Heritage
Recording Services Wales

Bron Lletty Ifan Hydro-electric Scheme, Arthog, Gwynedd.

Archaeological Watching Brief

By

Richard Scott Jones *(BA, MA, MCIfA)*

November 2016

HRSWales
Report No: 185

ARCHAEOLOGICAL WATCHING BRIEF

Bron Lletty Ifan Hydro-electric Scheme, Arthog, Gwynedd.

By
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On behalf of:

Date: November 2016

HRSW Report No: 185

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Non Technical Summary

The following report presents the results of an archaeological watching brief, undertaken during groundwork for the construction of a 99kw hydro-electric scheme, comprised of two intake weirs, a forebay tank, a power house and the installation of underground and overground pipes and underground cabling to provide grid connection on land at Bron Lletty Ifan, Arthog, Gwynedd LL39 1LX.

For the archaeological watching brief the proposed works had 3 main parts: Intakes, Forebay tank and Pipeline.

The archaeological watching brief during groundwork for the proposed intakes, forebay tank and pipeline (Penstock) exposed no new archaeological features, finds or deposits of any significance. The groundwork did however add further to our knowledge of a number of known features along the pipeline route, namely the boundary bank (Site No.11) and the lynchet (Site No. 13). The groundwork for the pipeline trench revealed that the boundary bank (Site No.13) is in fact solely an earth bank with field clearance stones laid up against it. Given that this boundary bank is probably 18th century in date at the earliest, suggests that the field clearance took place after its construction, which would imply that the field that houses the lynchet feature has also been ploughed in the 18th and 19th centuries, thereby having contributed to its character.

The groundwork also managed to record the character and depth of the lynchet feature itself and expose another possible lynchet further down the slope at the edge of a small platform/terrace area being retained at its northern side by a dry-stone wall (Site No. 19). This platform area only covers a small area of approximately 30m oval in extent, suggesting a small agricultural terrace, which is probably associated with the small ruinous stone built farming complex, possibly former stores, that exist immediately to the north east of this platform and lynchet feature.

Along the entire route of the pipeline trench and groundwork for the intakes and the pipeline, no datable finds were recovered that were earlier than the early 19th century.

1 Introduction

1.1 The following report presents the results of an archaeological watching brief, undertaken during groundwork for the construction of a 99kw hydro-electric scheme, comprised of two intake weirs, a forebay tank, a turbine house and the installation of underground and overground pipes and underground cabling to provide grid connection on land at Bron Lletty Ifan, Arthog, Gwynedd LL39 1LX (centered on NGR: SH 63660 13000).

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1.2 The specific objectives of this work were to:

- Undertake a watching brief during all intrusive works associated with the proposed scheme in the upper portion only (see Figure 2). This work includes groundwork for the proposed penstock (pipeline) and the forebay tank only.

1.3 The Technical Appendices for this report contains the following information:

- *Appendix I*: Figures;
- *Appendix II:* Photographs
- *Appendix III:* Context Register
- *Appendix IV:* SNPA Design Brief and HRSW Project Specification
- *Appendix V:* Archive Cover Sheet

Site Location & Description

1.4 This proposed development aims to introduce a new hydro-electric power scheme on two unnamed tributaries of the Afon Morfa, beginning on land at Bron Lletty Ifan Farm, Arthog, in the county of Gwynedd (National Grid Reference SH 63660 13000). The proposed scheme is positioned in an upland area within the Snowdonia National Park and also lies within the Registered Historic Landscape of *Mawddach* (HLW (Gw) 14).

1.5 The scheme begins near to the farmstead of Bron Lletty Ifan farmstead at a height of approximately 210m AOD. Following the intake of water from two tributaries, the scheme then carries water along a low pressure pipe to a forebay tank. From here the water will be carried downslope along a high pressure pipe to a powerhouse near Bron Meirion, where the water will then be discharged back into the watercourse (National Grid Reference SH 63290 13530).

Development Proposals

1.6 The development proposed to build two new intake weirs at E 263638, N 312965 (Intake 1) and E 263798, N 313103 (Intake 2). From the intakes two 400mm low-pressure pipes will carry water to a forebay tank at E 263752, N 313119. From the forebay tank a single 400mm high-pressure penstock will carry the water to the powerhouse at E 263299, N 313510 and the water returned to the watercourse at E 263300, N 313512.

1.7 The low pressure pipes were to be buried from the two intakes to the forebay tank. The low pressure pipe from Intake 1 was to be buried in the bank alongside an existing well maintained track using the cut and fill method. The low pressure pipe from Intake 2 was to be buried across marshy grassland taking care to separate the top soil during construction so that the grassland could be returned to its original state.

1.8 The high-pressure pipeline (penstock) was to be buried from the forebay tank, across open grazed fields and through an opening in a stone wall. The penstock was to then drop steeply downhill through grazed fields which show evidence of early farming activity. The pipe was then to be buried across the bracken field to the left of a public footpath, avoiding the existing birch woodland; this area will be planted with new birch trees leaving a 3m wide grass-covered strip to the side of the buried penstock to provide access to the lower section of the penstock in the event of the penstock requiring maintenance in the future.

1.9 At the bottom of this field, there is evidence of an old track and a double stone wall. A section of this wall will need to be removed to allow the pipe to be buried under it and for machine access to the lower workstation. It has been proposed to keep a permanent access track through this section to allow access in the future to the penstock for maintenance reasons and to aid woodland management.

1.10 After the wall at E 263547, N 313347 the landscape changes to mixed broadleaf woodland and scrub. There are some hazel trees which will be coppiced or removed to create the access track, but no mature broadleaf trees will be affected. It has been proposed to continue the permanent track to the workstation at E 263465, N 313384.

1.11 The penstock trench then entered some mature woodland at E 263552, N 313352, close to where there were remnants of an historic weir. From this point, the penstock enters mature unmanaged broadleaf woodland and will pass overland to ensure minimal impact on existing trees in accordance with the ecological assessment. It is proposed that the penstock will cross the river at the location of the old weir E 263450, N 313385 so that it may remain buried under the footpath. This route allows the pipe to be laid unobtrusively into the river bed. From the far side of the stream the pipe will begin its overland journey through the woods. There are two footpaths marked on the map at this location passing through the woodland and over the penstock route. These appear to be disused tracks at this point but neither being public rights of way.

1.12 The penstock was to terminate at the proposed powerhouse at E 263289, N 313519. The water will be returned to the watercourse at E 263288, N 313522. The penstock will not be visible from any public right of way.

1.13 A small multi-core armoured cable will be buried alongside the penstock to connect the head level sensor at the forebay tank to the control unit in the Powerhouse. An armoured cable will run to Bron Meirion house to provide the site with electricity and export to the grid.

1.14 Suitable means of demarcating the perimeter of the site using tape and warning signs will be erected. During the brief period while the work interacts with public footpaths alternative routes will be provided and clearly signed. The trench for the penstock will be dug and refilled using a small excavator. In general the main trench will measure approximately 0.60m wide and wil be no wider than 1.00m in places where boulders will have to be removed.

Planning Background

1.15 The proposed scheme (Planning Ref: NP5/52/367A) was approved by SNPA on 17th September 2015, with the following conditions stipulating:

> **Condition 10:** 'Prior to any work commencing (including any ground disturbing works or site clearance) pursuant to this permission the applicant/developer shall submit to and receive written approval from the Local Planning Authority for an archaeological specification for a programme of works which must meet all relevant archaeological standards. The development shall subsequently be carried out in strict accordance with the approved programme of works unless otherwise agreed in writing by the Local Planning Authority.
>
> **Condition 11:** The developer hereby approved shall be carried out in strict accordance with the archaeological specification for a programme of works as approved in condition 10 above unless otherwise agreed in writing by the Local Planning Authority.

1.16 In June 2016, the archaeologist for Snowdonia National Park Authority issued a design brief detailing the required archaeological work in accordance with the above conditions.

1.17 Heritage Recording Services Wales (HRS Wales) were commissioned by Snowdonia Hydro to undertake this work and duly submitted a project specification to Snowdonia National Park Authority (SNPA).

1.18 Construction work for the two intakes began in August 2016, with groundwork fro the pipeline and forebay tank beginning in mid October 2016.

Historical & Archaeological Background *(see Figures 4 – 7)*

1.22 The development site is located within the Registered Historic Landscape (RHL) of *Mawddach* (HLW (Gw) 14).The development is not within any Conservation Area. The proposed development is not within any Registered Park and Garden (P&G). There are also no Scheduled Ancient Monuments (SAMs), nor any Listed Buildings (LBs) along the route of the proposed scheme. The nearest SAM sites to the proposed scheme are two prehistoric cairns SAM sites, known as the *Bron-Llety-Ifan cairns and cup-marked rock* (ME242). These two SAM sites are positioned between approximately 400m – 440m southwest of the approved scheme. A further medieval Platform House SAM site is also positioned approximately 430m southwest of the scheme, known as *Cyfannedd-Fach Homestead* (ME101).

1.23 As well as these designated sites, the wider landscape surrounding the scheme is rich in known archaeological sites, particularly prehistoric and medieval settlement and field systems, and as such the scheme area is potentially archaeologically sensitive.

1.24 The upper part of the scheme has a number of historic environment features of interest, including lyncheted relict and active field boundaries, terraces and relict walls. The penstock crosses lyncheted boundary features at E 263694, N 313173, E 263669, N 313230 and possibly at c. E 263653, N 313265.

1.25 At E 263562, N 313384 there is a small cluster of derelict buildings (Sites 17 and 18 – see Figure 7) with attached walled enclosure and further associated walls including a double-walled track leading to the Afon Morfa. The group is recorded on the regional Historic Environment Record as PRN: 57918, but this is a record created from identification of the site from historic OS mapping and does not contain any descriptive information.

1.26 The only other entry on the HER in the immediate vicinity of the scheme is PRN: 3286, bronze palstave (axe head) findspot allocated to the farmhouse; this is an approximate location indicating its discovery nearby and underlines the potential for prehistoric archaeology in the area.

1.27 An historic hydro-electricity scheme was located on the Afon Morfa. The disused weir (at E 263448, N 313385) of the historic scheme lies on the line of the new scheme and will be crossed by the penstock. Components of the generating equipment and instruments of an early twentieth century hydroelectricity scheme are present in an outbuilding (turbine room alongside garage/workshop) at Bron Meirion.

Geology

1.28 The geology along the route of the proposed scheme is generally of undifferentiated Llanvirn Rocks, consisting of mudstone, siltstone and sandstone. However, at the northwestern end alongside Bron Meirion, the geology changes to undifferentiated Tremadoc Rocks, but still mudstone, siltstone and sandstone types.

2 Aims & Objectives

2.1 The aims of the watching brief, as defined by the CIfA (2014) were to:

- Allow a rapid investigation and recording of any archaeological features that are uncovered during the proposed groundwork.

- Provide the opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has

been made for which the resources allocated to the watching brief are not sufficient to support the treatment to a satisfactory or proper standard.

3 Methodology

Watching Brief

3.1 The archaeological watching brief was undertaken by HRS Wales staff using current best practice from October to November 2016.

3.2 All work was carried out by a suitably qualified archaeologist with relevant level membership of the Chartered Institute for Archaeologists (CI*f*A) and followed the CI*f*A Standard and Guidance for an archaeological watching brief (CI*f*A 2014).

3.3 All proposed groundwork was undertaken under close and constant archaeological supervision. All groundwork by the contractor was undertaken using a mechanical digger with a toothless grading bucket. On occasion a toothed bucket was used when either the ground demanded it or else bedrock or boulders were encountered. Once bedrock or natural was encountered during trench work, then groundwork continued along the route of the pipeline under watching brief conditions removing the turf, top and sub soils, so that work could continue removing the bedrock and natural at a later date without the need for an archaeologist on site.

3.4 All archaeological deposits or features when encountered were to be cleaned, recorded and partially excavated. All finds recovered during the watching brief were to be bagged and a grid coordinate was taken using a handheld GPS device in order to locate the findspot with the OS national grid.

3.5 Recording was carried out using HRS Wales recording systems (pro-forma context sheets etc), using a continuous number sequence for all contexts.

3.6 Where considered necessary plans and sections were drawn to a scale of 1:50, 1:20 and 1:10 as required and related to Ordnance Survey datum and published boundaries where appropriate.

3.7 All features identified were tied in to the both the OS National Grid and all local site and ground plans.

3.8 Photographs were appropriated in digital format, using a 10 mega-pixel DSLR camera, with photographs stored in RAW format, to be exported later in TIFF format in accordance with RCAHMW digital Archive guidelines.

