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Charlotte Elizabeth Mill Hydro Scheme, Gwyn-fynydd Mine, Mawddach, Gwynedd.
June 2014

Archaeological Assessment
Project Code: A0038.1
Report no. 0039

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Archaeological Assessment

Aeon Archaeology
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Project Code: A0038.1
Date: 09/06/2014
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Figures

Plates

Plate 01: Charlotte Elizabeth Mill c.1887.

Plate 02: Charlotte Elizabeth Mill c.1887 showing Smithy building.

Plate 03: Charlotte Elizabeth Mill c.1888.

Plate 04: Frue Vanners c.1890.

Plate 05: Charlotte Elizabeth Mill 1890 showing old 15 stamp mill.

Plate 06: Charlotte Elizabeth Mill 1890 showing new 40 stamp mill under construction.

Plate 07: Charlotte Elizabeth Mill c1890.

Plate 08: Possibly the steam engine at the Charlotte Elizabeth Mill c1890.

Plate 09: Charlotte Elizabeth Mill c1890

Plate 10: Mawddach Falls and offices c1890.

Plate 11: Water turbine 1968.

Plate 12: Water turbine 1968.

Plate 13: Charlotte Elizabeth Mill 1968.

Plate 14: Sluice gate and pool feature 1, from the southwest. Scale 1.0m.

Plate 15: Leat feature 2, from the southwest.

Plate 16: Trackway feature 3, from the southwest. Scale 1.0m.

Plate 17: Launder feature 4, from the northwest. Scale 1.0m.

Plate 18: Stone retaining wall feature 5, from the south. Scale 1.0m.

Plate 19: Iron pipe feature 6, from the southwest. Scale 1.0m.

Plate 20: Ruined building feature 7, from the northeast. Scale 1.0m.

Plate 21: Mill central floor feature 8, from the southeast. Scale 1.0m.

Plate 22: Mill central floor feature 8 showing amalgamating table bolts, from the north. Scale 1.0m.

Plate 23: Mill central floor feature 8 showing remains of stamp frames, from the east. Scale 1.0m.

Plate 24: Mill central floor feature 8 showing belting chute to stamps, from the north. Scale 1.0m.

Plate 25: Mill central floor feature 8 showing stamp battery shaft, from the north. Scale 1.0m.

Plate 26: Mill central floor feature 8 showing location of stamp batteries, from the east. Scale 1.0m.

Plate 27: Mill west-wing assay office feature 8 showing probable steam engine location and brick bunkers, from the south. Scale 1.0m.

Plate 28: Mill lower floor feature 8 showing location of vanner house and britten pans, from the south. Scale 1.0m.

Plate 29: Turbine shaft feature 9 showing mill eastern wall to be demolished, from the east. Scale 1.0m.

Plate 30: Turbine shaft feature 9 showing Armfield of Ringwood turbine base, from the north. Scale 1.0m.

Plate 31: Smithy buildings feature 10, from the southeast. Scale 1.0m.

Plate 32: Possible water wheel pit feature 11, from the east. Scale 1.0m.

Plate 33: Structure feature 12, from the west. Scale 1.0m.

Plate 34: Offices feature 13, from the south. Scale 1.0m.

Plate 35: Trackway feature 14, from the south. Scale 1.0m.

Plate 36: Compressor house base feature 15, from the southeast. Scale 1.0m.

Plate 37: Tramway feature 16, from the south. Scale 1.0m.

1.0 NON-TECHNICAL SUMMARY

Aeon Archaeology was commissioned by Carter Jonas LLP to undertake an archaeological assessment of a proposed new hydro-electric scheme as part of an archaeological condition of planning permission. The proposed scheme intake is to be located on the western bank of the Afon Mawddach, approximately 128.0m north of the confluence of the river with the Afon Cain. The proposed pipeline will then run south for approximately 82.0m, meandering through the upstanding remains of the Charlotte Elizabeth gold ore processing mill to a new turbine house to be located within the historic turbine shaft of the mill. The hydro scheme outfall will then empty back into the Afon Mawddach by the historic outfall cleft in the rocks to the immediate east of the turbine shaft.

The archaeological assessment identified seventeen archaeological sites within the 40.0m wide assessment corridor centred on the pipe route. All of these sites were post-medieval in date and associated with the gold ore processing site. It is anticipated that the proposed scheme will directly impact upon nine features of the processing complex, all of which are considered to be of national importance through their group value.

It is proposed that a watching brief is maintained during trenching work at all of the sites to be impacted upon and that provision is made for any revealed deposits or structures to be recorded prior to impact. Furthermore, recommendations have been made for the reinstatement of the gable wall of a ruined structure (feature 7) upon completion; and the reinstatement of the mill floor, working levels, and belt chute of the mill complex (feature 8) upon completion.

The SNPA Archaeologist has recommended that an information panel concerning the historical development and function of the mill be erected at the site.

Due to the potential for buried remains and structures associated with the mill general recommendations have been made for a watching brief to be maintained during all intrusive ground works. Furthermore, if possible the western part of the mill should not be utilised for the deposition of spoil material and another more suitable site should be located.

2.0 INTRODUCTION, AIMS AND PROJECT DESIGN

Aeon Archaeology was commissioned by Carter Jonas LLP to undertake an archaeological assessment of a proposed new hydro-electric scheme as part of an archaeological condition of planning permission. The proposed scheme intake is to be located on the western bank of the Afon Mawddach, approximately 128.0m north of the confluence of the river with the Afon Cain, and centred on **NGR SH 7358 275**. The proposed pipeline will then run south for approximately 82.0m, meandering through the upstanding remains of the Charlotte Elizabeth gold ore processing mill (NPRN: 34130), to a new turbine house to be located within the historic turbine shaft of the mill, centred on **NGR SH 7356 2747**. The hydro scheme outfall will then empty back into the Afon Mawddach by the historic outfall cleft in the rocks to the immediate east of the turbine shaft.

The proposals are then to run a buried cable northwest and within the current trackway to a new transformer house located on the western bank of the Afon Cain at approximately **NGR SH 73464 27467**. The proposed scheme lies approximately 3.0km northeast of the village of Ganllwyd, Mawddach, Gwynedd, and within the Snowdonia National Park Authority (SNPA) (figure 1 and 2).

The current proposals are to install a concrete weir at the intake point and to feed the water via a 1000mm diameter black HDPE plastic pipe buried within a trench measuring approximately 1.5m in depth by 1.2m in width (Min). The footprint of the new turbine house will measure approximately 5.3m by 5.5m reducing to 4.0m along the front face, and will have external stone cladding.

A mitigation brief has not been prepared for this scheme by the SNPA Archaeologist, but recommendations have been given to the client to commission a phased approach of archaeological mitigation to include an archaeological assessment, watching brief, conservation, and interpretation of the site (Roberts, J.G. email dated 25/04/2014).

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

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

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

The archaeological assessment considered the following:

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

The archaeological assessment was undertaken in four stages:

(i) Archival research
(ii) Field visit/site walkover of all accessible areas

(iii) Written report
(iv) Project archive

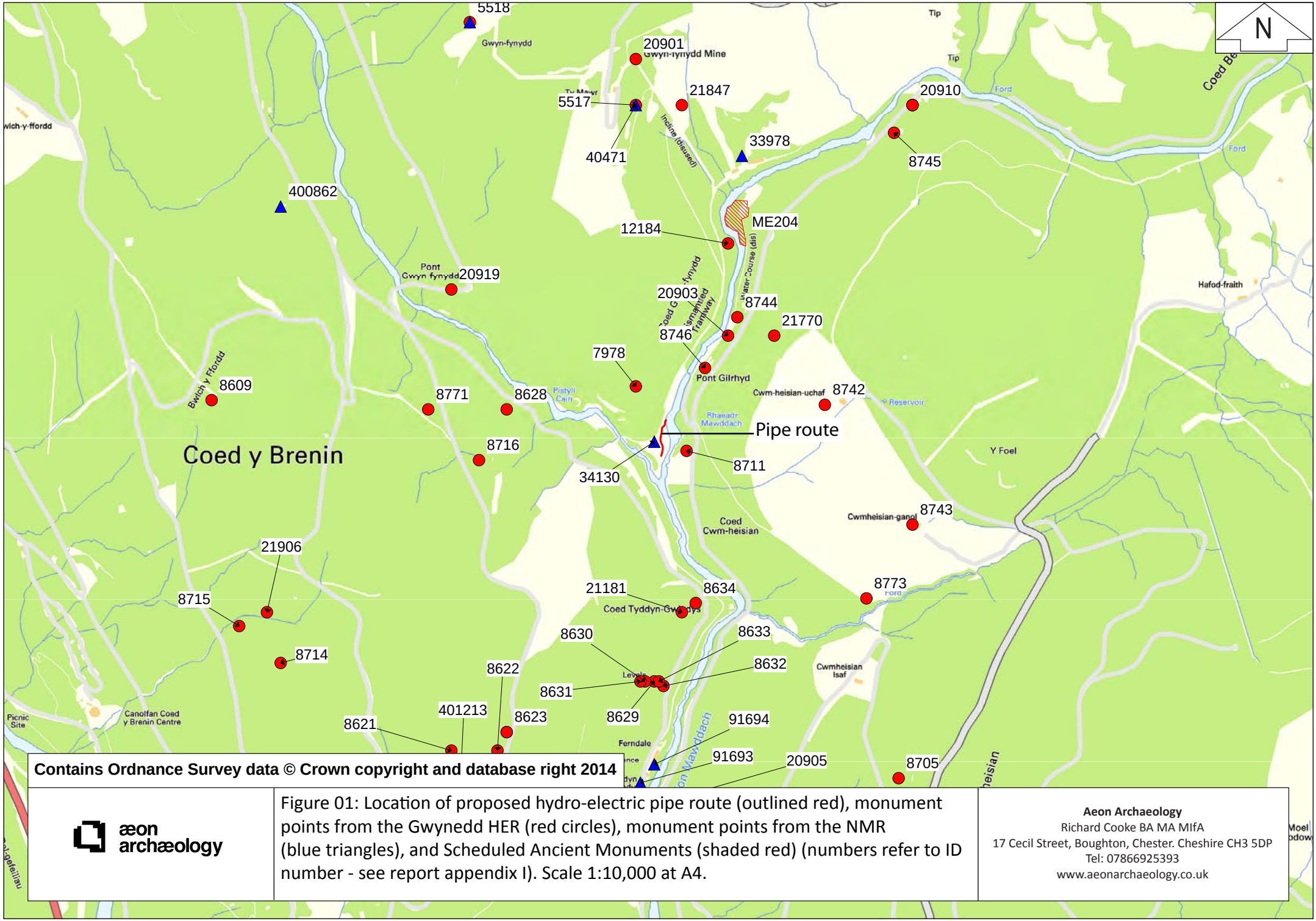

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Figure 01: Location of proposed hydro-electric pipe route (outlined red), monument points from the Gwynedd HER (red circles), monument points from the NMR (blue triangles), and Scheduled Ancient Monuments (shaded red) (numbers refer to ID number - see report appendix I). Scale 1:10,000 at A4.

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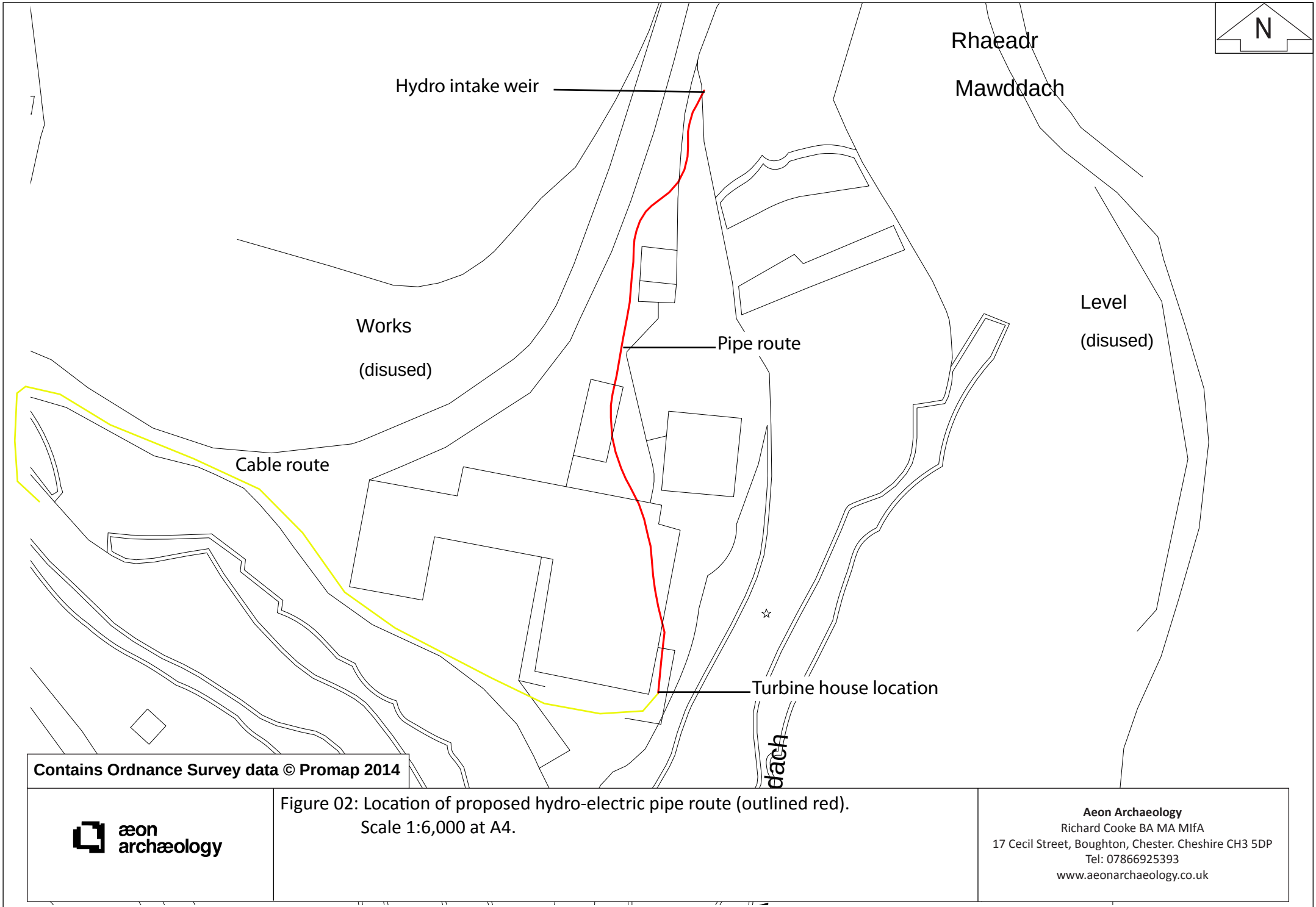

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Figure 02: Location of proposed hydro-electric pipe route (outlined red).
Scale 1:6,000 at A4.

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3.0 METHODS AND TECHNIQUES

3.1 Archival research

The archaeological assessment involved the study of the following records:

- The regional Historic Environment Record (Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor, LL57 2RT) was examined for information concerning the study area. This included an examination of the core HER, and secondary information held within the record which included unpublished reports, the 1:2500 County Series Ordnance Survey maps, and the National Archaeological Record index cards and aerial photography.

- The National Monuments Record (NMR RCAHMW, National Monuments Record of Wales, Plas Crug, Aberystwyth, SY23 1NJ) was checked for sites additional to the HER.

- Information about Listed Buildings and Scheduled Ancient Monuments from Cadw were examined in the regional HER. The Register of Outstanding and Special Historic Landscapes and the Register of Parks and Gardens was checked, and also the location of World Heritage Sites.

- Secondary sources were examined, including the Inventories of the Royal Commission on Ancient and Historical Monuments for Wales, and works held within the regional libraries.

- Evidence from aerial photographs was collated. Vertical and oblique collections held by the NMR, CCW and Welsh Government were examination.

- Archive maps were consulted in the National Library of Wales at Aberystwyth, and at the Gwynedd archives. This included the relevant estate maps and tithe maps and information from Land Tax Assessments.

- Results from previous archaeological work within the area was also reviewed.

3.2 Site walkover

The site walkover was carried out on 14th May 2014 by Richard Cooke BA MA MIfA, archaeological contractor and consultant at Aeon Archaeology. The weather conditions were ideal for the field search being both bright and clear. All archaeological sites and view points were photographed using a digital SLR (Canon 550D) set to maximum resolution (72 dpi).

3.3 Assessment report

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

3.4 Project archive

A full archive including plans, photographs and written material was prepared. All plans, photographs and written descriptions were labelled and cross-referenced using Aeon Archaeology pro-formas. A draft copy of the report was sent to the client and upon written approval from them copies of the report will be sent to the regional HER (Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor, LL57 2RT), the Snowdonia National Park Authority (SNPA), and the Royal Commission on the Ancient and Historic Monuments in Wales (RCAHMW). All notes, plans, and photographs arising from the assessment are stored at Aeon Archaeology under the project code **A0038.1**.

4.0 ARCHAEOLOGICAL AND TOPOGRAPHICAL BACKGROUND

4.1 Topographic Description

The proposed hydro-electric scheme lies within an extensive area of past gold mining, the remains of which dominate much of the landscape. The river cuts through a heavily wooded valley which is steep on the eastern side but has been terraced on the western side to facilitate access to the Charlotte Elizabeth gold ore processing mill, located immediately north of the confluence between the Afon Mawddach and the Afon Cain. The mill is surrounded by wooded slopes with dense bracken and bramble forming the undercover where the woodland becomes less dense.

The site lies within the parish of Trawsfynydd, within the historic county of Meirionnydd and unitary authority of Gwynedd. The assessment area slopes from approximately 120m OD at the proposed hydro intake, with the proposed turbine house lying at approximately 100m OD.

The bedrock geology is of the Gamlan Formation, a mudstone and siltstone sedimentary bedrock that formed approximately 502 to 508 million years ago in the Cambrian Period when the local environment was dominated by deep seas (British Geological Survey).

