There are eight Listed Buildings, all associated with the Felin Fawr Slate Mill complex, within the study area. These are listed in Appendix III. Twenty-four sites are noted on the Gwynedd HER within the study area and these are also listed in Appendix III.

### *3.1.3 Environmental Remains and Soil Morphology*

The potential for the survival of palaeo-environmental remains and the soil morphology is unknown. It is likely that over the higher ground topsoil is present over bedrock, which is exposed in places, and that colluvial deposits will be present in the Afon Galedfrwdd valley, with deeper soil deposits at the base of the valley near the river. However the potential for the survival of environmental remains is considered to be fairly low, since industrial and domestic development, which has taken place from the early 18<sup>th</sup> century onwards, is likely to leave low potential for the survival at the northeastern end of the study area. The potential for the survival of environmental remains may be higher around the river valley and at the southwestern end of the study area near Pont Galedffrwd, and there is the possibility of the survival of peat deposits. If peat is encountered during the ground works, a scheme for sampling and analysis will have to be agreed with GAPS, as peats identified in the area are considered to have a high potential for preserving a good pollen record (Kenney 2009b).

### *3.1.4 Historical and Archaeological Background*

#### *3.1.4.1 Prehistoric*

There is no recorded evidence of human activity in the immediate study area during the prehistoric period, although evidence of early prehistoric funerary and ritual activity has been found in the surrounding area. A Neolithic burial chamber is located at Sling, 1.07km northwest of the study area (PRN 221, SM CN 119; NGR SH 60556686) which is partially incorporated into a post-medieval field boundary, and is a Scheduled Monument. A cairnfield of prehistoric burial cairns is located 750m SE of the study area at Gwaen Gyfni (PRN 5671; NGR SH61006490). A burnt mound, approximately 3m in diameter was found at SH63036718 during an archaeological

watching brief (GAT 1997b). These mounds, dating to the Bronze Age c.2000 BC are found on the banks of streams and are the remains of the cooking process. The mound would have built up from discarded stone around a central trench containing a trough of stone or timber construction, in which water was boiled using local stones heated on a fire. Prehistoric activity in the area is also represented by the find of a stone axe-hammer at Pen y Ffriddoedd (PRN 3666; SH60706690), 920m northwest of the study area. Evidence for Mesolithic presence in the wider area is indicated by a sparse scatter of microliths found near Llandygai under both the Industrial Estate (Lynch and Musson 2001) and Parc Bryn Cegin (Kenney 2009a), which is located 5.2km north northwest of the study area. Both Llandygai excavations produced a wealth of evidence of Neolithic activity, including early Neolithic rectangular buildings, later Neolithic pit clusters and two henge monuments and related features.

Later prehistoric archaeology is represented by widespread evidence of settlement activity in the broader area around Mynydd Llandygai. A hut circle has been noted 630m SE of the study area near Gwaen Gyfni (PRN 12,638; NGR SH61106511) and a hut circle platform northwest of Ty'n Twr (PRN 5705; SH62486610), which is 1.13km east of the study area. A hut circle settlement is also known at Bodfeuri farm 1.16km northwest of the study area (PRN 3660; SH60356682). Further structures of this type are also noted further south on Gwaen Gynfi, a prehistoric hut settlement (PRN 5380; SH60906388) consists of a complex of five enclosures and paddocks, along with a hut circle, and is located 1.5km south-southeast of the study area (Hopewell 2009, 6).

Hut circle settlements and defended enclosures are distributed along the slopes of the hills overlooking the Arfon coastal plain, although the scarcity of such sites on the lowlands is almost certainly due to the loss of sites on agricultural land. A roundhouse settlement has recently been excavated on Parc Bryn Cegin near Llandygai village (Kenney 2009a). Most of these settlements consist of groups of only two or three roundhouses although the largest, at Parc Gelli, Tregarth (PRN 260, RCAHMW 1956, 108-9) had twelve roundhouses. Where well preserved these settlements were surrounded by small fields e.g. in Llanllechid (RCAHMW 1956, 140-1), Moel Faban (PRN 287, RCAHMW 1956, 145-6) and Cwm Ffrydlas (PRN 284, RCAHMW 1956, 144-5). Roman finds have been discovered on some of these



sites but many probably originated in the Iron Age and some may have continued after the end of the Roman period (Smith 1999).

Probably roughly contemporary with at least some of the roundhouse settlements are defended enclosures. The closest to the study area being Pendinas, Tregarth (PRN 223, RCAHMW 1956, 107) and Dinas Dinorwig (PRN 5, RCAHMW 1960, 175). The former had a single wall and commanded the approaches to the Ogwen valley and the lowlands below it. Dinas Dinorwig also started as a single-walled fort but massive bivallate banks were added, and it may have been a more important site commanding a larger area than Pendinas. The construction of the rampart at Pendinas was dated to 202 BC- 129 AD (HAR-1671) (White 1992), but excavations at other defended enclosures show use into the Roman period. An upland survey carried out by Gwynedd Archaeological Trust (GAT 1993) studied the lower slopes of Carnedd y Filiast. The drier areas around this plateau may have been fairly extensively occupied and farmed in prehistory.

#### 3.1.4.2 Roman

There is no known archaeological evidence for Roman activity within the study area itself. Within the wider landscape some of the roundhouse settlements in the general area probably continued in use throughout the Roman period, although those on the slopes of Carnedd y Filiast may not have done. Roman finds are often recovered from excavated sites and the round house settlement at Parc Bryn Cegin produced both pottery and radiocarbon dates suggesting use into the third century AD (Kenney 2009a). A third century AD Roman coin was found near the farm of Ty'n-y-Maes in the Ogwen valley (PRN 2339, RCAHMW 1964, 134). The possibility of a Roman fort in Penrhyn Park has been suggested because of its intermediary position between Caerhun and Caernarfon (Lynch 1994, 9), but again there is no firm evidence.

#### 3.1.4.3 Medieval

There is no known evidence of early medieval activity within the study area. An early medieval cemetery dating to about the 5th to 7th centuries AD was excavated

overlying the cursus found on the Llandygai Industrial Estate, located downstream of the Ogwen valley, 5.2km to the north of the study area (Lynch and Musson 2001). This cemetery included a square barrow enclosing one grave and recent aerial photography has revealed the presence of a square barrow cemetery (PRN 404666), presumably of a similar date, just over 200m to the north-east of it (Driver 2006). Excavations nearby at Parc Bryn Cegin revealed early medieval metalworking dating between cal AD 480-650 and cal AD 600-760 (Kenney 2009a). It is possible that some of the late prehistoric to Roman hut circle settlements closer to the study area continued in use into this period, but so far there is no firm evidence. Settlement of this period is very rarely found but must have existed in the area.

The medieval parish of Llandygai, which was very large and extended from the coast to the slopes beyond Mynydd Llandygai, was preceded by the township (*tref*) of Creuwrion, which was probably focused in the area of Tregarth, but is likely to have extended towards Mynydd Llandygai in the medieval period (Carr 1977). The study area is now situated within the smaller Llandygai community. About 810m west northwest of the study area is the site of Bryn Eglwys (PRN 6643; SH60706670). It is possibly the site of the former medieval church which was replaced by St. Anne's Church. Potential remains of this former church were described as 'the foundations of an oblong building, about 50 ft. long' (Hughes and North, 1984), and was associated with a holy well. This site may have represented a local focal point for later medieval settlement in the area, however little evidence for medieval settlement within 1km of the study area has been identified.

Some huts on Moel y Ci, 2.1km west of the study area (PRN 18327; SH59076619), may be shepherd's shelters and medieval in date. A possible Hafod (PRN 12327; SH60976398) has been identified 1.5km south southeast of the study area, defined by spread rubble walls. A nearby sheepfold (PRN 12327) is also thought to have medieval origins (Hopewell, 2009). About 4km south east of the study area is Llys Dinorwig, which might be the remains of a 14<sup>th</sup> century fortified dwelling, although this interpretation remains uncertain (RCAHMW 1960, 172).

The earliest record of quarrying in the area is in 1413 in the rent-roll of Gwilym ap Griffith where tenants were paid 10d each for working 5000 slates demonstrating

that low level quarrying activity was already taking place in the area in the late medieval period (Hopewell 2009, 3).

#### 3.1.4.4 Post-medieval and Modern

The study area, including the area of Felin Fawr and the valley of the Afon Galedffrwd, formed part of the Penrhyn estate in post-medieval times. From the 1780s the estate began to develop slate quarrying on the slopes of Cae Braich y Cafn, which grew to be of an enormous size. These came to be covered in the 19<sup>th</sup> century by an extensive tramway network. The quarry's first new transport link under the Pennant regime was a cart road, constructed in stages from the 1780s onwards to give the quarry direct access to the sea near Penrhyn Castle, but this quickly proved inadequate for the quarry's growing output. A horse-worked railway to the port, which was constructed from 1800-1801, was one of the earliest iron edge railways in the world. At the first point out of the quarry premises where the railway crossed a stream, the Afon Galedffrwd, a mill was constructed to produce slate slabs, which became known as Felin Fawr.

Whereas roofing slates were produced at the quarry itself, slate slabs for architectural purposes or for gravestones or cisterns required mechanical sawing. The Afon Galedffrwd contained a fall of water sufficient to turn a water-wheel, so the mill was built at this location. It was one of the earliest sites in the world where stone was mechanically processed, with the first blocks being delivered to the mill for sawing in June 1803 (Gwyn 2006, 58; Gwynedd Archives XPQ22/1). The mill initially processed 258 tons a month, but this doubled within 15 years of production. The working of the saws was described by Faraday in 1819, and he stated that 'here slabs for tombstones, mantle pieces, tables etc. are cut and in another mill furnished in a similar way, their surfaces are ground smooth and polished as required' (Tomos nd., 92). Lewis's *Topographical Dictionary* of 1834 refers to 'a large mill where mantle pieces and tombstones are sawn, also for production of laminae for roofing' (Lewis 1834).

The earliest extant plan of the site of Felin Fawr which shows the mill in detail is the Penrhyn Rail Road Survey of 1829 (Bangor Archives; Penrhyn Further Additional 1829). This shows the Afon Galedffrwd unculverted at this time; to its north and

alongside and to the east of the railway line is a building and a further building immediately to the east again which is marked as 'Mill'. Between the mill and the river, alongside and to the east of the railway, is an 'L' shaped building, but no obvious waterwheel-pit or launder. Slate Gwaliau (CN297; SH61486642), a wall associated with the industrial complex, lies immediately to the north of the mill, and is a Scheduled Monument.

The mill continued to expand through the 19<sup>th</sup> century. Until the end of the century the eastern perimeter of the site was the original road of the 1780s from the port to the quarry, turnpike in 1803. Around 1898 the Ogwen slate works was constructed to the east on the banks of the Galedffrwd, and apparently powered by a mill race from it. Here brick and tile were made from slate dust, though the work appears not to have been of long duration. These buildings have seen much re-use over subsequent years, being used in the 1950s as a dye works.

The site was enlarged again to the east a few years later, requiring a diversion of the original road from the quarry to the port, as discussed above. The mill continued to process slabs until the 1960s, and it remained the engineering centre for the quarry and its railway until the decision to go over to road transport was implemented in 1962. The rail system was dismantled in the area in 1965.

Within the wooded area of Parc yr Ocar, known at the time as Coed y Parc, ochre was quarried from the hillside. This was delivered by cart to the railway wagons to be taken to Llandygai, where it was ground with flint and chert to supply the Herculaneum pottery at Toxteth, Liverpool (Gwyn 2006).

The consolidated groups of quarrymen's smallholdings on Mynydd Llandygai to the west of the study area and Penrhyn Quarry, each with its parcel of land bounded by slate pillar fences, are one of the most striking testimonies to the planning of the Penrhyn Estate, and contrast with the unplanned nature of most of the villages that developed in the valley, such as Rachub, Llanllechid and Tregarth (Cadw/ICOMOS 1998; 107). An area of Common was enclosed into a regular series of narrow plots by the Penrhyn estate stewards in the 1870s, and was leased to the quarrymen and mill workers for 30 years, reverting back to the estate after the lease expired along with any buildings on them. The terms of the lease specified that the quarrymen

were to build their own cottages on the plot to an approved design (Lowe 1977, 62; Kenney 2009b, 9).

### 3.1.5 Cartographic Evidence

The 1768 Penrhyn Estate 'Map of the Lower Part of the Parish of Llandygai' (Bangor Archives, Penrhyn MSS S2205) shows the study area prior to the development of Felin Fawr (Figure 02). The valley is shown to be undeveloped, and the area that subsequently became Felin Fawr and Coed y Parc is a complex of small paddocks and garden plots, and suggestive of some dwellings in the area of Coed y Parc by this date. The surrounding farmland had already been divided up into small parcels, suggesting encroachment onto the edge of the common land, along with significant Penrhyn estate control of the landscape.

The tithe map of the parish of Llandygai for 1841 shows the study area as a wooded valley (parts of 19 and parts of 21), but not to the same extent as today, with the north eastern part as woodland, and the south and western part of the valley as open fields (fields 20, part of 21 and 22). Development at Felin Fawr at the east of the study area can be shown to have been well advanced at this stage, and the north-south running Penrhyn Quarry railway is also shown on the map (Figure 03). The landscape to the south of Parc yr Ocar, including irregular fields and a north south road are shown, which were subsequently to be swallowed up in the expansion of the Penrhyn quarry. Very little evidence for any development west of Felin Fawr and the quarry railway within the study area can be seen. This area at this time is a mixture of irregular enclosed fields and common upland pasture to the west. The tithe apportionment and field for the study area, as understood in 1841, is given below, the field numbers being those shown on the tithe map (Figure 03):

<b>Landowner</b>	<b>Occupiers</b>	<b>Number referring to the plan</b>	<b>Name Description of Land Premises and of and</b>	<b>Quantities in Statute measure A R P</b>
The Honble Edward Gordon Douglas Pennant	William Abraham and Others	19	Taidŵen	19 0 32

	John Williams and Others	20	Coedyparc	50 3 5
	Cornelius Roberts	21	Cilgeraint	36 1 34
	Richard Williams and others	22	Cilgeraint	195 0 34

The 1<sup>st</sup> edition 25 inch Ordnance Survey map of 1889 (Figure 04) shows that the valley of the Afon Galedfrwdd is now fully wooded, and Coed y Parc reservoir and associated dam (Feature 10) are clearly visible, with Felin Fawr (Feature 11) fully developed. The roads and field system on the surrounding higher ground has gained more or less their current form, and the dispersed but regular settlement pattern can be noted. The consolidated groups of quarrymen's smallholdings on Mynydd Llandygai are also clearly visible. Little change is shown on the 2<sup>nd</sup> edition Ordnance Survey map of 1900 within the study area, except that the name Parc yr Ocar is used for the first time, and evidence of small scale quarrying is depicted (Feature 3; Figure 05). In the wider landscape the expansion of the Penrhyn Slate Quarry can be seen, having swallowed up some of the area around Bryn Lllys, and expansions to the quarry railway noted. By the time of the 3<sup>rd</sup> edition Ordnance Survey map of 1914 (Figure 06) these expansions to the quarry can be seen to have extended further, and the small scale quarry in Parc yr Ocar has become disused.