4 Results of Watching Brief *(see Photo plates 1 – 48)*

4.1 All numbers marked in () refer to archaeological contexts encountered during the ground work.

4.2 Groundwork for the proposed scheme was undertaken in the following chronological order:

i) Intakes 1 and 2

ii) Forebay tank
iii) Penstock (Pipe route)
iv) Powerhouse

4.3 Each of the groundwork phases will be described individually in the same chronological order in the following section:

i) Intakes 1 and 2

4.4 Intake 1 was to be constructed across an existing stream at E 263638, N 312965, positioned only approximately 25m southwest of the main Bron Lletty Farmhouse. Construction for the intake began in August 2016 and was completed in October 2016. Construction for Intake 1 did not disturb any ground and was solely focused on construction above ground. As such, no archaeological finds, features or deposits were encountered.

4.5 Intake 2 was to be constructed across an existing stream at E 263798, N 313103, positioned approximately 161m northeast of the main Bron Lletty Farmhouse. As with Intake 1, construction for Intake 2 began in August 2016 and was again completed in October 2016. Construction for Intake 2 did not disturb any ground and was solely focused on construction above ground across the stream building onto exposed rock. As such, no archaeological finds, features or deposits were encountered.

ii) Forebay tank

4.6 The proposed Forebay tank was to be positioned in a fairly waterlogged area approximately 57m northwest of Intake 2 at E 263752, N 313119. Groundwork for the forebay tank involved the excavation of an approximately 2m deep trench measuring approximately 3m x 3m square. An approximately 20m long overflow trench was also to be dug from the forebay tank to let excess water flow back into the stream.

4.7 One the turf (100) was removed from the footprint of the proposed forebay tank, a fairly wet peat deposit was exposed (101). This peat deposit averaged only approximately 0.30m in depth. Once removed, a natural waterlogged deposit of grey clay intermixed with irregular slate/shale stones and grit became exposed (102). This natural deposit averaged approximately 0.50m in depth. Directly below this was a natural grey clay and slate silt deposit that average approximately 1m in depth (103). Directly below this natural clay was a natural slate bedrock (104). This formed the foundation for the forebay tank. No datable finds were recovered during this groundwork, and no features or deposits were exposed.

iii) Penstock (Pipe route) + Access track

4.8 Groundwork for the main pipeline began at the bank near Intake 1 and in the courtyard area opposite the main house of Bron Lletty Ifan. The trench in this area averaged approximately 0.60m in width and averaged a depth of approximately 1.25m. With regards stratigraphy in the courtyard area, once the overlying deposit of crushed stone that formed the existing access track had been removed (200), which averaged approximately 0.20 – 0.25m in depth. Directly below this deposit was a natural dry and loose grey shale deposit (201). This deposit averaged approximately 0.30m in depth. Directly below this deposit was a natural light orange silty sandy clay deposit with iron staining (202). This natural deposit continued to the bottom of the trench. During the watching brief for this initial length of pipe trench, the only feature exposed was the remains of an obsolete 19th century storm drain pipe that appeared to originate from a culvert from the earlier Bron Lletty Ifan farmhouse. The only dateable finds recovered from this length of pipeline trench were two small fragments of 19th century pottery *(not retained)*.

4.9 The next length of pipe trench to be excavated measured approximately 136m in length. This trench began from the farm courtyard gate all the way to the forebay tank to the north. The initial 30m of this trench was positioned along the side of an existing access track leading downslope to the lower field area. After this initial short length, the trench was then excavated along the base of a rocky outcrop. The stratigraphy of the first initial 30m of trench was similar to the already excavated trench in the courtyard area. Once the turf and top soil (300) had been removed, a natural dry and loose grey shale deposit (301) became exposed. This deposit averaged approximately 0.30m in depth. Directly below this deposit was a natural light orange silty sandy clay deposit with iron staining (302). This natural deposit continued to the bottom of the trench. After approximately 30m of trenching, the topography and underlying geology changed, wherein the natural slate bedrock (303) was reached at only approximately 0.40m. The anticipated depth of the trench had to be at least 1.2m in depth in order to satisfy the engineering of the water downflow. As such, the remaining approximately 106m of this trench, all the way to the edge of the stream immediately south of the forebay tank area had to be excavated by machine using a pecking device attached to the digger. Throughout this length of pipeline, no archaeological features, finds or deposits of any interest were encountered.

4.10 The next length of pipeline to be excavated was the short length of trench linking Intake 2 to the Forebay tank. The length of this trench was to measure approximately 72m. Given that this trench was positioned alongside the stream, the ground here was fairly waterlogged and reflected the same stratigraphy already encountered during groundwork for the Forebay tank (see above section 4.6 – 4.7). Throughout this length of pipeline, no archaeological features, finds or deposits of any interest were encountered.

4.11 The next length of trench to be excavated was a short 6m length of trench from the north end of the stream to the Forebay tank, thereby finalising the trench from Intake 1 to the Forebay. The stratigraphic deposits encountered during this groundwork reflected the same stratigraphy already

encountered during groundwork for the Forebay tank (see above section 4.6 – 4.7). Throughout this short length of pipeline trench, no archaeological features, finds or deposits of any interest were encountered.

4.12 The next length of pipeline trench to be excavated was for the main penstock, to run from the Forebay tank to the bottom of the slope to the northwest. From this point the pipeline was to continue downslope over-ground to the turbine house. This trench was to measure approximately 420m in length.

4.13 The first 72m of this 420m trench was started from the Forebay tank outlet to the field enclosure earth and stone bank at E 263694, N 313166. The stratigraphy of the initial 10m of this trench, from the area of the forebay tank, was much the same as that already exposed during groundwork for the forebay tank i.e shallow layer of peat, followed by a natural wet and loose grey shale grit (see section 4.6 – 4.7). After the initial 10m of trenching in this area, the natural slate bedrock was then encountered, which was anticipated given the presence of several rocky outcrops in the immediate area. From this point the trench continued up to the point of the field enclosure bank at E 263694, N 313166. The typical stratigraphy encountered in this length of trench consisted of turf and top soil (500) to a depth of only 0.20m. Directly below this top soil was a natural orange clay intermixed with a pale orange/yellow sandy grit (501). Throughout this short length of pipeline trench, no archaeological features, finds or deposits of any interest were encountered.

4.14 Groundwork through the field enclosure earth and stone bank (Site No. 11 / (502)), the bank that encloses the lower field (Site No. 12) and the field characterised by an early lynchet feature (Site No. 13 / (503)), revealed that this bank is in fact solely an earthen bank with large stones and boulders merely pushed up against its sides, suggesting that these boulder stones are most probably clearance stones. Within the core of the earth bank was recovered a large fragment of early 19th century glazed black ware from a large bowl or basin *(not retained)*. Given that this pottery fragment was recovered from within the core of the earth bank would suggest that this bank is probably early 19th century in date and not earlier. The stratigraphy encountered through this earth bank consisted of the earth bank itself constructed from a mid brown soil. Directly below the bank was a natural orange clay intermixed with a pale orange/yellow sandy grit (504).

4.15 Groundwork for the pipeline trench continued from the point of the earth bank (Site No. 11) to the northwest across an open field. The north-western edge of this field is characterised by the remains of an ancient *lynchet* that runs south-south-west to north-north-east. Further to the north this linear feature is surmounted by a post medieval dry-stone wall. Trenching across the field revealed that the stratigraphy here consisted of turf and top soil (500) to a depth of only 0.20 – 0.30m. The top soil was a mid brown loam, perfect for agricultural planting. Directly below this top soil was a natural orange clay intermixed with a pale orange/yellow sandy grit (501). Close inspection of the exposed stratigraphy through the trench revealed faint marks from centuries of ploughing, only faintly visible

in cross section as undulating channels in places, running north to south. At the point of the *lynchet* itself, the groundwork revealed that the depth of the top and sub soil that makes up the *lynchet* at this point reached a depth of approximately 1.25m, whereupon the natural topography then drops down steeply to the west. Unfortunately, across the field (Site No.12) and through the *lynchet*, no dateable finds or features were encountered.

4.16 From the point of the *lynchet*, trenching work continued downslope for a further 270m. At approximately 170m further downslope to the northwest, at E 263540, N 313350, the trenching work encountered a dry-stone wall (Site No. 19 / (601)), positioned at the end of a platform or terraced area. This wall is associated with part of a small complex of 18th – 19th century farm buildings positioned immediately to the north and is clearly marked on the early OS maps. Following cutting through a section of the walling and the ground itself, the resulting cross section revealed that the wall itself appeared to be acting as a retaining wall, holding earth for the apparent platform area. This suggested that the earth immediately abutting the wall itself is probably the remnants of another old small *lynchet.* The wall measured approximately 1.5m high x 1m wide. The depth of the soil on the upslope end to the southeast reached a depth of approximately 1.5m (602). Directly below this soil was a natural orange clay intermixed with a pale orange/yellow sandy grit (603). Groundwork in this area exposed no dateable finds. However, given the character and form of the wall and earthwork and the immediate building complex to the north, it is very likely that these two features are 18th century in date.

4.17 Groundwork for the pipeline trench continued downslope to the northwest. The length of trenching work also comprised ground clearance for the proposed access track. The stratigraphy here for the last 100m consisted of top soil that averaged only approximately 0.20m (600). Directly below this was a natural pale orange/yellow sandy grit (603), a natural deposit hat continued to the depth of the pipeline trench all the way to the final point of the groundwork, at E 263450, N 313390, whereupon the remaining pipeline was to travel overground all the way to the proposed turbine house at E 263299, N 313510. Along the entire length of this stretch of pipeline, only one fragment of pottery was recovered. This was a small fragment of brown glazed 19th century ware *(not retained).*

iv) Powerhouse

4.18 The penstock was to terminate at the proposed powerhouse at E 263289, N 313519. Given the post-medieval nature and character of the ground in the area of the proposed powerhouse and in accordance with the project specification, groundwork for the powerhouse was not undertaken under watching brief conditions.

5. Conclusions

5.1 The archaeological watching brief during groundwork for the proposed intakes, forebay tank and pipeline (Penstock) exposed no new archaeological features, finds or deposits of any significance.

The groundwork did however add further to our knowledge of a number of known features along the pipeline route, namely the boundary bank (Site No. 11) and the *lynchet* (Site No. 13). The groundwork for the pipeline trench revealed that the boundary bank (Site No. 13) is in fact solely an earth bank with field clearance stones laid up against it. Given that this boundary bank is probably 18th century in date at the earliest, suggests that the field clearance took place after its construction, which would further suggest that the field that houses the *lynchet* feature has also been ploughed in the 18th and 19th centuries.

5.2 The groundwork also managed to record the character and depth of the *lynchet* feature itself and expose another possible *lynchet* further down the slope at the edge of a small platform/terrace area being retained at its northern side by a dry-stone wall (Site No. 19). This platform area only covers a small area of approximately 30m oval in extent, suggesting a small agricultural terrace, which is probably associated with the small ruinous stone built farm complex (Sites 17 and 18), possibly being former root stores, that exist immediately to the north east of this platform and lynchet feature.

5.3 Along the entire route of the pipeline trench and groundwork for the intakes and the pipeline, no datable finds were recovered that were earlier than the early 19th century.

6 Acknowledgements

Thanks to; Anthony Jackson for allowing access to the site and also to Tywyn Construction for all their patience and understanding during the groundwork. Also thanks to Snowdonia National Parks Authority for their guidance and advice.