4.2 Statutory and non-statutory designations

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

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

There are 48 non-designated monuments within 1.0km of the proposed pipeline route (see appendix I) but no monuments are located within the 40.0m assessment zone centred on the pipe.

The pipe route lies within 100.0m of the following:

(i) Approximately 50.0m west of the post-medieval *Coed Cwm Heisian Level* (PRN: 8711);

(ii) Approximately 98.0m southeast of the post-medieval *Gwyn -fynydd Tramway* (PRN: 7978).

4.2.2 Scheduled Ancient Monuments (figure 1)

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

There is 1 Scheduled Ancient Monument within 1.0km of the proposed pipeline route (see appendix I) but no monuments are located within the 40.0m assessment zone centred on the pipe.

The pipe route lies within 500.0m of the following:

(i) Approximately 420.0m south of the post-medieval *Cwm Heisian West Lead and Gold Mine* Scheduled Ancient Monument (ME204).

4.2.3 Listed Buildings

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

There are no Listed Buildings within 1.0km of the proposed pipeline route.

4.2.4 National Monuments Record (figure 1)

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

There are 8 non-designated monument points within 1.0km of the pipeline route (see appendix I) and the following lie within the 40.0m assessment zone centred on the pipe:

(i) Approximately 13.0m east of the post-medieval *Charlotte Elizabeth ore processing mill, gwynfynydd* (NPRN: 34130).

4.2.5 Historic Landscape Character Areas (HLCAs)

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

The proposed development does not lie within a registered historic landscape or historic landscape character area.

4.2.6 Historic Parks and Gardens

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

on applications affecting sites Registered as grade I or II* and the Garden History Society on sites of all grades.

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

4.2.7 Events

The proposed development area was included within an archaeological assessment report by the Gwynedd Archaeological Trust in 1999 (GAT report 347) which identified several structures associated with the Charlotte Elizabeth mill. Furthermore, an archaeological assessment was carried out by Giffords Ltd in 2007 that looked at the wider location of the gwynfynydd mine workings but included a limited search of the area around and including the mill.

The ore processing mill was recorded through detailed descriptions and conjectural reconstruction drawings by the RCAHMW in 1977 and these records have been utilised to provide an historical narrative for the Charlotte Elizabeth mill and gold mining in Meirionnydd.

5.0 THE HISTORICAL CONTEXT

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

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

Table 1. Historic periods

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

5.1 Prehistoric and Roman Period

The prehistoric and Roman periods are poorly represented within the localised landscape and there are no known sites within 1.0km of the proposed hydro scheme. Settlement sites dating to the Iron Age and Roman periods are known within the wider landscape, with hillforts located at Ystum Gwadnaeth (PRN: 4744) and Moel Goedog (PRN: 1000) approximately 6.5km to the south and 13.5km to the northwest of the pipeline route respectively.

Approximately 1.1km to the west of the proposed development site lies two burnt mounds (PRN: 1438) which are most likely Bronze Age in date, although no investigation of these two mounds have taken place and identification is currently conjectural.

The steep wooded slopes of the Afon Mawddach valley would not have been conducive to early habitation sites and the steep topography would have been largely unsuitable to siphon water into the troughs of prehistoric burnt mounds. Moreover, the terrace upon which the Charlotte Elizabeth mill stands was created for the construction of the mill buildings and if any earlier sites were present they are likely to have been removed through construction of the mill. It is thus considered that the potential for unknown buried archaeological remains of the prehistoric and Roman periods to be present within the development area is low.

5.2 Early Medieval, Medieval and Post-Medieval Periods

The Early Medieval period is poorly represented within this part of northwest Wales and there are no known recorded early medieval sites within 1.0km of the proposed pipeline route.

By the 12th and 13th centuries the kingdom of Gwynedd was divided into administrative *commotes*, administered through a network of local centres governed by a royal court or *Llys*. The proposed development site lay within the cantref of Dunoding and the commote of Ardudwy. The administrative unit of Dunoding is thought to derive from the name Dunawdd, a son of Cunedda which suggests fifth century origins (GAT report 347). The township of a commote associated with a llys was known as the *maerdref*, in which the Prince's agent would reside. The maerdref for this part of Ardudwy was at Trawsfynydd. The component parts of a llys included the royal hall and other buildings associated with the residence, as well as the royal demesne worked by bond tenants, and the settlements of these tenants which constituted small hamlets. The llys and royal lands became the property of the English King upon the conclusion of the conquest of Wales.

The proposed hydro scheme site is first depicted on John Evans' map of 1797 (figure 3) but only the farm of Gwynfynydd is depicted within the vicinity and no buildings or features of note are shown at the confluence of the Afon Mawddach and Afon Cain. The area is again depicted on the Mostyn estate map of 1806 (figure 4) and an undated Mostyn estate map of around the same time (figure 5). Both of these maps focus on the land to the immediate southwest of the river confluence however no features are shown at the proposed development site.

The tithe map for the parish of Trawsfynydd dating to 1840 (figure 6) depicts the area in reasonable detail and shows a trackway connecting Bont Gilrhyd with Gwynfynydd farm in the north. The site of the proposed hydro scheme is shown as being wooded and clear of structures.

Table 2. Apportionment to the 1840 Tithe Map for the Parish of Trawsfynydd

Field Number	Field Name	Landowner	Occupier	Landuse
2175	Gwasladgoed	Robert Roberts	Robert Roberts	Wood, pasture
2176	Caeriwydd	Robert Roberts	Robert Roberts	
2177	Pant y Cafnau	Robert Roberts	Robert Roberts	Wood, pasture

It was often said that Gwynfynydd was an old lead mine, but apart from some very minor trials this does not seem to be the case (Hall, G.W.) The early lead mines were located at East and West Cwm-heisian, on the opposite bank of the Afon Mawddach to the Gwynfynydd mine. Both East and West Cwm-heisian were active during the 1840s in extracting galena (lead ore). When the proprietor of the mines, James Harvey, was unable to obtain a clean mineral product he hired Arthur Dean as consulting engineer. Dean recognised the gold particles caught within the lead dressing machinery and shortly afterwards published his findings in a report to the British Association.

By 1843 the existence of gold at the two mines was confirmed and Harvey sold the mines to Mr Bruin for £14,000. Bruin hired several engineers to work the lodes, with the general method being to form a heavy concentrate via conventional lead-dressing methods, and then to smelt this to recover the gold particles. Contemporary accounts of this early gold mining venture in the Mawddach valley are sparse, but it appears that only 200ozs of gold were recovered and the operation was not deemed a financial success (Hall, G.W.).

Gold rich lodes at the Gwynfynydd site were not identified until 1863 through exploration by T.A. Readwin and Company who were responsible for erecting the first mill at the site which was powered by a water wheel and had four britten pans. The operation encountered problems with amalgamation and the process ceased in 1865 although the company remained in existence.

The Gwynfynydd mine was again worked in 1869 by Professor William Rickford Collett, who had experience of gold mining in Australia and New Zealand. Under his leadership the Gwynfynydd Gold Mining Company and its successor the New Gwynfynydd Gold Mining Company expanded operations at the mine, and constructed the Charlotte Elizabeth processing mill, named after the Professor's daughter, at the site. The mill consisted of 16-head of stamps and britten pans driven by a 36 foot x 5 foot waterwheel fed by a sluice and leat from the Afon Mawddach. In addition, the mill is reputed to have had an electro-medium apparatus, which was designed by Professor Collett and was contained within a box 3 feet long and 12 inches high. The means by which this machine functioned still remains a mystery although it employed electric current and was supposed to have saved 100% of the gold particles (Hall, G.W.). The mill was claimed to be entirely automated and could run unattended even over the weekend, although the gold yield appears to have been less than expected and the mill closed in the 1870s.

The mill was repaired and reopened by T.A. Readwin in 1883 who formed the Mawddach Gold Mining Company the following year, the shareholders of which were mostly directors and cashiers of the Bank of England. Readwin, who was now in his 70s and new only too well the metallurgical difficulties of the local lodes, was convinced that there was rich gold deposits within the quartz veins which could not be extracted by conventional means. He was anxious to try a new method known as the Jordan Dry Ores Reduction Process through which he met the agent and part-proprietor William Pritchard Morgan, whom he introduced to the Gwynfynydd workings.

William Pritchard Morgan was born in Monmouthshire in 1844 and emigrated to Australia at the age of twenty. He later qualified as a barrister and took part in some notable legal battles. He was keenly interested in gold mining and successfully floated large mining companies, as well as fighting two elections for a seat in the Queensland Assembly, missing out by only one vote on his second attempt. On his return to Wales Pritchard Morgan became the Liberal MP for Merthyr Tydvil between 1888 and 1890.

Readwin and Pritchard Morgan constructed a tramway from the No.1 levels but after a dispute about the amount of money owed a legal battle ensued in which Pritchard Morgan was awarded £2,250. Neither Readwin nor the Mawddach Gold Mining Company could afford to pay this and thus the company went into liquidation and the mine closed. Pritchard Morgan carried out his own exploration of the lodes and discovered rich gold quartz in the Chidlaw Lode on 11th July 1887. He built a new mill at the Charlotte Elizabeth site in 1887 (figure 10, plates 1-3) which had a Marsden stone-breaker, 15 head of Sandycroft stamps, amalgamating tables, Frue vanners, and britten pans driven by water wheels. In this year he also formed the Morgan Gold Mine Company. The contemporary *Mining Journal* dated 17th December 1887 described the new mill as such:

'In the apex of the triangle formed by the Cain and Mawddach rivers, mill buildings, assay offices, electric light room, bullion room etc are in course of erection. The mill shed is built of wood, with roof lights; in this is being erected a 15-head stamper battery, by the Sandycroft Company, of Hawarden...Each stamp weighs 750 lbs; the drop is capable of variation from 7 to 11 inches, the first mentioned figure will be the one by which the early crushings are to be made...From the battery the crushed material will pass over amalgamating tables, on to Frue vanners, arranged one below the other – two to each five head. Ten small pans are provided to grind and treat these concentrates; the pans are about 2 foot in diameter by 1 foot deep. A heart shaped muller revolves on a point working in a hole in the centre of

the pan; it rolls from side to side. The miners call them 'Britten' pans, but we think they are the principle advocated by Mr Robinson, a clergyman. Mercury, ore and water are put into these, the grinding and amalgamation being carried on at the same time; from a tap in the bottom the amalgam may be drawn off. The ore is brought down from the mine by a small tramway built to a 2-foot gauge, worked by a wire rope. Before going to the battery it passes through a Marsden stone cracker, breaking to a gauge of about 1 inch; from this it is fed to the stamps by an automatic feeding machine...The power is conveyed by a 36 foot diameter by 4 foot wide waterwheel. Below this wheel and fed from it, is placed a 10 foot diameter wheel by 4 foot wide. This is to drive the Frue vanners. The electric light machinery is not yet on the ground...The mill site though artistically chosen, is a luxury, for to put it in its present position an immense quantity of solid rock had to be blasted away...A quantity of old machinery lies on the ground near the site of the present mill; so old fashioned is it, there is difficulty in deciding as to what it was originally intended for'

After various legal disputes involving the payment of royalties Pritchard Morgan sold the Gwynfynydd mine in June 1888 to the New Morgan Gold Mining Company, formed with the purpose of acquiring the mine. The first chairman of the new company was the Earl of Winchilsea, the other initial directors being the Lord Mostyn and the MPs for the Montgomery and Denbigh boroughs. In September 1888 the company purchased a steam-driven air-compressing plant and started using slugger machine drills. The Charlotte Elizabeth mill was extended to include a new 40-stamp Fraser and Chalmers mill, as well as replacing the waterwheel with a new Armfield turbine fed by an iron culvert. The turbine rectangular valve plate slid on rollers and was moved by cogs acting on racks on the top surface of the plate. The cogs were turned by a larger cog on the outside of the casing which was turned by a gear at the bottom of an upright rod, itself turned by a wheel handle on the end of a long control rod. Below the valve and inside the bolted casing was a pelton wheel of approximately 2 foot diameter, the shaft for which drove a wide belt pulley within the belting chute which drove the shaft for the stamps and stone-breakers. A 50 h.p. steam engine was installed at the western end of the mill to take over in periods of dry weather (figure 11 and 12, plates 5-10) and the mill was extended to the west to include an assay office and to house the steam engine.

The first edition 25" Ordnance Survey map of 1889 (figure 7) depicts the mill site in detail. The map shows three separate but attached buildings forming the main part of the mill, with a smaller fourth building attached to the north. The mill structure depicted is clearly that of the 1887 mill prior to the extension by the New Morgan Gold Mining Company suggesting that the map had been drawn two years before its publication. The Smithy building is depicted to the immediate northeast of the mill complex, as is at least two outbuildings and the overshot waterwheel on the eastern mill elevation. A sluice is depicted to the north as well as a series of footpaths and trackways, one of which was possibly a former inclined plane.

By late 1893 and early 1894 an organisation called Morgan Gold and Silver made further search for an extension of the old Chidlaw shoot about No.1 level, and they were succeeded in April of the latter year by British Gold Fields, formed by Pritchard Morgan and his associates.

By the production of the second edition 25" Ordnance Survey map of 1901 (figure 8) the extension and improvements carried out by the New Morgan Gold Mining Company in 1888 can easily be seen. To the south of the mill a freestanding building is likely to have been the bullion room and attached electric light room, and the Smithy to the northeast is still in existence. A detached building to the north of the mill is of unknown function but may have been a store or office. The mill is fed by an overhead tramway from the northwest and office buildings are shown further to the north.

The Gwynfynydd mine was worked almost continuously from 1883 until 1916 when the mine was closed and some of the machinery sold off. In 1931 Britain abandoned the gold standard and the resulting rise in metal prices encouraged C.V. Sale, who had mining interests abroad, to form the Hillside Mining Company. He renovated the old stamp mill but it was destroyed

by fire in 1935. A planning application map of the same year (figure 9) shows the mill site in detail with the mill, assay office, smithy, bullion room, sluice, leat, offices, and overhead tramway all being depicted.

The historical development of the Charlotte Elizabeth mill can be summarised as follows:

1863 (T.A. Readwin): A waterwheel driving 4 Britten pans.

1869 (W.R. Collett): 'Charlotte Elizabeth' mill built with 16 head of stamps and Britten pans driven by a 36 foot by 5 foot waterwheel. It also contained the mysterious 'electro-medium apparatus'.

1883 (T.A. Readwin): Repairs to mill.

1887 (W. Pritchard Morgan): Extends mill to include a Marsden stone-breaker, 15 head of Sandycroft stamps, amalgamating tables, Frue vanners and Britten pans driven by waterwheels. Additional 4 head of stamps for extra-rich ore.

1888 (New Morgan Gold Mining Company): Mill extended to incorporate some older machinery with a new 40 stamp Fraser and Chalmers mill. The waterwheel is replaced with an Armfield turbine with ancillary 50 hp steam-engine.

1931 (Hillside Mining Company): Renovation of stamp mill – mill burns down in 1935 (RCAHMW, 1977).

The mill remains consist now of stone rubble walls bonded by lime mortar. A survey carried out by the RCAHMW in 1977 identified the machine bases within the mill although these are now mostly missing, aside from some amalgamating table bolts (plate 22), the occasional remains of the stamp frames (plate 23), and part of the stamp battery shaft (plate 25). The mill site has been revetted but probably exaggerated the natural terrace and has been built up with spoil from the tramway system. Several working levels can be identified at the mill site. The mill of 1887 (figure 10) would have had ore delivered by an incline plane which was then delivered to the Marsden stone-breaker at the northern part of the mill. This would have been driven by an overhead shaft which was in turn driven by a countershaft transmitting belt-drive from the overshot water wheel. The crushed ore would have been fed down into 3 sets of Sandycroft 5-head stamp batteries, also powered by the main waterwheel, and then would have fed into amalgamating tables and vanners driven by a smaller pelton waterwheel.

When the mill was extended in 1888 the waterwheel was replaced with a turbine which would have transferred power via a counter-shaft to the stamp battery shaft and stone-breaker counter-shaft. An aerial tramway would have deposited the ore into hoppers which would feed into two Marsden stone-breakers situated at a high level at the northern part of the mill complex. This would have then automatically fed into the main mill floor level and its 8 California 5-head stamp 750 lb batteries. Gold was amalgamated on outside plates and the battery tailings were passed over Frue vanners and Wilfley tables. Batches of high-grade ore were processed in Britten pans and smelting was carried out at the mill (figure 12) (Morrison, T.A.).

5.3 Aerial Photographs

As part of the archaeological assessment the RCAHMW was visited to examine available historic aerial photographs of the proposed development area. Aerial coverage from the Royal Air Force and dating to 1946 and 1951 was examined, as was later Ordnance Survey coverage from 1971, 1991, and 1999, as well as modern aerial photographs. All of the photographs showed the proposed development area as heavily forested and no structures could be identified due to the dense tree canopy.

