

## LOWER HENDRE RESERVOIR, GWYNEDD

### ASESIAD ARCHEOLEGOL / ARCHAEOLOGICAL ASSESSMENT



Ymddiriedolaeth Archaeolegol Gwynedd  
Gwynedd Archaeological Trust

# LOWER HENDRE RESERVOIR, GWYNEDD

## ASESIAD ARCHEOLEGOL / ARCHAEOLOGICAL ASSESSMENT

Yr Amgylchedd Hanesyddol yn Cofnodi Prif Gyfeirnod /  
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Golygfa gyffredinol o'r gwaith llechi i'r de o Gronfa Ddŵr Hendre Isaf /  
General view of the slate workings south of Lower Hendre Reservoir (G2659\_014)

Cyhoeddwyd gan Ymddiriedolaeth Archaeolegol Gwynedd  
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Rev No.	Summary of Changes	Ref Section	Purpose of Issue
0.1	Additional discursive/analytical text, including reference to the 1998 assessment of the quarry	Throughout	Final approval
0.2	Inclusion of UAS survey methodology and results	1, 2.5, 3.4 Plates 29-32; Figure 09	GAPS Request

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## CRYNHODEB ANHECHNEGOL

*Comisiynwyd Ymddiriedolaeth Archeolegol Gwynedd gan Cyfoedd Naturiol Cymru i gynnal asesiad archeolegol cyn gwaith terfynu arfaethedig yng Nghronfa Ddŵr Hendre Isaf sy'n rhan o chwarel lechi Hendre Ddu. Mae'r chwarel ym mhen dyffryn Angell, yn ne Gwynedd, ac roedd ar waith rhwng canol y bedwaredd ganrif ar bymtheg a chanol yr ugeinfed ganrif. Nod y gwaith terfynu arfaethedig yw atal y gronfa ddŵr rhag dal unrhyw gyfeintiau sylweddol o ddŵr trwy gloddio ffos trwy argae'r gronfa ddŵr. Nod yr asesiad oedd nodi a chofnodi isadeiledd y chwarel yn Hendre Ddu ac i nodweddu ac o bosibl ddyddio'r nodweddion a gofnodwyd i gael gwell dealltwriaeth o safle'r chwarel.*

*Nodwyd bod y chwarel yn gorchuddio ardal helaeth gyda nodweddion y chwarel eu hunain a'r seilwaith cysylltiedig, ynghyd ag anheddau y credir eu bod hefyd yn gysylltiedig â'r gwaith. Nodwyd tri deg un o safleoedd fel rhan o'r asesiad, ac roedd pob un ohonynt yn ymwneud â gwaith y chwarel a strwythurau ategol a chysylltiedig. Cofnodwyd pedwar ar hugain o'r safleoedd hyn o'r blaen, a chofnodwyd saith fel rhan o'r prosiect hwn. Roedd y safleoedd yn cynnwys Cronfa Chwarel Hendre Isaf, y nodwyd bod ganddi wal argae wedi goroesi gyda llethr cytew amlwg wedi'i hadeiladu o rwbel llechi. Nodwyd bod tŷ Hendragode a Bythynnod Hendre-Ddu wedi'i adfer ac yn cael eu meddiannu. Nodwyd nifer o elfennau o seilwaith chwarel, megis tramffyrdd tai drwm a thomenni difetha, er bod y rhain mewn cyflwr pydredig yn gyffredinol. Roedd rhai rhannau o'r chwarel yn anhygyrch oherwydd ystyriaethau diogelwch ac ni chawsant eu harchwilio, fel ceuffyrdd y chwarel.*

*Mae recordiad manwl o strwythur yr argae cyn ei gwblhau wedi'i gwblhau gan arolwg ffotograffig o'r awyr i gynhyrchu model 3D digidol o argae'r gronfa ddŵr a chofnodi ei gyflwr.*

## NON-TECHNICAL SUMMARY

*Gwynedd Archaeological Trust was commissioned by Natural Resources Wales to undertake an archaeological assessment in advance of proposed discontinuance works at Lower Hendre Reservoir which forms part of the Hendre Ddu slate quarry. The quarry is located at the head of the Angell valley, in south Gwynedd, and was in operation between the mid-nineteenth and the mid-twentieth century. The proposed discontinuance works are aimed at stopping the reservoir holding any significant volumes of water by excavating a trench through the reservoir dam. The aim of the assessment was to identify and record the quarry infrastructure at Hendre Ddu and to characterise and possibly date the features recorded to gain a better understanding of the quarry site.*

*The quarry was noted to cover an extensive area with both the quarry features themselves and associated infrastructure, along with dwellings believed also to be associated with the workings. Thirty one sites were identified as part of the assessment, all of which related to the quarry workings and ancillary and associated structures. Twenty four of these sites had been previously recorded, and seven have been recorded as part of this project. The sites included the Lower Hendre Quarry Reservoir, which was noted to have a surviving dam wall with a pronounced battered slope built of slate rubble. Hendragode house and Hendre-Ddu Cottages were noted to be restored and in occupation. A number of elements of quarry infrastructure, such as drum houses tramways and spoil tips were noted, although these were generally in a decayed condition. Some areas of the quarry were inaccessible due to safety considerations and were not examined, such as the quarry adits.*

*Detailed recording of the dam structure prior to completion has been completed by aerial photographic survey to produce a digital 3D model of the reservoir dam and record its condition.*

# 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) was commissioned by Natural Resources Wales (NRW) to undertake an archaeological assessment in advance of proposed discontinuance works at Lower Hendre Reservoir, Gwynedd (NGR SH80141242; postcode SY20 9RU; Figure 01). The reservoir forms part of the Hendre Ddu slate quarry (Primary Reference Number 20447), which is situated at the head of the Angell valley, northwest of Aberangell. The quarry was in operation from the mid-nineteenth century to mid-twentieth century. The proposed discontinuance works are aimed at stopping the reservoir holding any significant volumes of water by excavating a trench through the reservoir dam, as detailed on *Arcadis* Drawing No. 10038919-ARC-XX-XX-DR-CE-LH0250 (Figure 02). The assessment included desk-based research, a field survey of the accessible quarry infrastructure and an Unmanned Aerial System (UAS) photographic survey of the reservoir dam. The assessment was undertaken between August and November 2020 and was completed in accordance with the following:

- *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* Version 1.1 (The Welsh Archaeological Trusts, 2018);
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015);
- *Management of Archaeological Projects* (English Heritage, 1991);
- *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England, 2015);
- *Standard and Guidance for Desk Based Assessment* (Chartered Institute for Archaeologists, 2017);
- *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (Chartered Institute for Archaeologists, 2014)
- *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (Chartered Institute for Archaeologists, 2014);
- *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures* (Chartered Institute for Archaeologists, 2014); and

- *Understanding Historic Buildings: A Good to Good Recording Practice* (Historic England, 2016).

The key aims and objectives were to:

- Complete a desk-based assessment, conduct a field survey/record of quarry infrastructure at Hendre-Ddu, and carry out a UAS photographic survey of the dam in advance of any proposed works to the Lower Hendre Reservoir, to assist with characterising and possibly dating the features recorded and to gain a better understanding of the quarry site.

The archaeological assessment was monitored by the Gwynedd Archaeological Planning Service and was undertaken in accordance with an approved Written Scheme of Investigation ([Appendix I](#)). In line with the Gwynedd Historic Environment Record (HER) requirements, the HER was contacted at the onset of the project to ensure that any data arising was formatted in a manner suitable for accession to the HER under the guidance set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). The HER was informed of the project start date, location, grid reference and estimated timescale; the project was assigned HER Enquiry Number GATHER1302 and Event PRN 45948. A bilingual event summary has been prepared for submission to the HER in accordance with their guidance.

Gwynedd Archaeological Trust is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

## 2 METHODOLOGY

### 2.1 Introduction

The proposed discontinuance works are aimed at stopping the Lower Hendre Reservoir holding any significant volumes of water by excavating a trench through the reservoir dam, as detailed on *Arcadis* Drawing No. 10038919-ARC-XX-XX-DR-CE-LH0250 (Figure 02). The assessment and field survey were undertaken in August 2020, the UAS photographic survey in November 2020. The combined programme of archaeological works was undertaken in advance of the proposed works and aimed to record, characterise and date quarry buildings and infrastructure in order to gain a better understanding of the site and to inform further decision making.

### 2.2 Assessment (Desktop Study)

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

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

1. The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) was examined for information concerning the study area, defined as Hendre Ddu slate quarry (PRN 20447) including both upper and lower reservoirs, quarry buildings and infrastructure as located in Figure 01. Examination of the core HER was undertaken, including the 6-inch and 25-inch County Series Ordnance Survey maps and any secondary information held within the HER; this included Gwynedd Archaeological Trust reports 152, 1480 and 1483, the *Dyfi Archaeological Assessment* report prepared by Engineering Archaeological Services Ltd. for *Forest Enterprise* in 1998 (Brooks and Price, 1999), D Gwyn, *Welsh Slate: the Archaeology and History of an Industry* (RCAHMW 2015) and A J Richards, *A Gazetteer of the Welsh Slate Industry* (1991). Information prepared for

the Gwynedd Council nomination bid to inscribe the Slate Landscape of Northwest Wales as a UNESCO World Heritage Site (Llechi Cymru 2019 & Llechi Cymru 2020) was also consulted.

All identified features were mapped, described and added to a gazetteer of sites and the relative importance defined based on pre-existing criteria;

2. The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) was checked for sites additional to the HER;
3. Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) were examined for potential features. This included 1946 RAF vertical aerial photographs;
4. An online catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU) was completed;
5. Archive data, including primary and secondary sources, historic maps and estate maps were not examined at the regional archives due to COVID-19 restrictions. At the time of the tithe survey, the landowner was Sir Watkin Williams Wynn of Wynnstay, Denbighshire; the archives of that estate are in Ruthin and these will also be consulted if required in future. Available archive data included the local tithe map and schedule (Mallwyd, 1838).
6. Light Detection and Ranging (LiDAR) data was examined from the Lle Geo-Portal at <http://lle.gov.wales/home> for information on potential surface features using digital terrain modelling and digital surface modelling.