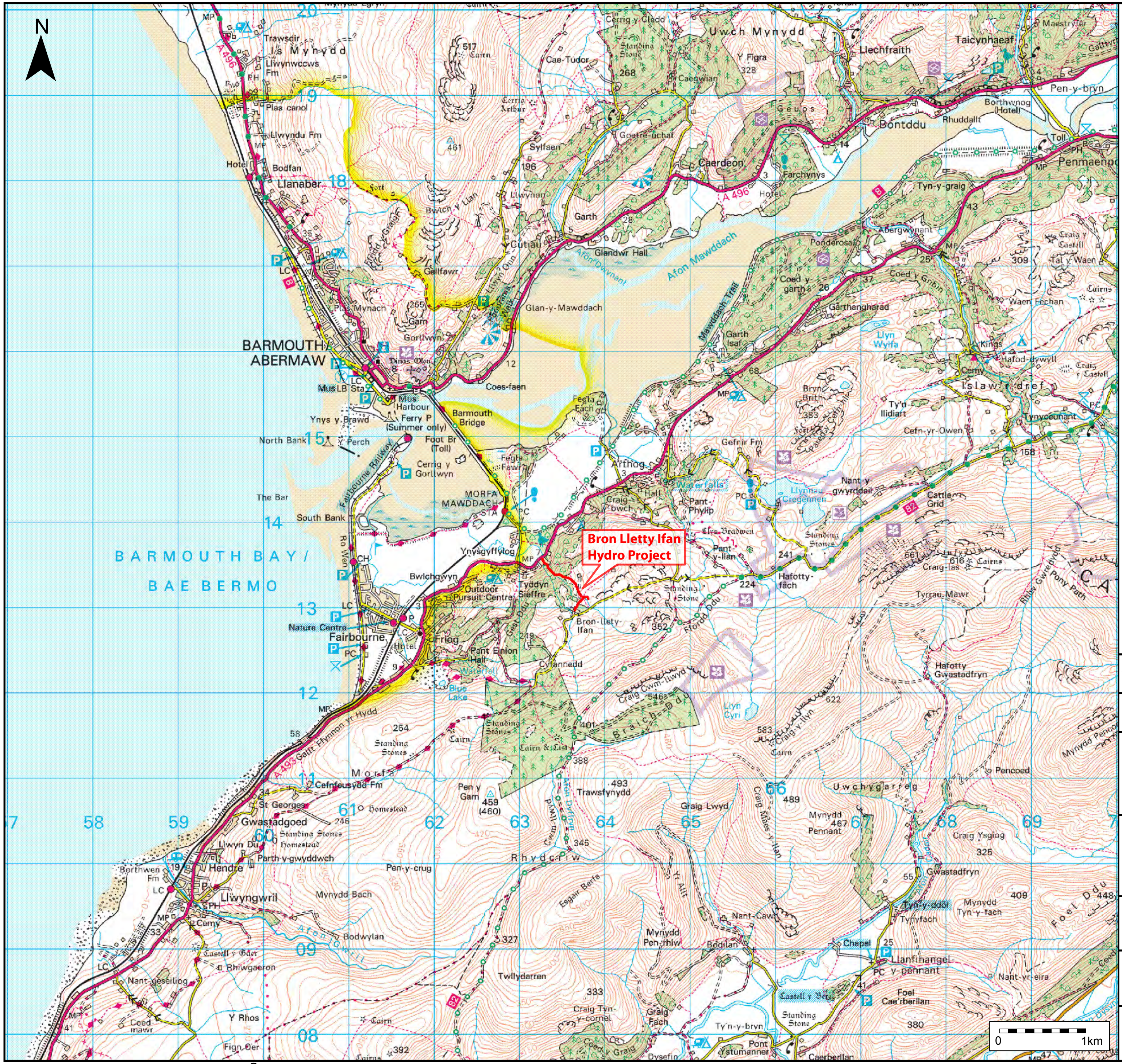
7 Bibliography

British Geological Survey 1979, Ten Mile Map 3rd edition (solid) 1:625000

Jones, R, S. 2016. HRS Wales Report No. 182. Bron Lletty Hydro Scheme – Archaeological Assessment

Soils of England and Wales 1983. Sheet 2: Wales, 1:25000

APPENDIX I:
Figures



Legend

Proposed Development

Approximate Scale (@ A4): 1:70,000

Date: November 2016

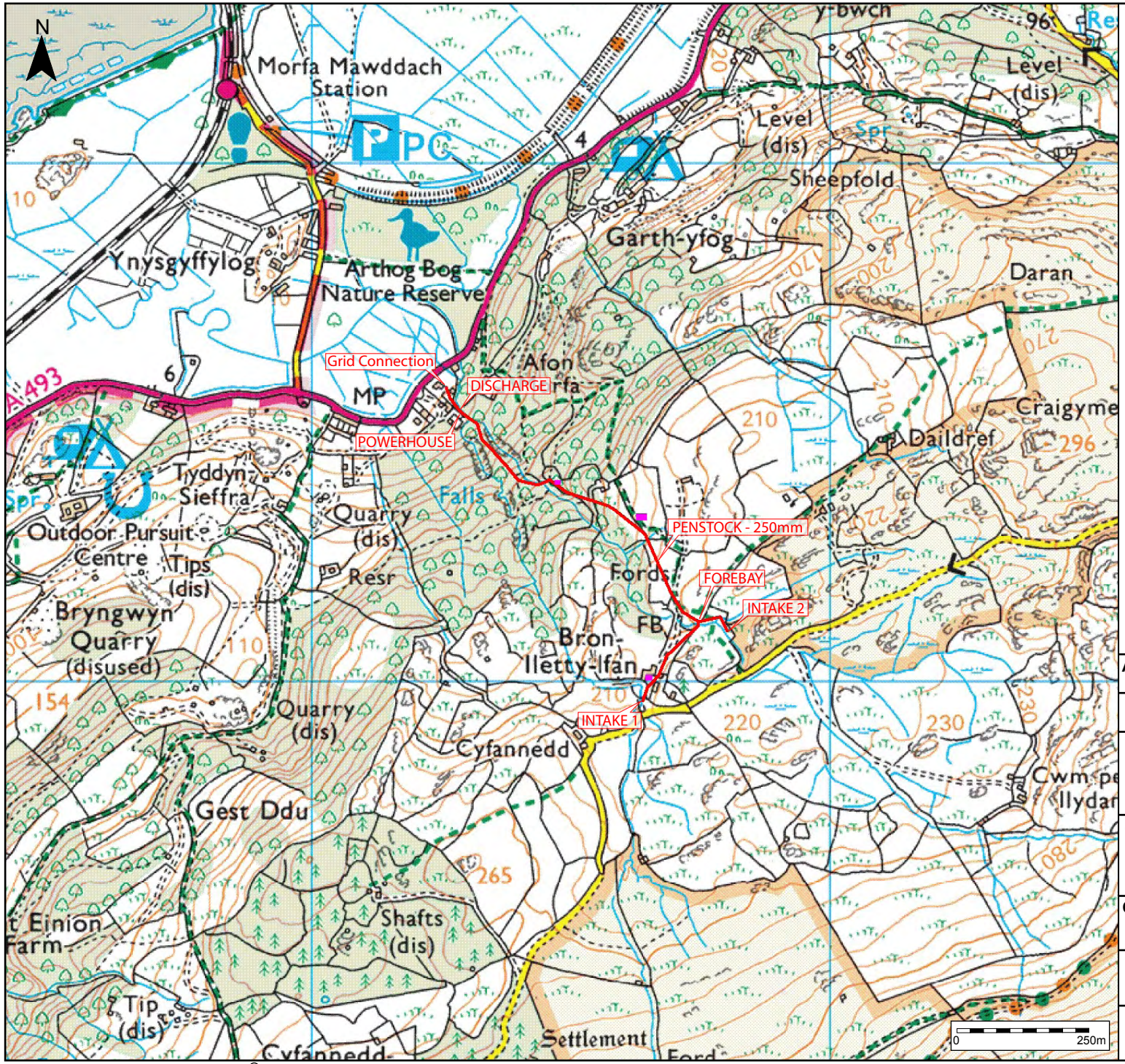
Prepared by: Heritage Recording Services Wales

Client: Snowdonia Hydro

On behalf of:

Project Title: Bron Lletty Ifan Hydro Project

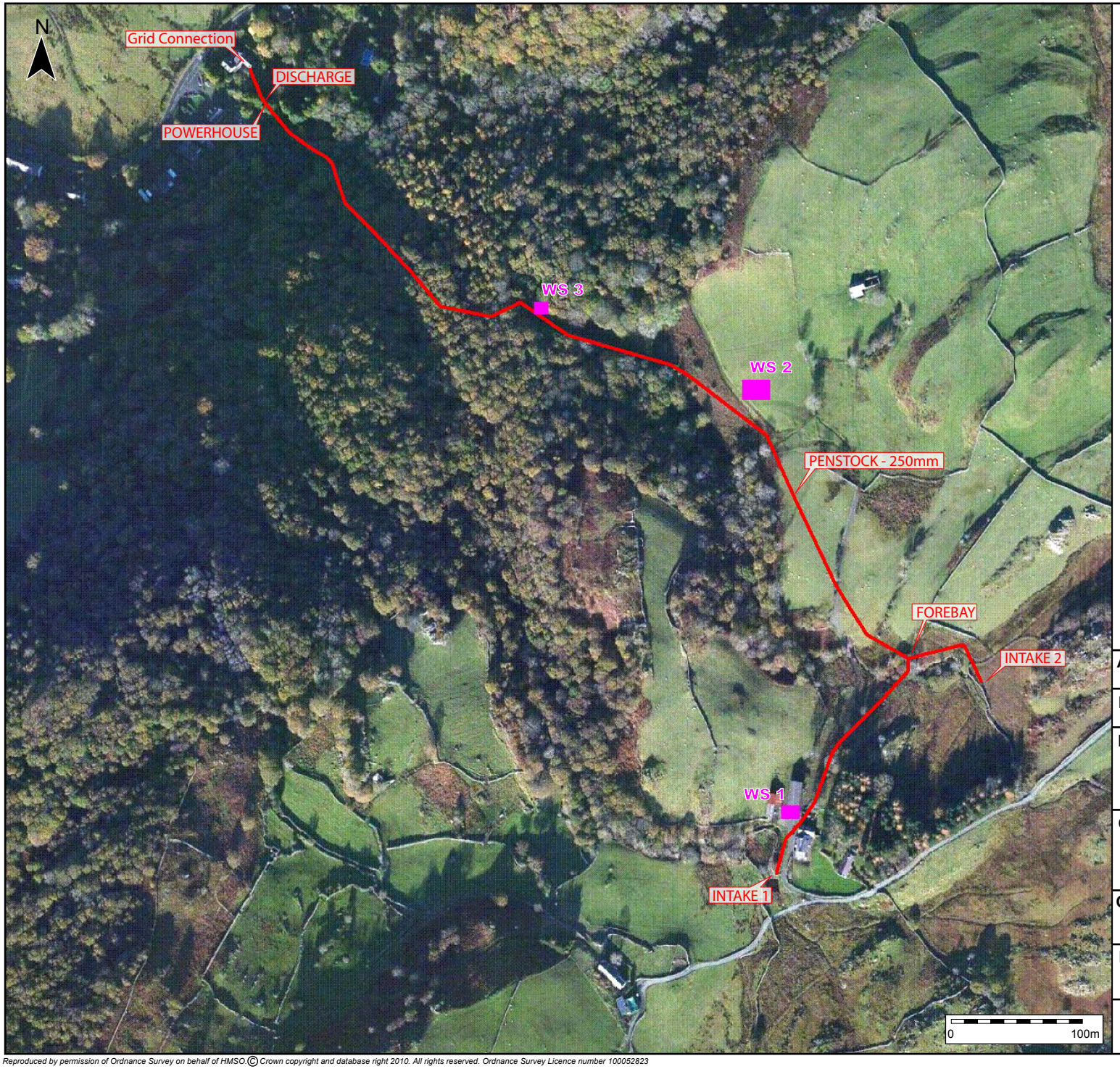
Figure 1. Site Location



Legend

Pipeline route

Approximate Scale (@ A4)**:**	1:10,000
Date:	November 2016
Prepared by:	Heritage Recording Services Wales
Client:	Snowdonia Hydro
On behalf of:	
Project Title:	Bron Lletty Ifan Hydro Project
Figure 2.	Location Map and Site Design