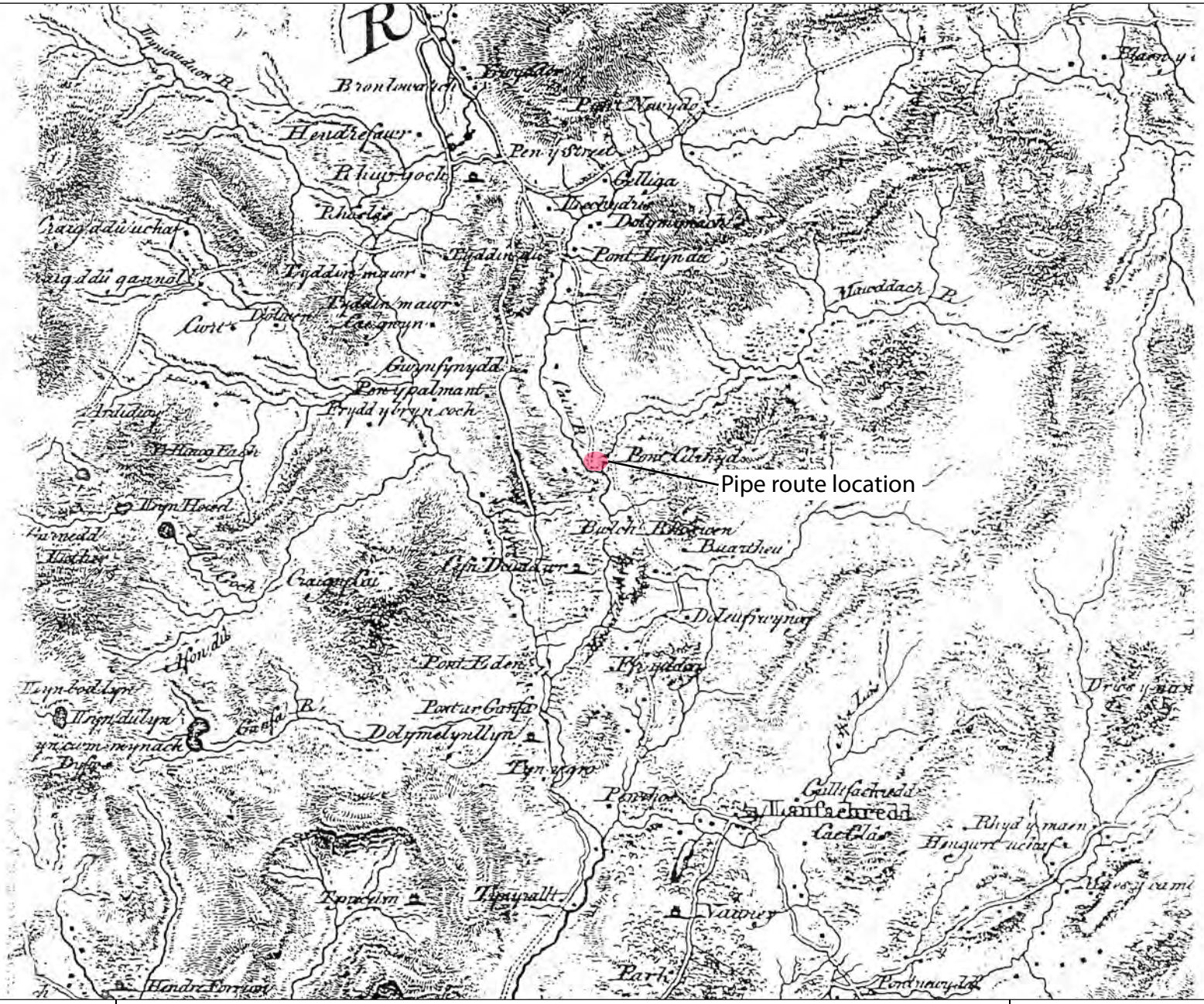

Figure 03: John Evans map of 1797 (Pipe route location shaded red).

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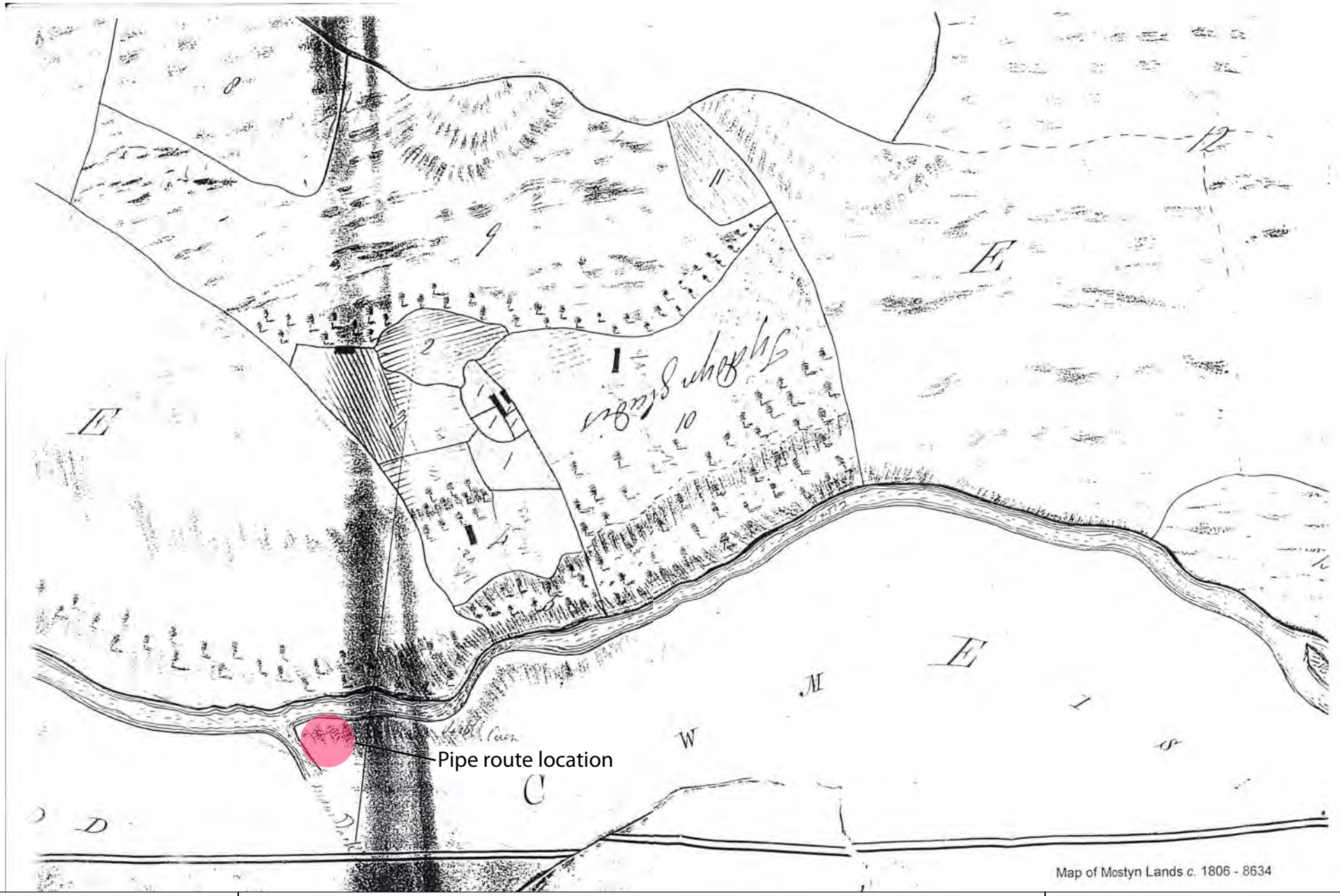

Figure 04: Mostyn Estate map of 1806 (Pipe route location shaded red).

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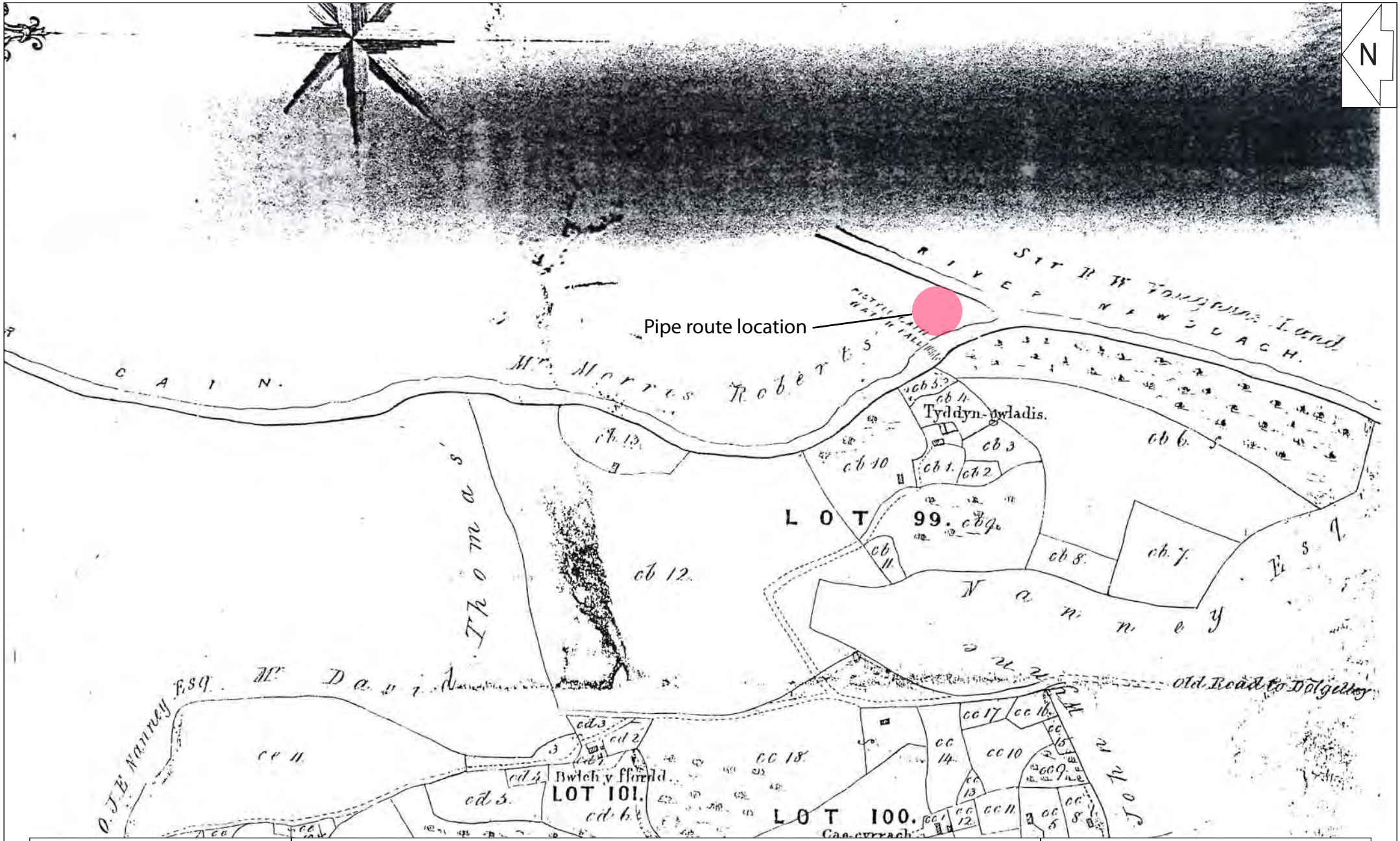

Figure 05: Mostyn Estate map - undated (Pipe route location shaded red).

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Figure 06: Trawsfynydd tithe map of 1840 (Pipe route location shaded red).

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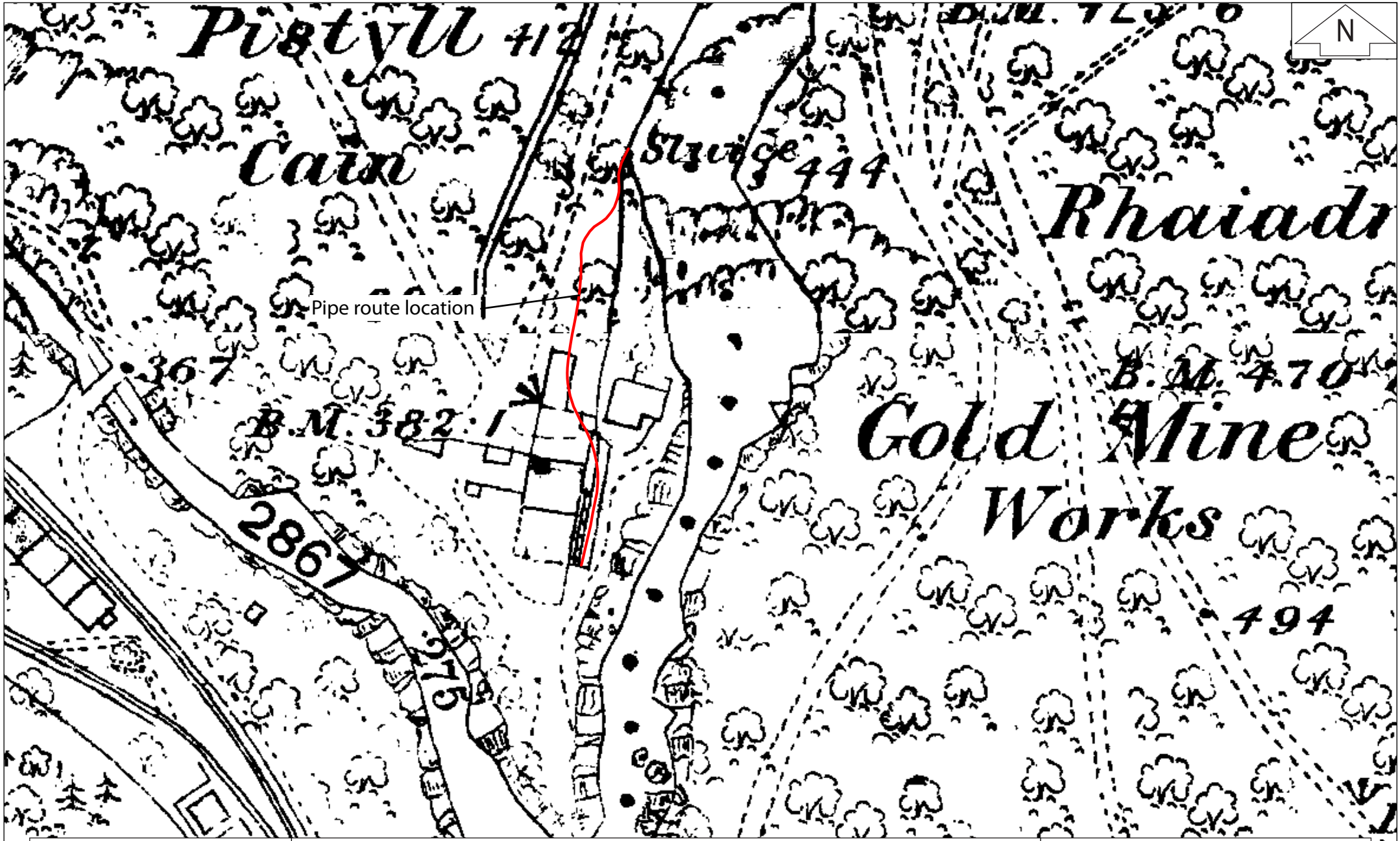

Figure 07: First Edition 25" County Series Ordnance Survey map of 1889 (Pipe route outlined red).

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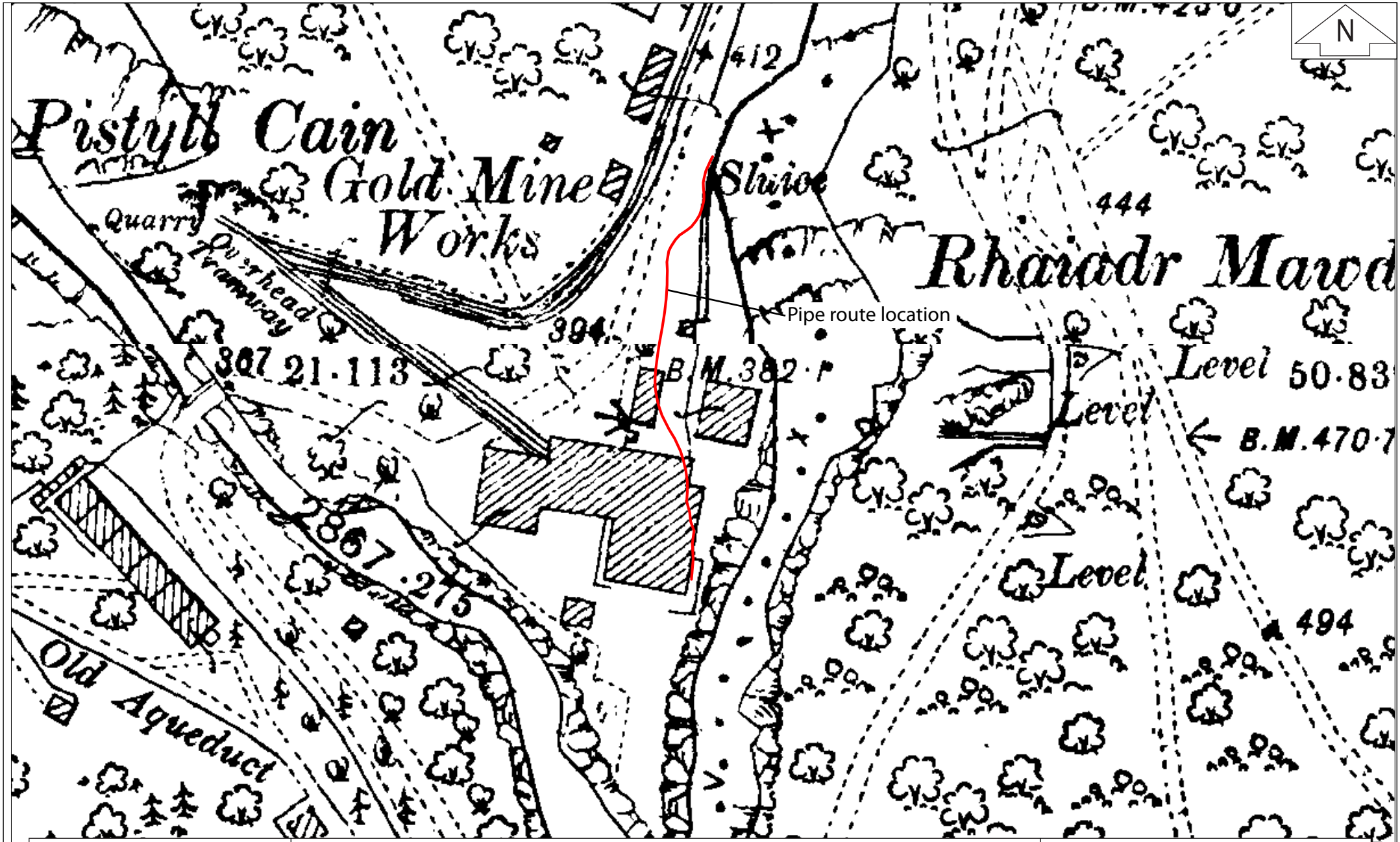

Figure 08: Second Edition 25" County Series Ordnance Survey map of 1901 (Pipe route outlined red).