## 2.3 Field Survey

A field survey was undertaken which incorporated the assessment area defined above. The aim was to visit and record known quarry features. The features were mapped and located in advance as part of the desk based assessment, using a combination of historic and GIS based data, including data from the *Dyfi Archaeological Assessment* report prepared by Engineering Archaeological Services Ltd. for *Forest Enterprise* in 1998 (Brooks and Price, 1999, which identified the key features within Hendre Ddu Quarry, as well as further information sourced during the current desk-based assessment; this information was then used to geo-locate features that were then described on GAT *pro-formas*. The sites were added to the overall gazetteer and their relative importance defined. Any newly identified assets were also recorded. Only features that could be safely accessed were directly recorded. A handheld GPS unit was also used during the walkover survey. A photographic record was maintained in RAW format using a digital SLR set to maximum resolution (Nikon D3100; resolution: 4,608 × 3,072 [14.2 effective megapixels]) and photographic metadata table was completed and included in the report. Photographic images were archived in TIFF format; the archive numbering system runs from G2660\_001 to G2660\_037 (cf. [Appendix IV](#)). Following the completion of the survey, the following archiving was completed:

1. Pro-formas: all cross referenced and complete;
2. Photographic Metadata: completed in *Microsoft Access* and cross-referenced with all pro-formas.

## 2.4 Gazetteer

A gazetteer has been compiled for all existing and newly identified sites within the quarry area, based on information sourced from the desk based assessment and the field survey; the gazetteer ([para. 3.4](#)) has been prepared in the following format:

<b>Feature Number</b>	
<b>Site name</b>	
<b>PRN number</b>	
<b>Grid reference</b>	
<b>Period</b>	
<b>Site type</b>	
<b>Assessment category</b>	
<b>Description</b>	
<b>Impact</b>	
<b>Recommendation for further assessment/evaluation</b>	
<b>Recommendation for mitigatory measures</b>	

**The following categories have been used to define the assessment category of the archaeological asset:**

*Category A - Sites of National Importance.*

Scheduled Monuments, Listed Buildings of grade II\* and above, as well as those that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both. Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

*Category B - Sites of regional or county importance.*

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

*Category C - Sites of district or local importance.*

Sites which are not of sufficient importance to justify a recommendation for preservation if threatened. Category C sites nevertheless merit adequate recording in advance of damage or destruction.

*Category D - Minor and damaged sites.*

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

*Category E - Sites needing further investigation.*

Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A - D are temporarily placed in this category, with specific recommendations for further evaluation.

**The impact of the proposed works on any asset has been identified using the following impact criteria:**

*None:*

There is no construction impact on this asset.

*Slight:*

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

*Unlikely:*

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

*Likely:*

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

*Significant:*

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

*Considerable:*

The total removal of an asset or its partial removal which would effectively destroy the remainder of the site.

*Unknown:*

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

## **2.5 UAS Aerial Photographic Survey**

The UAS aerial photographic survey was conducted in November 2020. The aerial survey was carried out using a DJI Phantom 4 Pro Plus V2.0 quadcopter UAS equipped with an onboard DJI FC6310S gimbal camera with a 1-inch 20MP CMOS sensor and a maximum resolution of 5472x3648px. The flight was conducted in accordance the Gwynedd Archaeological Trust Limited Permission for Commercial Operations (PfCO) issued by the Civil Aviation Authority (CAA), valid until 18/04/2021 (CAA Registered Operator ID OP-JHGTGQ7).

The aerial survey focused on a rectangular area of approximately 1.681ha centred on the Lower Hendre Reservoir dam. The UAS was flown in a series of east-west aligned parallel traverses over the survey area to capture a sequence of overlapping vertical photographs of the site with at least a 60% forward overlap (between photographs along the same traverse) and at least a 30% lateral overlap (between photographs on adjacent traverses). An altitude of approximately 366m AOD (25m above the ground level of the take-off point) was maintained to capture sufficient detail of the ground surface and minimise the risk of collision with trees in the survey area. Additional oblique vertical photographs were also taken at higher altitudes in order to enhance the existing photographic record of the dam. A series of 406 colour digital photographs at a resolution of 5472x3648px were taken in .jpg format and archived using a numbering system that runs from G2660\_UAV\_001 to G2660\_UAV\_406.

Seven ground control points (GCPs) were placed on the crest of the dam prior to the survey and surveyed using a Trimble R8s high precision GPS rover in order to record their OSGB grid coordinates and elevations.

The resulting aerial photographic dataset was then processed off-site using Agisoft Metashape Professional 1.6.5 in order to create a digital photogrammetric 3D model of the survey area. The model was scaled and georeferenced using the OSGB grid coordinates and elevations of the GCPs.

## 2.6 Archive and Dissemination

A full archive including plans, photographs, written material and any other material resulting from the project has been prepared and the following dissemination has been applied:

- A digital report has been prepared for *Arcadis* and Gwynedd Archaeological Planning Service;
- A paper report plus a digital report has been prepared for the regional Historic Environment Record, Gwynedd Archaeological Trust along with relevant digital datasets, including a bilingual event summary, in accordance with *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1);
- A digital report and archive data has been prepared for submission to the *Royal Commission on the Ancient and Historical Monuments of Wales*, in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information will include the photographic archive and associated metadata; and
- A copy of the digital photogrammetric 3D model of the Lower Hendre Reservoir dam has been uploaded to the Gwynedd Archaeological Trust account on the SketchFab online model hosting platform at <https://sketchfab.com/GAT2020>.

## **3 RESULTS**

### **3.1 Desk based assessment**

#### *3.1.1 Location and geological summary*

The Geology of Britain Viewer records the bedrock geology in the area of the Lower Hendre reservoir as various types of Mudstone. A sedimentary bedrock formed during the Ordovician Period (BGS 2020). These sedimentary rocks are marine in origin and include coarse to fine grained slurries of debris from the continental shelf flowing into a deep-sea environment. It is noted that the narrow vein mudstone and the broad vein mudstone at Hendre Ddu are the same veins exploited at the nearby Aberllefenni Quarry. These types of rock are notable for their lamination and quarries were situated to capitalise on these veins. No superficial deposits are recorded on the Geology of Britain Viewer for this area.

### 3.1.2 Statutory and non-statutory designations

An examination of the regional Historic Environment Record demonstrates that there are no known Listed Buildings or Scheduled monuments within the study area. There are 24 features and buildings located within 500m of the study area recorded on the Gwynedd HER. These are listed in [Appendix II](#).

Lower Hendre reservoir is situated in the Southern Uplands Historic Landscape Area (SNPHL061) of the Snowdonia National Park. This largely remote upland area stretches across southern Snowdonia and is characterised by a lack of modern and historic settlement, and rectilinear boundary walls and blocks of forestry.

#### 3.1.2.1 Slate Landscape of Northwest Wales as a UNESCO World Heritage Site

Gwynedd Council has prepared a nomination bid to inscribe the Slate Landscape of Northwest Wales as a UNESCO World Heritage Site (Llechi Cymru 2019). The aim of the nomination is to celebrate “the industrial and cultural influence of our region on the rest of the world, and the people, communities and landscape of Gwynedd” (Llechi Cymru 2019: 12). The Property Management Plan 2020–2030 prepared as part of the nomination bid states that the “Slate Landscape of Northwest Wales was formed by the quarrying, processing and transportation of slate to produce roofing materials and architectural materials for global markets, from the late eighteenth century to the twentieth. As well as the quarries and mines themselves, this landscape has also been shaped by the need to create huge tips of waste rock; to process and transport slate; to manage water to power machinery; to house quarrymen and their families, and to provide for their material, moral and intellectual well-being (*ibid*)”. The nomination bid includes six separate areas, or ‘Component Parts’:

- Component Part 1: Penrhyn Slate Quarry and Bethesda and the Ogwen Valley to Port Penrhyn;
- Component Part 2: Dinorwig Slate Quarry Mountain Landscape;
- Component Part 3: Nantlle Valley Slate Quarry Landscape;
- Component Part 4: Gorseddau and Prince of Wales Slate Quarries, Railways and Mill
- Component Part 5: Ffestiniog: its Slate Mines and Quarries, ‘city of slates’, and Railway to Porthmadog; and
- Component Part 6: Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway.

The Hendre Ddu Quarry is not part of any of these Component Parts, but it is still part of the broader slate landscape of northwest Wales. In preparation for the nomination bid Aberllefenni Slate Quarry, which is located c.4km to the southwest of Hendre Ddu Quarry, was initially included as Component Part 7, further to the completion of a Statement of Significance (Barker and Gwyn 2018) and a Field Survey and Character Area Study (Hopewell 2019). Subsequently, Component Part 7 was not included in the nomination bid as represented by the Property Management Plan 2020–2030 (Llechi Cymru 2019) and Nomination Document (Llechi Cymru 2020).

### *3.1.3 Environmental remains and soil morphology*

The likelihood of the presence of environmental remains of archaeological significance is currently unknown. However the lower reservoir, even though mostly overgrown, could contain waterlogged deposits but the potential for this is thought to be low. The soil morphology is also currently unknown but it is likely to be a shallow topsoil layer with areas of exposed bedrock and quarry spoil.

A programme of geotechnical test pitting has been completed by Arcadis in advance of the proposed works at Lower Hendre Reservoir. Three geotechnical trial pits were excavated on top of the reservoir dam and samples were taken of soil for contamination testing. The trial holes were excavated to a depth of 1m using a mini tracked excavator; there was no water ingress into any of the pits but the sides were prone to collapse. No structures or structural material were encountered in any of the pits, but it was evident that the dam was constructed from slate waste material. The trial pits were refilled with as dug material and this was compacted into place. The trial pit report stated the access route to the dam crest from the forest track comprised disturbed vegetation and “superficial materials”, suggesting a more defined constructed route was not present.

Trial Pit 1 contained c.5cm of topsoil over loose crushed flat slate particles varying from cobble to small gravel size with a rare silt and clay matrix.



**Plate 1: Trial Pit 1 post excavation (image provided by client)**

Trial Pit 2 contained c.5cm of topsoil over loosed crushed flat slate particles varying from cobble to small gravel size with a rare silt and clay matrix. A brown firm silty clay inclusion was found in the pit. This was localised and was not found to be continuous across the pit. The pit was excavated to a depth of 1m.