Legend

Pipeline route

WS Workstations

Approximate Scale (@ A4)**:** 1:4,000

Date: November 2016

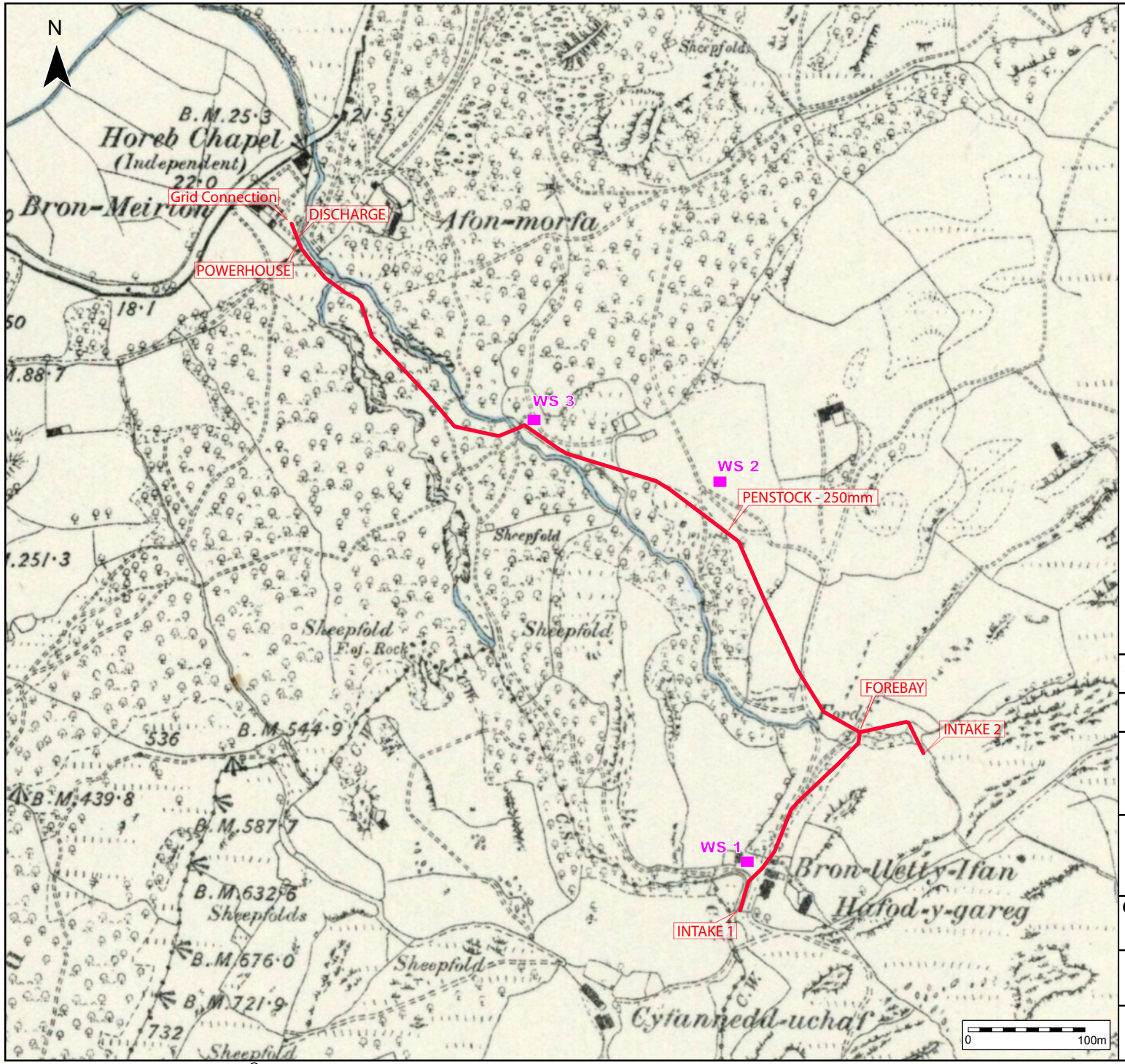
Prepared by: Heritage Recording Services Wales

Client: Snowdonia Hydro

On behalf of:

Project Title: Bron Lletty Ifan Hydro Project

Figure 3. OS Aerial Photo (2014)



Legend

Pipeline route

WS Workstations

Approximate Scale (@ A4)**:** 1:5,000

Date: November 2016

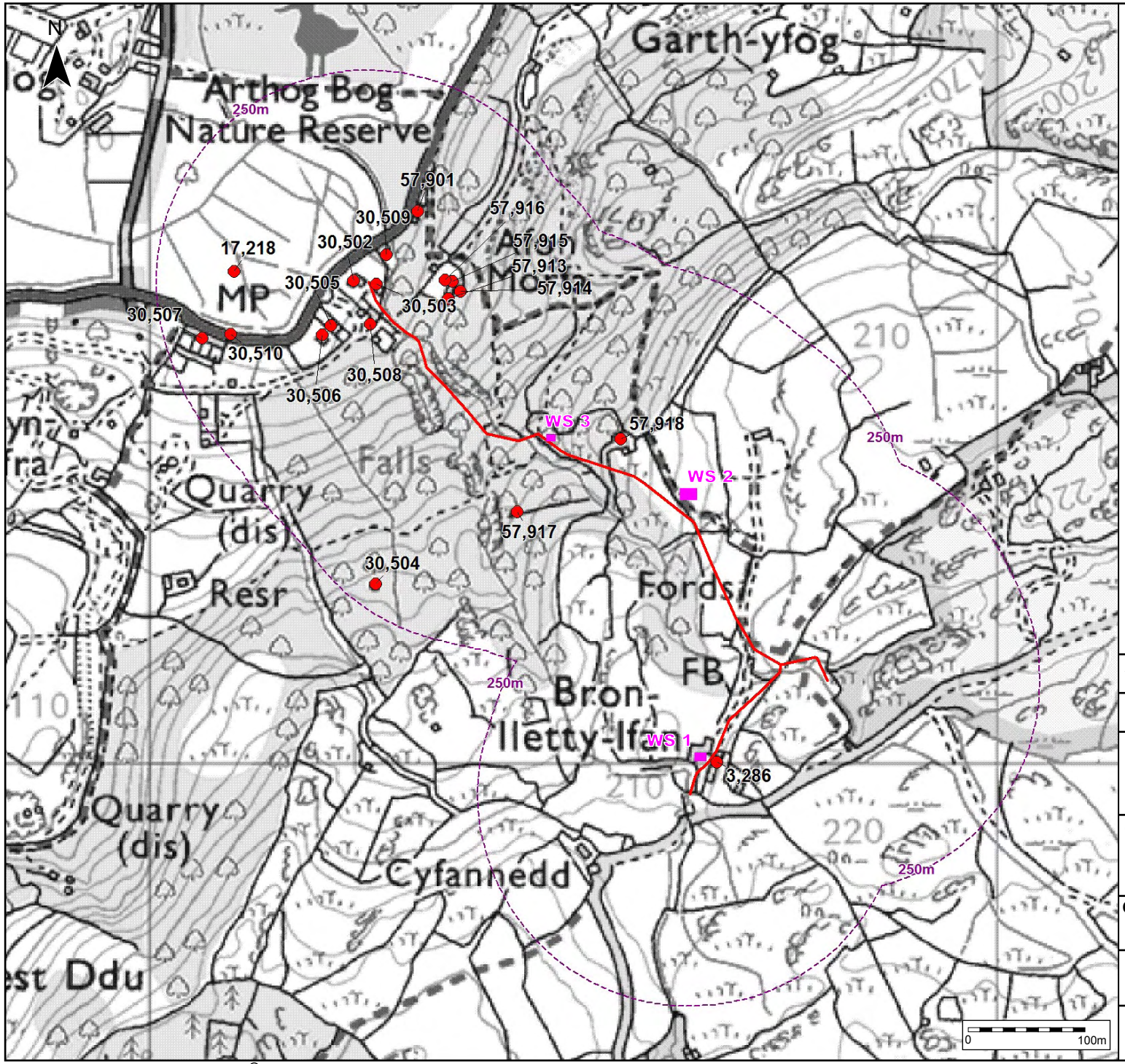
Prepared by: Heritage Recording Services Wales

Client: Snowdonia Hydro

On behalf of:

Project Title: Bron Lletty Ifan Hydro Project

Figure 4. OS First Edition Map (1886)



Legend

- Pipeline route
- WS — Workstation
- Buffer Zone (250m)
- Historic Environment Record (HER)

Approximate Scale (@ A4)**:** 1:5,000

Date: November 2016

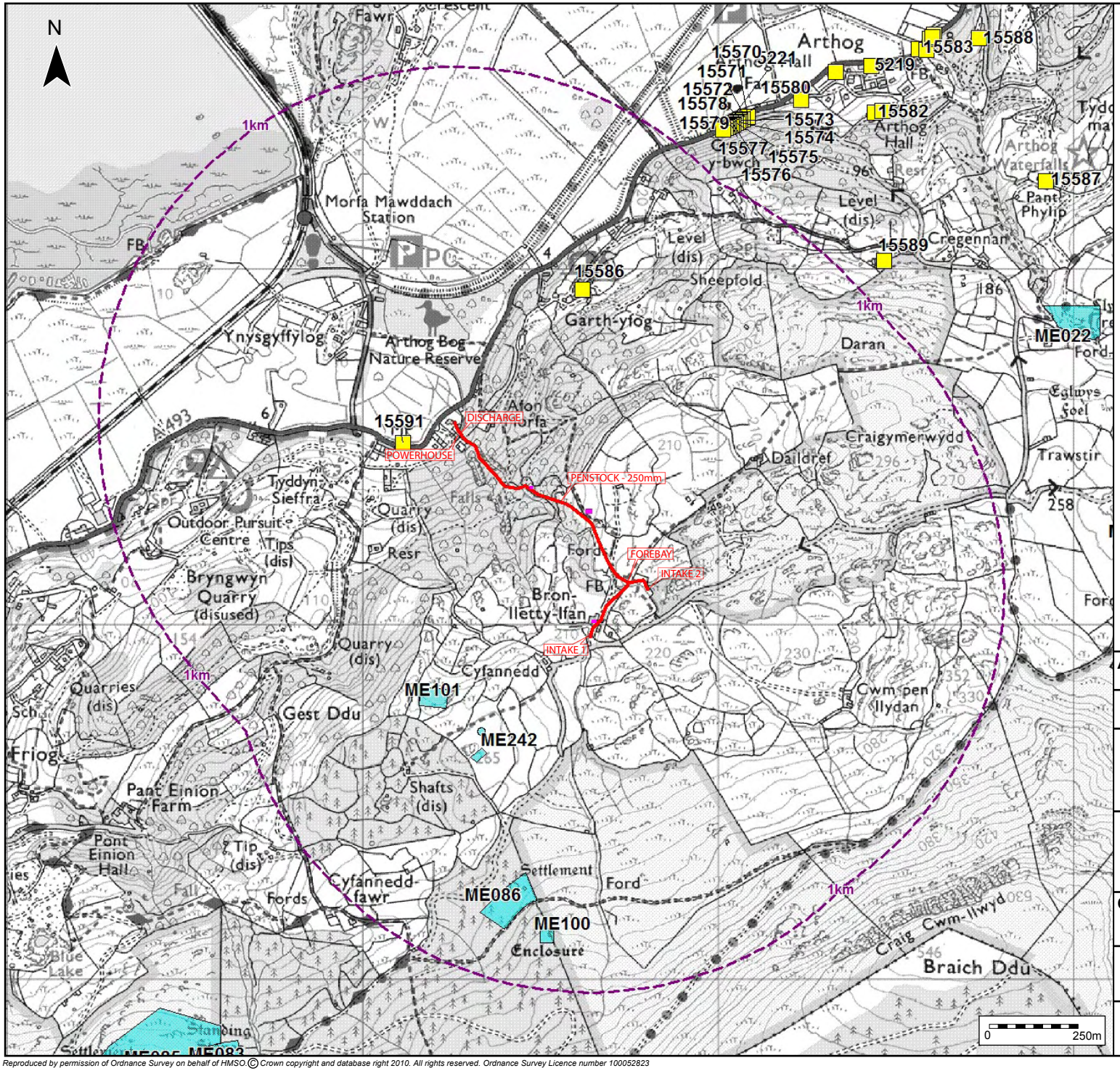
Prepared by: Heritage Recording Services Wales

Client: Snowdonia Hydro

On behalf of:

Project Title: Bron Lletty Ifan Hydro Project

Figure 5. HER Sites within 250m buffer zone



Legend

- Pipeline route
- WS Workstations
- Buffer Zone (1km)
- Scheduled Ancient Monument (SAM)
- Listed Building (LB)