### *3.1.6 Artefactual Potential*

For much of its length, the study area is situated in the steep valley of the Afon Galedfrwdd, and the presence for the recovery of artefactual evidence is considered quite low in this area. However at its southern end the study area opens out in the vicinity of the former Pen y Bont farm, surrounded by semi improved pastureland. In this area the recovery of post medieval artefacts associated with domestic activity is considered to be moderately high. The possibility of the recovery of artefacts related to medieval and earlier settlement is considered to be moderate in this area. At the northern end of the scheme in the vicinity of the Felin Fawr industrial complex post medieval and industrial artefacts are highly likely to be encountered.

### *3.1.7 Aerial Photographs and LIDAR (Figures 08-09)*

RAF Aerial Photograph CPE/UK/1996 frame 1326 taken on 13<sup>th</sup> April 1947 was examined for further archaeological information about the study area. The image showed the study area clearly. However the valley of the Afon Galedffrwd was shown to be significantly wooded by this time and the identification of archaeological features was difficult in this area. The woodland canopy however appears to be less dense in 1947 than it is now. The small regular field systems that surround the valley to the east and west are shown clearly, and also the regular plots associated with the Mynydd LLandygai housing. It was not possible however to identify any additional archaeological features.

Digital terrain model 2m LIDAR data was examined for the study area. This revealed little additional information within the Afon Galedffrwd valley itself or in the vicinity of Felin Fawr. However at the southwestern end of the study area the layout of the former Pen-y-Bont farm and yard is clearly depicted.

## 3.2 Site visit and Walk-over

### 3.2.1 Introduction

A site visit was made on 16<sup>th</sup> November 2016 to the study area, when the conditions were overcast and rainy and the ground conditions firm but damp, with a further visit taking place on Saturday 19<sup>th</sup> November 2016. The walk over survey walked the route from the northeast and the possible proposed turbine house location at SH60566544 upstream to the possible location of the take-off dam at NGR SH605665644.

### 3.2.2 The walk-over

The slate mill cottages formed an interesting group of varied houses to the east of the road and bridge at Coed y Parc, centred on SH61556627, some were small single storey cottages, others larger two storey houses (Feature 13). The site of the Felin Fawr mill was a well preserved complex (Feature 11), which formed an important group with preserved narrow gauge railway tracks and Pont Coed y Parc (Feature 12), which was of part cast iron construction. Ancillary buildings and structures were noted, with evidence of sawn slate walling, bounding the Felin Fawr works area.

South west of this area the pipeline route traverses a steeply sided valley (up to 30% slope) for much of its route, and it was difficult to observe any archaeology in this area, as it was also heavily wooded. The wider area was however noted to be rich in prehistoric archaeology, and it was considered that there was some potential for the survival of archaeological remains within the valley. As the area contains a good water supply, the Afon Galedfrwdd, the possibility of the presence of burnt mounds has to be considered.

One slate tip was noted, which is thought to be a remnant of small scale quarrying in the area (Feature 3). There was much evidence of the reservoir and weirs that formed the water management system associated with the power supply to Felin Fawr. The northern boundary wall of the wooded valley of Parc yr Ocar consists of a *clawdd* 1.1m high capped with 'Penrhyn Estate' style fencing (slate slabs joined by



twisted wire) (Feature 2). It also formed a revetment to the higher ground to the north and west. A former path was noted running along the southern side of this wall, which was probably a former route from the housing at Mynydd Llandygai to the slate works at Felin Fawr. A small 'clapper' type bridge was noted over a small north-south tributary to the Afon Galedffrwd (Feature 4).

In the upper southern part of the scheme, close to the workers cottages in Mynydd Llandygai, small enclosed fields predominate, southwest of where the Afon Galedffrwd debouches into the steep valley of Parc yr Ocar. Some walls remain close to the possible take-off dam location. These are believed to be remnants of walling associated with the former farmstead at Pen y Bont (Feature 1). The survival of prehistoric and medieval archaeology is possible in this area, although it is likely that in the area of the take-off location the area has been affected by the development of the later Pen-y-Bont.

### 3.3 Gazetteer of Features

The features listed below (located on Figure 09) were identified during the analysis of the cartographic evidence and field visit at Mynydd Llandygai, with recommendations for further assessment and mitigatory measures, where appropriate. The use of (C) in the grid reference indicates that the reference given is the central point of linear or larger more complex features; (A) indicates an approximate location. Definitions of the categories used and impact assessments are given in Appendix IV.

NB: The archaeological recommendations reflect the information currently provided by the client; any change to the scheme may require the recommendations to be reconsidered.

## **FEATURE 1 (PRN 62285; Plates 02-03)**

**Site Name:** Fragments of Mortared Stone Walling and possible structure associated with the former farmstead of Pen-y-Bont

**Grid reference:** SH60556547 – SH60556545

**Period:** Post-medieval

**Category:** C

**Impact:** Slight- it is possible that the take-off dam could impact upon these structures

**Description:** The wall remains consist of rubble fieldstone blocks bonded with mortar and capped with concrete, surviving to a height of up to 1.2m (Plate 2). They appear to form part of the former yard wall of the former farmstead of Pen-y-Bont. At NGR 60556545 the remains a small rectangular structure may represent a former outbuilding at Pen-y-Bont on the south side of the former yard (Plate 3).

Pen-y-Bont and its associated yard is shown on the 1<sup>st</sup> edition County Series Ordnance Survey map of 1889 (Figure 04), but not on the Llandygai tithe map of 1841 (Figure 03), so the walls and structure probably date from between 1841 and 1889.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Basic photographic record of all structures and boundaries in advance of groundworks on site, and archaeological watching brief to be carried out during groundworks.

## **FEATURE 2 (PRN 62286; Plate 07, Plate 15)**

**Site Name:** The northern boundary wall of the wooded valley of Parc yr Ocar and footpath

**Grid reference:** SH60576549 – SH61046595

**Period:** Post-medieval

**Category:** C

**Impact:** Unlikely

**Description:** The wall forms the northern boundary wall of Parc yr Ocar. It consists of a clawdd 1.1m high, with 'Penrhyn style' fencing set into the upper surface of the clawdd. It forms a revetment to the higher ground to the north. South of the clawdd is the remains of a gravel path, which ran southwest northeast from Mynydd Llandygai to Felin Fawr. The boundary and footpath is shown on the 1<sup>st</sup> edition County Series Ordnance Survey map of 1889 (Figure 04). The trackway becomes clearer and more defined to the north-east as it approaches Felin Fawr, and remains in current use. Here it can be seen bounded to the northwest by 'Penrhyn Estate' style slate fencing, and by drystone walling to the south.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Basic photographic record of all boundaries in advance of groundworks on site

### **FEATURE 3 (PRN 62287; Plate 10)**

**Site Name:** Slate tip

**Grid reference:** SH61086593

**Period:** Modern

**Category:** D

**Impact:** Unlikely

**Description:** A small mound of slate waste, 2m high and 5m in diameter, which is probably as a result of small scale quarrying in the area. A 'quarry' is first noted in this area on the 2<sup>nd</sup> edition 25 inch Ordnance Survey Map of 1900 (Figure 05), which is referred to as an 'old quarry' by the time of the 3<sup>rd</sup> edition map of 1914 (Figure 06). It is likely therefore that the waste comes from that small scale quarrying and dates from between 1900 and 1914.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

**FEATURE 4 (PRN 62288; Plate 12)**

**Site Name:** Clapper Bridge

**Grid reference:** SH61096597

**Period:** Post-medieval

**Category:** C

**Impact:** Unlikely

**Description:** A small foot bridge over a north-south tributary on the north side of the Afon Galedffrwd. It consists of a single slab constructed over piers of stone at either side, and is on the path leading to Felin Fawr from Mynydd Llandygai.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

**FEATURE 5 (PRN 62289; NPRN 23,793; Plate 05)**

**Site Name:** Pont Galedffwrdd

**Grid reference:** SH60616548

**Period:** Post-medieval (18<sup>th</sup>-19<sup>th</sup> century)

**Category:** B

**Impact:** Unlikely

**Description:** A road bridge over the Afon Galedffwrdd carrying the road to Mynydd Llandygai. It is constructed of local rubble fieldstone. The parapet is about 0.7m high along the road edge, built of a mixture of local fieldstone and sawn Penrhyn slate. The bridge is substantially embanked, but the absence of quarried slate from the main bridge construction suggests that it predates the main 19<sup>th</sup> century expansion of the Penrhyn Quarry. It has two narrow openings with a central pier in the river channel, through which the river water flows.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

**FEATURE 6 (PRN 62,357; Plate 08-09)**

**Site Name:** Building associated with Storm Drain

**Grid reference:** SH60806574

**Period:** Modern

**Category:** C

**Impact:** Unlikely

**Description:** A brick and concrete structure, about 4m by 3m and 1m tall, along with a former WC hut, were observed. These are 20<sup>th</sup> century in date, and are likely to be ancillary structures associated with a storm drain which runs from the Arafon housing estate across the fields at Ynys Uchaf to this structure, which is situated on land at Ynys Ganol (Brian Dickinson *pers. comm.*).

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None



**FEATURE 7 (PRN 65,241; Plates 29-30)**

**Site Name:** Yr Ocar and Building south of Yr Ocar

**Grid reference:** SH61076585

**Period:** Post-medieval/Modern

**Category:** C

**Impact:** Unlikely

**Description:** Yr Ocar is a substantial rubble built and slate roofed house on the banks of the Afon Galedffrwd. A former outbuilding in the grounds of Yr Ocar, has been converted into a small dwelling, with a slated roof with skylights and uPVC doors and windows.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

**FEATURE 8 (PRN 56,242; Plate 11)**

**Site Name:** Footbridge north of Yr Ocar

**Grid reference:** SH61096589

**Period:** Post-medieval/Modern

**Category:** C

**Impact:** Unlikely

**Description:** A probable early 20<sup>th</sup> century footbridge crosses the Afon Galedffwrdd. It consists of a concrete carriageway about 1.2m wide. The side rails consist of iron pipe supported by cast iron uprights. It appears to be an integral part of the design of Yr Ocar house and grounds, although it does not appear to have been a private route, but probably provided access across the Afon Galedffwrdd for workers heading from Mynydd Llandygai to the Penrhyn Quarry.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

## **FEATURE 9 (PRN 62290; Plate 17)**

**Site Name:** Visible Supports and Original Pipeline

**Grid reference:** SH60786564 – SH61186589 C

**Period:** Modern

**Category:** C

**Impact:** Significant. The proposed pipeline will cross this feature, and may use the original wall support feature and the stanchions for the new pipeline works. This will result in modifications to elements of the historic hydro-electric system feature.

**Description:** The feature covers the whole of the old pipeline route and the supports and fittings associated with it. The 19<sup>th</sup> or early 20<sup>th</sup> century service pipes, and supports for them, are visible at close to the river bank on both sides. For a significant length along its route above Yr Ocar the original cast-iron pipe work rested on what appears to be a drystone wall structure, fixed in place at intervals with iron fittings, much of the wall and some of the fittings are still visible (Brian Dickinson *pers. comm.*).

Below Yr Ocar at SH61256606 A there are two large stanchions either side of the river bank, and below Coed y Parc reservoir (Feature 10) there are several lengths of iron pipe still in situ. They formed part of the hydro-electric power system that served the former mill at Felin Fawr, and are an extensive feature. They are significant as an example of a remnant of an early hydro-electric power system, the use of which was becoming popular in the slate and associated industries at this time (Gwyn 2015, 90-91).

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Detailed Recording. A detailed descriptive and photographic record of the pipeline route and associated structures should be carried out prior to groundworks on the site. All elements of the feature that do not need to be modified as part of the works for the microhydro scheme, such as the *in situ* pipework, need to be retained, and that engineering is employed that

minimises impact to the feature. It is also recommended that after the works a display board is produced illustrating the former works and highlighting the continuity of use with the new scheme, possibly in association with a display salvaged elements from the feature that were removed as part of the works. This would be a positive asset that would enable the narrative of hydro-electric production to be read in future.

**FEATURE 10 (PRN 56,243-4; NPRN 302,106; Grade II LB 25,606; Plates 13,14, 32)**

**Site Name:** Felin Fawr Slateworks Dam and Coed y Parc Reservoir

**Grid reference:** SH61456619 C

**Period:** Post-Medieval/Modern

**Category:** B

**Impact:** Unlikely

**Description:** A mid-C19 masonry dam, associated with the water-powered slate works at Felin Fawr (NPRN 570). It is constructed from massive slate blocks (Plate 14), and held back a substantial reservoir (PRN 56244). Two cast-iron sluices controlled the water supply to the mill. The dam is a listed building (Grade II). There is a weir associated with the water management structures around the dam (PRN 56,245).