**Plate 2: Trial Pit 2 post excavation (Image provided by client)**

Trial pit 3 contained c.5cm of topsoil over loose crushed flat slate particles varying from cobble to small gravel size with a rare silt and clay matrix. The pit was excavated to a depth of 1m.



**Plate 3: Trial Pit 3 post excavation (Image provided by client)**

### *3.1.4 Historical and archaeological background*

#### *3.1.4.1 Introduction*

No sites of prehistoric or Roman date are noted on the Gwynedd HER within 1km of the study area. Their absence from the record is most likely due to the lack of information available about early activity in the area due to its remoteness. The extensive workings associated with the slate quarrying are also likely to have disturbed any relict archaeological remains from early periods within the area of the quarry itself.

The large parish of Mallwyd has extensive remote uplands, in which the Hendre Ddu Quarry is situated. The remoteness of the area and distance from established authority meant that the area became noted for lawlessness in later medieval times. This was the region of the Red Bandits of Mawddwy, well established by the 16<sup>th</sup> century, which is remembered in the name of the Mallwyd village pub, The Brigands.

According to tradition, Mallwyd church was founded in the 6th century by St Tydecho after he came to the area from Cornwall. The present building dates from the 14th century and is unusual in form, being long and narrow with a balcony at each end. There are many wooden fixtures dating from the 17th century. The scholar John Davies was rector of Mallwyd for 40 years at the beginning of the 17th century. There is a memorial to him in the church which was put up to commemorate the 200th anniversary of his death. Outside the church are several great yew trees.

### 3.1.5 Post-Medieval Settlement

Hendre Ddu slate quarry (Primary Reference Number (PRN) 20447) is remotely situated at the head of the Angell valley, northwest of Aberangell. The quarry was in the old county of Merioneth and was in operation from the 1850s to the 1940s (Richards 1991). The quarry is partly underground and includes a large mill and other quarry buildings, with material sent out via the Hendre Ddu incline and tramway, which was connected to the privately financed Mawddwy Railway. In 1864 the Hendre Ddu Slate and Slab Co. was established by Sir Edmund Buckley (NLW MS 19654E). The company specialised in slate slabs for billiard table beds, and output in 1883 was 878 tons from 31 men, but is unlikely to have ever exceeded 1000 tons. Some papers relating to the work of the quarry are housed in a broader bundle of documents at Denbighshire Archives (DRO DD/RO/132), relating to the years 1860-1885. These however relate to the business arrangements of the quarry and its commercial relationship with other quarries, rather than technical maps and plans relating to the works themselves.

The quarry employed 25 men in 1898 and 17 in 1937-8, and it closed in 1946 (Richards 1991, 117). Also munitions were stored in the Hendre Ddu Quarries during the Second World War and for some years afterwards.

Visible remains in 1991 included workings on four levels, a compact mill area, adits associated with massive spoil heaps (containing sizeable blocks), traceable tramroad formations and inclines, and a well-preserved reservoir at the top of the site (the upper reservoir); the quarry was known to have had a ward for injured workers attached to it (*ibid.*). Multiple PRNs have been assigned across the quarry to denote various buildings and features (including PRNs 9130 to 9147; PRN 9309; PRN 20447 and PRN 21056). The general area is now heavily forested, with access tracks leading to the quarry and around the upper reservoir. The upper reservoir still retains water and is triangular in shape, with a dam and outfall at the southern end; the lower reservoir is of similar shape but is smaller in size, also with a dam at the southern end, but does not regularly hold water. The upper and lower reservoirs (PRN 9146 and 9147 respectively) are located to the northwest of the main quarry buildings which are located in a clearing.

There are numerous other quarry workings in the vicinity of Hendre Ddu, including Ratgoed (Lynes 2019) and Aberllefenni (Evans *forthcoming*). The nearby quarry at Aberllefenni is of some significance, and has been assessed as part of the World Heritage Site nomination (NGR SH 773106; Hopewell 2019, 11-46). This quarry produced slate that was not suitable for splitting, so was instead used for slab (*ibid.*, 11), and was associated with the quarry

estate village of Aberllefenni, which commenced building in c.1860. An elaborate infrastructure using a quarry tramway, which ran over the reservoir, and an elaborate series of internal and external winches and cranes, to bring down the slate, is of technological significance, a very similar system was also utilised at Hendre Ddu. The quarry was in use piecemeal from the 14<sup>th</sup> century, but modern quarrying as the associated technological developments dated from c.1810 throughout the 19<sup>th</sup> century. Quarrying ended in 2003 at the site, but the main mill has been equipped with modern machinery and is still in use for processing slate waste.

Ratgoed Quarry was the northern most of the slate quarries served by the Corris Railway. It was located to the north of Aberllefenni and c.1km west of Hendre Ddu Quarry, on the western side of Mynydd Llwydiarth. The quarry primarily worked the narrow vein, though it also produced some broad vein slates (Richards, 1994). The original workings at Ratgoed date back to before 1840 when they are mentioned in the will of Horatio Nelson Hughes. In the late 1840s the quarry closed for a brief time, before re-opening in 1851. The fortunes of the quarry were improved significantly in 1864 when the Ratgoed Tramway opened, a 2 ft 3 in gauge horse worked tramway, which was an autonomous branch of the newly opened Corris Railway. Connecting the remote quarry with the Corris Railway at Aberllefenni prompted significant expansion work at the quarry, enabling it to operate profitably until 1878; but in 1879 slate prices dropped throughout the industry and small, remote concerns like Ratgoed suffered in the downturn. The quarry continued production through the 1880s, but at a reduced annual output. Fortunes revived in the early 1890s, but towards the end of the century the accessible supplies of more profitable roofing slates at Ratgoed were running dry and the owners attempted to sell the business in 1897. By 1900 the remaining workforce was dismissed and the quarry closed (Corris, 1900).

#### 3.1.5.1 Cartographic Evidence and History of Land Ownership

Hendre Ddu quarry was located in the ancient parish of Mallwyd, which was the remotest southern parish in Meirionnydd, bordering Montgomeryshire. The tithe map of 1838 (Figure 03), dating from prior to the opening of the quarry, shows that the landowner was Sir Watkin Williams Wynn of Wynnstay, Denbighshire. The quarry area formed part of a large open area of land, with any field subdivisions within it not shown on the map. The extensive archives of that estate are available for study in the Denbighshire Archives at Ruthin and the National Library of Wales, however, these could not be accessed at the time of writing due to current Covid-19 regulations. The information from the tithe apportionment is given below:

Landowners	Occupiers	Number Referring to the Plan	Name and Description of Land and Premises	State of Cultivation	Quantities in Statute Measure		
					A	R	P
Sir Watkin Williams Wynn Bart.	Evan Owens	31	Hendredu	-	499	1	37

An examination of the First to Third Edition 6-inch to 1-mile Ordnance Survey Merionethshire County Series Map Sheet 38SW (published 1888, 1899 and 1913 respectively; cf. Figures 04, 05 and 06) shows the extent of the visible quarry infrastructure. The distribution of the main quarry buildings does not appear to alter, but it is notable that the quarry is listed as “disused” on the Third Edition and the lower reservoir, listed and clearly visible on the First and Second Edition maps, is not listed on the Third Edition, with only the outline of the reservoir visible as an earthwork. This suggests the lower reservoir ceased in purpose in the early twentieth century.

### 3.1.6 Previous Historical and Archaeological work

An archaeological assessment of the Dyfi forest, which includes the location of Hendre Ddu Quarry, Ratgoed Quarry and Aberllefenni Quarry, was completed by Engineering Archaeological Services Ltd. for *Forest Enterprise* in 1998 (Brooks and Price, 1999). The aim of the assessment was to evaluate the archaeological heritage of the Dyfi forest using data gathered through desk-based assessment and field assessment. The desk-based assessment examined information from the regional Historic Environment Records and this information, along with digital mapping, was used to determine the scope of the field assessment. The field assessment was completed in November and December 1998; the report highlighted that this was a very wet period, which acted as a constraint in recording some sites, as did vegetation and overgrowth. The field assessment recorded multiple sites that were not identified on base maps or historic mapping. Overall, the assessment recorded or updated 430 sites within Dyfi forest. The majority of sites were associated with the slate industry, with the remaining sites including agricultural buildings, farmsteads and boundary stones. At Hendre Ddu Quarry, the assessment identified twenty four sites, PRN 9127 to PRN 9147, PRN 9276 to PRN 9277 and PRN 9309, all now listed in the Gwynedd Archaeological Trust HER ([Appendix II](#)); these included the quarry itself as well as associated infrastructure. Two features, PRN 9128 (Incline) and PRN 9129 (Tramway) were listed as having “(N)o physical presence”, whilst the remainder were generally visible or identifiable. The Lower Hendre reservoir was visited on 09/12/1998 and recorded as PRN 9147; it was ascribed management category “B”, defined as a feature of “regional or local importance”. The reservoir was described as a triangular in shape with a dam at the southeastern end, the dam was noted to still contain water, which was “strange” in colour; the recommendations were to “(C)heck water quality, maintain dam”.