Base Map: OS 1:25,000 Exploer Edition

Approximate Scale (@ A4)**:** 1:15,000

Date: November 2016

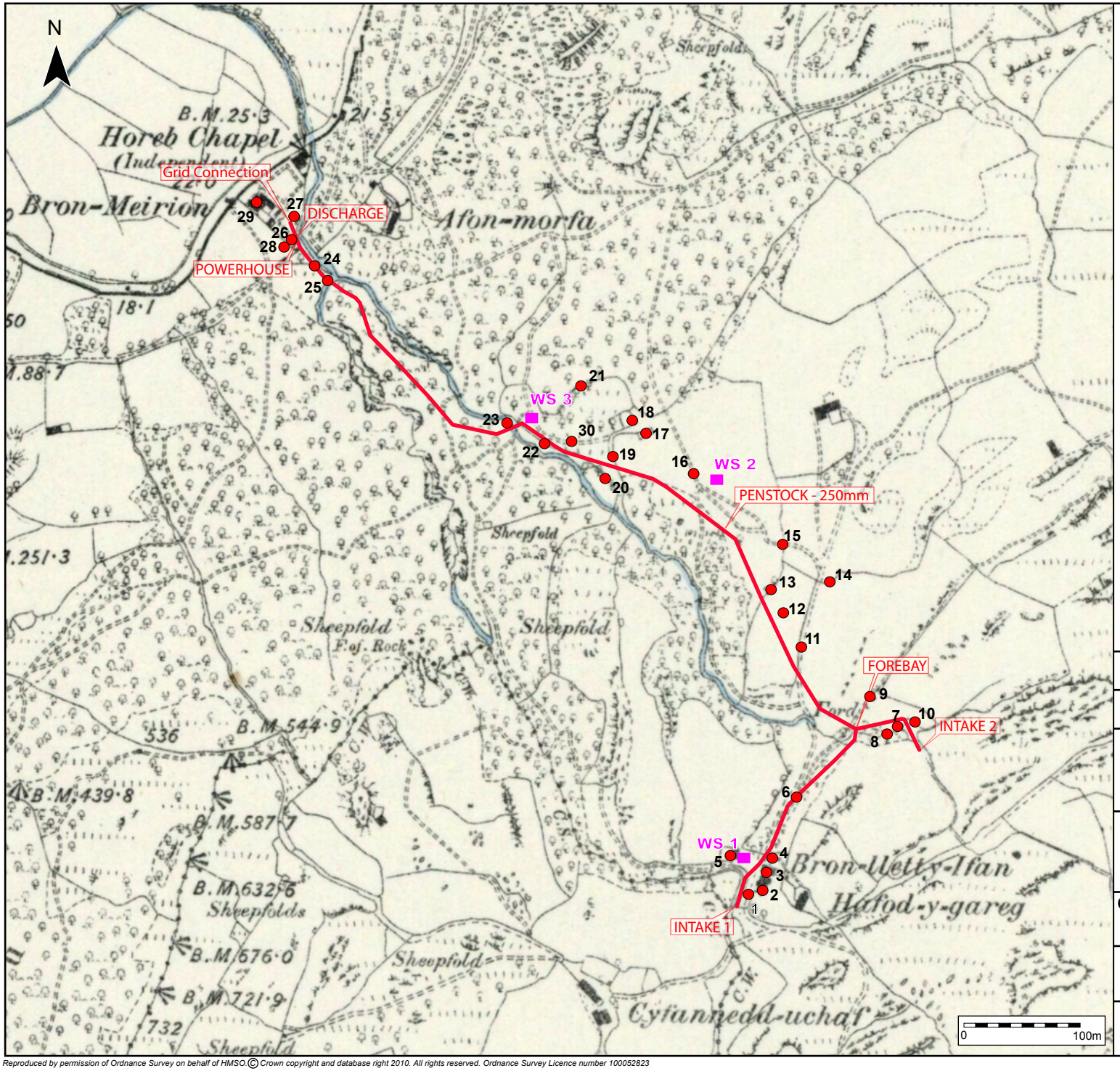
Prepared by: Heritage Recording Services Wales

Client: Snowdonia Hydro

On behalf of:

Project Title: Bron Lletty Ifan Hydro Project

Figure 6. Designated Sites within 1km radius



Legend

- Pipeline route
- WS — Workstations
- Heritage Assets identified from Walkover and Cartographic Sources

Base Map: OS First Edition 1886 Edition

Approximate Scale (@ A4)**:** 1:5,000

Date: November 2016

Prepared by: Heritage Recording Services Wales

Client: Snowdonia Hydro

On behalf of:

Project Title: Bron Lletty Ifan Hydro Project

Figure 7. Heritage Assets identified from Walkover and Cartographic Sources

APPENDIX II:
Photo plates

Plate 1. Montage of pipeline route from Intake No.1. Looking northwards across Bron Lletty Ifan courtyard.

Plate 2. Working shot during groundwork in courtyard area. Looking northwards.

Plate 3. Working shot during groundwork in courtyard area. Looking northwards.

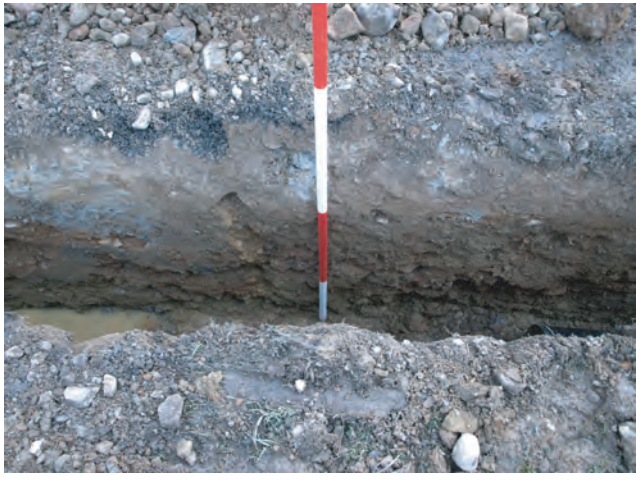


Plate 4. Working shot during groundwork in courtyard area. Looking northwards.

Project Title: Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken: November 2016	1 - 4	
Photographer: Richard Scott Jones		

Plate 5. Working shot during groundwork in courtyard area. Looking northwards.

Plate 6. Working shot during groundwork in courtyard area. Looking northwards.

Plate 7. Working shot during groundwork in courtyard area. Looking northwards.

Plate 8. Working shot during groundwork for pipeline leading from Intake 1 to Forebay tank.

Project Title: Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken: November 2016	5 - 8	
Photographer: Richard Scott Jones		

Plate 9. Working shot during groundwork for pipeline leading from Intake 1 to Forebay tank. Area of rock outcrop. Looking norhwards.

Plate 10. Working shot during groundwork for pipeline leading from Intake 1 to Forebay tank. Area of rock outcrop. Looking norhwards.

Plate 11. Stratigraphy in area of rock outcrop bewtween Intake 1 and Forebay tank. Looking eastwards.

Plate 12. Area between Intake 1 and Forebay tank following groundwork. Looking south.

Project Title:	Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken:	November 2016	9 - 12	
Photographer:	Richard Scott Jones		

Plate 13. Working shot during groundwork for area crossing stream leading to Forebay tank.

Plate 14. Working shot during groundwork for area crossing stream leading to Forebay tank.

Plate 15. Area of Forebay tank following groundwork. Looking eastwards.

Plate 16. Area of Forebay tank following groundwork. Looking eastwards.

Project Title:	Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken:	November 2016	13 - 16	
Photographer:	Richard Scott Jones		

Plate 17.Typical waterlogged stratigraphy in area of proposed Forebay tank.

Plate 18. Overflow trench leading from proposed Forebay tank. Looking eastwards.

Plate 19. Forebay tank under construion. Looking southeast.

Plate 20. Working shot durin trench cutting to Forebay tank from Intake 1. Looking northwards.

Project Title:	Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	
Date taken:	November 2016	17 - 20	Heritage Recording Services Wales
Photographer:	Richard Scott Jones		

Plate 21.Forbay tank construction completed. Looking eastwards.

Plate 22. Trench from Intake 1 to Forebay tank. Looking northwest.

Plate 23. Trench from Intake 1 in front of Forebay tank. Looking southeast.

Plate 24. View of Intake 2 during working shot for trench work joining trench to Forebay tank.

Project Title:	Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	
Date taken:	November 2016	21 - 24	Heritage Recording Services Wales
Photographer:	Richard Scott Jones		

Plate 25. Route of proposed trench linking Intake 2 to Forebay tank.

Plate 26. Working shot during trench cutting from Intake 2 to Forebay tank. Looking southeast.

Plate 27. Working shot during trench cutting from Intake 2 to Forebay tank. Looking southeast.

Plate 28. Working shot during trench cutting from Forebay tank to main Penstock. Looking northwest.

Project Title:	Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken:	November 2016	25 - 28	
Photographer:	Richard Scott Jones		

Plate 29. Working shot during trench cutting from Forebay tank to main Penstock. Looking northwest.

Plate 30. Cut trench looking back from Penstock to Forebay tank. Looking southeast.

Plate 31. Working shot during trench cutting from Forebay tank to main Penstock. Looking southeast toward Forebay tank frp, trachway.

Plate 32. Typical stratigraphy along route of Penstock by track following trenching. Looking south.

Project Title:	Bron Lletty Ifan Hydro Project	**Photo Plate No's.** 29 - 32
Date taken:	November 2016	
Photographer:	Richard Scott Jones	

Heritage Recording Services Wales

Plate 33. Working shot during trench cutting from field bank to Lynchet. Looking northwards.

Plate 34. Cut trench. Looking toward area of lynchet. Looking northwest.

Plate 35. Working shot during trench cutting in area of lynchet. Looking northwest.

Plate 36. View of pipeline trench through lynchet. Looking northwards along length of lynchet.

Project Title: Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken: November 2016	33 - 36	
Photographer: Richard Scott Jones		

Plate 37. Lynchet. Following groundwork for penstock. Looking east.

Plate 38. View along lynchet following groundwork. Looking northwards.

Plate 39. View northwest from position of lynchet. Looking northwest.

Plate 40. View of proposed pipeline route prior to groundowrk through bracken. Looking northwest.

Project Title:	Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken:	November 2016	37 - 40	
Photographer:	Richard Scott Jones		

Plate 41.Working shot during trenching for penstock on downslope through bracken.

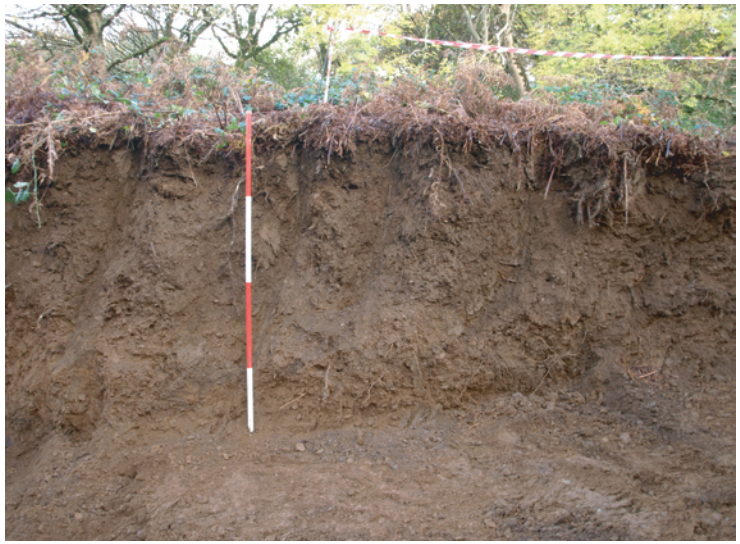


Plate 42. View of exposed stratigraphy along route pf proposed penstock following groundwork.

Plate 43. Cross section through small boundary wall alongside small stone enclosure. Looking northwards.

Plate 44. Working shot during groundwork for penstock. Looking northwest.

Project Title: Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken: November 2016	41 - 44	
Photographer: Richard Scott Jones		

Plate 45.Working shot during groundwork for penstock through woodland. Looking northwest.

Plate 46. Boundary wall in woodland where penstock cuts through to cross stream. Looking southwest.

Plate 47. Working shot during groundwork for penstock through woodland. Looking south

Plate 48. Position of proposed penstock through exposed natural. Looking northwards.

Project Title: Bron Lletty Ifan Hydro Project	**Photo Plate No's.**	Heritage Recording Services Wales
Date taken: November 2016	45 - 48	
Photographer: Richard Scott Jones		

APPENDIX III:
Context Register

Bron Lletty Ifan Hydro Scheme, Arthog, Gwynedd.

APPENDIX III

Context Register

Intakes Area 1 and 2

Context No.

N/A

Forebay tank Area

Context No.

100. Deposit - Turf
101. Deposit – Peat approximately 0.30m in depth.
102. Natural – Natural waterlogged deposit of grey silt and clay intermixed with irregular slate/shale stones and general grit. Averaged approximately 0.50m in depth.
103 – Natural - Natural grey clay intermixed with shale/slate. Approximately 1m in depth.
104. – Natural – Natural slate bedrock.

Penstock (Pipe line) and Access track

Context No.

Intake 1 and Courtyard Area

200. Deposit – Existing track in courtyard area opposite Bron Lletty Ifan farmhouse. Averaged approximately 0.20 – 0.25m in depth.
201. Natural – Natural dry and loose grey shale deposit. Approximately 0.30m in depth.
202. Natural – Natural light orange silty sandy clay deposit with iron staining

Courtyard to Forebay tank
Context No.

300. Deposit – Turf and top soil. Averaged a depth of approx. 0.20m.
301. Natural - Natural dry and loose grey shale deposit. Averaged approximately 0.30m in depth.
302. Natural - Natural light orange silty sandy clay deposit with iron staining. Continued to bottom of trench
303. Natural – Slate bedrock.

Intake 2 to Forebay tank

Context No.