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

**FEATURE 11 (PRN 21,947; 56,246-56,260; 60812-60,823; NPRN 570; LB 4153-4158; Plates 21-23)**

**Site Name:** Felin Fawr Slateworks Mill Complex

**Grid reference:** SH61476627 C

**Period:** Post-Medieval/Modern

**Category:** A

**Impact:** None

**Description:** Felin Fawr Slate Works was formerly the principal slate and slab manufacturing yard for the Penrhyn Slate Quarry, and includes a number of listed buildings. The complex is of international importance as the first water powered slate sawmill in the world. Buildings include an early slab mill, opened on 2 July 1803; extended to the north in March 1834 (PRN 60812; SH6148066367); a later slab mill, opened 1 March 1846 (SH6150266372); a water wheel house, housing a wheel made at the de Winton Foundry, Caernarfon in 1846 (PRN 60,815; SH6149266362), which remained in use until 1963 (Gwyn 2006, 63); a foundry dating from 1832 (PRN 60,820; SH6150966330); a fitting and repair shop, built by 1877 and later a joiners' shop (PRN 60,821; SH6151766372); a later water mill and wheel house, probably erected in 1906/7 when the public road was rerouted and works extended eastwards (SH6152666371); road bridge, built in 1900 to replace a gated level crossing (SH6150866276; NPRN 409724) and the Manager's House, probably built during the 1880s (SH6147066483). The small extension, with its blocked pointed arch doorway, on the south end of the 1803 mill (PRN 60,813; SH6148966334) was probably originally an engine shed. Slate Gwaliau (SM CN297; SH61486642), a wall associated with the industrial complex in its earliest phase, lies immediately to the north of the mill, and is a Scheduled Monument.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoidance

**FEATURE 12 (PRN 60824; NPRN 409,724; Grade II LB 4159; Pates 18-20)**

**Site Name:** Pont Coed y Parc and Former Penrhyn Quarry Railway

**Grid reference:** SH61506627

**Period:** Post-Medieval/Modern

**Category:** B

**Impact:** None

**Description:** Pont Coed y Parc carries a minor road over the former line of the Penrhyn Railway immediately south of the Felin Fawr Slate Works (NPRN 570). The arch ring consists of four courses of red brick with a stone keystone, between abutments of very large slate blocks; the spandrels and approach walls are of coursed sawn slate slabs, with parapets of riveted iron plates surmounted by iron railings. It was built in 1900, replacing a level crossing, and an inscription "OPEN JUNE 1900" is cut into the east abutment. Hinges on the south side of the bridge carried heavy wooden gates. After the railway was lifted in the mid-1960s the arch was infilled, but it was reopened in the 1990s for the Lon Las Ogwen cycle track.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None



**FEATURE 13 (PRN 62291; NPRN 409,725)**

**Site Name:** Tai'r Stablau; Slate Mill Cottages, Coed-y-Parc

**Grid reference:** SH61556627 C

**Period:** Post-Medieval/Modern

**Category:** B

**Impact:** None

**Description:** Coed y Parc is shown as complex of small paddocks and garden plots, and suggestive of some dwellings in the area on the Penrhyn Estate map of 1768 (Figure 02). The surrounding farmland had already been divided up into small parcels. By the time of the tithe map of 1841 there has been further development in the area (Figure 03), which has developed fully into a mix of one and two storey dwellings of varied sizes by the time of the 1<sup>st</sup> edition Ordnance Survey map (Figure 04). It formed an area of housing for quarry and mill workers.

A terrace of five double-fronted cottages is located on the west side of the Penrhyn Railway at its upper terminus, and is supposed to have been converted from stables which were built in June 1801 for the horses which worked the railway. Three of the cottages are rendered, the other two show rubble stone front walls with four added course of brick. The cottages share a continuous hipped roof, and the sole chimney stack which is not rendered is of brick. It is likely that the buildings shown on the Llandygai tithe map of 1841 are stables (Figure 03). Conversion to cottages had occurred by 1889, the date of the 1st edition of the 25-inch Ordnance Survey map (Figure 04), and probably took place soon after the introduction of steam locomotives on this part of the railway in 1876.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

## **FEATURE 14 (PRN 62292)**

**Site Name:** Tunnel Entrance to the Ochre Mine

**Grid reference:** SH61086584

**Period:** Post-Medieval/Modern

**Category:** C

**Impact:** Unlikely. The feature is close to the line of the proposed pipeline, but will not be affected by any of the works

**Description:** A tunnel entrance is located immediately behind the buildings at Yr Ocar. It is now partially blocked, but is thought to be the entrance to the original ochre mine, and it is not known how far the tunnel extends. It is also thought to have been used as an air raid shelter by local residents during the Second World War (Brian Dickinson *pers. comm.*). As the site lies on private land immediately behind Yr Ocar, it was not noted and examined during the walk-over survey.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

**FEATURE 15 (PRN 62358)**

**Site Name:** Level Platform within the woodland at Parc Yr Ocar

**Grid reference:** SH61256612

**Period:** Post-medieval/Modern

**Category:** C

**Impact:** Unlikely. The feature is uphill of the proposed pipeline and will not be affected by the works

**Description:** A level platform is located within the woodland of Parc Yr Ocar at this location. It is approximately 30m by 20m in size and appears to have been deliberately levelled (Brian Dickinson *pers. comm.*). It is covered in much younger tree regeneration than is the case in the surrounding area, and can therefore be considered to have been used for its purpose in relatively recent times. This purpose is not known, but it could possibly have been used as a platform base to support some structure or machinery associated with the industrial activities carried out within the valley.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

## **4 CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Conclusion**

The archaeological assessment studied the proposed route of the the Mynydd Llandygai microhydro scheme. For much of the route this traversed a steeply sided heavily wooded valley through Parc yr Ocar, where it was unlikely that much archaeology would be encountered. However fifteen features were identified (Section 3.3), with the important Felin Fawr complex, which has been much studied in detail and the results noted elsewhere, treated as a single site. All the sites identified were of post medieval and modern date, and associated with the industrial development of the wider area by the Penrhyn Estate from the late 18<sup>th</sup> century onwards. Two sites were recommended for basic recording and one for detailed recording in advance of groundworks on the site. The detailed recording is required because the proposed scheme will have a significant impact on the original pipeline route (Feature 9).

No sites of medieval or earlier date were identified within the study area, although the wider area was noted to be rich in prehistoric, particularly late prehistoric, archaeology. It was considered that there was some potential for the survival of prehistoric archaeology in the area, particularly burnt mounds.

Evidence of reservoirs, weirs and former pipelines, associated with earlier water management schemes associated with Felin Fawr were encountered. The Felin Fawr complex is a site of outstanding importance as the first slate mill, built in the years 1803-5, to work slate from the Penrhyn Quarries into decorative slate.

The Mynydd Llandygai and Bethesda area is exceptional as containing the leading producers of slate roofing elements world-wide in the classic industrial period of the 19th century, and was acknowledged as such at the time (Slate Industry of North Wales Nomination Justification: <http://whc.unesco.org/en/tentativelists/5678/>).

It is internationally significant not only in terms of the global export of slate from Wales, providing roofing for prestigious buildings and mass industrial housing alike, but also in terms of its impact on other and comparatively smaller slate quarrying industries and associated trades elsewhere in the world. In the case of the Felin Fawr complex itself, which produced decorative Slate in the form of mantle pieces and other items, it demonstrates that its domestic impact went way beyond roofing. Felin Fawr is a key element of the slate industry of North Wales, and provided an 'associated technology' (*ibid.*), the production of sawn and carved slate items, whose products were exported worldwide. Felin Fawr also produced gravestones, which are ubiquitous in the church and chapel cemeteries of the area, which gives an indication of the reach and breadth of the slate industry on the lives, deaths and culture of the inhabitants of the local area and beyond. The production of gravestones, many of which were inscribed in Welsh, helped also to support the use of the Welsh language in a formal context, and its primary place within the local community, enabling a traditional culture and minority language to adapt to the changing modern world (*ibid.*).

The impact of Felin Fawr on the landscape is also very significant, and it remains largely intact. It forms therefore an integral part of the slate quarrying landscape of the Ogwen valley, and therefore of the Slate Industry of North Wales World Heritage Site nomination.

There are 19 sites associated with Felin Fawr listed on the Gwynedd HER, and these are listed in Appendix III. Eight of these are also listed buildings, with the Western Slab Mill, Waterwheel House and Eastern Slab Mill listed Grade II\*, with the remainder listed Grade II. These are also listed in Appendix III.

Two pedestrian bridge crossings were also noted within the valley itself in addition to evidence for former ochre mining and small scale quarrying, which must have increased activity in Parc yr Ocar during the 19<sup>th</sup> and early 20<sup>th</sup> centuries. It appears that the Afon Galedfrwdd valley, known as Parc yr Ocar, was also used as a transit route for workers from Mynydd Llandygai to reach the Penrhyn Quarry and the Felin Fawr Mill, and evidence of former path ways were noted.

At the southwestern end of the scheme the route opens out near Pont Galedffrwd, where remnants of the former small enclosure pastoral agriculture can be noted.

Remnants of the lost farmstead of Pen-y-Bont, of probable 18<sup>th</sup> century origin, were also noted in this area.

## 4.2 General Recommendations

In addition to the specific recommendations for the fifteen identified sites, it is recommended that a partial **archaeological watching brief** be carried out during ground works on the site. This is because it is thought moderately likely that further evidence of the historically important water management systems and other industrial activity on the Afon Galedfrwdd dating to the 19<sup>th</sup> century might be encountered during the project. Also, whilst no prehistoric or medieval archaeological activity was identified within the study area, the wider area is rich in prehistoric archaeology, and the waterside location would make the area suitable for features such as burnt mounds. A burnt mound was found close by at NGR SH63036718 during a watching brief in 1997 close to a stream (GAT 1997b).

It is therefore felt that there is some possibility that prehistoric and medieval archaeology could be encountered both in the valley of the Afon Galedfrwdd, and also in the vicinity of Pen-y-Bont farm (Feature 1), where evidence for former settlement might be encountered.

The turbine house is likely to be situated on the footings of an existing derelict garage and the outflow will empty slightly upstream. All of the proposed structures will be located above the road outside the boundary wall of the Felin Fawr site, and it should not be visible from Felin Fawr, and there should be no impact upon the curtilage of Felin Fawr. It is important that the turbine house avoids these impacts on the internationally important site of Felin Fawr.

At the current time the location of compounds for storage and machinery is unknown, but it is proposed to utilise existing yards on adjacent properties, which should not be problematic. The locations of access tracks are currently unknown, and it is proposed that these will be minimised, and impacts upon the environment kept to a minimum through the use of small machines and ground protection matting if appropriate. Whilst the access tracks are likely to avoid the known sites, it is possible

that archaeological features could be impacted upon, and further recommendations for archaeological evaluation and/or mitigation may be required when this information becomes available. It is also recommended that the pipes are winched along the route using cables in order to minimise impacts.

Although the construction details of the proposed microhydro scheme are not currently available, it would appear that impacts on designated sites will be avoided, and impacts on the landscape will be minimised during construction and operation of the scheme. It is important that these remain the guiding principles during the final design phase of the project.

### **4.3 Table of Sites and Recommendations**

The table of sites below notes the sites identified during the assessment and recommendations for further assessment and any mitigation required.



No.	PRN	Name	Impact	Recommendations for Further Assessment	Recommendations for Mitigatory Measures
1	62285	Fragments of Mortared Stone Walling and possible structure associated with the former farmstead of Pen-y-Bont	Slight	None	Basic photographic record of all boundaries in advance of groundworks on site, and archaeological watching brief during works
2	62286	Northern Boundary wall of the wooded valley of Parc yr Ocar and footpath	Unlikely	None	Basic photographic record of all boundaries in advance of groundworks on site
3	62287	Slate tip	Unlikely	None	None
4	62288	Clapper Bridge	Unlikely	None	None
5	62289	Pont Galedffwrdd	Unlikely	None	None

<b>6</b>	<b>62357</b>	Building associated with Storm Drain	Unlikely	None	None
<b>7</b>	<b>65241</b>	Yr Ocar and Building south of Yr Ocar	Unlikely	None	None
<b>8</b>	<b>56242</b>	Footbridge North of Yr Ocar	Unlikely	None	None
<b>9</b>	<b>62290</b>	Visible supports and original pipeline	Significant	None	Detailed Recording. A detailed descriptive and photographic record of the pipeline route and associated structures should be carried out prior to groundworks on the site.
<b>10</b>	<b>56243</b> <b>56244</b>	Felin Fawr Slate works dam and reservoir	Unlikely	None	None
<b>11</b>	<b>21947</b>	Felin Fawr Slate Mill	None	None	Avoidance

<b>12</b>	<b>60824</b>	Pont Coed y Parc and Former Penrhyn Quarry railway	None	None	None
<b>13</b>	<b>62291</b>	Tai'r Stablau	None	None	None
<b>14</b>	<b>62292</b>	Tunnel Entrance to Ochre Mine	Unlikely	None	None
<b>15</b>	<b>62358</b>	Level Platform within the woodland at Parc Yr Ocar	Unlikely	None	None

## 5 ACKNOWLEDGEMENTS

Neil McGuinness of GAT prepared some of the drawings and the databases, with the rest being prepared by Bethan Jones, and their assistance is gratefully acknowledged. The assistance of Jenny Emmett and Ashley Batten at GAPS is also acknowledged. The author is also very grateful to Bryan Dickinson of *Coetir Mynydd* who provided a significant amount of information about the study area from his detailed knowledge of it, which is incorporated in this report.

## **6 BIBLIOGRAPHY**

### **6.1 Primary Sources**

Gwynedd Archives, Caernarfon

Tithe Map of the Parish of Llandygai of 1841

Ordnance Survey 1<sup>st</sup> edition 25 inch Caernarvonshire County Series of 1889, Sheet XII.6 and 9

Ordnance Survey 2<sup>nd</sup> edition 25 inch Caernarvonshire County Series of 1900, Sheet XII.6 and 9

Ordnance Survey 3<sup>rd</sup> edition 25 inch Caernarvonshire County Series of 1926, Sheet XII.6 and 9

XPQ 22/1-11 *Quarry Production Books* 1800-1868

Bangor University Archives

Penrhyn MSS S2205 *Penrhyn Estate Map of the Lower Part of the Parish of Llandygai* 1768

Aerial Photographs, RCAHMW Aberystwyth

RAF vertical AP CPE/UK/1996 frame 1326 taken on 13<sup>th</sup> April 1947

### **6.2 Secondary Sources**

Ball, D.F., 1963. *The soils and land use of the district around Bangor and Beaumaris*, Soil Survey of Great Britain

Bassett, T.M. and Davies, B.L. (eds.) 1977 *Atlas of Caernarfonshire* (Caernarfon).

British Geological Survey 1980 *Soil Map of England and Wales Sheet 2*

Cadw/ICOMOS 1998b *Register of Landscapes of Outstanding Historic Interest in Wales. Part 2.1 Landscapes of Outstanding Historic Interest*

Carr, A.D. 1977. 'Medieval Administrative Divisions' in Bassett and Davis (eds.) 1976, 69-74.