An assessment including Aberllefenni Quarry, which is located c.4km to the southeast of Hendre Ddu Quarry, was completed by GAT in 2019 (Hopewell, 2019), as part of the *Slate Landscape of North-West Wales* World Heritage Site nomination bid preparation. The assessment included a field survey and examined the Gorseddau and Prince of Wales Slate Quarries, Railways and Mill; Bryneglwys Slate Quarry and Aberllefenni Slate Quarry. A total of 443 sites were recorded that were grouped into twenty character areas, seventeen of which were found to be of national importance (*ibid.*). The use of character areas within each quarry, as opposed to individual sites, was determined as the preferred scheduling and management option. The assessment built on a previous work (Hopewell 2016) which examined the potential for enhancing the management of the physical remains of the

industry through scheduling. It was recognised in the 2016 report that much of the baseline data held by the Historic Environment Record (HER) was both “inaccurate and incomplete” (*ibid.*). Reliable data was deemed necessary for undertaking the scheduling process and for management of the assets. The quarries in the four largest WHS nominated areas (Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn; Dinorwig Slate Quarry Mountain Landscape; Nantlle Valley Slate Quarry Landscape and Ffestiniog:its Slate Mines and Quarries, ‘city of slates’ and railway to Porthmadog) had previously been re-examined by GAT during 2016-17 and 2017-18. The result of the assessment at Aberllefenni Quarry et al. was that the HER records were updated, producing accurate grid references for known sites, along with new records for previously un-surveyed areas. For each character area, a value was ascribed based on scoring criteria defined in Design Manual for Roads and Bridges Volume 11, Section 2, art 5: Assessment and Management of Environmental Effects 2008 (DMRB); these values ranged from AA (Very High – International Importance) to U (Unknown – Requires further assessment). Aberllefenni Quarry was sub-divided into eight character areas (A-01 to A-08), which ranged from values A (National Importance) to C (Local Importance). Aberllefenni Quarry was initially included in the *Slate Landscape of North-West Wales* World Heritage Site nomination bid as Component Part 7, but was subsequently removed from the bid. Archaeological mitigation was subsequently undertaken at Aberllefenni Quarry during repair works to three culverts associated with a disused tramway viaduct (PRN 74896; NGR SH77030996), located in Character Area A-08. The tramway crossed a reservoir that included the former line a railway to Aberllefenni and a length of the Ratgoed Quarry tramway (Hopewell 2019, 11-46). The railway joined the quarry extraction pits to the village of Aberllefenni where there were several buildings related to the quarry. The culverts were in a state of disrepair and the archaeological mitigation included a detailed photographic record of the tramway and culverts before site works, followed by a watching brief during the repair. This work was carried out in 2020 and the report is forthcoming.

A programme of archaeological mitigation was completed at Ratgoed Quarry in advance of reservoir discontinuance, c.1km to the west of Hendre Ddu Quarry (Lynes, 2019). The archaeological mitigation involved a basic written and photographic record of the largest of three reservoirs (PRN 9154; NGR 78651232), which was triangular shaped with the dam at the southwestern end and feeder leats. Ratgoed Quarry started operating in 1840, and was run alongside the nearby Gaewern and Braich Goch quarries. The quarry used the reservoirs as an elaborate system of water management.

### *3.1.7 Artefact potential*

The presence of artefacts dating from the prehistoric to post-medieval times is thought likely to be low, due to a lack of evidence of activity during these times. Given the extensive nature and duration of the quarrying works on the site, the potential for the discovery of artefacts dating to the industrial and modern periods is considered to be high.

### 3.1.8 *Aerial Photographs and LiDAR*

#### 3.1.8.1 Aerial Photographs

One historic aerial photograph of Hendre Ddu Quarry was examined dating from the 1940s, which is listed below:

- RAF 4801 540\_39 Image 5087 taken on 6<sup>th</sup> May 1948 (Figure 07).

The aerial photograph showed the upper and lower reservoirs clearly, with the lower reservoir no longer in water. The quarry buildings are shown, but no additional detail was observed that cannot be seen on the Ordnance Survey maps. The surrounding area is shown as unenclosed upland, with a number of watercourses. Enclosed small fields and paddocks are noted in the river valley to the east, with Hendre Ddu cottages located at the watercourse confluence.

#### 3.1.8.2 LiDAR

Lidar Composite 2 DTM data taken from the Welsh Government *Lle Portal* was examined; however, no suitable datasets for this area were encountered. This is probably due to the remote location of the quarry, and the fact that the area is now heavily wooded.

## **3.2 Field Survey**

The field survey was carried out on 28<sup>th</sup> August 2020, in overcast conditions, which were suitable for carrying out the survey. All quarry and related features which had previously been identified in the desk-based assessment phase of the work were visited on foot where this was possible, although some were inaccessible either due to safety considerations, or were not visible in dense woodland. Many features, including the Lower Reservoir itself (Feature 13; Plates 10-11, 14) were examined. The area was also examined for further evidence on the ground for any other related features. A descriptive and photographic record was maintained during the survey, and the sites identified were listed in the gazetteer below (Section 3.3).

### 3.3 Gazetteer of features

#### 3.3.1 Introduction

All the sites included in the gazetteer are shown on Figure 08. All recommendations are based on the current understanding of the scheme proposals and their impact on the features, and may have to be revised if information about the scheme impacts changes. In the event of alterations to the scheme, the recommendations might have to be revisited. A 'C' after the grid reference indicates the central point of a larger feature, and 'A' after the reference indicates the central point of a wider group of features.

The archaeological assessment results for Hendre Ddu Quarry from the 1998 report completed by Engineering Archaeological Services Ltd. (Brooks and Price, 1999) formed the basis of the current gazetteer and this was supplemented with any new sites identified. The current assessment used the same approach as in 1998 by examining information from the regional HER, digital mapping (MapInfo GIS) and a field survey. The current field survey was completed in August 2020 in overcast conditions (the survey for the original assessment was completed in December 1998 in wet conditions); as with the original survey there were constraints in recording some sites due to vegetation and overgrowth; safe access to individual sites was also an issue. The 1998 assessment identified twenty four sites: PRN 9127 to PRN 9147, PRN 9276 to PRN 9277 and PRN 9309 ([Appendix II](#)); of these the following twenty three sites were included in the 2020 assessment:

- PRN 9127 - Drum House: visible during the 2020 field survey partly cut into a hill side, constructed of slate rubble;
- PRN 9129 – Tramway: listed as having no physical presence in the 1998 field survey and considered destroyed by a modern forest road, the 2020 field survey suggested that the route was still discernible through the landscape;
- PRN 9130 - Hendre Ddu Quarry Building 3: location visited but inaccessible during 2020 field survey;
- PRN 9131 Hendre Ddu Quarry Level 1: adit mine; inaccessible during 2020 field survey;
- PRN 9132 - Hendre Ddu Quarry Spoil Tip 1: waste tip for PRN 9131; more visible during 2020 field survey than 1998 survey but inaccessible;
- PRN 9133 - Hendre Ddu Quarry Building 3: location visited but inaccessible during 2020 field survey;

- PRN 9134 Hendre Ddu Quarry Level 2: adit mine; inaccessible during 2020 field survey;
- PRN 9135 - Hendre Ddu Quarry Spoil Tip 3: waste tip from PRN 9134; visible but inaccessible during 2020 field survey;
- PRN 9136 - Hendre Ddu Quarry Pit 1: large quarry pit downslope of Lower Hendre Reservoir (PRN 9147); visible during 2020 field survey but heavily overgrown with unsafe access;
- PRN 9137 - Hendre Ddu Quarry Level 5: adit mine; inaccessible during 2020 field survey;
- PRN 9138 - Hendre Ddu Quarry Bench: inaccessible during 2020 field survey;
- PRN 9139 - Hendre Ddu Quarry Spoil Tip 2: waste tip from PRN 9137; visible but inaccessible during 2020 field survey;
- PRN 9140 - Hendre Ddu Quarry Level 4: adit mine; inaccessible during 2020 field survey;
- PRN 9141 - Hendre Ddu Quarry Spoil Tip 4: waste tip from PRN 9140; inaccessible during 2020 field survey;
- PRN 9142 Hendre Ddu Quarry Building 1: accessible in the 1998 field survey but not accessible during 2020 survey as within the curtilage of PRN 90585 (Hendragode House);
- PRN 9143 - Hendre Ddu Quarry Building 4: accessible in the 1998 field survey but not accessible during 2020 survey as within the curtilage of PRN 90585 (Hendragode House);
- PRN 9144 - Hendre Ddu Quarry Level 3: adit mine; inaccessible during 2020 field survey;
- PRN 9145 - Hendre Ddu Quarry Spoil Tip 5: waste tip from PRN 9144; inaccessible during 2020 field survey;
- PRN 9146 - Hendre Ddu Quarry Reservoir 1, Mawddwy; visible and accessible during 2020 field survey with evidence of clearance and recent repair;
- PRN 9147 - Hendre Ddu Quarry Reservoir 2, Mawddwy/Lower Hendre Reservoir: visible during 2020 field survey but heavily overgrown;

- PRN 9276 – Hendre Ddu Tramway: not visited in the 2020 field survey as identified in the 1998 field survey as in use as a forest track;
- PRN 9277 – Hendre Ddu Tramway: not visited in the 2020 field survey as identified in the 1998 field survey as in use as a forest track;
- PRN 9309 - Hendre Ddu Quarry Track - Track identified in 1998 field survey as joining PRN 9131 to PRN 9134; described as a well-made track c.1 m wide supported in places by well-made revetting wall; recorded as partly overgrown in the 1998 field survey and visible in the 2020 field survey.

*PRN 9128 (Incline) was listed as destroyed by a modern forest road in the 1998 field survey and was not identified or included in the 2020 assessment.*

Additional PRNs, not considered part of Hendre Ddu Quarry but included in the 1998 assessment:

- PRN 9166 - Mynydd Hendre-ddu Boundary Stone, Corris: visible on Ordnance Survey 6-inch but inaccessible during 2020 field survey;

Seven additional PRNs identified during the 2020 assessment were:

- PRN 90585 - House adjacent to PRN 9143: still extent building within quarry situated east of PRN 9143 and PRN 9142;
- PRN 90586 - Hendre-Ddu Cottages: located on historic and modern mapping; formerly six cottages now restored and inhabited;
- PRN 90587 - Footpath from Cottages to Quarry: visible on historic mapping but not visible or accessible on the ground;
- PRN 90588 - Possible buildings in tree line noted on aerial photo east of PRN 9130; no evidence for this was noted on the ground;
- PRN 90589 – Magazine: noted as magazine on 1<sup>st</sup> Editions 6-inch to 1-mile Ordnance Survey map. The location of this feature was completely overgrown in an area of conifer plantation, and was not located on the site visit;
- PRN 90590 – Ford and gravel pit behind cottages noted on 6-inch to 1-mile Ordnance Survey historic mapping. There are no surviving historic features on the ground, as the area is covered woodland and a modern forest track crossing point;
- PRN 90591 – Tramway: on the same route as PRN 9129 but more substantial markings on 1<sup>st</sup> edition 6-inch to 1-mile Ordnance Survey; largely destroyed by the

forest trackway, with possible remnants surviving in the form of slate revetment walling with facing stones, adjacent to the PRN 90585; it is also visible on a 1948 aerial photograph.