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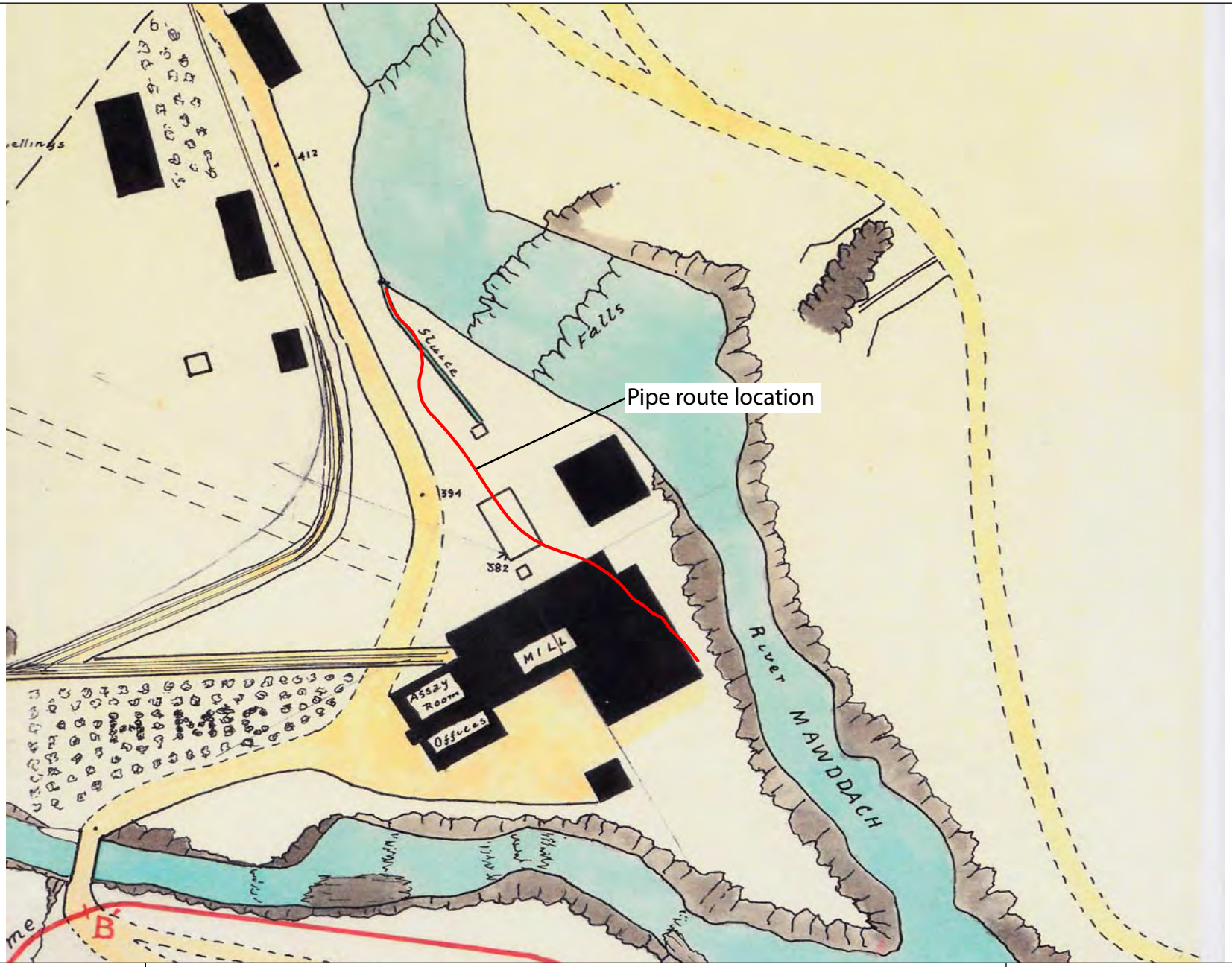

Figure 09: Gwynfynydd Mine map of 1935 (pipe route outlined red) (352/7).

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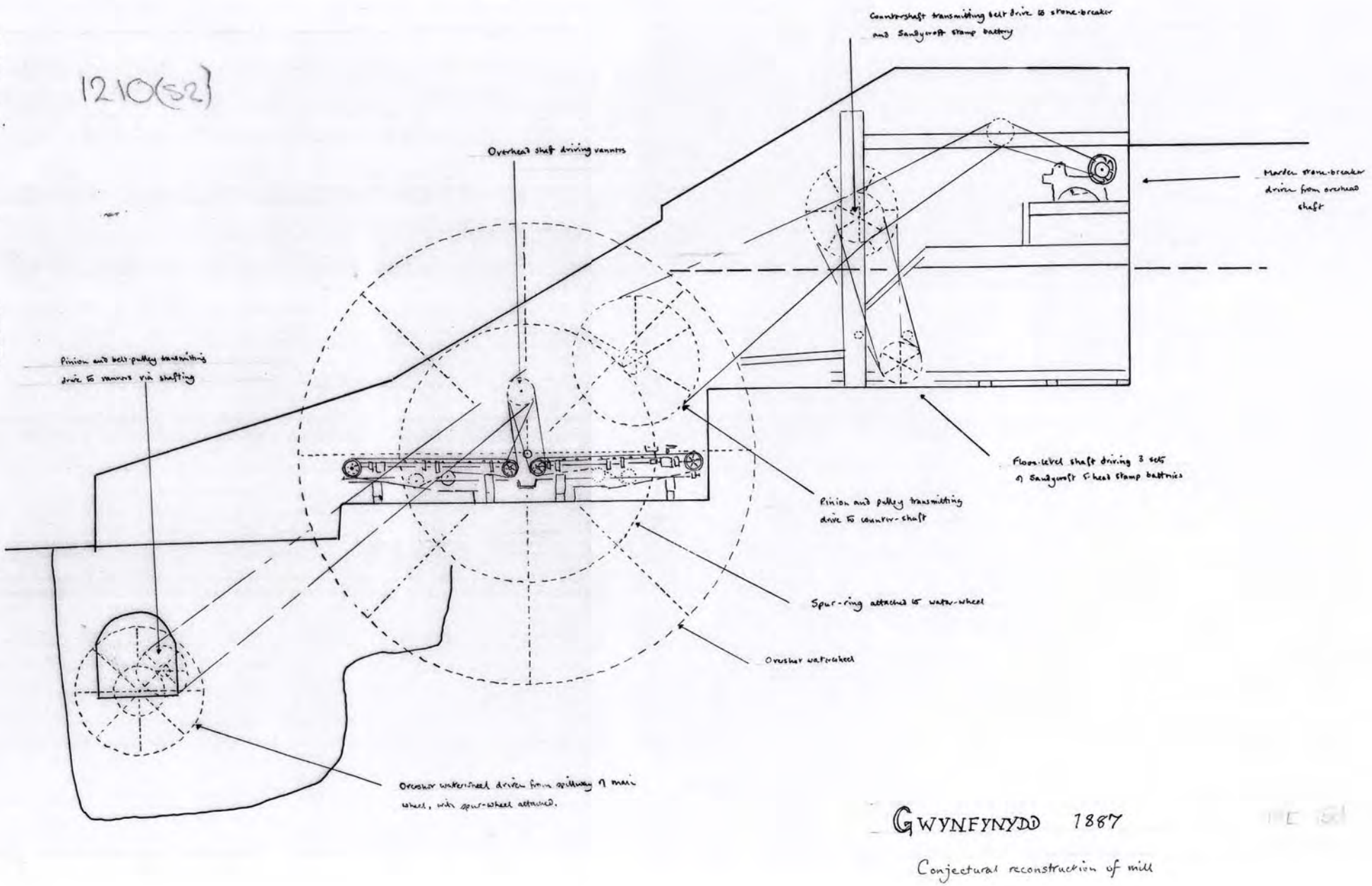

Figure 10: Conjectural reconstruction of mill 1887 (RCAHMW 1210-S2).

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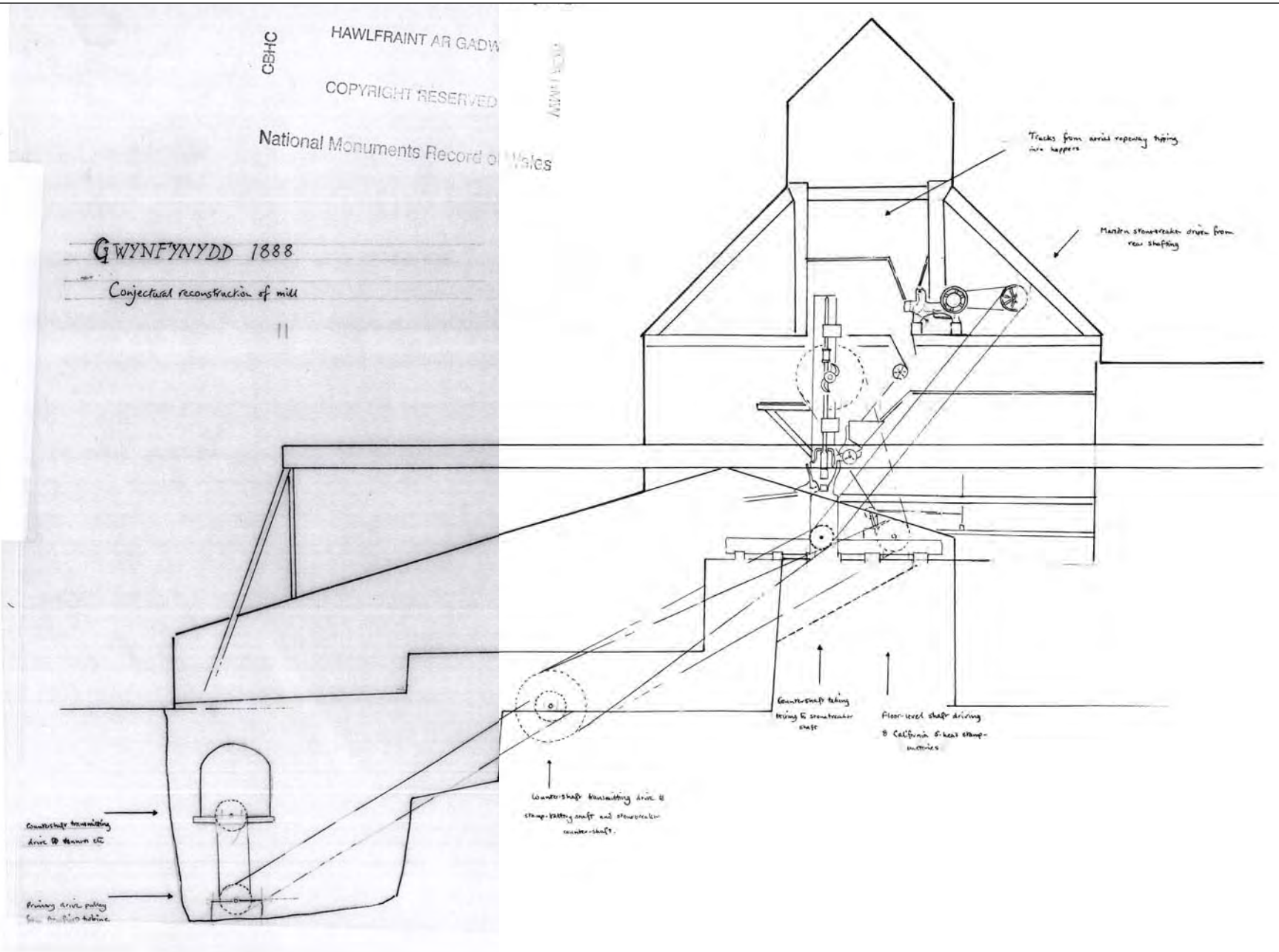

Figure 11: Conjectural reconstruction of mill 1888 (RCAHMW 1210-S4).

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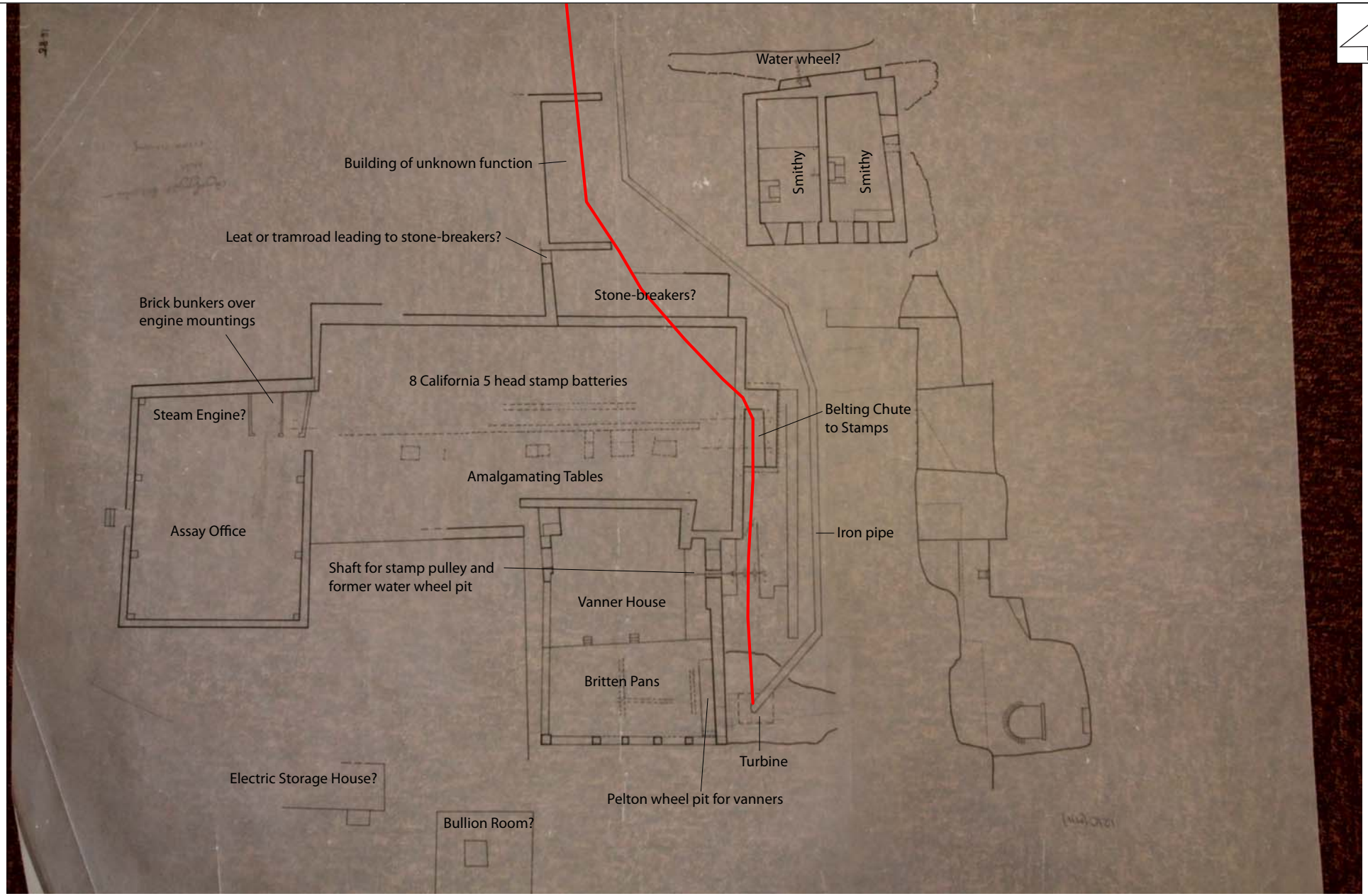

Figure 12: Reconstruction plan of mill 1888 (pipe route outlined red) (RCAHMW 1210 - M11).

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Plate 01: Charlotte Elizabeth Mill c.1887 (ZS/37/40).

Plate 02: Charlotte Elizabeth Mill c.1887 showing Smithy building (ZS/37/19).