Chartered Institute for Archaeologists (CIfA) 2014a, *Standards and guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives*

Chartered Institute for Archaeologists (CIfA) 2014b, *Standard and Guidance for Historic Environment Desk-Based Assessment*

English Heritage 1991 *Management of Archaeological Projects*

English Heritage 2015 *Management of Research Projects in the Historic Environment (MoRPHE)*

Fenton, R. 1917 *Tours in Wales 1804-1813* (Cambrian Archaeological Association)

GAT 1993, *The uplands survey project*, unpublished Gwynedd Archaeological Trust  
Unpublished GAT Report No. **22**

GAT 1997a. *Felin Fawr, Coed y Parc, Bethesda Local Agendum 21 Workshop Project. Archaeological Assessment*. Unpublished GAT Report No. **245**

GAT 1997b. *Tan y Foel Sewer Requisition. Archaeological Watching Brief (G1491)*.  
Unpublished GAT Report No. **277**

Gwyn, D. 2006. *Gwynedd. Inheriting a Revolution*

Gwyn, D. 2016 *Welsh Slate: Archaeology and History of an Industry* (Aberystwyth)

Gwynedd Historic Environment Record

Haslam, R, Orbach, J. and Voelker, A. 2009 *The Buildings of Wales; Gwynedd* (Pevsner Architectural Series)

Hopewell, D. 2009 *Proposed Quarry Realignment, Penrhyn Quarry, Bethesda*.  
Unpublished GAT Report No. **837**

Hopewell, D., 2013. *Roman roads in North-West Wales:*

Hughes, H. and North, H. 1984 *The Old Churches of Snowdonia* (Reprint)

Kenney, J. 2009a 'Recent Excavations at Parc Bryn Cegin, Llandygai, near Bangor, North Wales', *Archaeol. Cambrensis* 157, 9-142.

Kenney, J. 2009b *Mynydd Llandegai Raw Water Main Replacement Works*. Unpublished GAT Report No. **776**

Lewis, E.A. 1912 *Medieval Boroughs of Snowdonia*

Lewis, S. 1834 *A Topographical Description of Wales*

Lowe, J. B. 1977 *Welsh Industrial Workers Housing 1775-1875* (Cardiff)

Lynch, F. and Musson, C., 2001. 'A prehistoric and early medieval complex at Llandegai, near Bangor, North Wales', *Archaeol. Cambrensis* 150, 17-142 (2004)

Pennant, T. 1783 *A Tour in Wales, Vol.II*

Royal Commission on Ancient and Historic Monuments in Wales 2015 *Guidelines for Digital Archives*

Slate Industry of North Wales Nomination, seen at <http://whc.unesco.org/en/tentativelists/5678/>

Smith, B. and George, T.N., 1961. *British Regional Geology: North Wales*

Tomos, D. nd. *Michael Faraday in Wales* (Denbigh)

Waddelove, E., 1999. *The Roman roads of North Wales, recent discoveries*, privately published, Ruthin









Figure 02: Extract from the Penrhyn Estate Map of the Lower Part of the Parish of Llandygai of 1768 (Bangor Archives Penrhyn MSS 2205), showing the Galedfrwdd valley prior to industrial development





Figure 3: Tithe Map of the Parish of Llandygai of 1841 (Gwynedd Archives). Felin Fawr (Fields 19 and 21) and the Penrhyn Quarry Railway are shown, along with the valley of the Afon Galedffrwd (Field 20) with rough location of pipe-line route and turbine house and dam locations.



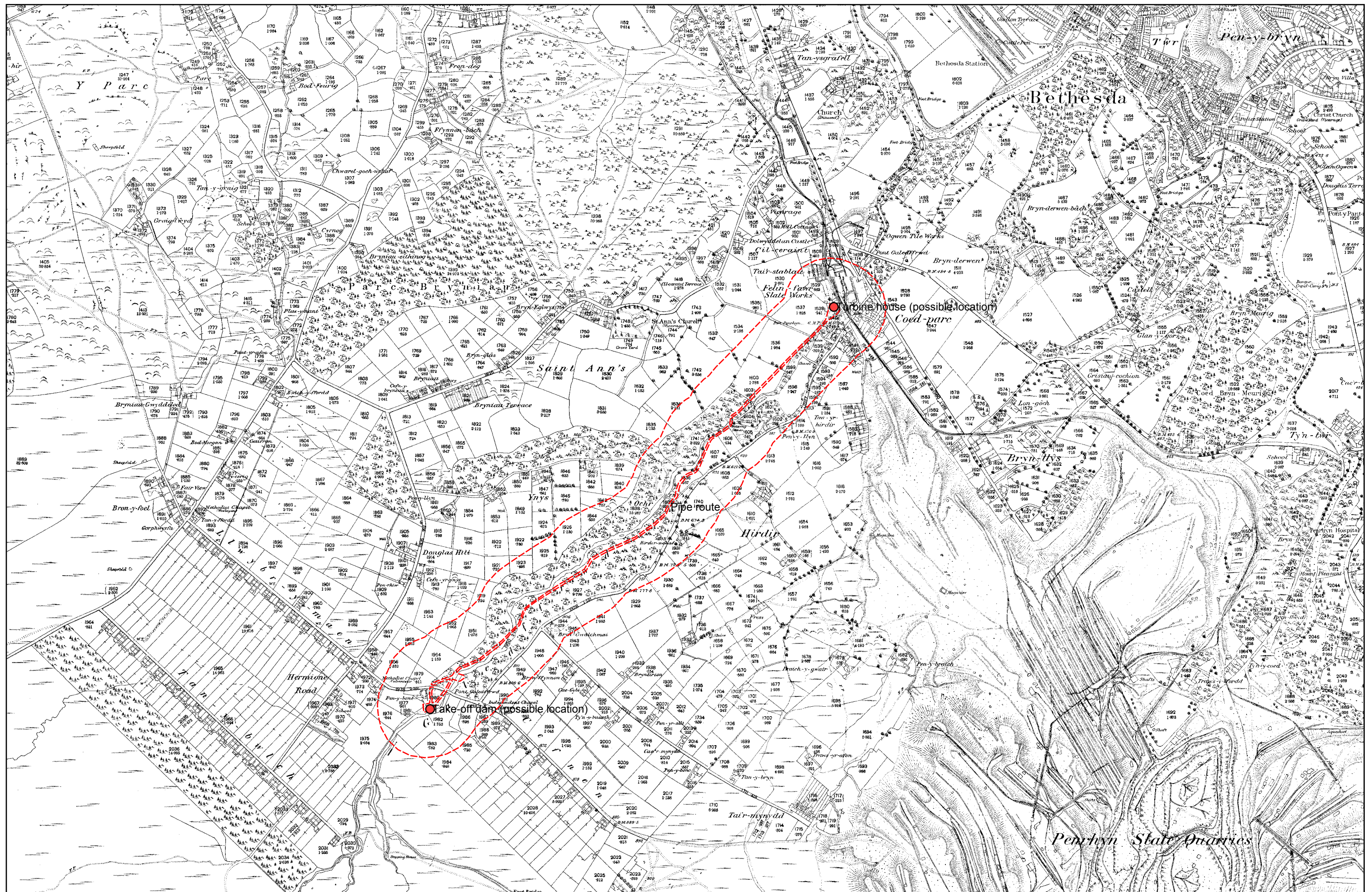


FIGURE 04: Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII First Edition (1889); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.



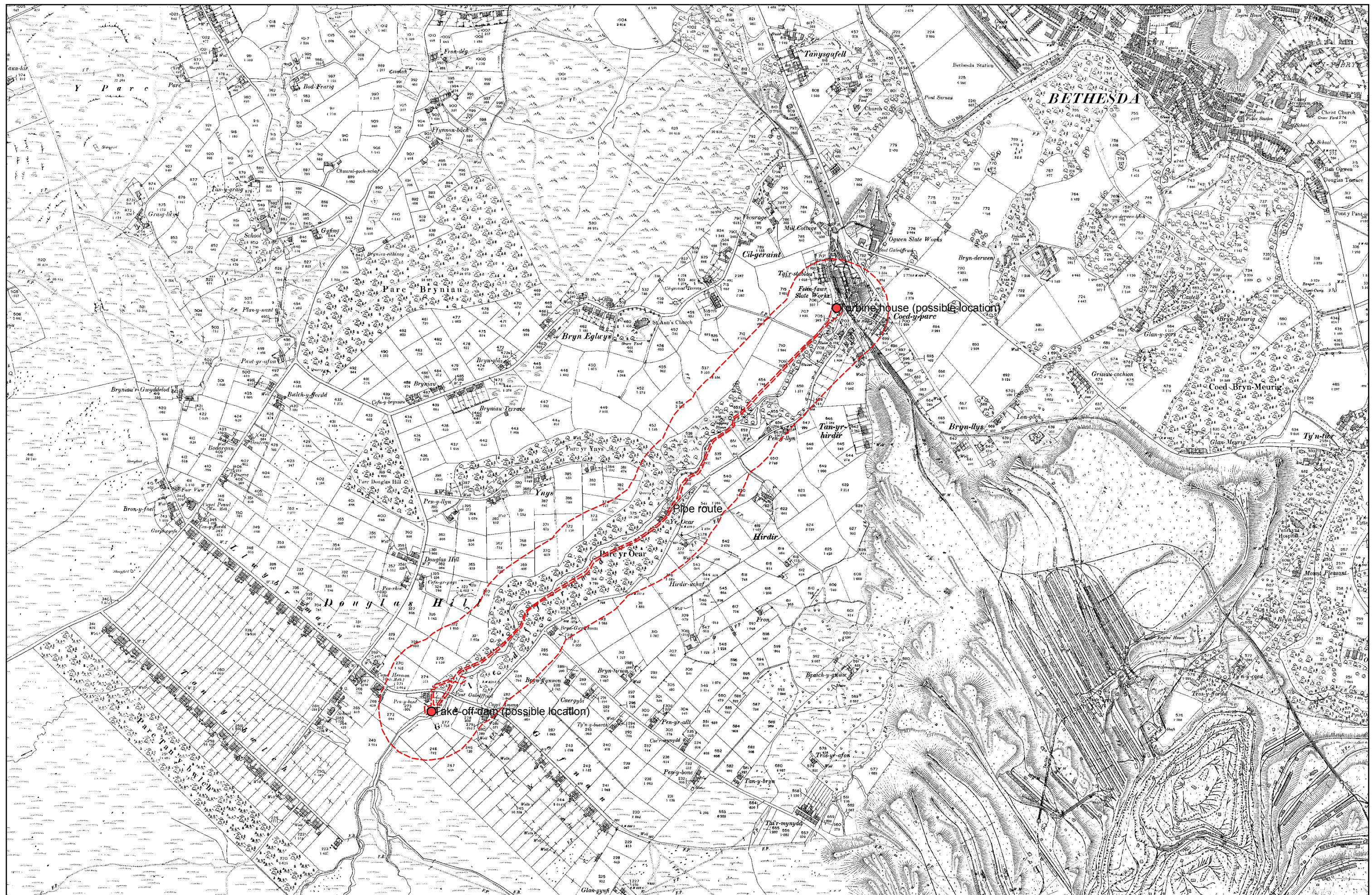


FIGURE 05: Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII Second Edition (1900); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.



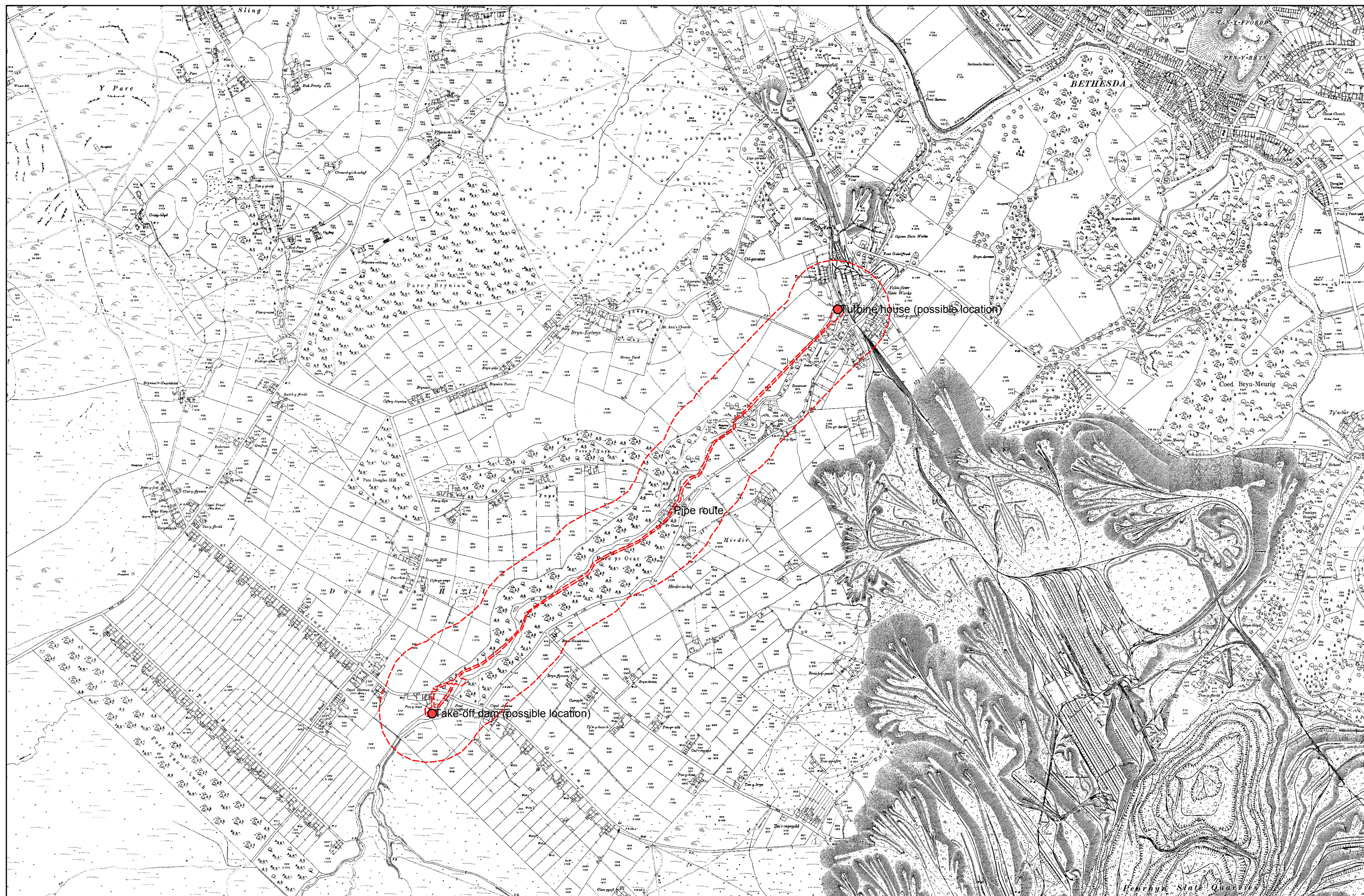


FIGURE 06: Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII Third Edition (1914); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.