### 3.3.2 *Assessment Category*

As stated in [para. 2.4](#), the sites recorded in the archaeological assessment have been divided into five categories (A to E), based on national (Category A), regional (Category B) or district/local importance (Category C), or whether they are minor sites (Category D) or sites needing further investigation (Category E). These categories are generally comparable to those used for the 1998 assessment, particularly Categories A (National Importance), B (Regional Importance) and C (lesser significance), with Category E from the 2020 assessment comparable to the *Not Yet Evaluated* category from 1998; the *No Visible Presence* category from the 1998 assessment has not been duplicated for the current assessment. These current assessment categories are also generally comparable to those used for the assessment of Aberllefenni Quarry c.4km to the southeast (Hopewell, 2019), as part of the *Slate Landscape of North-West Wales* World Heritage Site nomination bid. In that assessment, values were assigned for character areas rather than individual features, using scoring criteria defined in Design Manual for Roads and Bridges Volume 11, Section 2, art 5: Assessment and Management of Environmental Effects 2008 (DMRB). These values ranged from AA (International Importance), A (National Importance), B (Regional Importance), C (Local Importance), D (Local Importance – to include badly damaged sites and findspots) and U (Unknown – Requires further assessment). Categories A to D and U were similar to Categories A to E in the current assessment; the key difference was that the Aberllefenni Quarry assessment focussed on character areas within the quarry, whilst the 2020 assessment for Hendre Ddu Quarry matched the 1998 assessment in categorising individual sites.

A key consideration for the current assessment has been whether the assessment categories used in 1998 assessment are applicable and equivalent to the 2020 assessment and this is analysed and discussed in each gazetteer entry.

The current assessment has also considered the appearance and condition of the identified sites, comparing information from the 2020 survey with the 1998 survey. It was found in most cases that whilst the location of the sites identified in 1998 were often visible, many were inaccessible due to vegetation overgrowth and/or safety limitations. Where necessary, the gazetteer entries have used the site descriptions from the 1998 survey; it is stated in the gazetteer where original descriptions have been used.

The current assessment has been prepared with consideration given to the nomination bid to inscribe the Slate Landscape of Northwest Wales as a UNESCO World Heritage Site, including the recent assessment at Aberllefenni Quarry. Whilst the Hendre Ddu quarry is not one of the Component Parts that are the key elements of the bid, the quarry is still part of the broader slate quarry landscape in the region, including Ratgoed and Aberllefenni quarries locally and northwest Wales generally.

For the purposes of the gazetteer, sites are given feature numbers.

### 3.3.3 Hendre Ddu Quarry Gazetteer

<b>Feature Number</b>	<b>01</b>
<b>Site name</b>	Hendre Ddu Quarry Bench, Mawddwy
<b>PRN number</b>	9138
<b>Grid reference</b>	SH79851244
<b>Period</b>	Modern
<b>Site type</b>	Bench
<b>Assessment category</b>	C
<b>Description</b>	Stone bench 1 x 1m, 0.5m high besides track to 9137 (Feature 10) (Brooks and Price, 1999). This feature was inaccessible during the 2020 field survey. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) in the current assessment due to the small size of the feature. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>02 (Plate 4)</b>
<b>Site name</b>	Hendre Ddu Quarry Building 1, Mawddwy
<b>PRN number</b>	9142
<b>Grid reference</b>	SH80131243
<b>Period</b>	Modern
<b>Site type</b>	Building
<b>Assessment category</b>	C
<b>Description</b>	Footings only survive (Brooks and Price, 1999). This now lies within the curtilage of Hendragode House (Feature 23) and was not observed. Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment and the description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) due to the limited structural survival. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 4: General view of garden previous location for building 1; scale not used; view from south southwest (archive image: G2660\_008).**

<b>Feature Number</b>	<b>03 (Plate 5)</b>
<b>Site name</b>	Hendre Ddu Quarry Building 2, Mawddwy
<b>PRN number</b>	9130
<b>Grid reference</b>	SH80111254
<b>Period</b>	Modern
<b>Site type</b>	Building
<b>Assessment category</b>	C
<b>Description</b>	Building 10 x 6m end walls survive to near roof line, side walls collapsed (Brooks and Price, 1999). The building is of drystone walling and no internal features were noted. Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment and the description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) due to the limited structural survival. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 5: Feature 03: PRN 9130, general view; scale not used; view from southwest  
(archive reference: G2660\_36)**

<b>Feature Number</b>	<b>04 (Plate 6)</b>
<b>Site name</b>	Hendre Ddu Quarry Building 3, Mawddwy
<b>PRN number</b>	9133
<b>Grid reference</b>	SH79921250
<b>Period</b>	Modern
<b>Site type</b>	Building
<b>Assessment category</b>	B
<b>Description</b>	Building 3m x 7m with sloping roof. Roof partly survives, slab roof. Possible external stair on western side (Brooks and Price, 1999). This appears to be the remains of a former drum house as it is at the northwest end of the probable tramway (Feature 31). No internal fittings were noted to remain. Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment and the description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category B (local importance) in the current assessment due to survival level. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 6: Feature 04: PRN 9133, view across site to a possible drum house; scale not used; view from south (archive reference: G2660\_035)**

<b>Feature Number</b>	<b>05 (Plate 4)</b>
<b>Site name</b>	Hendre Ddu Quarry Building 4, Mawddwy
<b>PRN number</b>	9143
<b>Grid reference</b>	SH80161245
<b>Period</b>	Modern
<b>Site type</b>	Building
<b>Assessment category</b>	C
<b>Description</b>	Footings only survive (Brooks and Price, 1999). Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment as it now lies within the curtilage of Hendragode House (Feature 23) and was not observed. The description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) in the current assessment due to the limited structural survival. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>06</b>
<b>Site name</b>	Hendre Ddu Quarry Level 1, Mawddwy
<b>PRN number</b>	9131
<b>Grid reference</b>	SH79951253
<b>Period</b>	Modern
<b>Site type</b>	Level
<b>Assessment category</b>	B
<b>Description</b>	Adit mine c.2m wide and up to 2m high (Brooks and Price, 1999). Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment and the description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category B (regional importance) in the current assessment due to its function as an integral part of the quarry and survivability. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>07</b>
<b>Site name</b>	Hendre Ddu Quarry Level 2, Mawddwy
<b>PRN number</b>	9134
<b>Grid reference</b>	SH79841250
<b>Period</b>	Modern
<b>Site type</b>	Level
<b>Assessment category</b>	B
<b>Description</b>	Adit 2.5m wide and 2m high in places leading back into hill side (Brooks and Price, 1999). Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment and the description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category B (regional importance) in the current assessment due to its function as an integral part of the quarry and survivability. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>08</b>
<b>Site name</b>	Hendre Ddu Quarry Level 3, Mawddwy
<b>PRN number</b>	9144
<b>Grid reference</b>	SH79741262
<b>Period</b>	Modern
<b>Site type</b>	Level
<b>Assessment category</b>	B
<b>Description</b>	Adit tunnel 2m wide and 1.5m high (Brooks and Price, 1999). Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment and the description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category B (regional importance) in the current assessment due to its function as an integral part of the quarry and survivability. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>09 (Plate 7)</b>
<b>Site name</b>	Hendre Ddu Quarry Level 4, Mawddwy
<b>PRN number</b>	9140
<b>Grid reference</b>	SH79931237
<b>Period</b>	Modern
<b>Site type</b>	Level
<b>Assessment category</b>	B
<b>Description</b>	Adit mine 2m wide and 2m high (Brooks and Price, 1999). Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment and the description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category B (regional importance) in the current assessment due to its function as an integral part of the quarry and survivability. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 7: Feature 09: PRN 9140, view of adit; scale not used; view from north (archive reference: G2660\_022)**

<b>Feature Number</b>	<b>10</b>
<b>Site name</b>	Hendre Ddu Quarry Level 5, Mawddwy
<b>PRN number</b>	9137
<b>Grid reference</b>	SH79851245
<b>Period</b>	Modern
<b>Site type</b>	Level
<b>Assessment category</b>	B
<b>Description</b>	Adit mine 2m wide and up to 1m high (Brooks and Price, 1999). Whilst the location of the feature was generally visible, this feature was inaccessible during the 2020 field survey and assessment and the description used is from the 1998 assessment. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category B (regional importance) in the current assessment due to its function as an integral part of the quarry and survivability. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>11 (Plate 8 &amp; 9)</b>
<b>Site name</b>	Hendre Ddu Quarry Pit 1, Mawddwy
<b>PRN number</b>	9136
<b>Grid reference</b>	SH79841258
<b>Period</b>	Modern
<b>Site type</b>	Quarry
<b>Assessment category</b>	B
<b>Description</b>	Large quarry with several levels and possible adit mines (Brooks and Price, 1999). The large quarry, located downslope of the Lower Hendre Ddu reservoir and in 2020 is heavily overgrown and dangerous of access. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category B (regional importance) in the current assessment due to its function as an integral part of the quarry. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 8: Feature 11: PRN 9136, view of Hendre Ddu Quarry, Pit 1; scale not used; view from northwest (archive reference: G2660\_024)**



**Plate 9: Feature 11: PRN 9136, view of Hendre Ddu Quarry, Pit 1; (Image taken from drone survey undertaken by client)**

<b>Feature Number</b>	<b>12 (Plate 10, 11, 12 &amp; 13)</b>
<b>Site name</b>	Hendre Ddu Quarry Reservoir 1, Mawddwy
<b>PRN number</b>	9146
<b>Grid reference</b>	SH79821265 C
<b>Period</b>	Modern
<b>Site type</b>	Reservoir
<b>Assessment category</b>	B
<b>Description</b>	Triangular shaped reservoir with dam at southern end. It is still in water, and shows evidence of recent repair to ancillary walls to the dam, and site clearance around the dam. It was listed as Category B (regional importance) in the 1998 assessment and has been ascribed Category B (regional importance) in the current assessment for the same reason. It is not within the route or location of the proposed works and no further recommendations are given beyond avoidance.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 10: Feature 12: PRN 9146, view along Upper Hendre Reservoir dam; scale 1x1m; view from southwest (archive reference: G2660\_31)**