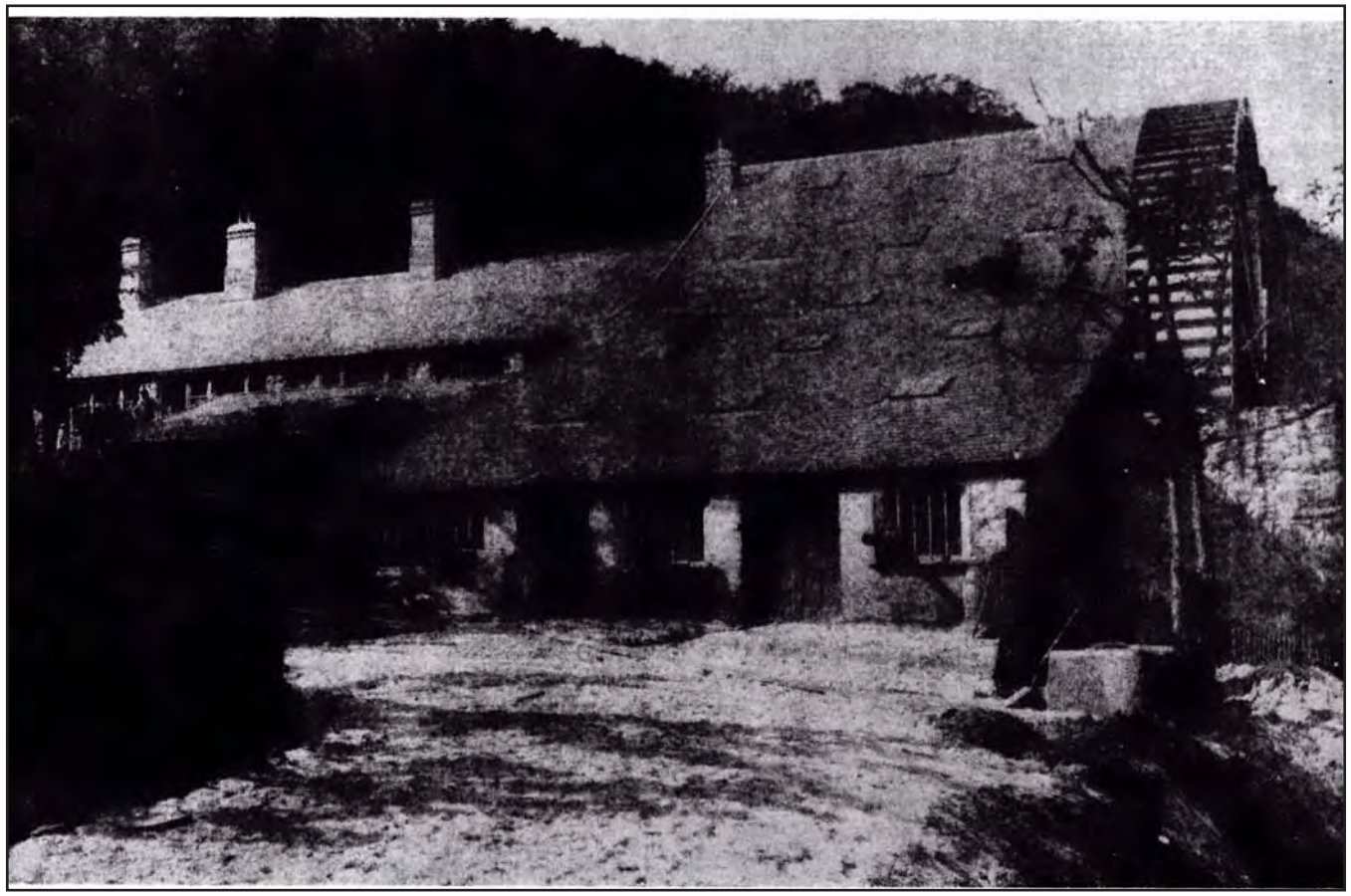

Plate 03: Charlotte Elizabeth Mill c.1888.

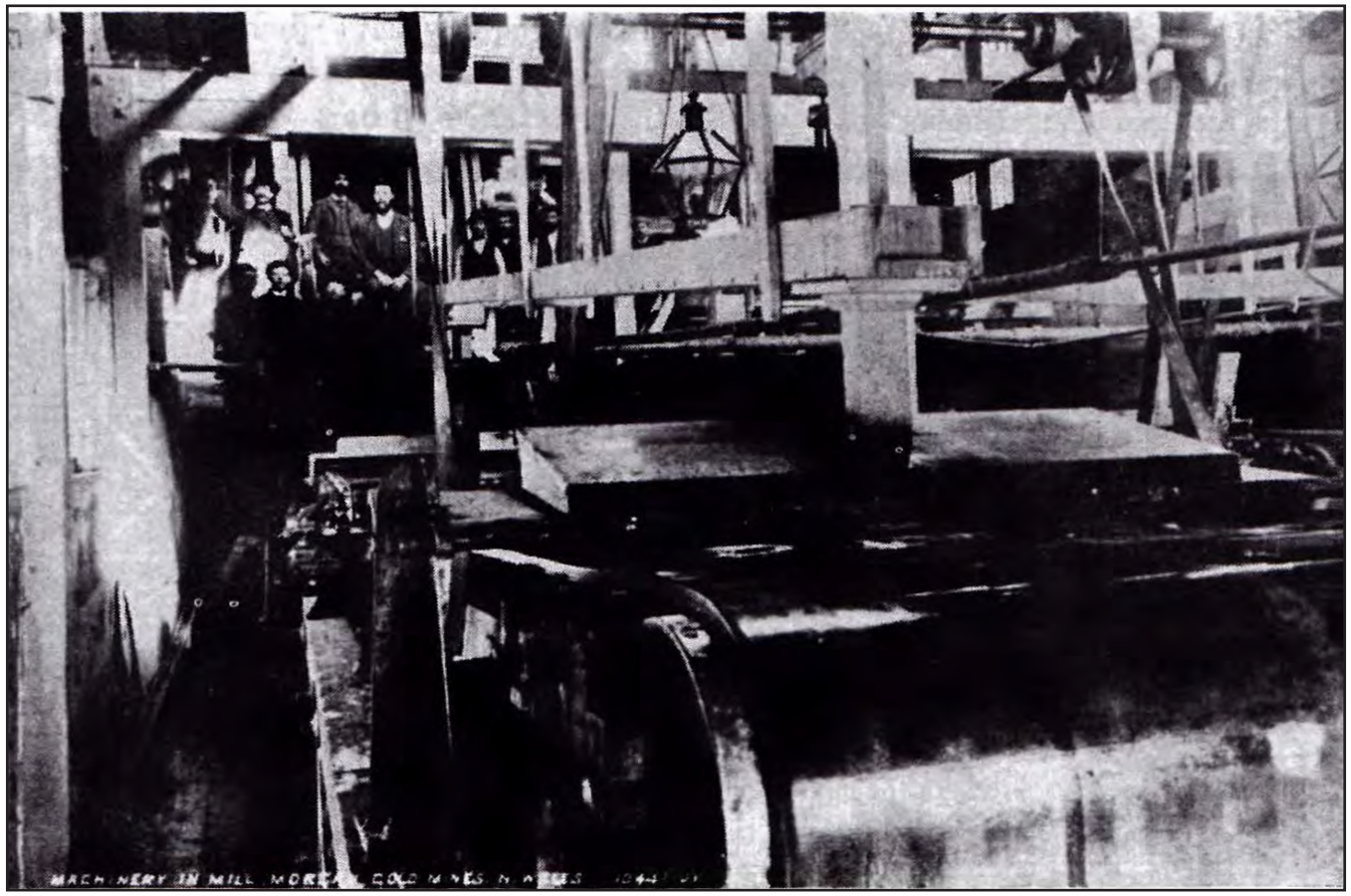

Plate 04: Frue Vanners c.1890.

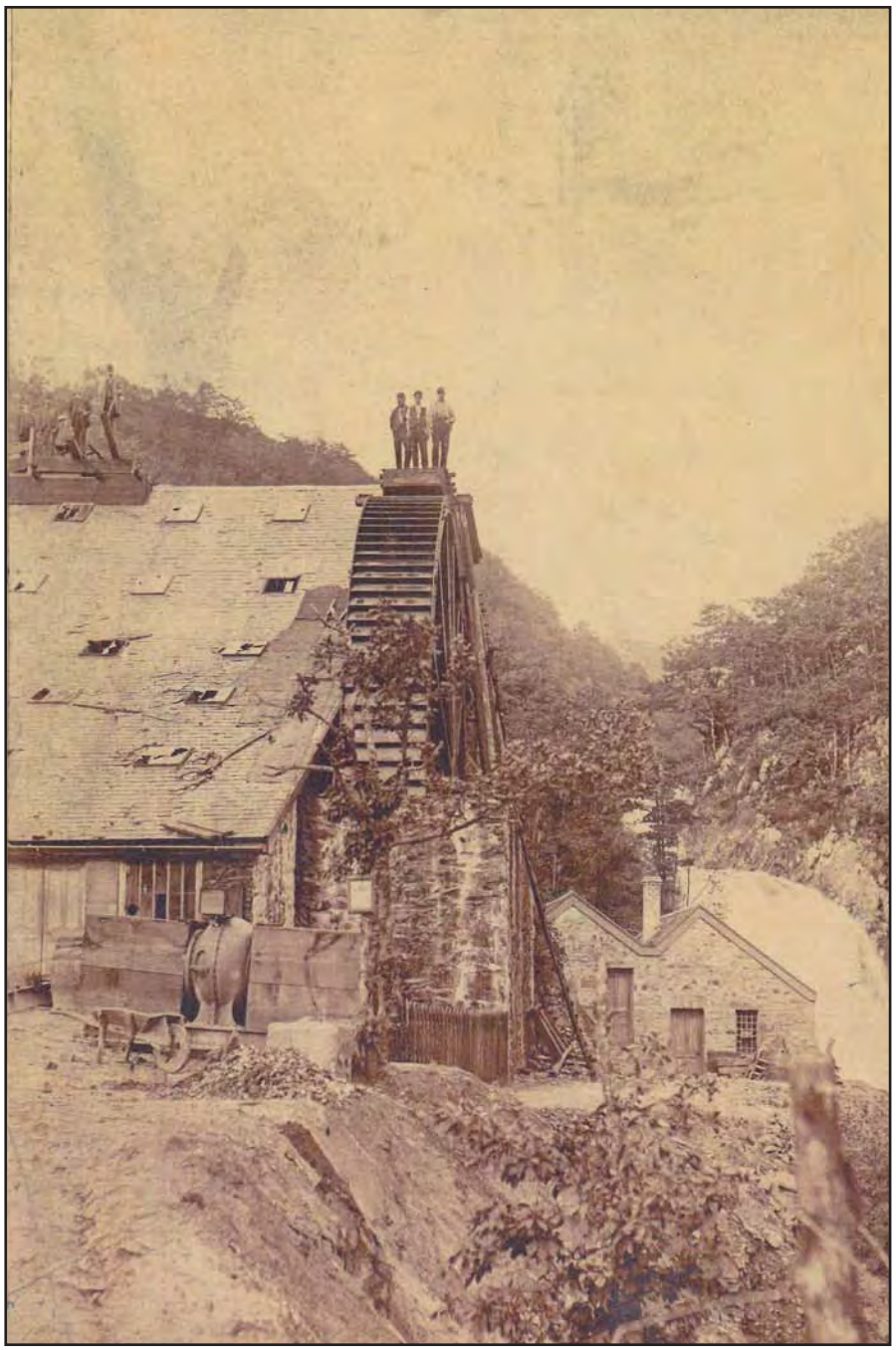

Plate 05: Charlotte Elizabeth Mill 1890 showing old 15 stamp mill (ZS/37/202).

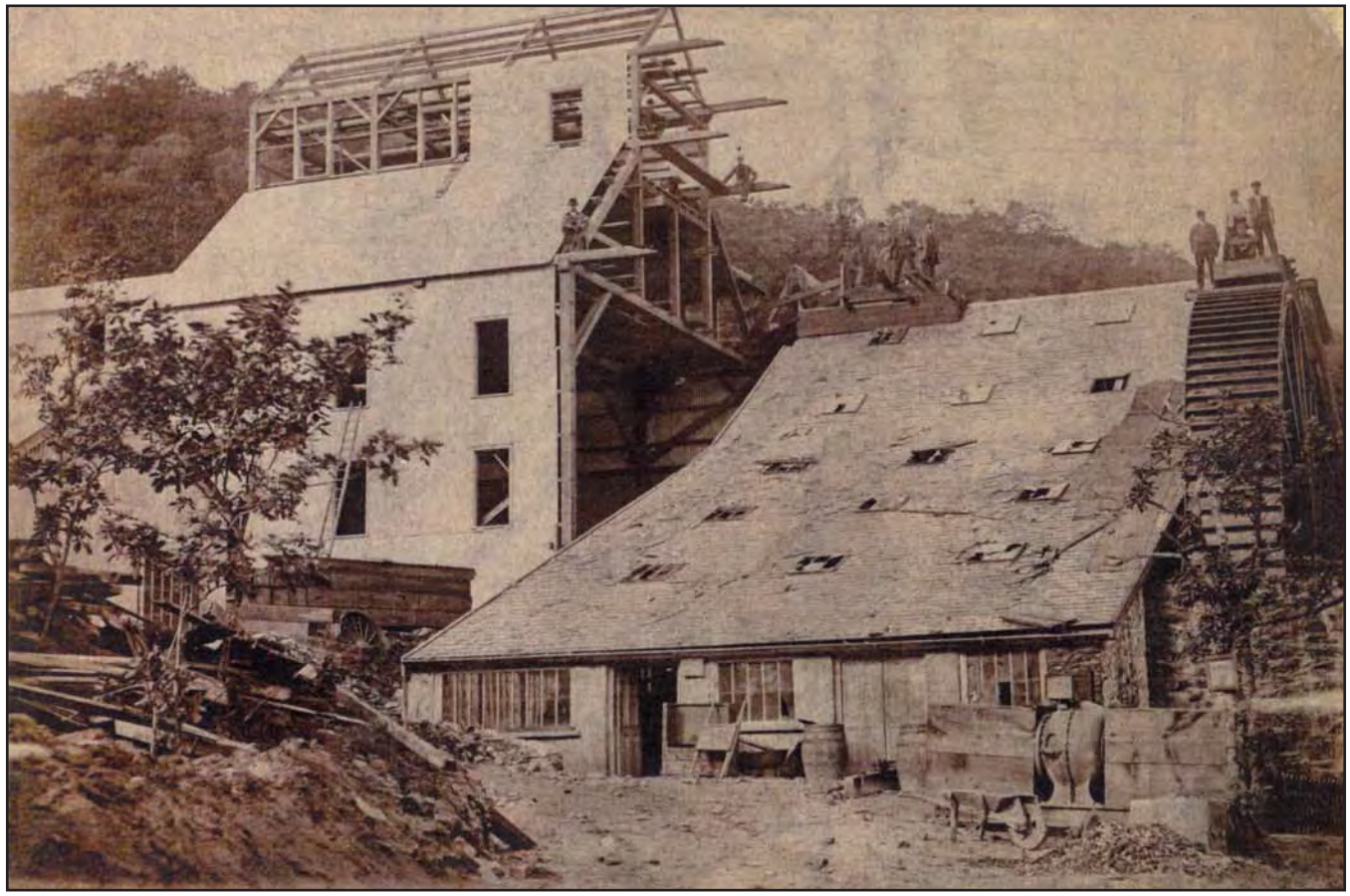

Plate 06: Charlotte Elizabeth Mill 1890 showing new 40 stamp mill under construction (ZS/37/201).

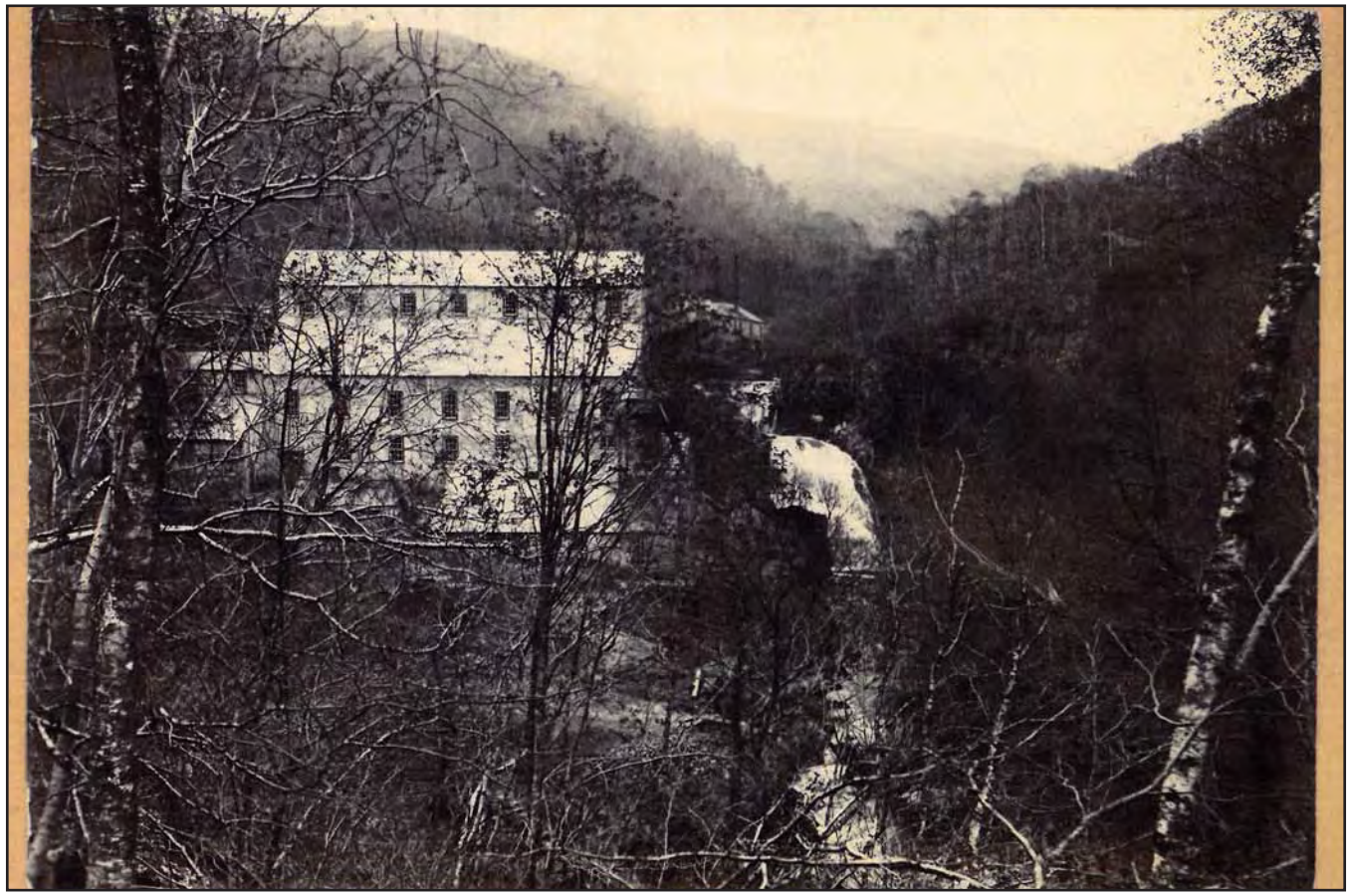

Plate 07: Charlotte Elizabeth Mill c1890 (ZS/37/24).