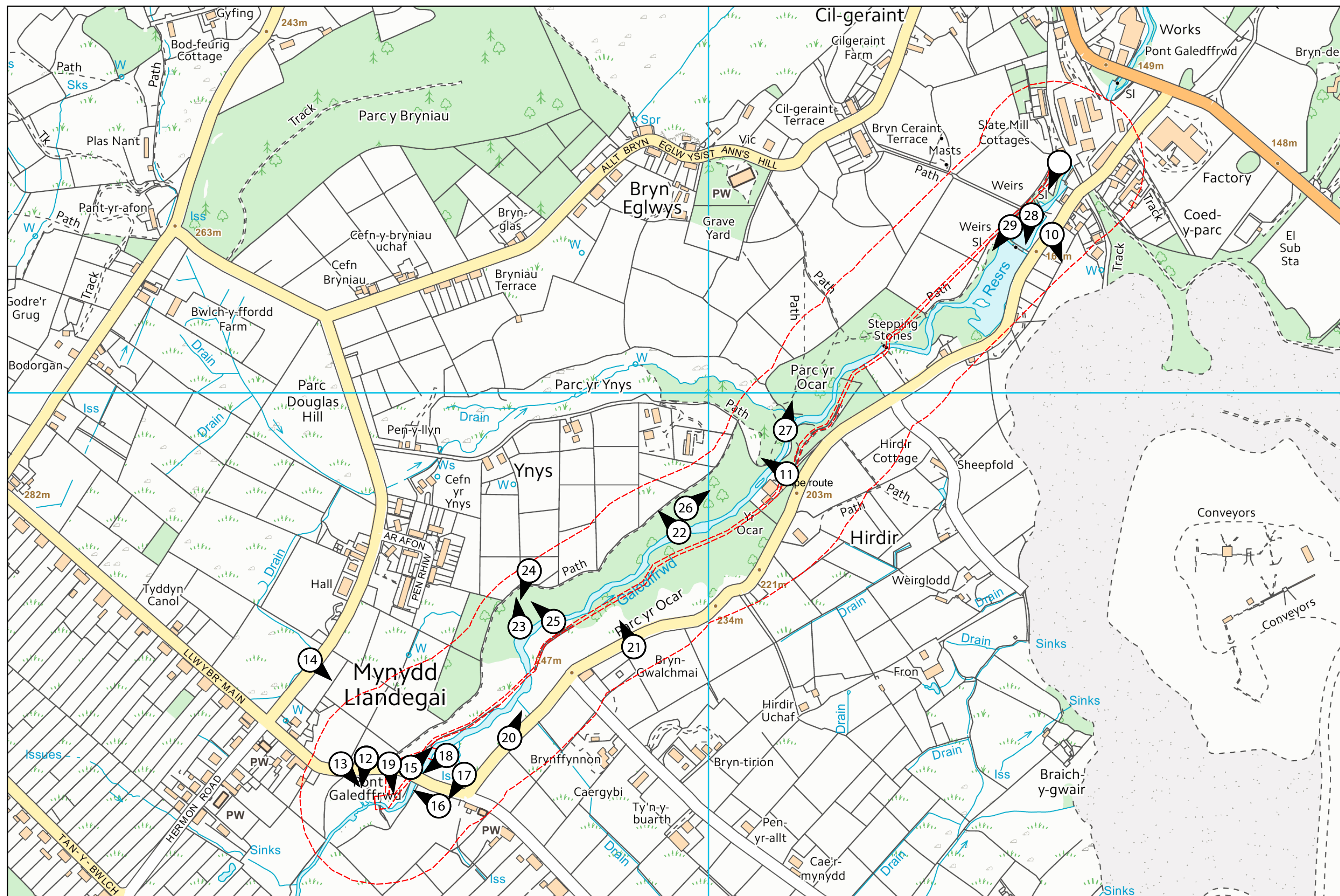


FIGURE 07: Map detailing photographic locations along scheme route within the 100m assessment buffer. Based on Ordnance Survey 1:10000 County Series (Sheets SH56 and SH66). Scale: 1:2500@A3. Crown Copyright. All Rights Reserved. License number AL100020895.

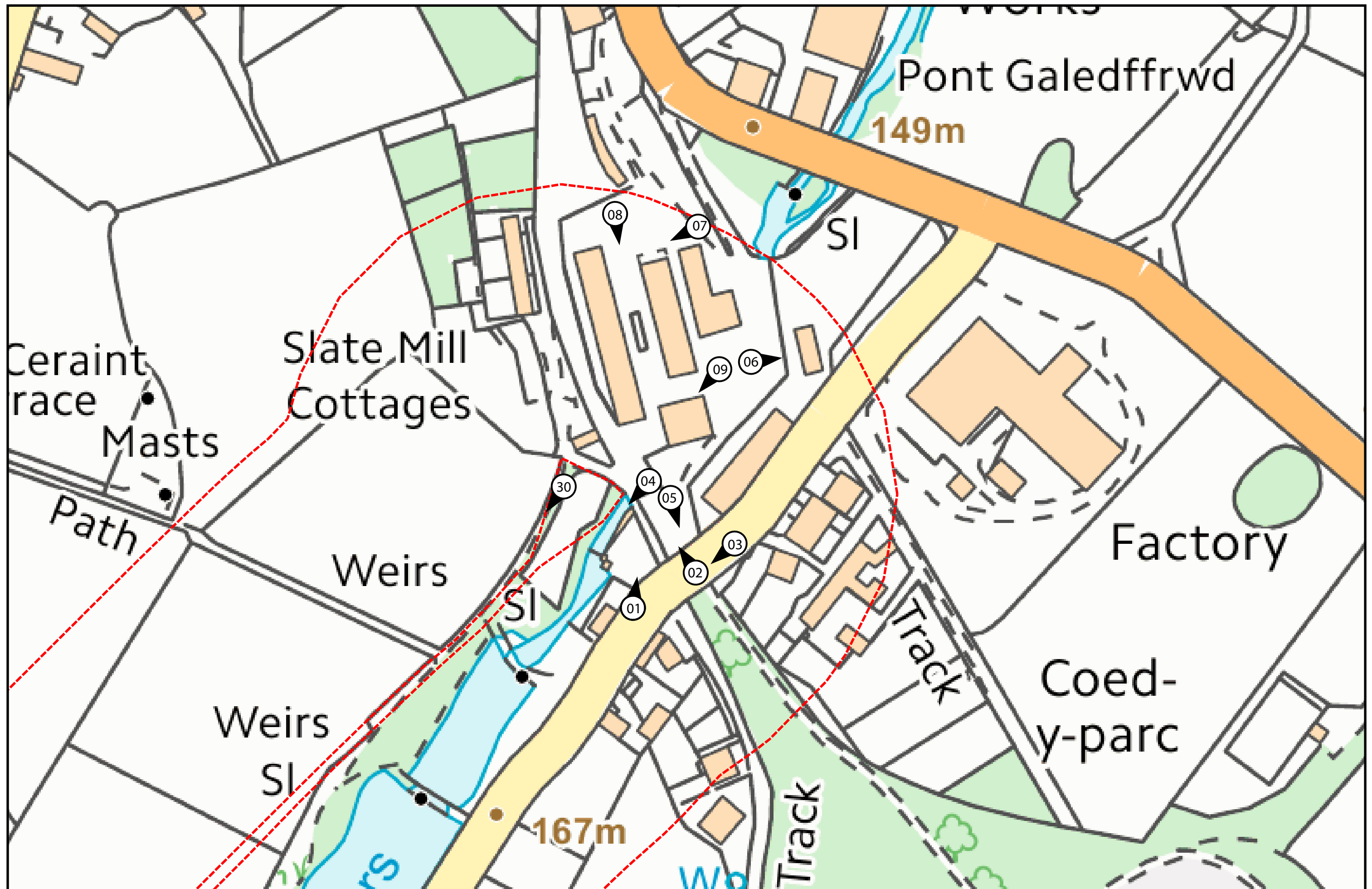


FIGURE 08: Map detailing photographic locations along scheme route within Felin Fawr assesment buffer. Based on Ordnance Survey 1:10000 County Series (Sheets SH56 and SH66). Scale: 1:2500@A3.  
Crown Copyright. All Rights Reserved. License number AL100020895.



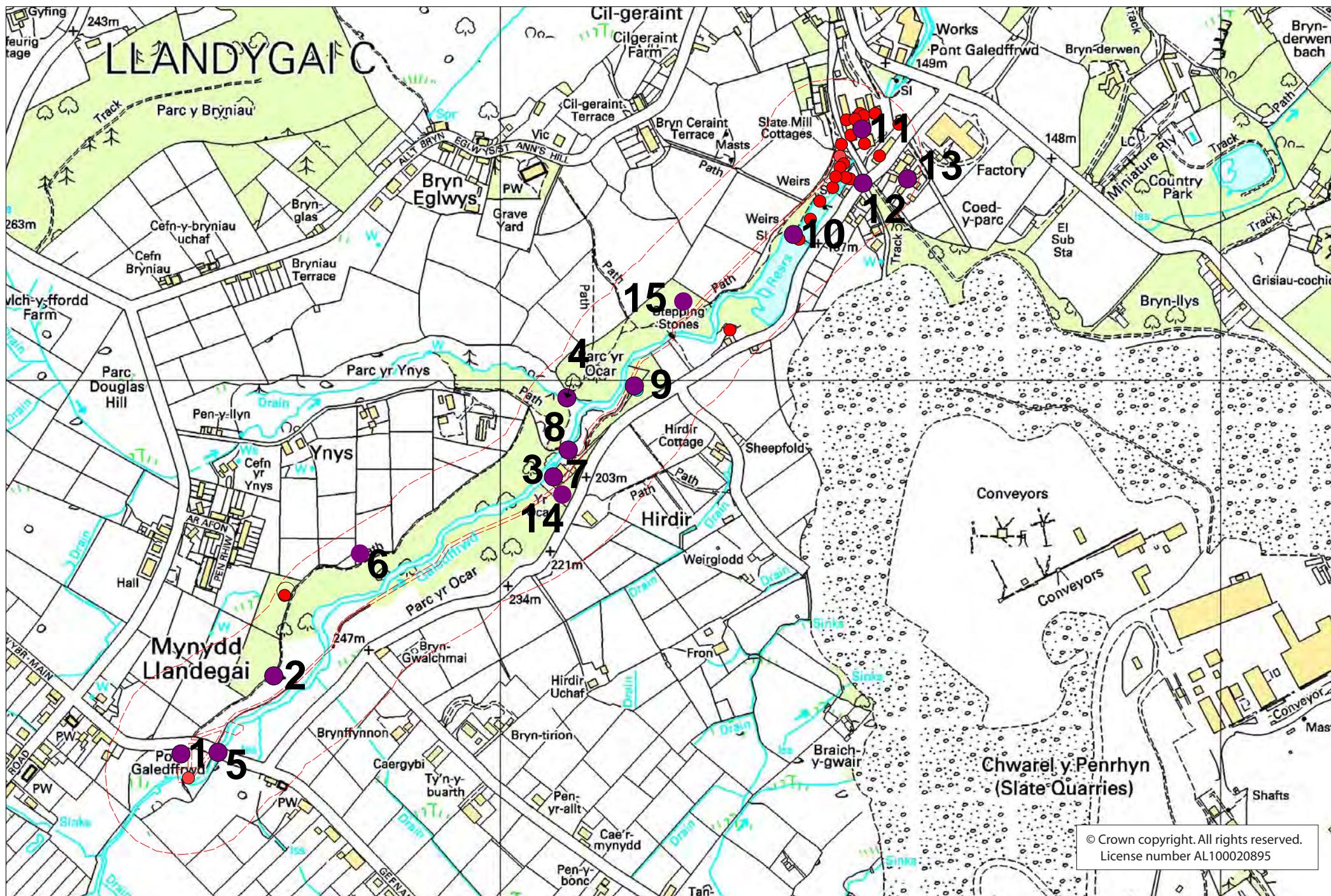


Figure 09: Sites noted in the Gazetteer (purple dots) and numbered. Red dots indicate sites noted on the Gwynedd HER. The buffer zone and proposed pipeline route are outlined in red. Map taken from Ordnance Survey 1:10 000 sheet SH66NW. Scale 1:10 000 @A4.