**Plate 11: Feature 12: PRN 9146, view along Upper Hendre Reservoir dam; scale not used; view from south (archive reference: G2660\_032).**



**Plate 12: Feature 12: PRN 9146, view of modern revetment works to the Upper Hendre Reservoir dam; scale not used; view from southwest (archive reference: G2660\_033).**



**Plate 13: Feature 12: PRN 9146, view from Upper Hendre Reservoir spillway; scale not used; view from northwest (archive reference: G2660\_034).**

<b>Feature Number</b>	<b>13 (Plate 14, 15, 16, 17 &amp; 18)</b>
<b>Site name</b>	Hendre Ddu Quarry Reservoir 2 / Lower Hendre Ddu Reservoir
<b>PRN number</b>	9147
<b>Grid reference</b>	SH79751280 C
<b>Period</b>	Modern
<b>Site type</b>	Reservoir
<b>Assessment category</b>	B
<b>Description</b>	<p>Triangular shaped reservoir with dam at southeastern end and outfall from southern end. This is the reservoir and dam scheduled for the proposed discontinuance works. The reservoir and dam were accessible for the 2020 field survey; the reservoir was dry but heavily overgrown with trees and shrubs; the dam was in a good condition and was constructed of slate rubble, with a pronounced batter on the downslope side. The three geotechnical trial pits excavated into the top of the reservoir dam in August 2020 for contamination testing further confirmed the dam was built from slate waste. It was listed as Category B (regional importance) in the 1998 assessment and has been ascribed Category B (regional importance) in the current assessment for the same reason. The proposed discontinuance works will include the excavation of a trench through the reservoir dam, which is aimed at stopping the reservoir holding any significant volumes of water during heavy rain. As detailed in Arcadis Drawing No. 10038919-ARC-XX-XX-DR-CE-LH0200, the proposals include the excavation of a c.20m long and 2.5m wide channel; the channel side will be excavated to a 1:2 incline ratio, with a maximum width of c.28m, as indicated on Arcadis Drawing No. 0038919-ARC-XX-XX-DR-CE-LH0201. Preservation <i>in situ</i> is the preferred option for Category B sites (in the 1998 assessment this is recommended for “better examples”), but as the impact of the trench will involve the partial removal of the feature affecting its overall integrity, “damage or destruction” cannot be avoided; appropriate detailed recording is therefore proposed as an alternative.</p>
<b>Impact</b>	Significant: will result in the partial removal of an asset (dam) affecting its overall integrity
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Detailed Recording (this has subsequently been completed by GAT via a UAS Survey)



**Plate 14: Feature 13: PRN 9147, view along Lower Hendre Reservoir dam; scale 1x1m; view from west (archive reference: G2660\_023).**



**Plate 15: Feature 13: PRN 9147, view of Lower Hendre Reservoir dam wall; scale 1x1m; view from east (archive reference: G2660\_030).**



**Plate 16: Feature 13: PRN 9147, view from Lower Hendre Reservoir dam wall showing overgrowth within reservoir; scale 1x1m; view from south (archive reference: G2660\_029).**



**Plate 17: Feature 13: PRN 9147, view of channelled watercourse; scale not used; view from south (archive reference: G2660\_027).**



**Plate 18: Feature 13: PRN 9147, aerial view of dam; (Image taken from drone survey undertaken by client)**

<b>Feature Number</b>	<b>14 (Plate 19)</b>
<b>Site name</b>	Hendre Ddu Quarry Spoil Tip 1, Mawddwy
<b>PRN number</b>	9132
<b>Grid reference</b>	SH79971250
<b>Period</b>	Modern
<b>Site type</b>	Spoil Tip
<b>Assessment category</b>	C
<b>Description</b>	Waste tip for 9131 (Feature 06). The tip is twin crested and is about 5m high with a base of around 20m. It is constructed of mainly medium sized fragments of slate waste with some larger blocks. The location of the feature was generally accessible and in appearance appeared similar to the “overgrown” condition identified in 1998; there was no tree planting in the immediate area, which was a recommendation in 1998. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) in the current assessment as evidence of slate processing.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 19: Feature 14: PRN 9132, view of spoil tip; scale not used; view from south (archive reference: G2660\_015).**

<b>Feature Number</b>	<b>15 (Plate 20)</b>
<b>Site name</b>	Hendre Ddu Quarry Spoil Tip 2, Mawddwy
<b>PRN number</b>	9139
<b>Grid reference</b>	SH79851242
<b>Period</b>	Modern
<b>Site type</b>	Spoil Tip
<b>Assessment category</b>	C
<b>Description</b>	Waste tip from 9137 (Feature 10). Five smoothed tracks are defined in the top of the tips marking the line of tramways (Brooks and Price, 1999). This feature was not accessible during the current assessment, so the current appearance and condition of the feature could not be confirmed. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) in the current assessment as evidence of slate processing.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 20: Feature 15: PRN 9139, Aerial view of spoil tip 2; (Image taken from drone survey undertaken by client)**

<b>Feature Number</b>	<b>16 (Plate 21)</b>
<b>Site name</b>	Hendre Ddu Quarry Spoil Tip 3, Mawddwy
<b>PRN number</b>	9135
<b>Grid reference</b>	SH79831248
<b>Period</b>	Modern
<b>Site type</b>	Spoil Tip
<b>Assessment category</b>	C
<b>Description</b>	Waste tip from 9134 (Feature 07). Top surface has six smoothed areas probably the line of trackways (Brooks and Price, 1999). This feature was not accessible during the current assessment, but an image from a drone survey completed by Arcadis suggests the appearance and condition of the feature hadn't changed. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) in the current assessment as evidence of slate processing.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 21: Feature 16: PRN 9135, Aerial view of spoil tip 3; (Image taken from drone survey undertaken by client)**

<b>Feature Number</b>	<b>17</b>
<b>Site name</b>	Hendre Ddu Quarry Spoil Tip 4, Mawddwy
<b>PRN number</b>	9141
<b>Grid reference</b>	SH80111238
<b>Period</b>	Modern
<b>Site type</b>	Spoil Tip
<b>Assessment category</b>	C
<b>Description</b>	Waste tips from 9140 (Feature 09). Partly disturbed by later dumping, and appears to be no longer extant (Brooks and Price, 1999). This feature was not accessible during the current assessment, so the current appearance and condition of the feature could not be confirmed. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) in the current assessment as evidence of slate processing.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>18</b>
<b>Site name</b>	Hendre Ddu Quarry Spoil Tip 5, Mawddwy
<b>PRN number</b>	9145
<b>Grid reference</b>	SH79851261
<b>Period</b>	Modern
<b>Site type</b>	Spoil Tip
<b>Assessment category</b>	C
<b>Description</b>	Waste tip from 9144 (Feature 08) joined to 9144 by track (Brooks and Price, 1999). This feature was not accessible during the current assessment, so the current appearance and condition of the feature could not be confirmed. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) in the current assessment as evidence of slate processing.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>19</b>
<b>Site name</b>	Hendre Ddu Quarry Track, Mawddwy
<b>PRN number</b>	9309
<b>Grid reference</b>	SH79891249 C
<b>Period</b>	Modern
<b>Site type</b>	Trackway
<b>Assessment category</b>	C
<b>Description</b>	Track joining 9131 (Feature 06) to 9134 (Feature 07). Well-made track c.1m wide supported in places by well-made revetting wall (Brooks and Price, 1999). This feature was not accessible during the current assessment, so the current appearance and condition of the feature could not be confirmed. It was listed as Category C (lesser significance) in the 1998 assessment and has been ascribed Category C (local importance) in the current assessment as evidence of slate processing.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>20</b>
<b>Site name</b>	Hendre Ddu Slate Quarry, Mawddwy
<b>PRN number</b>	20447
<b>Grid reference</b>	SH799125 C
<b>Period</b>	Modern
<b>Site type</b>	Slate Quarry
<b>Assessment category</b>	B
<b>Description</b>	<p>Part underground slate quarry, comprising a fairly extensive site which had a substantial mill and other buildings but output unlikely to have exceeded 1000 tons pa (878 tons 31 men 1883). Operated from the 1850s to the 1940s; material was transported via the Hendre Ddu Tramway. The site is mainly covered by forestry and incorporates workings on 4 levels, including a twll working. The compact mill area is cleared but there is a two storey building in reuse and the foundations of a number of other structures. There are three adits: the lowest, at mill level (Feature 06/PRN 9131) has some chambering; above this is a second adit (Feature 07/PRN 9134), which is flooded; above this is a third adit (Feature 08/PRN 9144), which leads to some chambering and to open workings. Above these are the early open workings. At each adit level there are massive spoil heaps, notable for the size of many of the blocks. Tramroad formations, just traceable in forestry lead from each level to an incline down to the mill (PRN 9129). There is also a working, possibly just a trial adjacent to the head of incline. The main exit incline down to the join the Hendre Ddu tramroad is visible. There is a reservoir at the top of the site (Feature 13/PRN 9147) (Source: Richard, 1991: 171). This PRN number was not included in the 1998 archaeological assessment. The 2020 assessment has ascribed Category B (regional importance), reflecting the significance of the quarry as part of the slate industry of northwest Wales. The impact of the proposed discontinuance works is classed as significant for the Lower Hendre Reservoir (PRN 9147) as it will affect the overall integrity of that specific feature; mitigation through preservation by record is proposed as part of this assesement</p>
<b>Impact</b>	Significant: trench through lower reservoir (Feature 13/PRN 9147) will result in the partial removal of an asset (reservoir dam) affecting its overall integrity.
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Detailed Recording of the reservoir dam (Feature 13/PRN 9147). This has subsequently been completed by GAT via a UAS Survey.

<b>Feature Number</b>	<b>21</b>
<b>Site name</b>	Slate Quarry, Hendre Ddu
<b>PRN number</b>	21056
<b>Grid reference</b>	SH800124 C
<b>Period</b>	Modern
<b>Site type</b>	Slate Quarry
<b>Assessment category</b>	B
<b>Description</b>	Same as Feature 20
<b>Impact</b>	Significant: trench through lower reservoir (Feature 13/PRN 9147) will result in the partial removal of an asset affecting its overall integrity.
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Detailed Recording of the reservoir dam (Feature 13/PRN 9147). This has subsequently been completed by GAT via a UAS Survey.