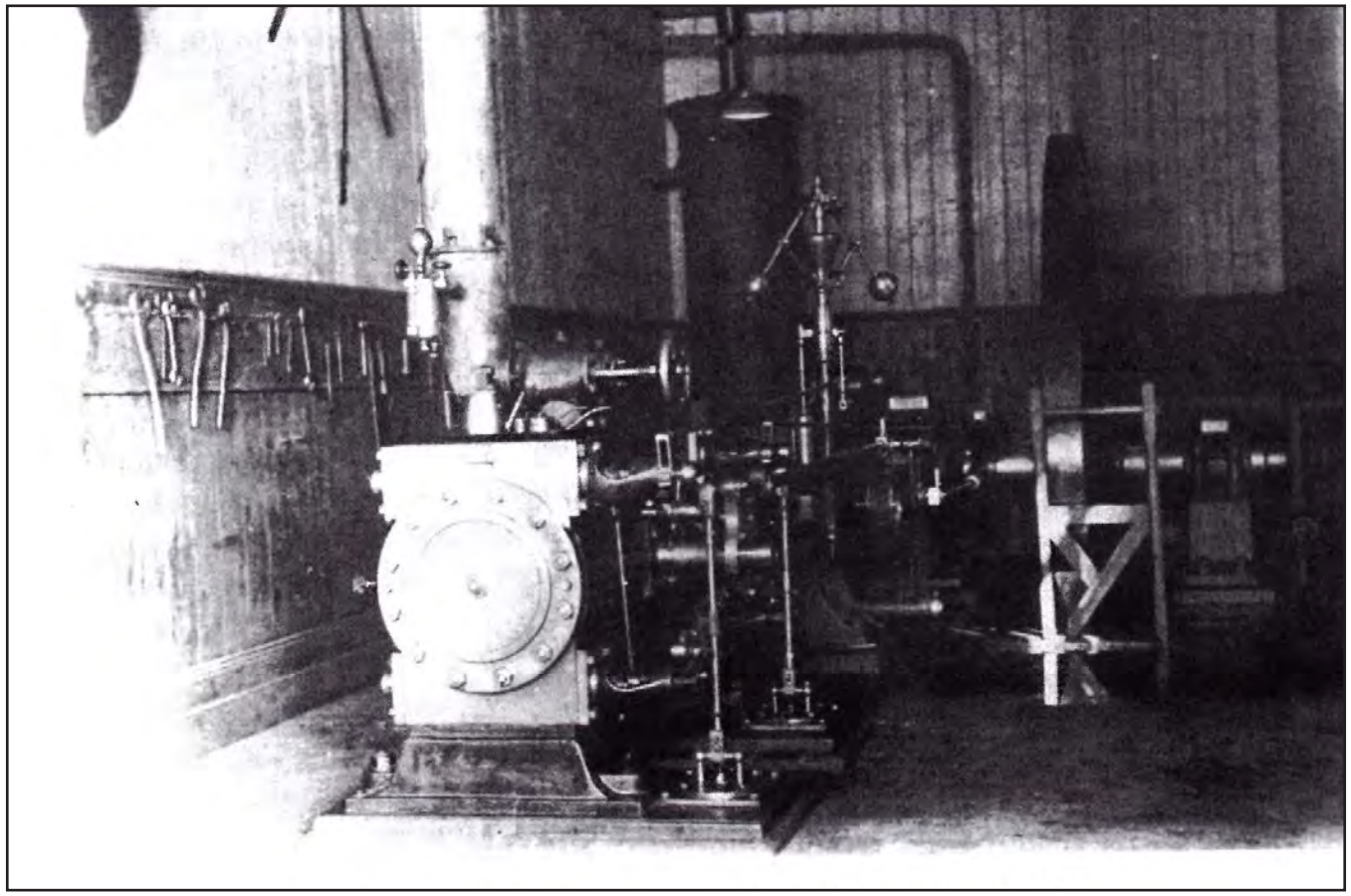

Plate 08: Possibly the steam engine at the Charlotte Elizabeth Mill c1890.

Plate 09: Charlotte Elizabeth Mill c1890 (ZS/37/3).

Plate 10: Mawddach Falls and offices c1890.

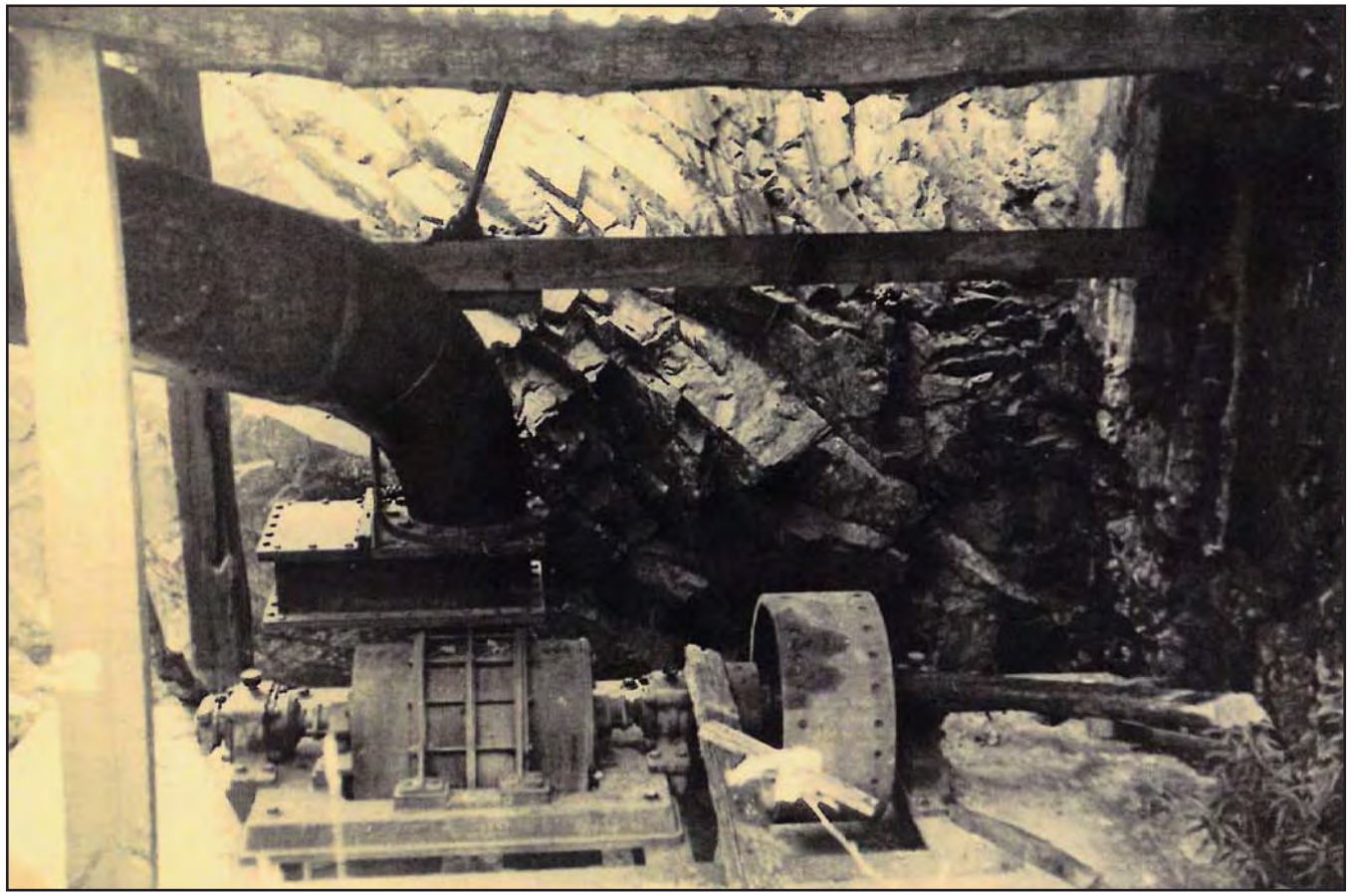

Plate 11: Water turbine 1968 (ZM/1435/2-119).

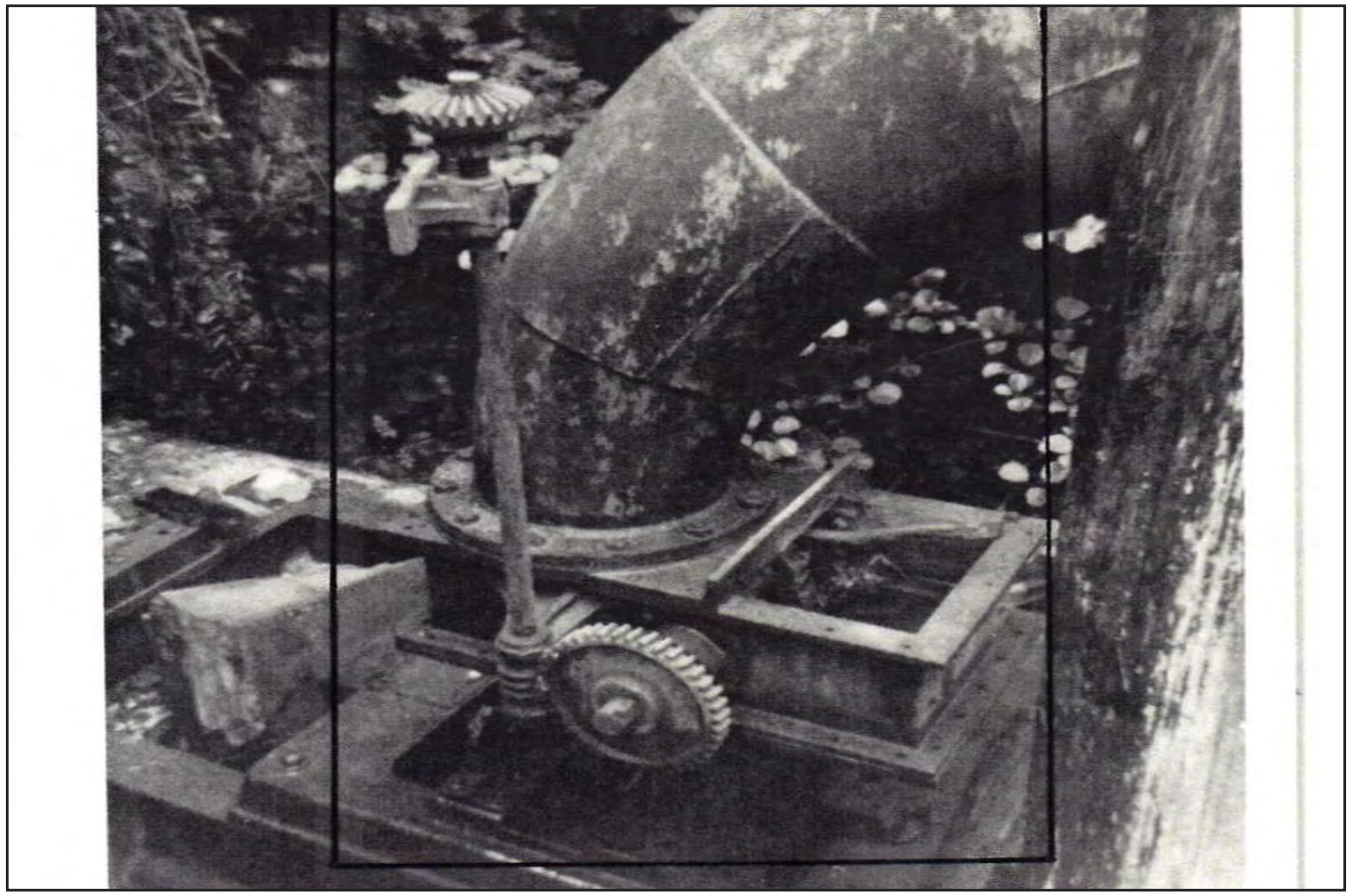

Plate 12: Water turbine 1968 (ZS/37/148).

Plate 13: Charlotte Elizabeth Mill 1968 (ZS/37/123).

6.0 ASSESSMENT OF HISTORICAL ASSETS

6.1 Definitions

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

1. Definition of Categories of importance

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

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

2. Definition of Impact

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

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

3. The significance of effect

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

Very large - A serious impact on a site of international or national importance with little or no scope for mitigation. These effects represent key factors in the decision making process.
Large - Lesser impacts on sites of national importance and serious impacts on sites of regional importance, with some scope for mitigation. These factors should be seen as being very important considerations in the decision making process.
Moderate - Moderate or minor impacts on sites of regional importance and minor to major impacts on sites of local or minor importance. A range of mitigatory measures should be available.
Slight - Negligible impacts on sites of regional, local or minor importance and minor and moderate impacts on minor or damaged sites. A range of basic mitigatory measures should be available.
Neutral - No perceptible effect or change to sites of all categories.
The significance of effect will be determined using the table below, a basic matrix combining archaeological value and magnitude of impact.

Determination of Significance of Effect

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

7.0 SITE GAZETTEER – PHYSICAL IMPACTS

The field walkover discovered 17 sites of archaeological and historic interest within the 40.0m wide assessment corridor, as listed below.

In accordance with Paragraph 128 of the National Planning Policy Framework and Welsh Office Circular 60/96 each heritage asset has been assigned a level of importance ranked from International through to National, Regional/County, Local, and None. If it is not possible to assess the importance of the site from the visible remains, then it is ranked Unknown with the suspected importance level placed in brackets if possible. Identified sites were also assigned a level of impact ranked from High through to Medium, and Low. Levels of impact can be considered as both adverse or beneficial, and can be direct (physically impacting upon a site) or indirect (indirectly physically impacting upon a site). The significance of effect is determined from the importance level of the resource and the magnitude of the impact upon it. Where it is expected that a site will be impacted upon by the proposed works then mitigation/assessment recommendations are provided. All archaeological/historical sites identified are depicted on figure 13 along with the location/orientation of photographs.

1. Sluice gate and pool	**PRN:** 59150
Figure: 7, 8, 9, and 13	**Plate:** 14
NGR: SH 73579 27520	**Period:** Post-medieval

Description

A sluice gate and pool is located at this point on the immediate western bank of the Afon Mawddach and approximately 56.0m north of the main mill complex. The sluice gate has been removed and replaced with iron grating to stop debris and is located at the northern end of the holding pool, which measures approximately 10.0m by 5.0m orientated northeast to southwest. The walls of the northern sluice are constructed from red brick clad in render and measure approximately 0.9m in height and 0.3m in width. A second outflow sluice is located at the southern end of the pool, also with the gate removed and with walls measuring approximately 2.0m in height and 0.3m in width also constructed from red brick clad in render. The walls of the pool are constructed from reinforced concrete and measure approximately 0.6m in width.

The sluice and pool are first depicted on the first edition 25" Ordnance Survey map of 1889 and were installed to regulate the water feeding south to the waterwheel located on the eastern wall of the mill. The sluice and pool were installed at least as part of the 1887 mill but may date to the mill of the 1860s. The sluice and pool should be considered to be of national importance because of their contribution to the overall group value of the mill, its workings, and its ancillary structures.

The current proposals are to remove the iron grating at the northern sluice along with the sluice walls. The base of the pool will be excavated so as to install a buried settling tank, and the western wall of the southern sluice gate will require removal. It is also proposed that the concrete wall of the pool to the east will have two channels excavated through it for the installation of two hand-off flow pipes.

The overall direct physical impact of the hydro scheme on the sluice and pool is expected to be medium adverse resulting in a moderate or large adverse significance of effect. It is therefore recommended that a detailed photographic and descriptive record is taken of the feature prior to the commencement of works, however the record presented within this report should be seen as being commensurate with this level. In addition it is recommended that a watching brief is maintained during the ground disturbance works and that provision is made for the recording of any revealed features by a suitably qualified archaeologist.

Category of importance: National

Level of impact: Medium adverse direct physical

Significance of effect: Moderate or large adverse

Recommendations for further assessment: None

Recommendations for further mitigatory measures: Detailed photographic and descriptive record (completed as part of report); watching brief during ground disturbance.

Plate 14: Sluice gate and pool feature 1, from the southwest. Scale 1.0m.

2. Leat	**PRN:** 59151
Figure: 7, 8, 9, and 13	**Plate:** 15
NGR: SH 73563 27511 – SH 73561 27496	**Period:** Post-medieval

Description

A leat cuts through the rock and runs south feeding water from the sluice and pool (feature 1) into the launder (feature 4). The leat measures 1.5m in width, up to 3.0m in depth in places, and approximately 15.0m in length. The eastern wall of the southern quarter of the leat is constructed from dry-stone angular slate blocks with an overflow back o the Afon Mawddach.

The leat is first depicted on the first edition 25" Ordnance Survey map of 1889 and was installed at least as part of the 1887 mill but may date to the mill of the 1860s. The leat should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

The current proposals are to trench the hydro pipe within the base of the leat for the initial 8.0m before cutting through the western rock wall of the leat.

The overall direct physical impact of the hydro scheme on the leat is expected to be low adverse resulting in a moderate or slight adverse significance of effect. It is therefore recommended that a detailed photographic and descriptive record is taken of the feature prior to the commencement of works, however the record presented within this report should be seen as being commensurate with this level. In addition it is recommended that a watching brief is maintained during the ground disturbance works and that provision is made for the recording of any revealed features by a suitably qualified archaeologist.

Category of importance: National

Level of impact: Low adverse direct physical

Significance of effect: Moderate or slight adverse

Recommendations for further assessment: None

Recommendations for further mitigatory measures: Detailed photographic and descriptive record (completed as part of report); watching brief during ground disturbance.

Plate 15: Leat feature 2, from the southwest.

3. **Trackway**	**PRN:** 59152
Figure: 7, 8, 9, and 13	**Plate:** 16
NGR: SH 73549 26822 – SH 73669 28020	**Period:** Post-medieval

Description

A trackway measuring 3.0m in width runs to the immediate west of the mill site, connecting Tyddyn Gwladys in the south with the Gwynfynydd incline in the north. The trackway exists as a mettled surface of small rounded pebbles.

The trackway is first depicted on the first edition 25" Ordnance Survey map of 1889 and was installed at least as part of the 1887 mill but may date to the mill of the 1860s. The trackway should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

The current proposals are to construct an access track from the trackway to the leat (feature 2). In addition the new electric cable will be trenched within the trackway, crossing the Afon Cain by the existing bridge to a new transformer.