Plate 01: View from north west of rubbing stone taken from road - view slightly obscured by field boundary fence posts. Scale 1m.  
(photographic archive ref. G2487\_014)



Plate 02: Feature 1 view from North West of early 20th century concrete capped wall/structure.  
(photographic archive ref. G2487\_012)





Plate 03: Feature 1 view from south of stone pile or possible remnants of small structure (SH605654).  
(photographic archive ref. G2487\_021)



Plate 04: Plate 04: View from north west of proposed location of take-off dam. Scale 1m. (photographic archive ref. G2487\_013)



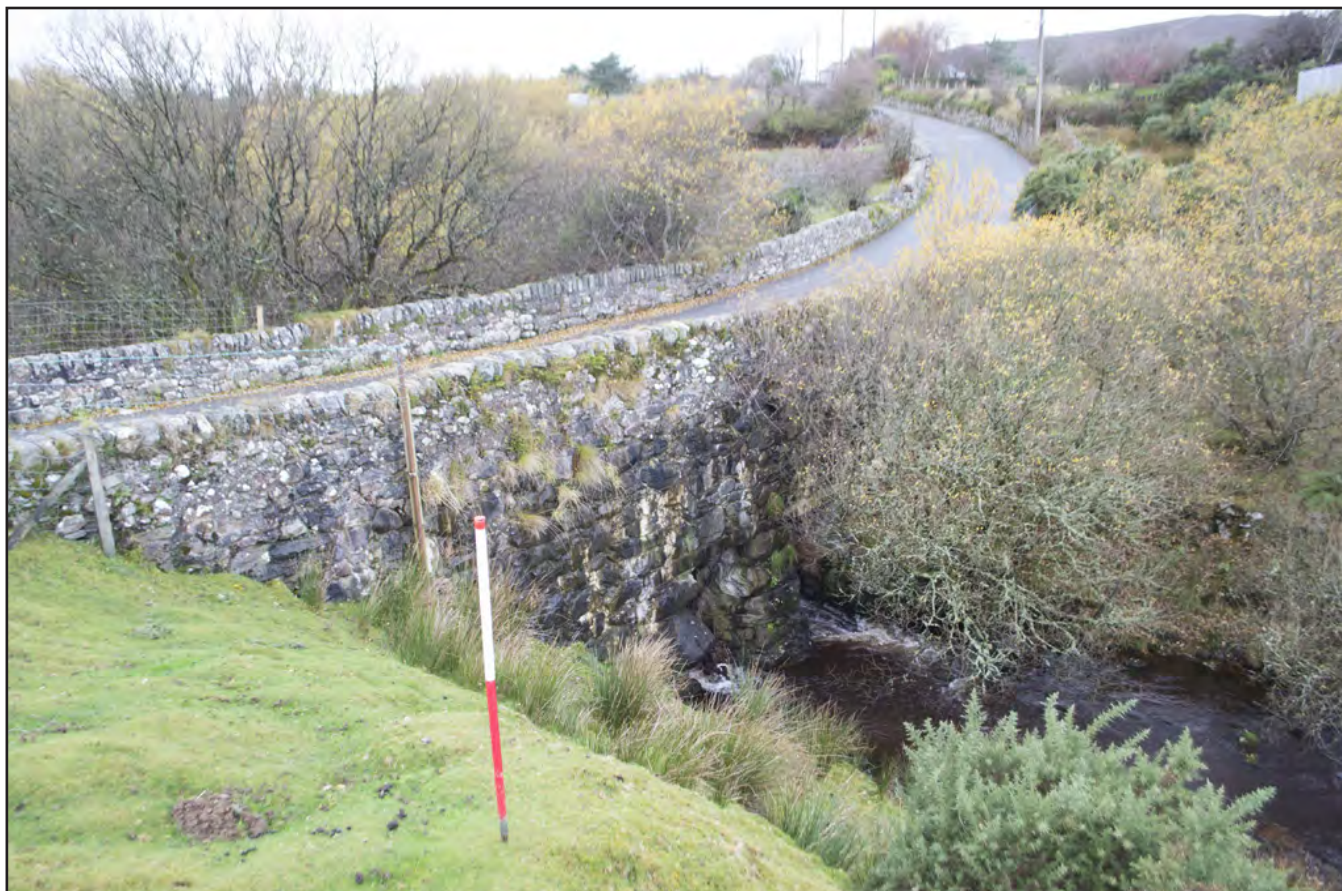


Plate 05: Feature 5 (PRN 23793) view from east of Pont Galedffwrdd construction taken from Mynydd Llandygai. Scale 1m. (photographic archive ref. G2487\_018)



Plate 06: View from South of Galedffwrdd river boundary wall against road. Scale 1m. (photographic archive ref. G2487\_021)





Plate 07: Feature 2 view from south of boundary wall (with drain) along foot path leading to Felin Fawr within Parc Ocar woodland. Scale 1m.(photographic archive ref. G2487\_022)



Plate 08: Feature 6 (PRN 20811) view from north east of a small rectangular structure, possibly Ochre Mine (pre/post war construction), with raised ground to the East (SH608657). Scale 1m. (photographic archive ref. G2487\_024)





Plate 09: Feature 6 (PRN 20811) view from west of drainage pipe, exiting from small rectangular structure. Scale 1m. (photographic archive ref. G2487\_025)



Plate 10: Feature 3 view from west of slate tip within Parc Ocar woodland, possibly linked with old quarry in 1914 OS maps (SH608658). Scale 1m. (photographic archive ref. G2487\_026)





Plate 11: Feature 8 (PRN 56242) view from south east of early 20th century foot bridge (SH610659). Scale 1m. (photographic archive ref. G2487\_011)



Plate 12: Feature 4 view from south of small foot bridge along path leading towards Felin Fawr, with slate recesses in background. Scale 1m. (photographic archive ref. G2487\_027)





Plate 13: Feature 10 (PRN 56243) view from north west of dam below the reservoir (SH614662). Scale 1m.  
(photographic archive ref. G2487\_028)



Plate 14: Feature 10 (PRN 56243) view from south of large slate slabs used for dam's construction. Scale 1m.  
(photographic archive ref. G2487\_029)





Plate 15: View from south of footpath connecting from Felin Fawr to Mynydd Llandygai. Scale 1m.  
(photographic archive ref. G2487\_030)



Plate 16: Feature 9 (PRN 56247) view from north east of Galedffrwd River as it enters Felin Fawr, along with 19th century industrial pipeworks.  
(photographic archive ref. G2487\_004)





Plate 17: Feature 9 view from south west of 19th century service pipes leading into Felin Fawr with turbine house location to the left. (photographic archive ref. G2487\_034)



Plate 18: Feature 12 (PRN 60820) view from south east of Felin Fawr with Penrhyn Railway taken from Pont Coed y Parc . (photographic archive ref. G2487\_002)





Plate 19: Feature 12 (PRN 60824) view from east of Pont Coed y Parc with building formerly associated with Felin Fawr in background on the right. Scale 1m. (photographic archive ref. G2487\_003)



Plate 20: Feature 12 (PRN 60824) view from north of Pont Coed y Parc construction, taken from within Felin Fawr. Scale 1m. (photographic archive ref. G2487\_005)





Plate 21: Feature 11 (PRN 60820) view from north east of foundry within Felin Fawr, with turbine house location to the rear of photo. Scale 1m. (photographic archive ref. G2487\_009)



Plate 22: Feature 11 (PRN 60821) view from north west of 19th century workshops within Felin Fawr, with slate tip in background. Scale 1m. (photographic archive ref. G2487\_008)





Plate 23: Feature 11 (PRN 60217, LB 4158) view from west of early 19th century industrial building with clock tower (former waterwheel). Scale 1m. (photographic archive ref. G2487\_006)



Plate 24: View from north west taken from the road showing edge of slate tip (SH614661). Scale 1m. (photographic archive ref. G2487\_010)





Plate 25: View from north of early post-medieval boundary wall belonging to Hirdir cottage. (photographic archive ref. G2487\_031)



Plate 26: View from west of "Building Complex" previously identified in HER database, which is one small storey cottage, Pen Llyn. (photographic archive ref. G2487\_032)





Plate 27: Feature 9 (PRN 56247) view from east of turbine house location with 19th century existing pipeworks in view (bottom left corner). (photographic archive ref. G2487\_033)



Plate 28: View from east of modern concrete garage within Turbine house location (c.1950-60s), listed under PRN 56247/8. (photographic archive ref. G2487\_036)





Plate 29: Feature 7 (PRN 65241) view from east of 18th - 19th century building south-west gable end within Yr Ocar grounds. (photographic archive ref. G2487\_039)



Plate 30: Feature 7 (PRN 65241) view from south east of west facing exterior 18th - 19th century building within Yr Ocar grounds. (photographic archive ref. G2487\_41)





Plate 31: View from east of unusual metal (Fe) object, c. 0.35m high, attached to boulder on river island, within Yr Ocar grounds. (photographic archive ref. G2487\_039)



Plate 32:  
Feature 10 (PRN 56244) view from south east of slate step leading to Galedffwrdd dam and reservoir - possible former site entrance from road. (photographic archive ref. G2487\_041)

## **APPENDIX I: PROJECT DESIGN**

# MYNYDD LLANDYGAI MICROHYDRO SCHEME (G2487)

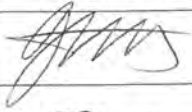


## PROJECT DESIGN FOR ARCHAEOLOGICAL ASSESSMENT

*Prepared for*

*Coetir Mynydd*

***November 2016***

Ymddiriedolaeth Archaeolegol Gwynedd  
Gwynedd Archaeological Trust

Approvals Table				
	Role	Printed Name	Signature	Date
Originated by	Document Author	JOHN ROBERTS		16/11/16
Reviewed by	Document Reviewer	ROBERT EVANS		16/11/16
Approved by	Principal Archaeologist	JOHN ROBERTS		16/11/16

Revision History			
Rev No.	Summary of Changes	Ref Section	Purpose of Issue

All GAT staff should sign their copy to confirm the project specification is read and understood and retain a copy of the specification for the duration of their involvement with the project. On completion, the specification should be retained with the project archive:

Name

Signature

Date

# **MYNYDD LLANDYGAI MICROHYDRO SCHEME** **PROJECT DESIGN FOR ARCHAEOLOGICAL ASSESSMENT**

Prepared for *Coetir Mynydd*, November 2016

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# 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by *Coetir Mynydd* to prepare a project design for an archaeological assessment in advance of a proposed microhydro scheme at Mynydd Llandygai, Gwynedd (Figure 01). The scheme measures up to 1.2km in length and will be located along Afon Galedffrwd between a proposed turbine house (NGR SH61486630) and a proposed take-off dam (NGR SH60596544). The specific design of the microhydro pipeline, turbine house and take-off dam have not been confirmed, but the assessment will include the proposed scheme locations as detailed in Figures 01.

The pipeline will mostly traverse semi-improved land and woodland, whilst the turbine house will be located on the outskirts of an industrial estate and the take-off dam to the immediate south of Pont Galedffrwd.

The assessment will conform to the guidelines specified in the Chartered Institute for Archaeologists *Standard and Guidance for Historic Environment Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014). Gwynedd Archaeological Trust is a Chartered Institute for Archaeologists *Registered Archaeological Organisation*. The format of this design corresponds to the requirements of section 2.3 of MoRPHE (English Heritage 2015) and to MAP2 (English Heritage, 1991, *Management of Archaeological Projects*). The assessment is scheduled to be completed in November/December 2016.

The assessment will be monitored by the Gwynedd Archaeological Planning Services (GAPS); the content of this design and all subsequent reporting by GAT must be approved by GAPS prior to final issue.

## **2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND**

The microhydro scheme is located within an area characterised by post-medieval industrial activity as represented by Penrhyn slate quarry and the settlements of Mynydd Llandygai and Bethesda. The assessment will consider these in relation to the local industry and landscape and how this is reflected in the archaeological record.

A brief examination of the regional Historic Environment Record has confirmed that there are a limited number of known archaeological receptors along the proposed scheme route and immediate area. These include buildings associated with the Felin Fawr slate works to the northeast of the proposed turbine house location as well as a weir reservoir and dam, to the immediate south of the route, also associated with the slate works. The Felin Fawr works formed part of the Penrhyn slate industry are described as an “excellent example of a largely self-sufficient industrial complex of the nineteenth century” (GAT Report 245) that survives almost intact. Penrhyn quarry itself dominates the landscape to the immediate east of the scheme, with waste tips located within 170m of the scheme.

There are fewer known archaeological receptors along the central and southern portions of the scheme: a post-medieval ochre mine (Primary Reference Number (PRN) 20811) is located at NGRSH60706570, 88.0m northwest of the proposed pipe route.

The first to third edition Ordnance Survey 1-inch to 25-mile County Series maps of the area published in 1889, 1900 and 1914 respectively (Sheets XII.6, XII.9 and XXII.10; Figures 02 to 04) detail a field system and industrial layout very similar to the present day map (Figure 01), reflecting the well-established nature of the Penrhyn Estate lands and industry by this time.

The assessment will review the location and distribution of all known and suspected archaeological activity within proximity to the scheme and assess the impact of the scheme on this activity using the methodology outlines in para. 3.0.



### 3 METHODOLOGY

#### 3.1 Assessment (Desktop Study)

A desk-based assessment is defined as “a programme of study of the historic environment within a specified area or site on land, the inter-tidal zone or underwater that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage....Significance is to be judged in a local, regional, national or international context as appropriate” (ClfA 2014, 4).

The desk-based assessment will involve a study of the following resources:

1. The regional Historic Environment Register (HER, Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the study area. This will include an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held within the. A list of archaeological assets will be prepared for the report using information from the HER; this will include information sourced from within a 100m assessment buffer either side of the route to examine any potential impact (Figure 01). This information will be used to prepare a gazetteer and incorporate information from the walkover survey if any previously unidentified receptors are also located;
2. The National Monuments Record (NMR RCAHMW, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be checked for sites additional to the HER, and if required additional supporting information will be examined at the NMR.
3. On-line catalogue search of the National Library of Wales; and
4. Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives (Gwasanaeth Archifau Gwynedd, Cyngor Gwynedd, Caernarfon LL55 1SH) and at the Bangor University Department of Manuscripts (Bangor University, Bangor, Gwynedd, LL57 2DG).
5. Light Detection and Ranging (LiDAR) data will be examined from the Lle Geo-Portal at <http://lle.gov.wales/home> digital terrain modelling and information on potential surface features.

Part of the assessment will involve a walkover of the study; the aim of this stage of the work is to:

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

The walkover survey will follow the scheme route as well as the locations of the take-off dam and turbine house. A photographic record will be maintained in RAW format using a digital SLR set to maximum resolution (Nikon D3000; resolution: 3,872 × 2,592 [10.2 effective megapixels]) and photographic metadata table will be completed and included in the report. Photographic images will be archived in TIFF format; the archive numbering system will start from G2487\_001. It is noted that the portions of the scheme are within wooded areas, which may restrict the extent of visibility across the local landscape.

A gazetteer will be compiled for any identified sites within and within proximity to the specified route based on information sourced from the regional HER and the walkover survey; the gazetteer will include:

1. Feature Number
2. Site name
3. PRN number
4. Grid reference
5. Period
6. Site type
7. Assessment category
8. Description
9. Impact
10. Recommendation for further assessment/evaluation
11. Recommendation for mitigatory measures

## 3.2 Data processing and report compilation

Following completion of the stages outlined above, a report will be produced incorporating the following:

1. Front cover;
2. Inner cover;
3. Figures and Plates List
4. Non-technical summary;
5. Introduction;
6. Methodology
  - i. Desk-based assessment
  - ii. Walkover survey;
7. Results
  - a. Desk based assessment
    - i. Location and geological summary
    - ii. Statutory and non-statutory designations
    - iii. Environmental remains and soil morphology
    - iv. Historical and archaeological background
    - v. Cartographic evidence
    - vi. Artefact potential
    - vii. Aerial photographs and LiDAR;
  - b. Walkover survey
  - c. Gazetteer of features
8. Conclusions and recommendations
  - a. Conclusion
  - b. Table of sites and recommendations
9. Acknowledgements
10. Bibliography
  - a. Primary sources
  - b. Secondary sources
11. Figures; inc.:
  - location plan;
  - historic mapping;
  - location plan with identified features
12. Plates: illustrative examples from walkover survey
13. Appendix I (approved project design)
14. Appendix II (Photographic metadata);
15. Appendix III (Sites listed on Gwynedd Historic Environment Record)
16. Appendix IV (Definition of terms)
17. Back cover

Illustrations will include plans of the location of the study area and archaeological sites. Historical maps, when appropriate and if copyright permissions allow, will be included.