100. Deposit - Turf

101. Deposit – Peat approximately 0.30m in depth.
102. Natural – Natural waterlogged deposit of grey silt and clay intermixed with irregular slate/shale stones and general grit. Averaged approximately 0.50m in depth.
103 – Natural - Natural grey clay intermixed with shale/slate. Approximately 1m in depth.
104. – Natural – Natural slate bedrock.

Forebay tank to emergence of overground pipe at E 263450, N 313390
Context No.

i) Initial 10 meters
100. Deposit - Turf
101. Deposit – Peat approximately 0.30m in depth.
102. Natural – Natural waterlogged deposit of grey silt and clay intermixed with irregular slate/shale stones and general grit. Averaged approximately 0.50m in depth.
103 – Natural - Natural grey clay intermixed with shale/slate. Approximately 1m in depth.
104. – Natural – Natural slate bedrock.

ii) Area of field enclosure bank (Site No. 11) and Lynchet
Context No.

500. Deposit – Turf and top soil to a depth of approx. 0.20 – 0.30m. Depth of top soil at point of lynchet reached c. 1.25m.
501. Natural – Natural orange clay intermixed with a pale orange/yellow sandy grit.
502. Feature – Field enclosure bank. 18th century earth bank with field clearance stones pushed up against it.
503. Feature – Agricultural lynchet (Site No. 13). Depth of top soil at point of lynchet reached c. 1.25m.
504. Natural - Orange clay intermixed with a pale orange/yellow sandy grit

iii) Lynchet to overground pipe
Context No.

600. Deposit – Turf and top soil. Averaged approx. 0.20m
601. Structure – Remains of dry-stone enclosure wall (Site No. 19). Measured approximately 1.5m high to its footings to 1m in width.
602. Deposit – Deposit of earth abutting dry stone wall feature. At its deepest point up against the wall the soil here reached approximately 1.5m
603. Natural – Pale orange/yellow sandy deposit.

APPENDIX IV:
SNPA Design Brief & Project Specification

DESIGN BRIEF FOR AN ARCHAEOLOGICAL ASSESSMENT AND WATCHING BRIEF

Archaeologist, Snowdonia National Park Authority

Site: Bron Llety Ifan, Arthog, LL39 1LX

Scheme: Proposed 99kw hydro-electric scheme including construction of 2 intake weirs, turbine house and installation of underground and overground pipes and installation of underground cable to provide grid connection

National Grid Reference: 264077 313480

Brief prepared for: Snowdonia Hydro

Date: 01 June 2016

Planning reference number: NP5/52/367A

This design brief is only valid for six months after the above date. After this period the Archaeologist, Snowdonia National Park Authority, should be contacted.

It is recommended that the contractor appointed to carry out the archaeological mitigation programme visits the site of the proposed development and consults the Regional Historic Environment Record (HER) for north west Wales before completing their specification. The Archaeologist, Snowdonia National Park Authority (SNPA) cannot guarantee the inclusion of all relevant information in the design brief.

1.0 Archaeological and historical background

1.1 The application is an area of upland pasture (approx. the upper half of the scheme) and woodland (lower half).

1.2 The broader environs of the scheme are rich in known archaeological sites, particularly prehistoric and medieval settlement and field systems, and the scheme area is potentially archaeologically sensitive. A full assessment study of the impact of the scheme on the historic environment was not carried out in support of the planning application. The SNPA Archaeologist visited the scheme with Snowdonia Hydro staff on 29/01/2015 as part of the pre-application process.

1.3 The upper part of the scheme has a number of historic environment features of interest, including lyncheted relict and active field boundaries, terraces and

relict walls. The penstock crosses lyncheted boundary features at 263694,313173, 263669,313230 and possibly at c.263653,313265.

1.4 At 263562,313384 there is a small cluster of derelict buildings with attached walled enclosure and further associated walls including a double-walled track leading to the Afon Morfa. The group is recorded on the regional Historic Environment Record as PRN (Primary Record Number) 57918, but this is a record created from identification of the site from historic OS mapping and does not contain any descriptive information.

1.5 The only other entry on the HER in the immediate vicinity of the scheme is PRN 3286, bronze palstave (axe head) findspot allocated to the farmhouse; this is an approximate location indicating its discovery nearby and underlining potential for prehistoric archaeology in the area.

1.6 A historic hydro-electricity scheme was located on the Afon Morfa. The disused weir (at 263448,313385) of the historic scheme lies on the line of the new scheme and will be crossed by the penstock. Components of the generating equipment and instruments of an early twentieth century hydro-electricity scheme are present in an outbuilding (turbine room alongside garage/workshop) at Bron Meirion.

1.7 The scheme will impact upon a number of active and relict stone walls.

1.8 The SNPA Archaeologist felt that the potential impact of the scheme on the historic environment could be mitigated by a programme of archaeological works during construction and consequently a bi-partite archaeological condition was placed on the planning permission, requiring: a. submission and approval by SNPA of a specification (also known as a 'written scheme of investigation', WSI) for a programme of archaeological mitigation prior to any development works commencing on site and; b. the subsequent adherence to the programme laid out in the specification.

2.0 The nature of the development and archaeological requirements

2.1 The proposed development relates to the installation of a 99kw hydro-electric scheme including construction of 2 intake weirs, turbine house, installation of associated pipes and cables for grid connection.

2.2 It is proposed to create a compound/workstation area at 263465,313384 with a permanent access and maintenance track leading to it from the east.

2.3 Beyond the old weir at 263448,313385 the penstock runs through mature unmanaged broadleaf woodland and will be installed over-ground.

2.4 There is potential for the scheme to impact upon known and hitherto unknown historic environment features, particularly in the upper part of the scheme (i.e. approx. above the old weir at 263448,313385).

2.5 On this basis it is considered that the proposed development represents a potential threat to archaeological remains. A mitigation programme is required comprising:

i. a pre-construction archaeological record by **walk-over survey supplemented by a basic review of existing archaeological and historical records**;

ii. the **marking/fencing** out of sensitive archaeological areas in the proximity of the working corridor, and;

iii. an **archaeological watching brief** on potentially archaeologically sensitive portions of scheme.

3.0 Outline of archaeological requirements, submission of specification

3.1 This is a design brief for a programme of archaeological mitigation, including a pre-construction archaeological record by **walk-over survey** supplemented by a basic review of existing archaeological and historical records, **marking/fencing out** and an **archaeological watching brief,** to be undertaken according to guidelines set out in Welsh national planning guidance (*Planning Policy Wales 2016, chapter 6, Conserving the Historic Environment*), Welsh Office Circular 60/96 (*Planning and the Historic Environment: Archaeology*) and the Chartered Institute for Archaeologists' (CIfA) 2014 '*Standard and Guidance for Historic Environment Desk-based Assessment'*, *'Standard and Guidance for Archaeological Field Evaluation'* and '*Standard and Guidance for an Archaeological Watching Brief'.* Other Standards and Guidance documents of the CIfA (e.g. excavation, archives and treatment of finds) should be followed as required.

3.2 The object of this programme of archaeological works is to minimise the potential for damage to archaeological remains and to create an archive record of any archaeological deposits or structures present on site and any that that may be revealed through on-site construction activity.

3.3 Archaeologically sensitive areas identified in the immediate proximity of the development footprint during the walk-over survey will be **marked out** under archaeological direction prior to the commencement of any works in those areas so as to prevent inadvertent damage.

3.4 This *design brief* should be used by the archaeological contractor as the basis for the preparation of a detailed written archaeological *specification*. **The specification must be submitted to the SNPA Archaeologist for approval before the construction scheme commences**.

3.5 The *specification* should contain, as a minimum, the following elements:

i. Non-technical summary.

ii. Details of the proposed works as precisely as is reasonably possible, indicating clearly on a plan their location and extent.

iii. **Details of the watching brief methodology should include a statement acknowledging that the archaeological contractor must be capable of stopping works at any point to check features of possible archaeological interest and that in the event of the discovery of archaeologically significant remains work must cease until the remains have been fully investigated, recorded and recovered (as appropriate) to the satisfaction of the archaeological contractor. Further, it should be specifically noted that these procedures may have implications for costs and timetable of the development.**

iv. A statement of the site-specific objectives of the archaeological works.

v. Reference to the relevant legislation.

vi. Health and Safety considerations.

vii. Monitoring procedures.

viii. Field methodology.

ix. Methods of recording, including the collection and disposal strategy for artefacts and ecofacts.

x. Arrangement for immediate conservation of artefacts.

xi. Post-fieldwork methodology.

xii. The level and grade of all key project staff.

xiii. Details of all proposed specialists.

xiv. A timetable for the proposed works including contingency costs (if appropriate).

xv. The intended method of publication.

xvi. Proposed arrangements for archive deposition.

4.0 Pre-construction archaeological record by walk-over survey supplemented by basic review of archaeological and historical records, detail

4.1 Basic review of archaeological records: the regional Historic Environment Record (held by Gwynedd Archaeological Trust) and the National Monument Record (held by RCAHMW) should be consulted in order to confirm the known archaeological record for the area.

4.2 Basic review of historic records: the first edition of both the Ordnance Survey 6" to the mile and 25" to the mile (if the latter exists) mapping should be checked, together with the tithe apportion map for the area (if exists).

4.3 The route of the penstock and a 25m corridor to either side of it (i.e. 50m total width centred on the penstock) will be walked to determine the archaeological potential of the scheme and its immediate environs and to define areas for: a. marking out, b. avoidance by construction machinery, and c. for watching brief. All historic environment features (including all walls/boundary features and the components of the historic hydro-electricity scheme as per para 1.16 above) will be recorded photographically and by written description.

4.4 Photographs should include a scale and should be taken with a high quality digital SLR camera, set to highest image resolution in RAW or TIFF with images presented as both TIFF and high resolution JPEGs in the archive.

4.5 It is unlikely that the lower, very steep, portion of the route (i.e. approx. below the old weir at 263448,313385) will require a watching brief. The penstock is to be installed over-ground beyond this point (as it runs through mature broad leaf woodland), reducing the likelihood of disturbance. Furthermore, the steepness of the ground means that potential for the presence of significant historic environment features is low. **However, the need for a watching brief in this lower area should be reviewed by the archaeological contractor in the light of the walk-over survey and the supplementary desk-based assessment of records and the SNPA Archaeologist informed of their recommendation with respect to whether or not the watching brief should be extended into this area**.

4.6 A brief written statement (supported by photographs and mapping as required) of findings and recommendations concerning the archaeological potential of the scheme footprint and areas to be impacted by associated works, together with that of the 50m walk-over survey corridor, should be provided to the SNPA so that areas where marking out, avoidance and watching brief are required can be determined, agreed and approved by the SNPA Archaeologist **in advance of construction works commencing on site**.

5.0 Briefing of construction team and marking out

5.1 The archaeological contractor will attend a pre-commencement meeting with key representatives of the construction team at which all known archaeological constraints will be outlined. The route will be walked with the construction team representatives and known sensitive areas identified. This will include establishing the positioning of any marking out (e.g. by temporary barriers/fencing) required to protect archaeologically sensitive locations along the route.

5.2 Care must be taken to ensure that in identifying sensitive areas with potential to be affected by the development, all of the scheme activities, including vehicle movements and location of works/lay-down compounds, not just the construction works, are considered.

6.0 Watching brief detail

6.1 On the basis of the information currently available, it is considered that a watching brief should be carried out on all intrusive excavation works in the upper portion of the scheme (i.e. approx. above the old weir at 263448,313385). However, the extent of the watching brief may vary following the walkover survey and review of archaeological and historical records, as per paragraph 4.5 above.

6.2 The watching brief is to be carried out by a suitably qualified archaeologist.

6.3 The monitoring of works is to be undertaken in a manner that allows for the immediate cessation of development for the recording of archaeological evidence. Agreement must be reached between the archaeological contractor and developer/agent in order that this is achieved. The level of response to any archaeological features or deposits encountered will initially be assessed by the archaeologist carrying out the mitigation works. The Snowdonia National Park Authority Archaeologist must be informed by the archaeological contractor of any significant archaeological features or deposits as soon as possible after they are encountered.

6.4 The watching brief shall be carried out in accordance with the Chartered Institute for Archaeologists' standard and guidance (as per paragraph 3.1 above). Recording will include written descriptions, photographs and appropriate plans and elevations.

6.5 Note that recording should include photographs, section drawings and written descriptions of all historic linear features (walls, bank, terraces etc) that are breached by the construction scheme.

6.6 Photographs should be taken with a high quality digital SLR camera, set to highest image resolution in RAW or TIFF with images presented as both TIFF and high resolution JPEGs in the archive.