The overall direct physical impact of the hydro scheme on the trackway is expected to be low adverse resulting in a moderate or slight adverse significance of effect. It is therefore recommended that a detailed photographic and descriptive record is taken of the feature prior to the commencement of works, however the record presented within this report should be seen as being commensurate with this level and as such no further mitigatory measures are recommended.

Category of importance: National

Level of impact: Low adverse direct physical

Significance of effect: Moderate or slight adverse

Recommendations for further assessment: None

Recommendations for further mitigatory measures: Detailed photographic and descriptive record (completed as part of report).

Plate 16: Trackway feature 3, from the southwest. Scale 1.0m.

4. Launder	**PRN:** 59153
Figure: 7, 8, 9, and 13	**Plate:** 17
NGR: SH 73559 27493	**Period:** Post-medieval

Description

A launder tank measuring 7.0m by 4.0m and orientated north to south is located at this point. The launder is constructed from reinforced concrete but has stone built foundations suggesting that an earlier structure occupied the site, possibly a launder for the overshot waterwheel of the 1887 mill. The walls of the launder measure 0.3m and an iron grate is installed over the leat (feature 2) which feeds into it from the north. An iron pipe (feature 6) runs out of the southern face of the launder and carried water to the turbine (feature 9) of the 1888 mill. The depth of the launder is uncertain as it is currently overgrown with knotweed.

The launder is not depicted on the first or second edition 25" Ordnance Survey maps of 1889 and 1901 respectively (figure 7 and 8), nor is it shown on the mine map of 1935 (figure 9). However a small rectangular structure is shown on the 1901 and 1935 map at the southern end of the leat. It is probable that the launder was considered too insignificant to depict on the maps and its early foundations are likely to date to the 1887 mill and possibly the mill of the 1860s. The launder should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

Under the current hydro scheme proposals the launder tank will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.

Category of importance: National
Level of impact: None
Significance of effect: Neutral
Recommendations for further assessment: None
Recommendations for further mitigatory measures: None/ avoidance

Plate 17: Launder feature 4, from the northwest. Scale 1.0m.

5. Stone retaining wall	**PRN:** 59154
Figure: 13	**Plate:** 18
NGR: SH 73555 27489 – SH 73545 27472	**Period:** Post-medieval

Description
A stone retaining wall measuring 1.5m in height, 0.3m in width, and approximately 20.0m in length runs from north to south providing a revetment for the trackway (feature 3) located to the immediate west. The wall is of dry-stone construction of medium and small sized angular stone blocks.

The wall is not depicted on the first or second edition 25" Ordnance Survey maps of 1889 and 1901 respectively (figure 7 and 8), nor is it shown on the mine map of 1935 (figure 9). This is because the wall would have been considered too insignificant by the cartographers to depict and it is likely that the retaining wall dates to the earliest mill of the 1860s. The wall should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

Under the current hydro scheme proposals the wall will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.

Category of importance: National

Level of impact: None

Significance of effect: Neutral

Recommendations for further assessment: None

Recommendations for further mitigatory measures: None/ avoidance

Plate 18: Stone retaining wall feature 5, from the south. Scale 1.0m.

6. Iron pipe	**PRN:** 59155
Figure: 13	**Plate:** 19
NGR: SH 73559 27489 – SH 73559 27440	**Period:** Post-medieval

Description
An iron pipe measuring 0.5m in diameter and supported on concrete pillars runs south and downhill from the launder tank (feature 4) to the turbine (feature 9) located at the eastern side of the mill complex.

The pipe is first depicted on the second edition 25" Ordnance Survey map of 1901 (figure 8) and was installed in 1888 by the New Morgan Gold Mining Company along with the Armfield turbine. The pipe should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

Under the current hydro scheme proposals the pipe will require its outfall end to be removed to allow space for the construction of the new turbine house. The overall direct physical impact of the hydro scheme on the pipe is expected to be low adverse resulting in a moderate or slight adverse significance of effect. It is therefore recommended that a detailed photographic and descriptive record is taken of the feature prior to the commencement of works, however the record presented within this report should be seen as being commensurate with this level and as such no further mitigatory measures are recommended.

Category of importance: National

Level of impact: Low adverse direct physical

Significance of effect: Moderate or slight adverse

Recommendations for further assessment: None

Recommendations for further mitigatory measures: Detailed photographic and descriptive record (completed as part of report).

Plate 19: Iron pipe feature 6, from the southwest. Scale 1.0m.

7. Ruined structure	**PRN:** 59156
Figure: 7, 8, 9, and 13	**Plate:** 20
NGR: SH 73551 27473	**Period:** Post-medieval

Description

A ruined structure measuring 10.0m by 4.5m and orientated from north to south is located to the immediate north of the main mill complex. The building appears to have been revetted into the slope at the western end and only the north and south gable walls now stand to a height of 1.3m. The structure is roofless and the standing walls are in a poor state of preservation, constructed from large angular stone blocks of dry-stone bond. The remains of a stone-built hearth measuring 0.5m in width and height is located towards the centre of the structure and the interior of the building is littered with collapsed wall stones.

The structure is first depicted on the first edition 25" Ordnance Survey map of 1889 (figure 7) and is also shown on the second edition map of 1901 (figure 8) and the mine map of 1935 (figure 9). The function of the building is uncertain but it may have been an office to the mill. The structure should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

The current proposals are to trench the hydro pipe through the remains of the northern gable wall. This will almost certainly mean the demolition of this wall as part of the works as well as trenching the hydro pipe through the interior of the structure.

The overall direct physical impact of the hydro scheme on the structure is expected to be medium to high adverse resulting in a large adverse significance of effect. It is therefore recommended that a detailed photographic and descriptive record is taken of the feature prior to the commencement of works, however the record presented within this report should be seen as being commensurate with this level. In addition it is recommended that a watching brief is maintained during the trenching of the hydro pipe through the structure and that provision is made for the recording of any revealed features by a suitably qualified archaeologist. Furthermore, it is recommended that the upstanding remains of the northern gable wall are reinstated upon completion of the works.

Category of importance: National

Level of impact: Medium to high adverse direct physical

Significance of effect: Large adverse

Recommendations for further assessment: None

Recommendations for further mitigatory measures: Detailed photographic and descriptive record (completed as part of report); watching brief during ground disturbance; reinstatement of gable wall upon completion of works.

Plate 20: Ruined building feature 7, from the northeast. Scale 1.0m.

8. Mill complex	**PRN:** 59157
Figure: 7, 8, 9, 10, 11, 12 and 13	**Plate:** 21-29
NGR: SH 73545 27460	**Period:** Post-medieval

Description

The mill remains consist now of stone rubble walls bonded by lime mortar. A survey carried out by the RCAHMW in 1977 identified the machine bases within the mill although these are now mostly missing, aside from some amalgamating table bolts (plate 22), the occasional remains of the stamp frames (plate 23), and part of the stamp battery shaft (plate 25). The mill site has been revetted but probably exaggerated the natural terrace and has been built up with spoil from the tramway system. Several working levels can be identified at the mill site. The mill of 1887 (figure 10) would have had ore delivered by an incline plane which was then delivered to the Marsden stone-breaker at the northern part of the mill. This would have been driven by an overhead shaft which was in turn driven by a countershaft transmitting belt-drive from the overshot water wheel. The crushed ore would have been fed down into 3 sets of Sandycroft 5-head stamp batteries, also powered by the main waterwheel, and then would have fed into amalgamating tables and vanners driven by a smaller pelton waterwheel.

When the mill was extended in 1888 the waterwheel was replaced with a turbine which would have transferred power via a counter-shaft to the stamp battery shaft and stone-breaker counter-shaft. An aerial tramway (feature 17) would have deposited the ore into hoppers which would feed into two Marsden stone-breakers situated at a high level at the northern part of the mill complex. This would have then automatically fed into the main mill floor level and its 8 California 5-head stamp 750 lb batteries. Gold was amalgamated on outside plates and the battery tailings were passed over Frue vanners and Wilfley tables. Batches of high-grade ore were processed in Britten pans and smelting was carried out at the mill (figure 12). The mill was also extended to the west to include an assay office and steam engine. A structure depicted to the immediate south of the mill but no longer in existence is likely to have been the bullion room and electric light room.

The mill complex is first depicted on the first edition 25" Ordnance Survey map of 1889 (figure 7) and is also shown on the second edition map of 1901 (figure 8) and the mine map of 1935 (figure 9) after its extension by The New Morgan Mining Company in 1888. A more detailed account of the mill, its development and function is provided in section 5.2. The mill complex although destroyed largely by fire in 1935 exists as a series of walls that can easily be interpreted, and the mill is considered to be of national importance as part of the gold production of the late 19th Century Wales gold-rush.

The current proposals are to trench the hydro pipe through the upstanding stone built base of the mill, where it will head southeast and down through the masonry built belting chute to the turbine shaft. As part of the proposals the eastern wall of the mill building that divides the vanner house from the turbine shaft (feature 9) will require bracing and supporting by a scaffold structure tied back to secure ground, due to safety reasons of working below it in the turbine shaft (plate 29).

The overall direct physical impact of the hydro scheme on the structure is expected to be medium adverse resulting in a moderate or large adverse significance of effect. It is therefore recommended that a detailed photographic and descriptive record is taken of the mill prior to the commencement of works, however the record presented within this report should be seen as being commensurate with this level. In addition it is recommended that a watching brief is maintained during the trenching of the hydro pipe through the structure and that provision is made for the recording of any revealed features by a suitably qualified archaeologist.

It is also recommended that the mill floor, working levels, and belting chute are reinstated upon the completion of works. The SNPA Archaeologist has also requested that the client considers funding an information board to interpret the mill's history and function to the general public.
Category of importance: National
Level of impact: Medium adverse direct physical
Significance of effect: Moderate or large adverse
Recommendations for further assessment: None
Recommendations for further mitigatory measures: Detailed photographic and descriptive record (completed as part of report); watching brief during ground disturbance; bracing of east mill wall; reinstatement of mill floor, working levels, and masonry belt chute upon completion of works; installation of information panel.

Plate 21: Mill central floor feature 8, from the southeast. Scale 1.0m.

Plate 22: Mill central floor feature 8 showing amalgamating table bolts, from the north. Scale 1.0m.

Plate 23: Mill central floor feature 8 showing remains of stamp frames, from the east. Scale 1.0m.

Plate 24: Mill central floor feature 8 showing belting chute to stamps, from the north. Scale 1.0m.

Plate 25: Mill central floor feature 8 showing stamp battery shaft, from the north. Scale 1.0m.

Plate 26: Mill central floor feature 8 showing location of stamp batteries, from the east. Scale 1.0m.

Plate 27: Mill west-wing assay office feature 8 showing probable steam engine location and brick bunkers, from the south. Scale 1.0m.

Plate 28: Mill lower floor feature 8 showing location of vanner house and britten pans, from the south. Scale 1.0m.

9. Turbine shaft	**PRN:** 59158
Figure: 8, 9, 12 and 13	**Plate:** 29 and 30
NGR: SH 73559 27439	**Period:** Post-medieval

Description

The turbine shaft of the 1888 mill occupies the site of the original waterwheel pit of the 1869 mill. The shaft measures approximately 4.0m in length and width and is towered over by the rock cut shaft and mill wall to the west, standing approximately 6.0m above the turbine shaft base. A rock cut adit provides an overflow east from the turbine to the Afon Mawddach. The remains of the Armfield turbine is located within the base of the shaft and is fed by the iron pipe (feature 6). The rectangular valve plate slid on rollers and was moved by cogs acting on racks on the top surface of the plate. The cogs were turned by a larger cog on the outside of the casing which was turned by a gear at the bottom of an upright rod, itself turned by a wheel handle on the end of a long control rod. Below the valve and inside the bolted casing was a pelton wheel of approximately 2 foot diameter, the shaft for which drove a wide belt pulley within the belting chute which drove the shaft for the stamps and stone-breakers.

The turbine shaft is first depicted on the second edition 25" Ordnance Survey map of 1901 (figure 8) and is also shown on the mine map of 1935 (figure 9). The turbine and shaft should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

The current proposals are to remove the remains of the Armfield turbine and to excavate the turbine shaft to accommodate the proposed turbine building.

The overall direct physical impact of the hydro scheme on the turbine and shaft is expected to be high adverse resulting in a large or very large adverse significance of effect. It is therefore recommended that a detailed photographic and descriptive record is taken of the feature prior to the commencement of works, however the record presented within this report should be seen as being commensurate with this level. In addition it is recommended that a watching brief is maintained during the excavation of the shaft.

Category of importance: National

Level of impact: High adverse direct physical

Significance of effect: Large or very large adverse

Recommendations for further assessment: None

Recommendations for further mitigatory measures: Detailed photographic and descriptive record (completed as part of report); watching brief during ground disturbance.

Plate 29: Turbine shaft feature 9 showing mill eastern wall to be demolished, from the east. Scale 1.0m.

Plate 30: Turbine shaft feature 9 showing Armfield of Ringwood turbine base, from the north. Scale 1.0m.

10. Smithy	**PRN:** 59159
Figure: 7, 8, 9, and 13	**Plate:** 31
NGR: SH 73564 27469	**Period:** Post-medieval

Description

A roofless structure measuring 10.0m in length and width is located to the northeast of the mill complex and adjacent to the Mawddach falls. The building has walls standing to approximately 2.5m constructed from medium sized angular stone blocks bonded by lime mortar. The roof appears to have been of corrugated metal but has long since collapsed into the building along with the trusses. The structure is divided into two rooms by an internal stone wall that runs from north-south down the centre of the building. There are two doorways in the southern wall and also two windows in the same wall and a third in the eastern wall. The interior of each compartment is approximately 9.0m by 4.5m in size and each has a chimney and hearth located on the western walls. The chimney in the western compartment is constructed from stone and brick and the one in the eastern compartment is solely of brick construction.

The building is depicted on the first and second edition 25" Ordnance Survey maps of 1889 and 1901 respectively (figure 7 and 8), and is shown on the mine map of 1935 (figure 9). The building appears to date to at least the mill of 1887 but may have earlier origins from the mill of the 1860s. It has been identified in the past as a store but is in fact more likely to be a smithy building. The smithy should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

Under the current hydro scheme proposals the smithy will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.

Category of importance: National

Level of impact: None

Significance of effect: Neutral

Recommendations for further assessment: None

Recommendations for further mitigatory measures: None/ avoidance

Plate 31: Smithy buildings feature 10, from the southeast. Scale 1.0m.

11. Smithy waterwheel pit	**PRN:** 59160
Figure: 7, 8, 9, and 13	**Plate:** 32
NGR: SH 73565 27475	**Period:** Post-medieval

Description

A thick wall measuring 0.5m in width and 3.0m in height butts up against the northern gable wall of the Smithy building. The wall is constructed from large angular stone blocks bonded by a lime mortar. An old trial adit measuring approximately 2.5m in width lies to the immediate north and it is possible that this feature represents a waterwheel pit. The wheel may have powered the smithy to the immediate south but appears to be situated too low to have done so. The site of the original mill of 1863 which had four Britten pans driven by a waterwheel has been assumed in the past to have been located at the Charlotte Elizabeth mill site, but it can be theorised that this building may have indeed been the site of the first mill. This is purely conjectural on the part of the author.

The building is depicted on the first and second edition 25" Ordnance Survey maps of 1889 and 1901 respectively (figure 7 and 8), and is shown on the mine map of 1935 (figure 9). The smithy waterwheel pit should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures.

Under the current hydro scheme proposals the smithy will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.

Category of importance: National

Level of impact: None

Significance of effect: Neutral

Recommendations for further assessment: None

Recommendations for further mitigatory measures: None/ avoidance

Plate 32: Possible water wheel pit feature 11, from the east. Scale 1.0m.

12. Ruined structure	**PRN:** 59161
Figure: 8, 9, and 13	**Plate:** 33
NGR: SH 73548 27513	**Period:** Post-medieval
Description A square structure is depicted on the second edition 25" Ordnance Survey map of 1901 (figure 8), and is shown on the mine map of 1935 (figure 9). The structure exists today as a mound in the grass measuring approximately 4.0m square. The function of the building is unclear but appears to have been constructed as part of the 1888 mill extension. The structure should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures. Under the current hydro scheme proposals the structure will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.	
Category of importance: National	
Level of impact: None	
Significance of effect: Neutral	
Recommendations for further assessment: None	
Recommendations for further mitigatory measures: None/ avoidance	

Plate 33: Structure feature 12, from the west. Scale 1.0m.

13. Offices	**PRN:** 59162
Figure: 8, 9, and 13	**Plate:** 34
NGR: SH 73548 27513	**Period:** Post-medieval
Description A rectangular structure orientated north to south is depicted on the second edition 25" Ordnance Survey map of 1901 (figure 8), and is shown on the mine map of 1935 (figure 9). The structure exists today as a series of low walls approximately 0.5m in height and heavily overgrown with bracken. The building was almost certainly the mill office and appears to have been constructed as part of the 1888 mill extension. The structure should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures. Under the current hydro scheme proposals the structure will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.	
Category of importance: National	
Level of impact: None	
Significance of effect: Neutral	
Recommendations for further assessment: None	
Recommendations for further mitigatory measures: None/ avoidance	

Plate 34: Offices feature 13, from the south. Scale 1.0m.

14. Trackway	**PRN:** 59163
Figure: 8, 9, and 13	**Plate:** 35
NGR: SH 73573 27556	**Period:** Post-medieval
Description A grassed over trackway measuring 4.0m in width leads down from the present track (feature 3) in a southwest to northeast direction to the compressor house (feature 15). The track is depicted on the second edition 25" Ordnance Survey map of 1901 (figure 8), and is shown on the mine map of 1935 (figure 9). The trackway appears to have been constructed as part of the 1888 mill extension. The structure should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures. Under the current hydro scheme proposals the structure will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.	
Category of importance: National	
Level of impact: None	
Significance of effect: Neutral	
Recommendations for further assessment: None	
Recommendations for further mitigatory measures: None/ avoidance	

Plate 35: Trackway feature 14, from the south. Scale 1.0m.