A draft copy of the report will be sent to Gwynedd Archaeological Planning Services and Coetir Mynydd. Once approved, a copy of the report will be submitted to Gwynedd Archaeological Planning Services and Coetir Mynydd and to the Historic Environment Record located at the Gwynedd Archaeological Trust. Submission of digital information to the

Royal Commission on the Ancient and Historical Monuments of Wales will be undertaken in accordance with the RCAHMW Guidelines for Digital Archives Version 1 (2015). Digital information will include the photographic archive and associated metadata.

## **4 PERSONNEL**

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section. The assessment will be completed by a project archaeologist who will have responsibility for completing the desk based assessment, completing the walkover survey, maintaining the site archive, liaising with GAPS and Coetir Mynydd and submitting the draft report and final report. The project manager will be responsible for reviewing and approving the report prior to submission.

## **5 HEALTH AND SAFETY**

The GAT project archaeologist will be CSCS certified. A site specific risk assessment will be prepared prior to the start of fieldwork. The site archaeologist will be issued with required personal safety equipment appropriate for the walkover survey.

## **6 INSURANCE**

### **Public Liability**

Limit of Indemnity- £5,000,000 any one event in respect of Public Liability

INSURER Aviva Insurance Limited

POLICY TYPE Public Liability

POLICY NUMBER 24765101CHC/000405

EXPIRY DATE 22/06/2017

### **Employers Liability**

Limit of Indemnity- £10,000,000 any one occurrence.

The cover has been issued on the insurers standard policy form and is subject to their usual terms and conditions. A copy of the policy wording is available on request.

INSURER Aviva Insurance Limited

POLICY TYPE Employers Liability

POLICY NUMBER 24765101CHC/000405

EXPIRY DATE 22/06/2017

### **Professional Indemnity**

Limit of Indemnity- £5,000,000 in respect of each and every claim

INSURER Hiscox Insurance Company Limited

POLICY TYPE Professional Indemnity

POLICY NUMBER

HU PI 9129989/1208

EXPIRY DATE 23/07/2017

## 7 SOURCES CONSULTED

English Heritage, 2015, *Management of Research Projects in the Historic Environment (MoRPHE)*.

English Heritage, 1991, *Management of Archaeological Projects*

Gwynedd Archaeological Trust, 1997. *Felin Fawr, Coed y Parc, Behesda – Archaeological Assessment*. Gwynedd Archaeological Trust Report 245.

Ordnance Survey 1-inch to 25-mile County Series Sheets XII.6, XII.9 and XXII.

Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*

*Standard and Guidance for Historic Environment Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014).



## **FIGURE 01**

**Location map detailing proposed scheme route and 100m assessment buffer. Based on Ordnance Survey 1:10000 County Series (Sheets SH56 and SH66). Scale: 1:7500@A3. Crown Copyright. All Rights Reserved. License number AL100020895.**







## **FIGURE 02**

**Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII First Edition (1889); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.**



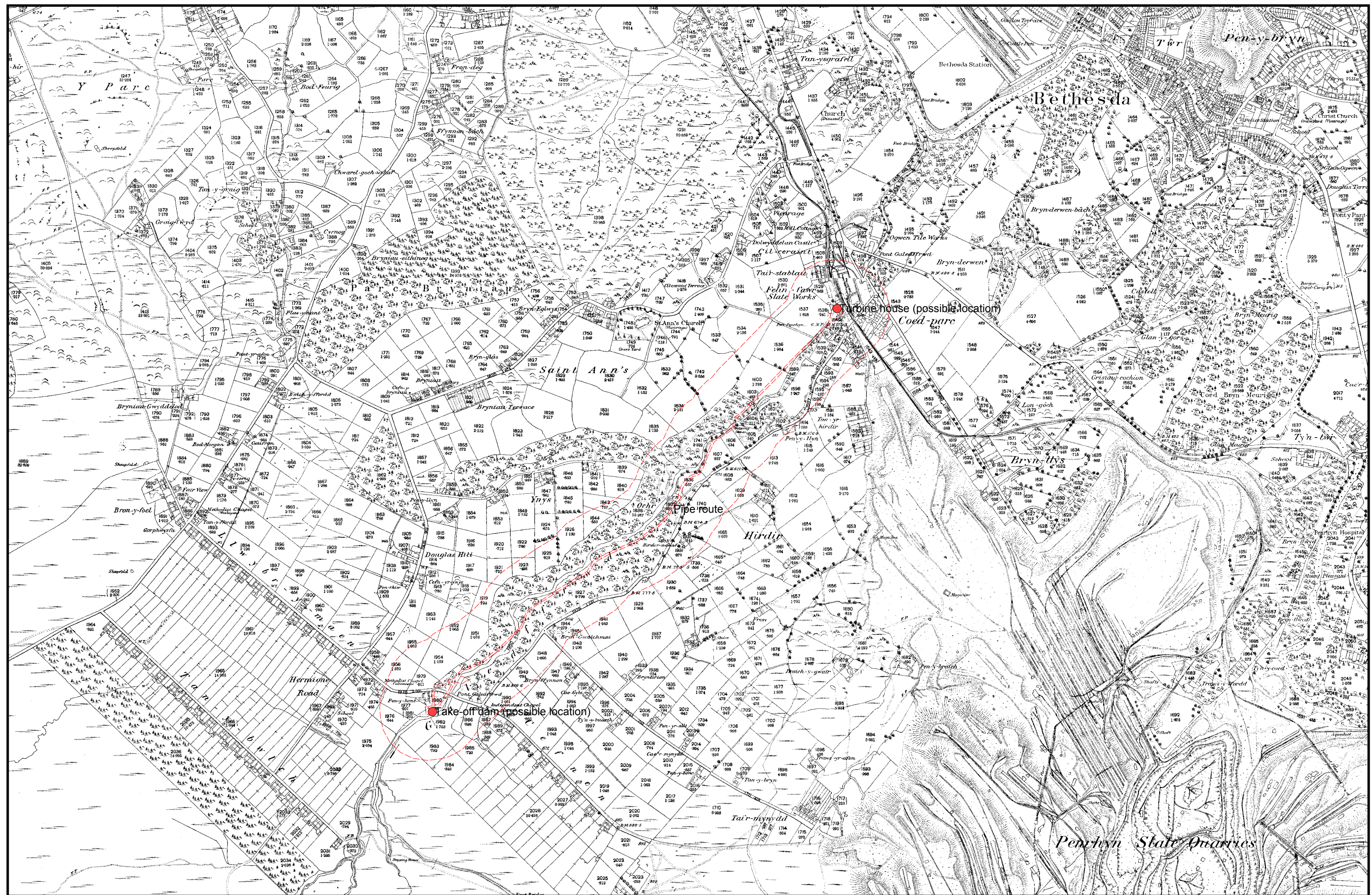


FIGURE 02: Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII First Edition (1889); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.



### **FIGURE 03**

**Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII Second Edition (1900); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.**



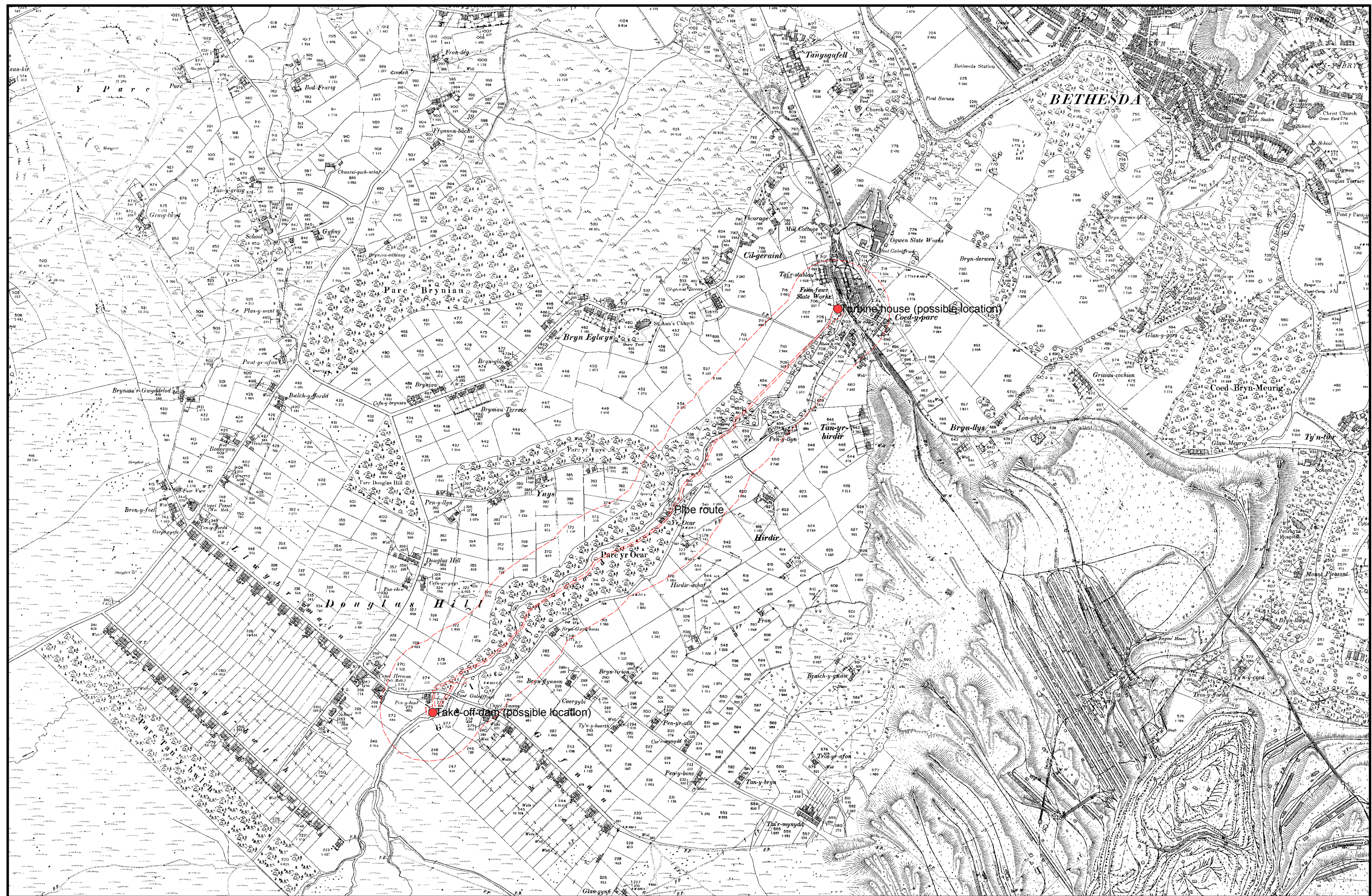


FIGURE 03: Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII Second Edition (1900); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.



## **FIGURE 04**

**Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII Third Edition (1914); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.**



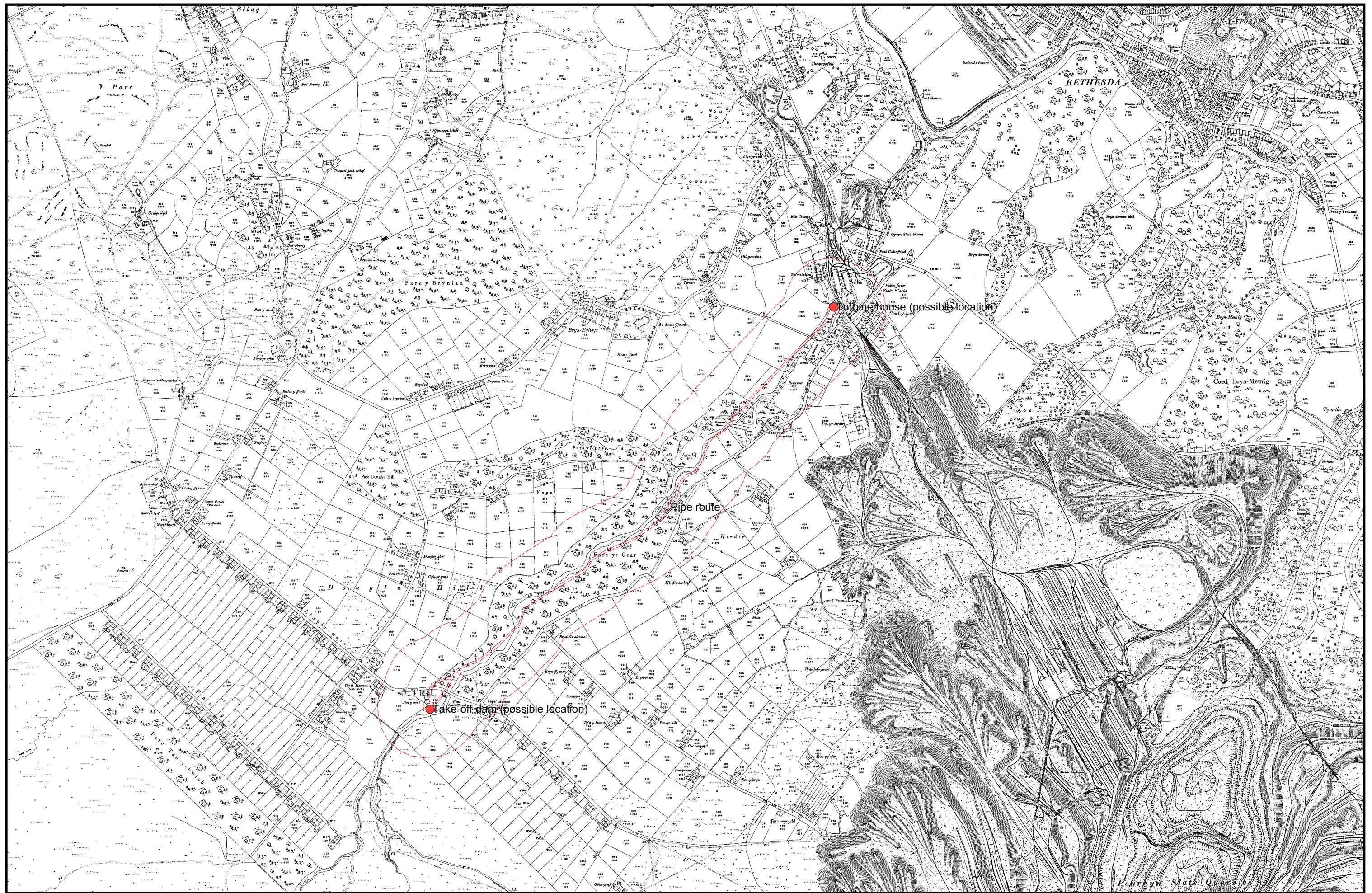


FIGURE 04: Reproduction of Ordnance Survey 1-inch to 25-mile County Series Map Sheets XII.6, XII.9 and XXII Third Edition (1914); including proposed scheme route and 100m assessment buffer. Scale: 1:7500@A3.