6.7 The archaeological contractor will ensure that sufficient resource is made available for a post-excavation programme (including any specialist analysis such as dating and of finds and samples that might be required to understand the findings) to result in an archive report.

7.0 Reporting

7.1 The report should include details of the full mitigation programme including the results of both the walk-over survey (including supplementary basic assessment of archaeological and historical records) and the watching brief. It should specifically include the following:

i. Non-technical summary.

ii. Introduction to the project.

iii. A location plan.

iv. Aims and objectives of the work.

v. Methodology adopted.

vi. Archaeological results including descriptions of any archaeological features or deposits encountered.

vii. Maps, plans and section drawings at suitable scales.

viii. Photographs illustrating the results.

ix. Archaeological and historical context of the site and findings of the work.

x. Conclusions.

xi. Recommendations for further work if appropriate.

xii. References and bibliography.

xiii. Appendices including a copy of this design brief and agreed specification.

7.2 The SNPA Archaeologist should be sent a draft version of the report prior to preparation of the final report as this will enable any comments to be addressed before finalized versions are produced for the various archive destinations.

7.3 Hard copies of the finalized report should be sent to the Snowdonia National Park Authority (3 copies), the regional Historic Environment Record held by the Gwynedd Archaeological Trust and the National Monument Record of the RCAHMW. These bodies will also be sent digital copies of the report together with the archive on optical digital disc.

7.4 The involvement of the SNPA Archaeologist should be acknowledged in any report generated by this project.

8.0 Archiving and dissemination

8.1 The regional Historic Environment Record (maintained by Gwynedd Archaeological Trust) will be contacted for any PRN (primary record number) identifiers required and to discuss compatibility of any outputs (databases, spreadsheets, and image and document archives) with the HER.

8.2 Arrangements for the long-term storage and deposition of all artefacts and ecofacts must be agreed with the landowner and the SNPA Archaeologist. The Gwynedd Museum and Art Gallery (Storiel), Bangor, is the preferred storage location.

8.3 A full archive including plans, photographs, written material and any other material resulting from the project should be prepared in accordance with standard guidance. All plans, photographs and descriptions should be labelled and cross-referenced. The complete archive should be lodged in an appropriate place (probably with the National Monument Record of the RCAHMW; to be agreed with the SNPA Archaeologist) within six months of the completion of the project.

8.4 The full digital record should be archived according to best practice (following the digital data standards of the RCAHMW) and lodged in an appropriate

place (probably with the National Monument Record of the RCAHMW; to be agreed with the SNPA Archaeologist) within six months of the completion of the project.

8.5 The results of the work should be published, as a minimum, through the preparation of a submission to Archaeology in Wales.

8.6 The involvement of the SNPA Archaeologist should be acknowledged in any publication generated by this project.

9.0 General requirements including

9.1 This archaeological mitigation programme must be undertaken by an appropriately qualified individual or organisation, experienced in work of this character.

9.2 Details, including the name, qualifications and experience of the project director and all other key project personnel (including specialist staff) should be communicated to the SNPA Archaeologist and all written work attributed to an author(s).

9.3 Contractors and subcontractors are expected to conform to the standard professional guidelines of the Chartered Institute for Archaeologists.

9.4 The archaeological contractor must satisfy themselves that all constraints to groundworks have been identified, including the location of live services, Tree Preservation Orders and public footpaths. The SNPA bears no responsibility for the inclusion or exclusion of such information within this brief.

9.5 Any changes to the specifications that the archaeological contractor may wish to make after approval by this office should be communicated to the SNPA Archaeologist and are subject to approval in writing by the SNPA Archaeologist.

9.6 Care must be taken in dealing with human remains and the appropriate environmental health regulations followed. The SNPA Archaeologist and the local Coroner must be informed immediately human remains are discovered and all work must stop until the appropriate permissions have been obtained.

10.0 Curatorial monitoring

10.1 The project will be monitored by the SNPA Archaeologist to ensure fulfilment of the brief and specification. The SNPA Archaeologist may inspect site works and will normally review the progress of excavation reports and archive preparation. The archaeological contractor must inform the SNPA Archaeologist in writing of the proposed start dates for the project.

11.0 Further information

11.1 This document outlines best practice expected of an archaeological assessment by walk-over survey and watching brief but cannot fully anticipate the conditions that will be encountered as work progresses. If requirements of the brief cannot be met they should only be excluded or altered after gaining written approval of the SNPA Archaeologist.

11.2 Further details or clarification of any aspects of the brief may be obtained from the SNPA Archaeologist, contact details as below.

11.3 Contact details for regional Historic Environment Record: Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT / nsteele@heneb.co.uk / 01248 366963.

11.4 Contact details for RCAHMW/National Monuments Record: the RCAHMW and NMR is moving to the National Library of Wales, Aberystwyth at the time of writing. Check website details for latest contact information. Email: nmr.wales@rcahmw.gov.uk

John Griffith Roberts
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Tel. 01766 722518
Mob. 07909 267501

Heritage
Recording Services Wales
HERITAGE & ARCHAEOLOGICAL
CONSULTANT AND CONTRACTOR

Project Specification

Archaeological Assessment and Watching Brief

relating to the construction of a

'Proposed 99kw hydro-electric scheme including construction of 2 intake weirs, turbine house and installation of underground and overground pipes and installation of underground cable to provide grid connection on land at Bron Lletty Ifan, Arthog, Gwynedd LL39 1LX'

Planning Ref:

NP5/52/367A

Prepared for:

Snowdonia National Park Authority

On behalf of:

Snowdonia Hydro

HRS Wales Project No: 182

Date: 10th June 2016

Heritage Recording Services Wales
Egwyl,
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Non Technical Summary

This document is a project specification for an Archaeological Assessment and Watching Brief relating to the construction of a Proposed 99kw hydro-electric scheme including construction of 2 intake weirs, turbine house and installation of underground and overground pipes and installation of underground cable to provide grid connection on land at Bron Lletty Ifan, Arthog LL39 1LX.

The specification details the aims, objectives and methodology to be used when undertaking the assessment and the watching in accordance with a design brief from the Snowdonia National Park Authority archaeologist, aided by a design and access statement provided by Snowdonia Hydro following approval of the scheme on 17th September 2015.

1 Introduction

1.1 This document is a project specification for an Archaeological Assessment and Watching Brief relating to the construction of a Proposed 99kw hydro-electric scheme including construction of 2 intake weirs, turbine house and installation of underground and overground pipes and installation of underground cable to provide grid connection on land at Bron Lletty Ifan, Arthog LL39 1LX.

1.1 The program of archaeological work will comprise of three main elements:

1) *A pre-construction archaeological record by walk-over survey, supplemented by a basic desk based review of existing archaeological and historical records.*

2) *The marking/fencing out of sensitive archaeological areas in the proximity of the working corridor, and;*

3) *An archaeological watching brief on potentially archaeologically sensitive portions of scheme.*

1.3 This project specification has been prepared by Richard Scott Jones of Heritage Recording Services Wales (henceforth HRS Wales) for Snowdonia National Park Authority (henceforth SNPA) on behalf of Snowdonia Hydro. The specification has been prepared in accordance with a Design Brief supplied by SNPA on 1st June 2016.

2 Site Location and Description

2.1 This proposed development aims to introduce a new hydro-electric power scheme on two unnamed tributaries of the Afon Morfa, beginning on land at Bron Lletty Ifan Farm, Arthog, in the county of Gwynedd (National Grid Reference SH 63660 13000). The proposed scheme is positioned in an upland area within the Snowdonia National Park and also lies within the Registered Historic Landscape of *Mawddach* (HLW (Gw) 14).

2.2 The scheme begins near to the farmstead of Bron Lletty Ifan farmstead at a height of approximately 210m AOD. Following the intake of water from two tributaries, the scheme then carries the water along a low pressure pipe to a forebay tank. From here the water will be carried downslope along a high pressure pipe to a powerhouse near Bron Meirion, where the water will then be discharged back into the watercourse (National Grid Reference SH 63290 13530).

2.3 Planning Background

2.4 The proposed scheme (Planning Ref: NP5/52/367A) was approved by SNPA on 17th September 2015, with the following conditions stipulating:

> **Condition 10:** 'Prior to any work commencing (including any ground disturbing works or site clearance) pursuant to this permission the applicant/developer shall submit to and receive written approval from the Local Planning Authority for an archaeological specification for a programme of works which must meet all relevant archaeological standards. The development shall subsequently be carried out in strict accordance with the approved programme of works unless otherwise agreed in writing by the Local Planning Authority.
>
> **Condition 11:** The developer hereby approved shall be carried out in strict accordance with the archaeological specification for a programme of works as approved in condition 10 above unless otherwise agreed in writing by the Local Planning Authority.

3 Development Proposals

3.1 The development proposes building two new intake weirs at 263638, 312965 (Intake 1) and E 263798, N 313103 (Intake 2). From the intakes two 400mm low-pressure pipes will carry water to a forebay tank at E 263752, N 313119. From the forebay tank a single 400mm high-pressure penstock will carry the water to the powerhouse at E 263299, N 313510 and the water returned to the watercourse at E 263300, N 313512.

3.2 The low pressure pipes will be buried from the two intakes to the forebay tank. The low pressure pipe from Intake 1 is to be buried in the bank alongside an existing well maintained track using the cut and fill method. The low pressure pipe from Intake 2 will be buried across marshy grassland taking care to separate the top soil during construction so that the grassland can be returned to its original state.

3.3 The high-pressure penstock will be buried from the forebay tank, across open grazed fields and through a gateway in a stone wall. The land here is rocky and the penstock should avoid rock veins where possible. The penstock will then drop steeply downhill through the grazed fields which show possible evidence of prehistoric settlement activity. The pipe will then be buried across the bracken field to the left of the public footpath, avoiding the existing birch woodland; this area will be planted with new birch trees leaving a 3m wide grass-covered strip to the side of the buried penstock to provide access to the lower section of the penstock in the event of the penstock requiring maintenance in the future.

3.4 At the bottom of this field, there is evidence of an old track and a double stone wall. A section of this wall will need to be removed to allow the pipe to be buried under it and for machine access to the lower workstation. We propose to keep a permanent access track through this section to allow access in the future to the penstock for maintenance reasons and to aid woodland management.

3.5 After the wall at E 263547, N 313347 the landscape changes to mixed broadleaf woodland and scrub. There are some hazel which shall be coppiced or removed to create the access track, but no mature broadleaf trees will be affected. It has been proposed to continue the permanent track to the workstation at E 263465, N 313384.

3.6 The penstock will then enter some mature woodland at E 263552, N 313352 close to where there are remnants of an historic weir. From this point, the penstock enters mature unmanaged broadleaf woodland and will pass overland to ensure minimal impact on existing trees in

accordance with the ecological assessment. It is proposed that the penstock will cross the river at the location of the old weir E 263450, N 313385 so that it may remain buried under the footpath. This route allows the pipe to be laid unobtrusively into the river bed. From the far side of the stream the pipe will begin its overland journey through the woods. There are two footpaths marked on the map at this location passing through the woodland and over the penstock route. These appear to be disused and not public rights of way.

3.7 The penstock will terminate at a powerhouse at E 263289, N 313519. The water will be returned to the watercourse at E 263288, N 313522. The penstock will not be visible from any public right of way.

3.8 A small multi-core armoured cable will be buried alongside the penstock to connect the head level sensor at the forebay tank to the control unit in the Powerhouse. An armoured cable will run to Bron Meirion house to provide the site with electricity and export to the grid.

4 Historical & Archaeological Background

4.1 The development site is located within the Registered Historic Landscape (RHL) of *Mawddach* (HLW (Gw) 14).The proposed development site is not within any Conservation Area. The proposed development will not be within any Registered Park and Garden (P&G). There are also no Scheduled Ancient Monuments (SAMs), nor any Listed Buildings (LBs) along the route of the proposed scheme. The nearest SAM sites to the proposed scheme are two prehistoric cairns SAM sites, known as the *Bron-Llety-Ifan cairns and cup-marked rock* (ME242). These two SAM sites are positioned between approximately 400m – 440m southwest of the approved scheme. A further medieval Platform House SAM site is also positioned approximately 430m southwest of the scheme, known as *Cyfannedd-Fach Homestead* (ME101). The nearest Listed Building (LB) to the scheme is a Grade II milepost (LB No.15591) positioned on the northwest side of the A493. This LB lies approximately 160m west of the proposed discharge point.

4.2 As well as these designated sites, the wider landscape of the scheme is rich in known archaeological sites, particularly prehistoric and medieval settlement and field systems, and the scheme area is potentially archaeologically sensitive. A full assessment study of the impact of the scheme on the historic environment was not carried out in support of the planning application. The SNPA Archaeologist visited the scheme with Snowdonia Hydro staff on 29/01/2015 as part of the pre-application process.