15. Compressor House	**PRN:** 59164
Figure: 8, 9, and 13	**Plate:** 36
NGR: SH 73580 27577	**Period:** Post-medieval
Description A revetted platform located directly on the eastern bank of the Afon Mawddach is constructed from dry-stone bonded large angular stone blocks measuring 1.6m in height and is the location of the compressor house. The building is depicted on the second edition 25" Ordnance Survey map of 1901 (figure 8), and is shown on the mine map of 1935 (figure 9). The compressor house appears to have been constructed as part of the 1888 mill extension. The structure should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures. Under the current hydro scheme proposals the structure will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.	
Category of importance: National	
Level of impact: None	
Significance of effect: Neutral	
Recommendations for further assessment: None	
Recommendations for further mitigatory measures: None/ avoidance	

Plate 36: Compressor house base feature 15, from the southeast. Scale 1.0m.

16. Tramway	**PRN:** 59165
Figure: 7, 8, 9, and 13	**Plate:** 37
NGR: SH 73557 27549	**Period:** Post-medieval
Description A revetted trackway running parallel with the river follows the line of the trackway at this point. The revetment measures up to 3.0m in height in places and acted as a tramway to transport ore from the mine in the north to the mill. The tramway is depicted on the first and second edition 25" Ordnance Survey maps of 1889 and 1901 respectively (figure 7 and 8), and is shown on the mine map of 1935 (figure 9). The tramway route should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures. Under the current hydro scheme proposals the structure will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.	
Category of importance: National	
Level of impact: None	
Significance of effect: Neutral	
Recommendations for further assessment: None	
Recommendations for further mitigatory measures: None/ avoidance	

Plate 37: Tramway feature 16, from the south. Scale 1.0m.

17. Overhead railway	**PRN:** 59166
Figure: 8, 9, and 13	**Plate:** n.a.
NGR: SH 73532 27465 – SH 73475 27512	**Period:** Post-medieval
Description An overhead railway transported ore from the mine in the northwest to the hoppers and rock-crushers at the mill. No visible trace of this feature survives. The overhead railway is depicted on the second edition 25" Ordnance Survey map of 1901 (figure 8), and is shown on the mine map of 1935 (figure 9). It appears to have been constructed as part of the 1888 mill extension. The overhead railway route no longer exists as upstanding remains but there is a possibility that fallen and buried remains exist along its route. The railway should be considered to be of national importance because of its contribution to the overall group value of the mill, its workings, and its ancillary structures. Under the current hydro scheme proposals the structure will not be impacted upon and as such there are no recommendations made for further assessment or mitigatory measures aside from avoidance.	
Category of importance: National	
Level of impact: None	
Significance of effect: Neutral	
Recommendations for further assessment: None	
Recommendations for further mitigatory measures: None/ avoidance	

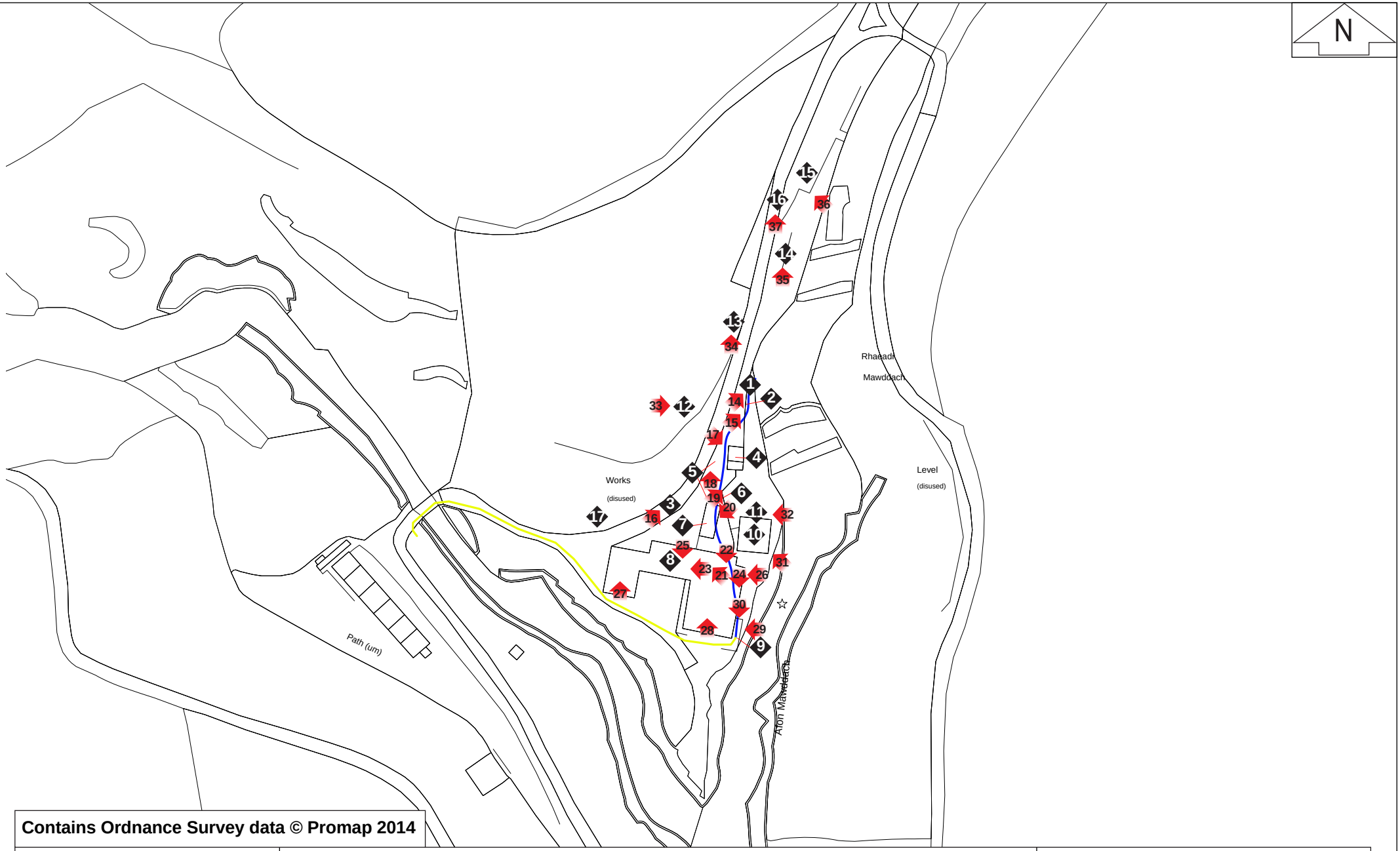

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Figure 13: Location of archaeological sites (black diamonds), and location/orientation of photographs (red arrows). Scale 1:6,000 at A4.

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	Table 3: Summary of archaeological features.			**GREEN = no action required; RED= Action required**		
Number	**Name**	**Importance**	**Impact**	**Significance of effect**	**Further Assessment**	**Mitigation Recommendations**
PHYSICAL DIRECT AND INDIRECT IMPACTS						
1	Sluice gate and pool	National	Medium adverse direct physical	Moderate or large adverse	None	Watching brief
2	Leat	National	Low adverse direct physical	Moderate or slight adverse	None	Watching brief
3	Trackway	National	Low adverse direct physical	Moderate or slight adverse	None	Detailed record - complete
4	Launder	National	None	Neutral	None	None/avoidance
5	Stone retaining wall	National	None	Neutral	None	None/avoidance
6	Iron pipe	National	Low adverse direct physical	Moderate or slight adverse	None	Detailed record - complete
7	Ruined structure	National	Medium to high adverse direct physical	Large adverse	None	Watching brief; reinstatement of gable wall upon completion
8	Mill complex	National	Medium adverse direct physical	Moderate or large adverse	None	Watching brief; bracing of east mill wall; reinstatement of mill floor, working levels, and masonry belt chute upon completion; installation of information panel.
9	Turbine shaft	National	High adverse direct physical	Large or very large adverse	None	Watching brief.
10	Smithy	National	None	Neutral	None	None/avoidance
11	Smithy waterwheel pit	National	None	Neutral	None	None/avoidance
12	Ruined structure	National	None	Neutral	None	None/avoidance
13	Offices	National	None	Neutral	None	None/avoidance
14	Trackway	National	None	Neutral	None	None/avoidance

15	Compressor house	National	None	Neutral	None	None/avoidance
16	Tramway	National	None	Neutral	None	None/avoidance
17	Overhead railway	National	None	Neutral	None	None/avoidance

8.0 IMPACT AND RECOMMENDATIONS

8.1 Direct physical impact

Construction phase

The proposed development scheme is expected to have a *low adverse direct physical* impact upon three sites of historic importance (leat feature 2, trackway feature 3, and iron pipe feature 6) during the construction phase. In addition the proposed scheme will have a *medium adverse direct physical* impact upon three features (sluice gate and leat feature 1, ruined structure feature 7, and mill complex feature 8) and a *high adverse direct physical* impact upon one feature (turbine shaft feature 9). All of these features form parts of the Gwynfynydd processing site and are thus considered to be of *national* importance.

Completion phase

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

8.2 Site Specific Recommendations

The archaeological assessment has identified seventeen sites within close proximity to the proposed hydro scheme route, nine of which will be directly and adversely impacted upon by the development. Site specific mitigatory measures have been provided in the gazetteer for each feature affected. It is proposed that a watching brief is maintained during trenching work at all of the sites to be impacted upon and that provision is made for any revealed deposits or structures to be recorded prior to impact. Furthermore, recommendations have been made for the reinstatement of the gable wall of the ruined structure (feature 7) upon completion; and the reinstatement of the mill floor, working levels, and belt chute of the mill complex (feature 8) upon completion.

The SNPA Archaeologist has recommended that an information panel concerning the historical development and function of the mill be erected at the site.

8.3 General recommendations

The Charlotte Elizabeth ore processing site should not be viewed as a single feature but more as an integral part in the extraction and processing of gold at the Gwynfynydd site and indeed as part of the Mawddach gold rush. The upstanding and buried remains of the mill and its ancillary structures are of national importance through their group value as a mid to late 19th century gold mining complex. It is therefore of upmost importance that this group value is not eroded through the piecemeal destruction of elements that when considered by themselves may appear of limited archaeological value. It is through this group value that the complex of sites can be understood and interpreted and as such all ground disturbance should be monitored by a suitably qualified archaeologist through a watching brief. Moreover, remains of known structures such as the bullion room and electric light house are no longer visible on the surface and there is potential for these buildings to be encountered during the trenching of the electric cable.

It has been proposed that the western end of the mill building (feature 8) which contained the assay office and steam engine be cleared of trees and utilised as a lay-down area for the working compound and that spoil from the pipe trench is deposited here. It is recommended that if trees are to be cleared it is done so through mechanical cutting with stumps left to rot down and it is strongly recommended that an alternative site is utilised for the deposition of spoil.

9.0 SOURCES

OS Maps

1st edition 25 inch Ordnance Survey Map of 1889.

2nd edition 25 inch Ordnance Survey Map of 1901.

OS 1:10 000 Series sheet SH 72NE, SH 72SE, SH 72SW, and SH 72NW.

Aerial Photographs

Aerial Photographs

106G/UK/1235 frames 4050 – 4053. Dated 10th March 1946

540/491 frames 4255, 4215 and 4216. Dated 11th May 1951

71-283 frame 464. Dated 1971

91-206 frame 037. Dated 1991

99-921 frame 381. Dated 1999

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Dolgellau Archives and Record Office – 352/7 *Mining Map 1935*

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Mostyn Estate Map (undated)

John Evans' Map of 1797

Tithe Map and Apportionment of the Parish of Trawsfynydd 1840

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

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

PRN	Name	Type	Broadclass	Period
5517	Gold Mine, Gwyn-fynydd	Gold mine	Industrial	Post-Medieval
5518	House - Gwynfynydd	House	Domestic	Post-Medieval
7978	Gwyn -fynydd Tramway	Tramway	Transport	Post-Medieval
8609	Cae Cyrach Sheepfold	Sheep fold	Agriculture and Subsistence	Post-Medieval
8621	Cefn Deuddwr Clearance Cairn I	Clearance cairn	Agriculture and Subsistence	Post-Medieval
8622	Cefn Deuddwr Clearance Cairn Ii	Clearance cairn	Agriculture and Subsistence	Post-Medieval
8623	Cefn Deuddwr Clearance Cairn Iii	Clearance cairn	Agriculture and Subsistence	Post-Medieval
8624	Cefn Deuddwr Sheepfold	Sheep fold	Agriculture and Subsistence	Post-Medieval
8625	Cefn Deuddwr Clearance Cairn Iv	Clearance cairn	Agriculture and Subsistence	Post-Medieval
8626	Cefn Deuddwr Clearance Cairn V	Clearance cairn	Agriculture and Subsistence	Post-Medieval
8627	Cefn Deuddwr Clearance Cairn Vi	Clearance cairn	Agriculture and Subsistence	Post-Medieval
8628	Pistyll y Cain	Building	Unassigned	Post-Medieval
8629	Coed Tyddyn Gwladys Level Ii	Level	Industrial	Post-Medieval
8630	Coed Tyddyn Gwladys Level I	Level	Industrial	Post-

				Medieval
8631	Coed Tyddyn Gwladys Level Iii	Level	Industrial	Post-Medieval
8632	Coed Tyddyn Gwladys Trial Level	Level	Industrial	Post-Medieval
8633	Coed Tyddyn Gwladys Level Iv	Level	Industrial	Post-Medieval
8634	Coed Tyddyn Gwladys Leat	Leat	Water Supply and Drainage	Post-Medieval
8701	Foel Wen Level	Level	Industrial	Post-Medieval
8705	Cwm Heisian Isaf Building	Building	Unassigned	Post-Medieval
8707	Cwm Heisian Level	Level	Industrial	Post-Medieval
8708	Cwm Heisian Level	Level	Industrial	Post-Medieval
8709	Cwm Heisian Shaft	Shaft	Industrial	Post-Medieval
8711	Coed Cwm Heisian Level	Level	Industrial	Post-Medieval
8712	Tyddyn Gwladys Level I	Level	Industrial	Post-Medieval
8713	Tyddyn Gwladys Level Ii	Level	Industrial	Post-Medieval
8714	Tyddyn Gwladys Stone	Stone	Unassigned	Unknown
8715	Tyddyn Gwlad	Level	Industrial	Post-Medieval
8716	Tyddyn Gwladys	Farmstead	Agriculture and Subsistence	Post-Medieval
8742	Cwm Heisian Uchaf	Farmstead	Agriculture and Subsistence	Post-Medieval

8743	Cwm Heisian Ganol	FARMSTEAD	Agriculture and Subsistence	Post-Medieval
8744	Cwm Heisian (west) Shaft	SHAFT	Industrial	Post-Medieval
8745	Cwm Heisian (east) Level	LEVEL	Industrial	Post-Medieval
8746	Pont Gilrhyd Building	BUILDING	Unassigned	Post-Medieval
8771	Tyddyn Gwladys Landscape	LANDSCAPE	Unassigned	Multi-Period
8773	Cwm Heisian Landscape	LANDSCAPE	Unassigned	Multi-Period
12184	Cwm Heisian West Lead and Gold Mine	MINE	Industrial	Post-Medieval
20901	Gold Mine, Gwynfynydd	GOLD MINE	Industrial	Post-Medieval
20903	Gold/Copper Mine, Cwm Heisian West	MINE	Industrial	Post-Medieval
20905	Gold Mine Tyddyn Gwladys	GOLD MINE	Industrial	Post-Medieval
20910	Gold Mine, Cwm Heisian East	GOLD MINE	Industrial	Post-Medieval
20919	Gold Level, Pont Gwynfynydd	LEVEL	Industrial	Post-Medieval
21181	Gunpowder Mill, Tyddyn Gwladys Nr Dolgellau	GUNPOWDER WORKS	Industrial	Modern
21767	Cwm Y Swm Mine	GOLD MINE	Industrial	Post-Medieval
21770	Cwm Heisian West Mine	MINE	Industrial	Post-Medieval
21847	Mawddach Mine	GOLD MINE	Industrial	Post-Medieval
21906	Tyddyn Gwladys (2) Mine	LEAD MINE	Industrial	Post-

				Medieval
21912	Foel Gwynfynydd Mine	GOLD MINE	Industrial	Post-Medieval

Scheduled Ancient Monuments within 1km of the proposed development area (figure 1)

SAM no.	Name	Type	General	Broadclass
ME204	Cwm Heisian West Lead and Gold Mine	Mill	Post-Medieval/Modern	Industrial

NMR Monument Points within 1km of the proposed development area (figure 1)

NPRN	Name	Broadclass	Type	Period
28464	Gwynfynydd farm	Domestic	Farmhouse	Post medieval?
33978	Gwynfynydd gold mine: no.6 level entrance	Industrial	Gold mine	Post medieval
34130	Charlotte elizabeth ore processing mill, gwynfynydd	Industrial	Crushing mill	Post medieval
40471	Gwynfynydd gold mine	Industrial	Gold mine	Post medieval;19th century
91693	Tyddyn gwladys lead mine, ganllwyd	Industrial	Lead mine	Post medieval
91694	Tyddyn gwladys gunpowder works, ganllwyd	Industrial	Explosives works	Post medieval;19th century
400862	Pont gwyn-fynydd, sheepfold nw of	Agriculture and subsistence	Sheep fold	Unknown
401213	Cefndeuddwr, clearance features north of	Agriculture and subsistence	Field	Unknown;post medieval

APPENDIX 2: DEFINITIONS OF FURTHER ASSESSMENT AND MITIGATORY MEASURES

1. Definition of field evaluation techniques

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

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

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

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

2. Definition of Mitigatory Recommendations

None:
No further action is required.

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

Basic recording:
A photographic and basic descriptive record is required.

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

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

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

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

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