## **APPENDIX II: PHOTOGRAPHIC METADATA**



File reference	Project name	Project phase	PRN	Site Sub-Division	Description	Scales	View From	Date Modified	Originating Person	Originating Organisation
G2487_001	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56248	Felin Fawr	Shot of proposed turbine house location with Felin Fawr in background	1x1	S	16/11/2016 10:30	Bethan Jones	GAT
G2487_002	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	60820	Felin Fawr	Shot of Felin Fawr taken from bidge (turbine house to the S)		SE	16/11/2016 10:33	Bethan Jones	GAT
G2487_003	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	60824	Felin Fawr	Shot of Pont Galedffrwd (Parc y Coed end) with turbine house location	1x1	E	16/11/2016 10:36	Bethan Jones	GAT
G2487_004	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56247	Felin Fawr	View of Afon Galedffrwd as it enters Felin Fawr showing 19th cen. Industrial pipeworks (FF beind)		NE	16/11/2016 10:40	Bethan Jones	GAT
G2487_005	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	60824	Felin Fawr	Shot of Pont Galedffrwd taken from within Felin Fawr, turbine station to the East	1x1	N	16/11/2016 10:43	Bethan Jones	GAT
G2487_006	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	60817	Felin Fawr	Shot of early 19th cen industrial building with clock tower (waterwheel)	1x1	W	16/11/2016 10:52	Bethan Jones	GAT
G2487_007	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	21947	Felin Fawr	Shot of later 19th cen workshop gable end within Felin Fawr with original iron columned veranda	1x1	SE	16/11/2016 10:56	Bethan Jones	GAT
G2487_008	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	21947	Felin Fawr	Shot of 19th cen workshops within Felin Fawr, with turbine house location and slate tip in background	1x1	NW	16/11/2016 10:59	Bethan Jones	GAT

File reference	Project name	Project phase	PRN	Site Sub-Division	Description	Scales	View From	Date Modified	Originating Person	Originating Organisation
					(west)					
G2487_009	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	60820	Felin Fawr	Shot of foundary within Felin Fawr, turbine loaction to the rear of photo	1x1	NE	16/11/2016 11:02	Bethan Jones	GAT
G2487_010	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56243	Reservoir	General shot from road showing edge of slate tip (SH614661)	1x1	NW	16/11/2016 11:13	Bethan Jones	GAT
G2487_011	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56242	Parc Ocar	Shot of early 20th cen foot bridge (SH610659)	1x1	SE	16/11/2016 11:26	Bethan Jones	GAT
G2487_012	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment		Mynydd Llandygai	Concretre capped wall/structure, early 20th century		N	16/11/2016 11:57	Bethan Jones	GAT
G2487_013	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	23793	Mynydd Llandygai	Shot of proposed location for take off dam	1x1	NW	16/11/2016 12:03	Bethan Jones	GAT
G2487_014	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	16070	Mynydd Llandygai	Shot of rubbing stone taken from road (view slightly obscured by field boundary)		NW	16/11/2016 12:11	Bethan Jones	GAT
G2487_015	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	23793	Mynydd Llandygai	Shot of Pont Galedffrwd down the valley taken from Pont Galedffrwd (Mynydd Llandygai end)		SW	16/11/2016 12:19	Bethan Jones	GAT
G2487_016	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	23793	Mynydd Llandygai	General shot of proposed location of take off dam (taken from road)		E	16/11/2016 12:22	Bethan Jones	GAT
G2487_017	Mynydd Llandygai	Archaeological Assessment	23793	Mynydd Llandygai	Shot of proposed location of take off	1x1	NE	16/11/2016 12:26	Bethan Jones	GAT

File reference	Project name	Project phase	PRN	Site Sub-Division	Description	Scales	View From	Date Modified	Originating Person	Originating Organisation
	Microhydro Scheme				dam					
G2487_018	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	23793	Mynydd Llandygai	Shot of Pont Galedffwrdd construction taken from Mynydd Llandygai end	1x1	E	16/11/2016 12:27	Bethan Jones	GAT
G2487_019	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	23793	Mynydd Llandygai	View of stone pile or possible remnants of small structure (SH605654)		N	16/11/2016 12:36	Bethan Jones	GAT
G2487_020	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	23793	Mynydd Llandygai	General view down valley of proposed pipe route		SW	16/11/2016 12:46	Bethan Jones	GAT
G2487_021	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment		Mynydd Llandygai	Example shot of Galedffwrdd river boundary wall against road	1x1	S	16/11/2016 12:52	Bethan Jones	GAT
G2487_022	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment		Parc Ocar	Example of boundary wall along foot path leading to Felin Fawr within Parc Ocar woodland, with drain	1x1	S	16/11/2016 13:06	Bethan Jones	GAT
G2487_023	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	20811	Parc Ocar	Shot of small rectangular structure, possibly Ocar Mine (pre/post war construction)		S	16/11/2016 13:18	Bethan Jones	GAT
G2487_024	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	20811	Parc Ocar	Shot of small rectangular structure showing raised ground to the East (SH608657)	1x1	NE	16/11/2016 13:21	Bethan Jones	GAT
G2487_025	Mynydd Llandygai	Archaeological Assessment	20811	Parc Ocar	Shot of drainage pipe - exiting from small	1x1	W	16/11/2016 13:34	Bethan Jones	GAT



File reference	Project name	Project phase	PRN	Site Sub-Division	Description	Scales	View From	Date Modified	Originating Person	Originating Organisation
	Microhydro Scheme				rectangular structure					
G2487_026	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment		Parc Ocar	Slate midden dumped within Parc Ocar woodlkand (possibly linked with old quarry) SH608658	1x1	W	16/11/2016 13:45	Bethan Jones	GAT
G2487_027	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56245	Parc Ocar	Shot of small footbridge along path leading towards Felin Fawr, along with slate recessess	1x1	S	16/11/2016 13:56	Bethan Jones	GAT
G2487_028	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56243	Parc Ocar	Shot of dam below the resevoir (SH614662)	1x1	E	16/11/2016 14:13	Bethan Jones	GAT
G2487_029	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56243	Parc Ocar	General shot of slate slabs used for dam's construction	1x1	S	16/11/2016 14:14	Bethan Jones	GAT
G2487_030	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56246	Felin Fawr	Shot of footpath connecting Mynydd Llandygai to Felin Fawr	1x1	S	16/11/2016 14:20	Bethan Jones	GAT
G2487_031	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment		Hirdir Cottage	Shot of early post-medieval boundary wall	1x1	NW	16/11/2016 15:00	Bethan Jones	GAT
G2487_032	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56240	Pen-Y-Llyn	Shot of "Bulding Complex" as noted in HER, which appears tp be a one small story cottage		N	16/11/2016 15:16	Bethan Jones	GAT
G2487_033	Mynydd Llandygai Microhydro	Archaeological Assessment	56247	Felin Fawr	View of turbine house location with 19th cen. pipeworks in view		E	16/11/2016 15:49	Bethan Jones	GAT

File reference	Project name	Project phase	PRN	Site Sub-Division	Description	Scales	View From	Date Modified	Originating Person	Originating Organisation
	Scheme									
G2487_034	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	60323	Felin Fawr	Shot of 19th century service pipes leading into Felin Fawr with turbine house location to the South	SW	Bethan Jones	GAT		
G2487_035	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56250	Felin Fawr	Slate building on opposing side of 19th cen pipework - perhaps relating to Felin Fawr		S	16/11/2016 15:52	Bethan Jones	GAT
G2487_036	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56247	Felin Fawr	Modern concrete garage within Turbine house location (c.1950-60s)		E	16/11/2016 15:54	Bethan Jones	GAT
G2487_037	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	65247	Parc Ocar	View of turbine house from Parc Ocar footpath with Felin Fawr in background		W	16/11/2016 16:00	Bethan Jones	GAT
G2487_038	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56241	Parc Ocar	18th - 19th century building within Yr Ocar		W	16/11/2016 16:15	Bethan Jones	GAT
G2487_039	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment		Parc Ocar	Unusual metal (Fe) object attached to bolulder within Galedffrwd river island (within Yr Ocar grounds).	E	Bethan Jones	GAT		
G2487_040	Mynydd Llandygai Microhydro Scheme	Archaeological Assessment	56241	Parc Ocar	18th - 19th century building SW gable end within Yr Ocar grounds		NE	16/11/2016 16:17	Bethan Jones	GAT
G2487_041	Mynydd Llandygai Microhydro	Archaeological Assessment	56243	Reservoir	Slate step leading to Galedffrwd dam - former entrance (?)		SE	16/11/2016 16:24	Bethan Jones	GAT

<b>File reference</b>	<b>Project name</b>	<b>Project phase</b>	<b>PRN</b>	<b>Site Sub- Divison</b>	<b>Description</b>	<b>Scales</b>	<b>View From</b>	<b>Date Modified</b>	<b>Originating Person</b>	<b>Originating Organisation</b>
	Scheme				from road					





### **APPENDIX III: SITES LISTED ON THE GWYNEDD HER**





### Sites Located on the Gwynedd HER within the study area

PRN	Site Name
20811	Ochre Mine, Cloddfa Ocar, Mynydd Landygai
21947	Felin Fawr Slate Works, Bethesda
56240	Building Complex, N of Hirdir Villa
56241	Building, S of Yr Ocar
56242	Footbridge, N of Yr Ocar
56243	Dam, SW of former Felin Fawr Slate Works
56244	Reservoir, SW of former Felin Fawr Slate Works
56245	Weir, SW of former Felin Fawr Slate Works
56246	Building, SW of Felin Fawr Slate Works
56247	Building, SW of Felin Fawr Slate Works
56248	Structure, W of Pont Coed-y-Parc
56249	Building, SW of Felin Fawr Slate Works
56250	Building, W of Pont Coed-y-Parc
60812	Slate Mill, Felin Fawr, Bethesda
60813	Engine Shed, Felin Fawr, Bethesda
60814	Slate Mill, Felin Fawr, Bethesda
60815	Waterwheel, Felin Fawr, Bethesda
60816	Structure, Felin Fawr, Bethesda
60817	Waterwheel, Felin Fawr, Bethesda
60820	Foundry, Felin Fawr, Bethesda
60821	Workshops, Felin Fawr, Bethesda
60822	Fuel Store, Felin Fawr, Bethesda
60823	Culvert, Felin Fawr, Bethesda
60824	Pont Coed y Parc Bridge, Bethesda

### Listed Buildings within the study area

Number	Name	Grade
25606	Dam to SW of former Felin Fawr Slate Works	II
4153	Western Slab Mill at Felin Fawr Slate Works	II*
4154	Water Wheel House between slab mills at Felin Fawr Slate Works	II*
4155	Eastern Slab Mill at Felin Fawr Slate Works	II*
4156	Fitting and Repair Shop at Felin Fawr Slate Works	II
4157	Foundry at Felin Fawr Slate Works	II
4158	Water Mill & Wheel House at Felin Fawr Slate Works	II
4159	Pont Coed-y-Parc	II

### Sites on the RCAHMW National Monuments Record within the Study Area

NPRN	Site Name
570	Felin Fawr Slate Works, Ffrancon View, Bethesda

23793	Pont Galed Ffrwd
302106	Felin Fawr Slate Works: Dam To SW, Coed-Y-Parc, Llandygai
409724	Penrhyn Railway, Coed-Y-Parc Bridge
409725	Tai'r Stablau; Slate Mill Cottages, Coed-Y-Parc
418940	Waterwheel Felin Fawr Works

## **APPENDIX IV: DEFINITION OF TERMS**



## Categories of importance

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

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

Scheduled Ancient Monuments, Listed Buildings of grade II\* and above, as well as those 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 or county importance.*

Grade II listed buildings and sites which would not fulfil the criteria for scheduling or listing, 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.*

Sites which are not of sufficient importance to justify a recommendation for preservation if threatened.

Category C sites nevertheless merit adequate recording in advance of damage or destruction.

### *Category D - Minor and damaged sites.*

Sites that are of minor importance or are so badly damaged that too little remains to justify their inclusion in a higher category.

For Category D sites, rapid recording, either in advance of 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. In this report several sites of unknown potential have been allocated to this category.

## Definition of Impact

The impact of the proposed development on each feature was estimated. The impact is defined as *none, slight, unlikely, likely, significant, considerable or unknown* as follows:

### *None:*

There is no construction impact on this particular site.

### *Slight:*

This has generally been used where the impact is marginal and would not by the nature of the site cause irreversible damage to the remainder of the feature, e.g. part of a trackway or field bank.

*Unlikely:*

This category indicates sites that fall within the band of interest but are unlikely to be directly affected. This includes sites such as standing and occupied buildings at the margins of the band of interest.

*Likely:*

Sites towards the edges of the study area, which may not be directly affected, but are likely to be damaged in some way by the construction activity.

*Significant:*

The partial removal of a site affecting its overall integrity. Sites falling into this category may be linear features such as roads or tramways where the removal of part of the feature could make overall interpretation problematic.

*Considerable:*

The total removal of a feature or its partial removal which would effectively destroy the remainder of the site.

*Unknown:*

This is used when the location of the site is unknown, but thought to be in the vicinity of the proposed works.

## **Definition of field evaluation techniques**

Field evaluation is necessary to fully understand and assess most class 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 can be used for carrying out the evaluation: geophysical survey and trial trenching. Topographic survey may also be employed where sites are thought to survive as earthworks.

Geophysical survey most often involves the use of a magnetometer, which allows detection of some underground features, depending on their composition and the nature of the subsoil. Other forms of geophysical survey, including resistivity survey and ground penetrating radar might also be of use.

Trial trenching allows a representative sample of the development area to be investigated at depth. Trenches of appropriate size can also be excavated to evaluate category E sites. Trenching is typically carried out with trenches of between 20 to 30m length and 2m width. The topsoil is removed by machine and the resulting surface is cleaned by hand, recording features. Depending on the stratigraphy encountered the machine may be used to remove stratigraphy to deeper levels.

## **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.







Gwynedd Archaeological Trust  
Ymddiriedolaeth Archaeolegol Gwynedd



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