4.3 The upper part of the scheme has a number of historic environment features of interest, including lyncheted relict and active field boundaries, terraces and relict walls. The penstock crosses lyncheted boundary features at E 263694, N 313173, E 263669, N 313230 and possibly at c. E 263653, N 313265.

4.4 At E 263562, N 313384 there is a small cluster of derelict buildings with attached walled enclosure and further associated walls including a double-walled track leading to the Afon Morfa. The group is recorded on the regional Historic Environment Record as PRN: 57918, but this is a record created from identification of the site from historic OS mapping and does not contain any descriptive information.

4.5 The only other entry on the HER in the immediate vicinity of the scheme is PRN: 3286, bronze palstave (axe head) findspot allocated to the farmhouse; this is an approximate location indicating its discovery nearby and underlining potential for prehistoric archaeology in the area.

4.6 An historic hydro-electricity scheme was located on the Afon Morfa. The disused weir (at E 263448, N 313385) of the historic scheme lies on the line of the new scheme and will be crossed by the penstock. Components of the generating equipment and instruments of an early twentieth century hydroelectricity scheme are present in an outbuilding (turbine room alongside garage/workshop) at Bron Meirion.

4.7 The scheme will impact upon a number of active and relict stone walls.

4.8 The SNPA Archaeologist felt that the potential impact of the scheme on the historic environment could be mitigated by a programme of archaeological works during construction and consequently a bi-partite archaeological condition was placed on the planning permission, requiring: *i)* submission and approval by SNPA of a specification for a programme of archaeological mitigation prior to any development works commencing on site and; *ii)* the subsequent adherence to the programme laid out in the specification.

5 Aims and research objectives

5.1 The proposed development relates to the installation of a 99kw hydro-electric scheme including construction of 2 intake weirs, turbine house, installation of associated pipes and cables for grid connection.

5.2 It is proposed to create a compound/workstation area at E 263465, N 313384 with a permanent access and maintenance track leading to it from the east.

5.3 Beyond the old weir at E 263448, N 313385 the penstock runs through mature unmanaged broadleaf woodland and will be installed over-ground.

5.4 There is potential for the scheme to impact upon known and hitherto unknown historic environment features, particularly in the upper part of the scheme (i.e. approx. above the old weir at E 263448, N 313385).

5.5 On this basis it is considered that the proposed development represents a potential threat to archaeological remains. As such, a mitigation programme is required. In summary, this will comprise the following elements of work:

- *A pre-construction archaeological record by walk-over survey supplemented by a basic review of existing archaeological and historical records;*
- *The marking/fencing out of sensitive archaeological areas in the proximity of the working corridor, and;*
- *An archaeological watching brief on potentially archaeologically sensitive portions of scheme.*

5.6 A pre-construction archaeological record by walk-over survey supplemented by a basic review of existing archaeological and historical records

5.7 This rapid piece of work will make a review of archaeological records by consulting with the regional Historic Environment Record (HER), held by Gwynedd Archaeological Trust (GAT) and the National Monument Record (held by RCAHMW), in order to confirm the known archaeological record for the area. With reference to the HER data, all known sites that lie within a 250m buffer zone around the route of the proposed scheme will be consulted. As well

as giving information relating to known sites along the route of the penstock, these sites will also help inform the watching brief of the character and form of archaeological sites within the immediate vicinity of the scheme.

5.8 A basic review will also be made of readily available documentary records, including cartographic sources. These will include a review of the early OS Surveyors drawing, the Tithe Map, the OS First Edition map (1:10560 and 1:2500), the OS Second Edition map (1:10560 and 1:2500), and any later OS map editions relevant to the scheme. Aerial photographs will also be inspected.

5.9 With regard to the walk-over survey, the route of the penstock and a 25m corridor to either side of it (i.e. 50m total width centred on the penstock) will be filed walked to determine the archaeological potential of the scheme and its immediate environs, as well as to define potential areas for marking out, in order to avoid possible damage by construction machinery and in order to inform the watching brief archaeologist.

5.10 In order to create a lasting record, all historic environment features (including all walls/boundary features and the components of the historic hydro-electricity scheme will be recorded photographically accompanied by written description. All photographs will include a scale and will be appropriated using a high quality digital SLR camera, set to highest image resolution in RAW or TIFF format, with images presented as both TIFF and high resolution JPEGs in the archive.

5.11 The marking/fencing out of sensitive archaeological areas in the proximity of the working corridor

5.12 It is proposed that the contracted archaeologist (Richard Scott Jones) will attend a pre commencement meeting with key representatives of the construction team, at which all known archaeological constraints will be outlined.

5.13 The route will be walked with the construction team representatives and known sensitive areas identified. This will include establishing the positioning of any marking out (e.g. by temporary barriers/fencing) required to protect archaeologically sensitive locations along the route. Care will be taken to ensure that in identifying sensitive areas with potential to be affected by the development, all of the scheme activities, including vehicle movements and location of works/lay-down compounds, not just the construction works, are considered.

5.14 Archaeological Watching Brief

5.15 On the basis of the information currently available, it is considered that a watching brief should be carried out on all intrusive excavation works in the upper portion of the scheme (i.e. approx. above the old weir at E 263448, N 313385). However, the extent of the watching brief may vary following the results of the walkover survey and review of archaeological and historical records.

Methodology and Sources

5.16 The aims of the watching brief, as defined by the CIfA (2014) are:

- to allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established

with sufficient accuracy) in advance of development or other potentially disruptive works;

- to provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.

5.17 A watching brief is not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.

5.18 The objective of a watching brief is to establish and make available information about the archaeological resource existing on a site.

General

5.19 It is understood that the archaeological watching brief will be undertaken by HRS Wales staff using current best practice from July/August 2016.

5.20 All work will be carried out by a suitably qualified archaeologist (Richard Scott Jones) with relevant level membership of the Chartered Institute for Archaeologists (CI*f*A) and will follow the CI*f*A Standard and Guidance for an archaeological watching brief (CI*f*A 2014).

Detailed

5.21 All proposed groundwork will be undertaken under close and constant archaeological supervision.

5.22 If archaeological features, finds or deposits are uncovered, work will be stopped in the area of the exposed material in order that the supervising archaeologist can clean and identify the extent and nature of the material and for a degree of excavation and recording to take place.

5.23 All archaeological deposits or features that are identified will be cleaned, recorded and fully excavated. The developer will provide a safe working area and sufficient time to record and excavate all features to the satisfaction of the SNPA archaeologist. Full excavation and recording of identified features will not be compromised by the construction program.

Contingency Arrangements

5.24 In the event of significant archaeological features being discovered all activities in this area of the site will be temporarily suspended. This will allow a period of consultation with the client, the regional archaeological trust, the council and any potential specialists.

5.25 Following such consultation, recommendations will be presented to the Developer and the Local Planning Authority.

5.26 The methodology and timescale of additional archaeological work to investigate such features will be presented and included in the Developers Program, the feature will be made secure thus allowing the site program to continue.

Recording

5.27 Recording will be carried out using HRS Wales recording systems (pro-forma context sheets etc), using a continuous number sequence for all contexts.

5.28 Plans and sections will be drawn to a scale of 1:50, 1:20 and 1:10 as required and related to Ordnance Survey datum and published boundaries where appropriate.

5.29 All features identified will be tied in to the both the OS National Grid and all local site and ground plans.

5.30 Photographs will be taken in digital format, using either a 14 mega-pixel DSLR camera with photographs stored in both RAW and high resolution JPEG formats. Should significant remains be identified that require comprehensive excavation, photographs may also be appropriated in black and white and colour slide (35mm film).

Artefacts

5.31 Archaeological artefacts recovered during the course of the work will be cleaned and labelled using an accession number, which will be obtained from the local museum. A single number sequence will be allocated to all finds. The artefacts will be stored appropriately until they are deposited with a suitable local museum.

5.32 All finds of gold and silver will be removed to a safe place and the Environment Agency, the SNPA archaeologist and the local coroner informed, within the guidelines of the Treasure Act 1996.

5.33 Any finds which are considered to be in need of immediate conservation will be referred to a UKIC qualified conservator.

Human remains

5.34 In the event of burials or cremations being found all work will be halted in the area of the burials and their extent and nature established. The client, the SNPA archaeologist and the Ministry of Justice will be informed and a methodology of excavation agreed which will adhere to Ministry of Justice Guidelines.

Environmental and technological samples

5.35 Samples will be taken where necessary if significant deposits are located.

Specialists

5.36 In the event of certain finds/features etc. being discovered, the site archaeologist may have to seek specialist opinion for assistance. Such specialists will be accessed either internally within HRS Wales itself or from an external source.

6 Post-Fieldwork Programme

Conservation

6.1 After agreement with the client, arrangements will be made for the long term conservation and storage of all artefacts in an appropriate local or county museum.

Archive

6.2 The site archive will be prepared in accordance with MAP 2, Appendix 3 (English Heritage 1991). It will comprise all the data recovered during the fieldwork and shall be quantified, ordered and indexed and will be internally consistent. The archive will be deposited with the finds in a suitable local museum.

Reporting

6.3 The results will be submitted in an illustrated and bound report, which will include the following material:

The report will contain the following:

- Site code/project number; dates of fieldwork visit; grid reference; location plan; and a plan showing the limits of the study area.
- Non technical summary.
- Introduction.
- Aims and objectives of the study.
- Methodology and sources consulted.
- Results of pre-commencement desk based assessment and walk-over
- Summary and synthesis of the archaeological results.
- Mitigation strategies
- Results of Watching Brief
- Conclusions and recommendations
- Appendices. To include Figures (maps, plans, drawings), Photo Plates, Gazetteer of all known HER sites within 250m buffer, copy of the SNPA design brief and the approved specification.
- References to all primary sources.

Monitoring

6.4 Any changes to this written scheme of investigation that the contractor may wish to make after approval will be communicated to SNPA archaeologist for approval on behalf of the Local Planning Authority.

6.5 Representatives of SNPA will be given access to the site so that they may monitor the progress of the watching brief. The SNPA archaeologist will be kept regularly informed about developments, both during the site works and subsequently during any potential post-excavation.

Archive Format & Deposition

6.7 The full site archive will be deposited within one month of the completion of the client report.

6.8 The paper/drawing/digital archive will be deposited at the offices the Royal Commission on Ancient and Historical Monuments of Wales (RCAHMW) with the finds being deposited with the appropriate local museum. HRS Wales will agree the location and timing of the deposition of the archive before the contract commences.

6.9 The archive will include all site notes, finds, documents, drawings, photographs, digital data and a copy of the final report and any prior draft versions. All of these items will be clearly quantified in tabular from in an 'archive deposition statement' located at the rear of the clients report, and their ultimate location and proposed date of deposition stated.

7 Resources and timetable

Standards

7.1 The watching brief will be undertaken by HRS Wales staff using current best practice.

7.2 All work will be undertaken to the standards and guidelines of the CIfA.

Staff

7.3 The project will be undertaken by suitably qualified HRS Wales staff. In this instance Richard Scott Jones will be managing the project.

Equipment

7.4 The project will use existing HRS Wales equipment.

Timetable of archaeological works

7.5 It is anticipated that the ground work for the construction for the development will start in July/August 2016.

Health and safety

7.6 All members of staff will adhere to the requirements of the *Health & Safety at Work Act*, 1974, and the Health and Safety Policy Statement of HRS Wales.

Insurance

7.7 HRS Wales presently holds Public Liability Insurance up to £5,000,000 and Professional Indemnity Insurance up to £250,000.

Richard Scott Jones *(BA, MA, MCIfA)*

Date: 10th June 2016

APPENDIX V:
Archive Cover Sheet

ARCHIVE COVER SHEET

Bron Lletty Ifan Hydro-electric Scheme, Arthog, Gwynedd.

ARCHIVE DESTINATION – HRS Wales

Site Name:	Bron Lletty Ifan Hydro-electric Scheme
Site Code:	BLI/2016/WB
PRN:	
NPRN :	N/A
SAM:	N/A
Other Ref No:	HRSW Report No. 182
NGR:	SH 6364 1297 to SH 8326 1357
Site Type:	Multi Period uplands landscape
Project Type:	Archaeological Assessment
Project Manager:	Richard Scott Jones
Project Dates:	October - November 2016
Categories Present:	N/A
Location of Original Archive:	RCAHMW
Location of duplicate Archives:	Snowdonia National Park Authority (SNPA)
Number of Finds Boxes:	None
Location of Finds:	N/A
Museum Reference:	N/A
Copyright:	HRS Wales
Restrictions to access:	None

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