<b>Feature Number</b>	<b>22</b>
<b>Site name</b>	Mynydd Hendre-ddu Boundary Stone, Corris
<b>PRN number</b>	9166
<b>Grid reference</b>	SH79881212
<b>Period</b>	Unknown
<b>Site type</b>	Boundary stone
<b>Assessment category</b>	E
<b>Description</b>	Visible on Ordnance Survey 6-inch to 1-mile 2nd Edition (Brooks and Price, 1999) but not accessed during the 1998 or 2020 survey. Classed as "Not Yet Evaluated" in the 1998 assessment and Category E (Sites needing further investigation) in the current assessment. Further investigation is not recommended as part of the current assessment.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>23 (Plate 22)</b>
<b>Site name</b>	House adjacent to PRN 9143 (Hendragode House)
<b>PRN number</b>	90585
<b>Grid reference</b>	SH8020712458
<b>Period</b>	Modern
<b>Site type</b>	House
<b>Assessment category</b>	B
<b>Description</b>	Still extent building within quarry situated east of Quarry building 4 (PRN 9143) and Quarry building 1 (PRN 9142). The buildings consist of a hipped north-south wing which is to the rear of and slightly taller than the main east west wing. The east-west orientated building is the main single house of three bays with hipped roof, and constructed of cut slate blocks and slate rubble. The windows and doors are modern replacements, but slate lintels survive. There is a lateral chimney on the north-south rear wing, but none were noted to survive on the east-west range. The building is still currently occupied as a dwelling. This was not identified or visited during the 1998 assessment; it is ascribed Category B (regional importance) in the current assessment as evidence of surviving quarry infrastructure.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 22: Feature 23: PRN 90585, view of house Hendregoes; scale not used; view from south-southwest (archive reference: G2660\_007).**

<b>Feature Number</b>	<b>24 (Plate 23)</b>
<b>Site name</b>	Hendre-Ddu Cottages
<b>PRN number</b>	90586
<b>Grid reference</b>	SH8059012529
<b>Period</b>	Modern
<b>Site type</b>	House
<b>Assessment category</b>	B
<b>Description</b>	Cottages are noted at this location on historic and modern mapping. What were formerly six cottages were noted, slate rubble built, and are now restored and inhabited. They are single pile with central gable chimneys. Cottages 5 and 6 were noted to have original features within the stonework, although doors and windows had been replaced. They are located within private gardens. These cottages were not identified or visited during the 1998 assessment; it is ascribed Category B (regional importance) in the current assessment as evidence of surviving quarry infrastructure.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 23: Feature 24: PRN 90856, Hendre Ddu Cottages; scale not used; view from south (archive reference: G2660\_003).**

<b>Feature Number</b>	<b>25</b>
<b>Site name</b>	Footpath from Cottages to Quarry
<b>PRN number</b>	90587
<b>Grid reference</b>	SH8052512454 C
<b>Period</b>	Modern
<b>Site type</b>	Transport
<b>Assessment category</b>	E
<b>Description</b>	Noted on historic mapping for the quarry. This is now completely inaccessible within woodland and was not noted on the ground. This was not identified or visited during the 1998 assessment; it is ascribed Category E (sites needing further investigation) in the current assessment as evidence of quarry activity. Further investigation is not recommended as part of the current assessment.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>26</b>
<b>Site name</b>	Possible structures to East of Quarry building 2
<b>PRN number</b>	90588
<b>Grid reference</b>	SH8015412540
<b>Period</b>	Modern
<b>Site type</b>	Building
<b>Assessment category</b>	E
<b>Description</b>	Possible buildings in tree line noted on aerial photo East of Quarry Building 2 (Feature 08/PRN 9130). No evidence for this was noted on the ground. This was not identified or visited during the 1998 assessment; it is ascribed Category E (sites needing further investigation) in the current assessment as evidence of quarry activity. Further investigation is not recommended as part of the current assessment.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>27</b>
<b>Site name</b>	Magazine
<b>PRN number</b>	90589
<b>Grid reference</b>	SH7976912451
<b>Period</b>	Modern
<b>Site type</b>	Building
<b>Assessment category</b>	E
<b>Description</b>	Noted as magazine on 1 <sup>st</sup> Editions 6-inch to 1-mile Ordnance Survey map. The location of this feature was completely overgrown in an area of conifer plantation, and was not located on the site visit. This was not identified or visited during the 1998 assessment; it is ascribed Category E (sites needing further investigation) in the current assessment as evidence of quarry activity. Further investigation is not recommended as part of the current assessment.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>28</b>
<b>Site name</b>	Ford
<b>PRN number</b>	90590
<b>Grid reference</b>	SH8062312469
<b>Period</b>	Modern
<b>Site type</b>	Quarry
<b>Assessment category</b>	E
<b>Description</b>	Ford and gravel pit behind cottages noted on 6-inch to 1-mile Ordnance Survey historic mapping. There are no surviving historic features on the ground, as the area is covered woodland and a modern forest track crossing point. This was not identified or visited during the 1998 assessment; it is ascribed Category E (sites needing further investigation) in the current assessment as evidence of quarry activity. Further investigation is not recommended as part of the current assessment.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

<b>Feature Number</b>	<b>29 (Plate 24, 25 &amp; 26)</b>
<b>Site name</b>	Tramway
<b>PRN number</b>	90591
<b>Grid reference</b>	SH 80223 12460 C
<b>Period</b>	Modern
<b>Site type</b>	Transport
<b>Assessment category</b>	C
<b>Description</b>	Same route as PRN 9129 but more substantial markings on 1 <sup>st</sup> edition 6-inch to 1-mile Ordnance Survey. This tramway seems to have been largely destroyed by the forest trackway. Possible remnants are noted to survive, in the form of slate revetment walling with facing stones, adjacent to the house (Feature 23). It appears visible on the 1948 aerial photograph (Figure 07). This was not identified or visited during the 1998 assessment; it is ascribed Category C (local importance) in the current assessment due to current level of survival and as evidence of quarry infrastructure.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 24: Feature 29: PRN 90591 possible remains of tramway; scale not used; view from southeast (archive reference: G2660\_010).**



**Plate 25: Feature 29: PRN 90591 possible remains of tramway; scale not used; view from south (archive reference: G2660\_011).**

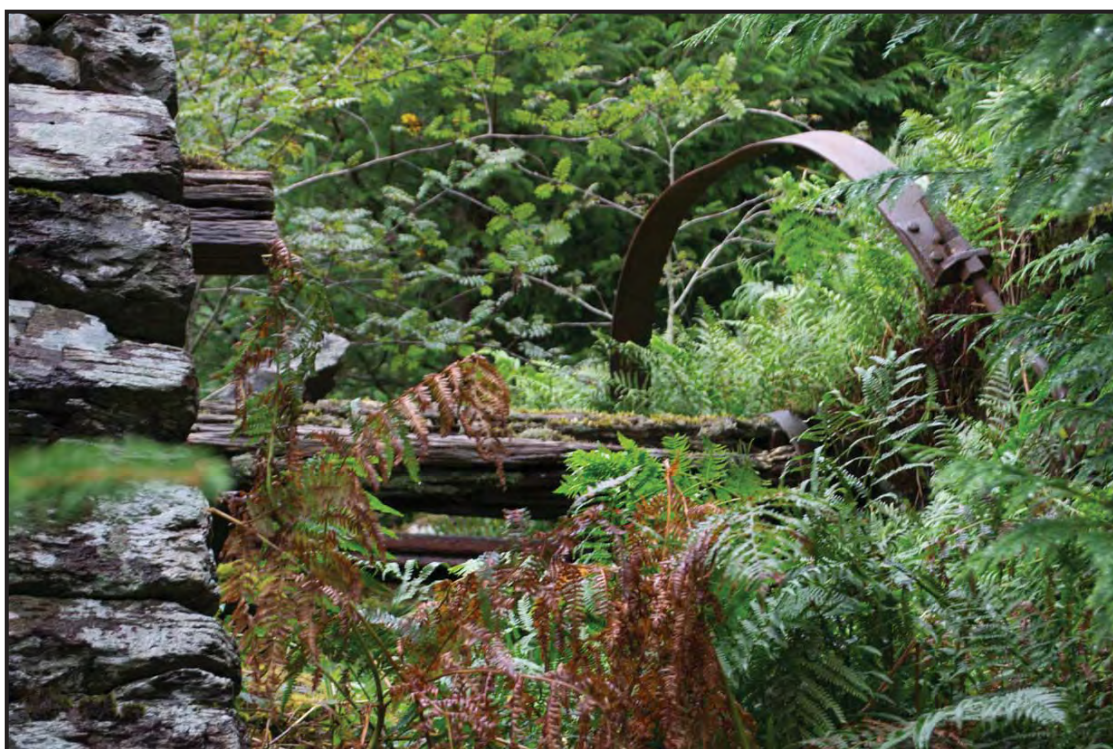


**Plate 26: Feature 29: Wide angle view of tramway; scale not used; view from south (archive reference: G2660\_016).**

<b>Feature Number</b>	<b>30 (Plate 27 &amp; 28)</b>
<b>Site name</b>	Drum House
<b>PRN number</b>	9127
<b>Grid reference</b>	SH 80482 12607
<b>Period</b>	Modern
<b>Site type</b>	Building
<b>Assessment category</b>	B
<b>Description</b>	Engine shed 4m by 6m partly cut into hill side, constructed of slate rubble. Contains wooden wheel shaft in situ and iron wheel brake. Large buttress on the south side. This identified in the 1998 assessment and visited during the 2020 survey; the feature was partly obscured by vegetation (the description used is from the 1998 field survey), but the key elements were still visible. The feature was listed as Category A (national importance) in the 1998 assessment, presumably due to the presence of the wheel shaft and iron wheel brake. The current assessment has ascribed Category B (regional importance) as a partially surviving quarry infrastructure in line with the other built structures currently identified on site.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance



**Plate 27: Feature 30: PRN 9127: view of drum house; scale not used; view from south (archive reference: G2660\_018).**



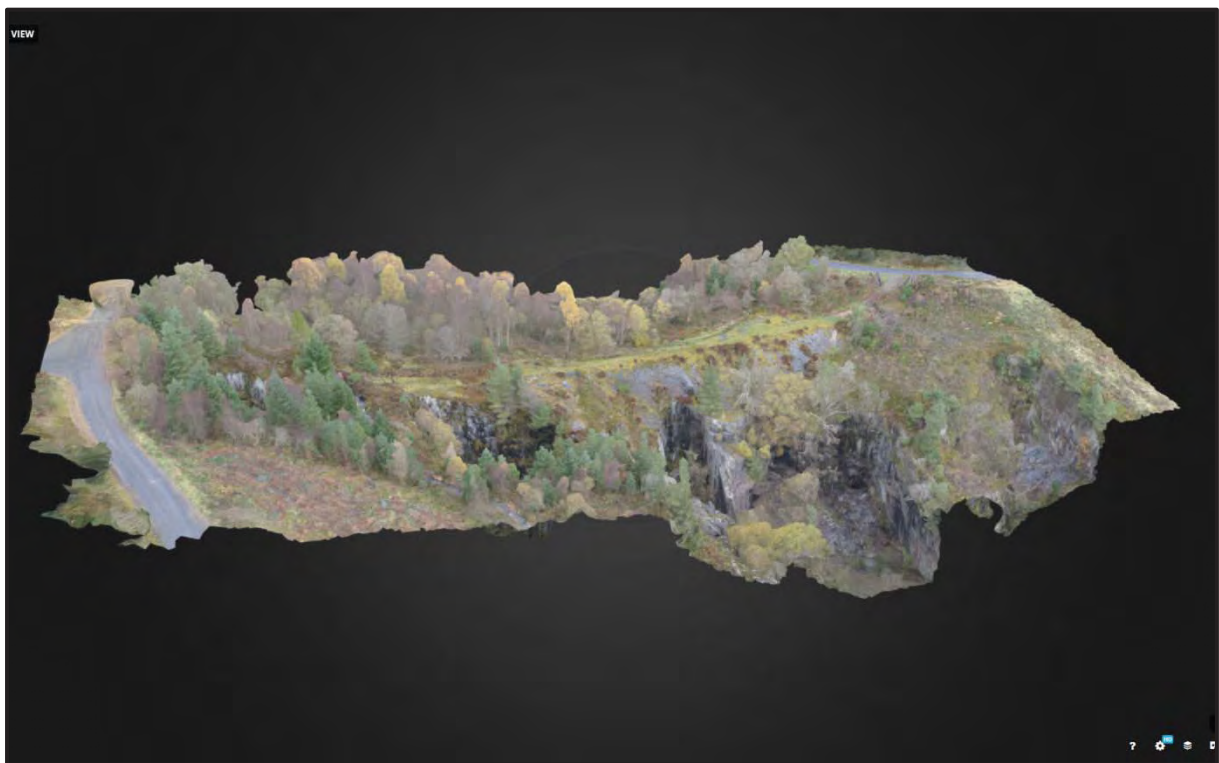
**Plate 28: PRN 9127: view of drum house detailing metal and wood structural remains; scale 1x1m; view from southeast (archive reference: G2660\_019).**

<b>Feature Number</b>	<b>31</b>
<b>Site name</b>	Tramway
<b>PRN number</b>	9129
<b>Grid reference</b>	SH 80491 12613 C
<b>Period</b>	Modern
<b>Site type</b>	Quarry infrastructure
<b>Assessment category</b>	C
<b>Description</b>	A tramway cut into the hill slope, associate with the Drum House (Feature 30). This feature was listed as having “no physical presence” in the 1998 assessment, but whilst the feature was generally inaccessible, but the line is still discernible through the landscape during the 2020 field survey. It is visible on the 1948 aerial photograph (Figure 07). No category was assigned to the feature in the 1998 assessment; for the 2020 assessment, it is ascribed Category C (local importance) in the current assessment due to current level of survival and as evidence of quarry infrastructure.
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Avoidance

### 3.4 UAS Aerial Photographic Survey

The UAS aerial photographic survey of the Lower Hendre Reservoir dam was completed on 4<sup>th</sup> November 2020 in dry, overcast weather conditions. A total of 406 colour digital images of the dam and the surrounding area were captured. Overlapping vertical photographs were used to construct a digital 3D model of the dam in order to record its condition prior to the discontinuance works. The model also enabled the extraction of a scaled and geo-referenced orthomosaic of the dam with a resolution of 5mm/px (Figure 09). A copy of the model can be viewed online using the following link:

<https://skfb.ly/6W8xC>



**Plate 29: Screenshot of Lower Hendre Reservoir dam 3D model**

Additional oblique aerial images of the dam were also captured during the survey, a selection of which are included as Plates 30-32.



**Plate 30: Feature 13: PRN 9147, aerial view of Lower Hendre Reservoir dam; view from southwest (archive reference: G2660\_UAV\_247).**



**Plate 31: Feature 13: PRN 9147, aerial view of Lower Hendre Reservoir dam; view from south (archive reference: G2660\_UAV\_274).**



**Plate 32: Feature 13: PRN 9147, aerial view of Lower Hendre Reservoir dam; view from southeast (archive reference: G2660\_UAV\_261).**

## **4 CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Conclusion**

Gwynedd Archaeological Trust was commissioned by Natural Resources Wales to undertake an archaeological assessment of Hendre Ddu Quarry in advance of proposed reservoir discontinuance works at the Lower Hendre Reservoir. The quarry is located in a remote location at the head of the Angell valley, in the parish of Mallwyd in south Gwynedd (former County of Meirionethshire), and was in operation between the mid-nineteenth and the mid-twentieth century. The aim of the assessment was to identify and record the quarry infrastructure at Hendre Ddu and to characterise the sites recorded to gain a better understanding of the quarry. The assessment was undertaken in August 2020 and included a field survey carried out on 28<sup>th</sup> August. All the features identified were associated with the quarry and its workings with the exception of the Mynydd Hendre-Ddu boundary stone, which was of unknown date, but is currently assumed to predate the operations of the quarry.

The quarry was noted to cover an extensive area and thirty one sites have been identified, most of which relate to the quarry workings as well as ancillary and associated structures. Twenty four of these sites had been previously identified during the Dyfi Forest Archaeological Assessment completed in 1998 and this information formed the basis of the current assessment gazetteer, which was then supplemented with additional sites identified through desk based research and a field survey. The current report reviewed the assessment categories used in 1998 and considered the appearance and condition of the identified sites, comparing information from the respective field surveys. It was found in many cases that whilst the location of the sites identified in 1998 were often visible, many were inaccessible due to vegetation overgrowth and/or safety limitations; site descriptions from the 1998 survey were used for the current assessment where access was restricted. The majority of assessment categories from 1998 were retained, with many sites considered to be of district/local importance; exceptions to this included the Lower Hendre Reservoir, which in both 1998 and 2020 was considered as being of regional importance. Seven additional sites were identified as part of the current assessment including quarry housing and a trackway.

The impact of the proposed reservoir discontinuance was considered to be significant in that the excavation of a channel and associated batter through the reservoir dam will involve the partial removal of an asset affecting its overall integrity. It is not however considered that these works will affect the overall interpretation of the reservoir and the dam or its place within the quarry and it will still be evident as a source of water management and an integral part of the existing Hendre Ddu Quarry landscape. The reservoir has not been used as a

regular water store since the early twentieth century and the proposed works are aimed at stopping the reservoir holding any significant volumes of water during heavy rain. Whilst preservation *in situ* is the preferred option for sites of regional importance, if, as in this instance, the proposed structural change cannot be avoided, appropriate detailed recording is proposed as an alternative.

Whilst Hendre-Ddu quarry lies outside the boundaries of the proposed *Slate Landscape of North-West Wales* World Heritage Site bid nomination area, the quarry, along with nearby quarries such as Ratgoed and Aberllefenni, forms an outlying part of the wider industrial and cultural landscape of upland north Wales that was profoundly shaped by large scale quarrying and underground mining, and the working and transport of slate for national and international markets. This slate trade dominated world production and led to major transcontinental developments in building and architecture, and provided the materials for rapid urbanisation in Europe and North America. Some quarries had specialities, such as billiard table slate produced at Hendre Ddu. These slates would have graced the billiard rooms of the grander houses in Britain, Europe and North America.

The workings are characterised by the monumental scale of the quarry itself, with its large open pits and cavernous adits, landforms of cascading tips, creative water management infrastructure including two dams and reservoirs, and a range of industrial buildings together with outstanding technical equipment and major features of engineering. Dispersed locations represent concentrated nodes of exploitation and settlement, of sustainable power generated by prolific volumes of water that was harnessed in ingenious ways, and for a myriad network of pioneering technology (Barker and Gwyn 2018, iv).

At Hendre-Ddu Quarry, though much of this evidence lies in a very dilapidated condition, and the quarry is now heavily overgrown by more recent forestation, this does not lessen its significance. The monumentality of the quarry landscape in its isolated and challenging mountain setting is intense and compelling. The remote location of the quarry, with the opportunity for a significantly sized workforce, also meant that local culture and language could be preserved in the area in the mid to late 19<sup>th</sup> century, at a time of significant rural depopulation (Llechi Cymru 2020, 73).

## **4.2 Recommendations**

As the proposed trench to be cut through lower reservoir (will result in the partial removal of a significant quarry asset affecting its overall integrity, detailed recording of the dam structure in advance of any discontinuance works is recommended and this has been completed by Gwynedd Archaeological Trust via UAV survey and the results included in this report.

It is also recommended that all other features identified are avoided by the scheme, and no further archaeological work is required on them, as there is thought there will be no direct impact. Care should however be taken that the location of any compounds and any works associated with access arrangements avoid the features that have been identified.

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#### Aerial Photographs and Lidar

RAF 4801 540\_39 Image 5087 taken on 6<sup>th</sup> May 1948

Lidar Composite 1m DTM data taken from the Welsh Government *Lle Portal*

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## FIGURES

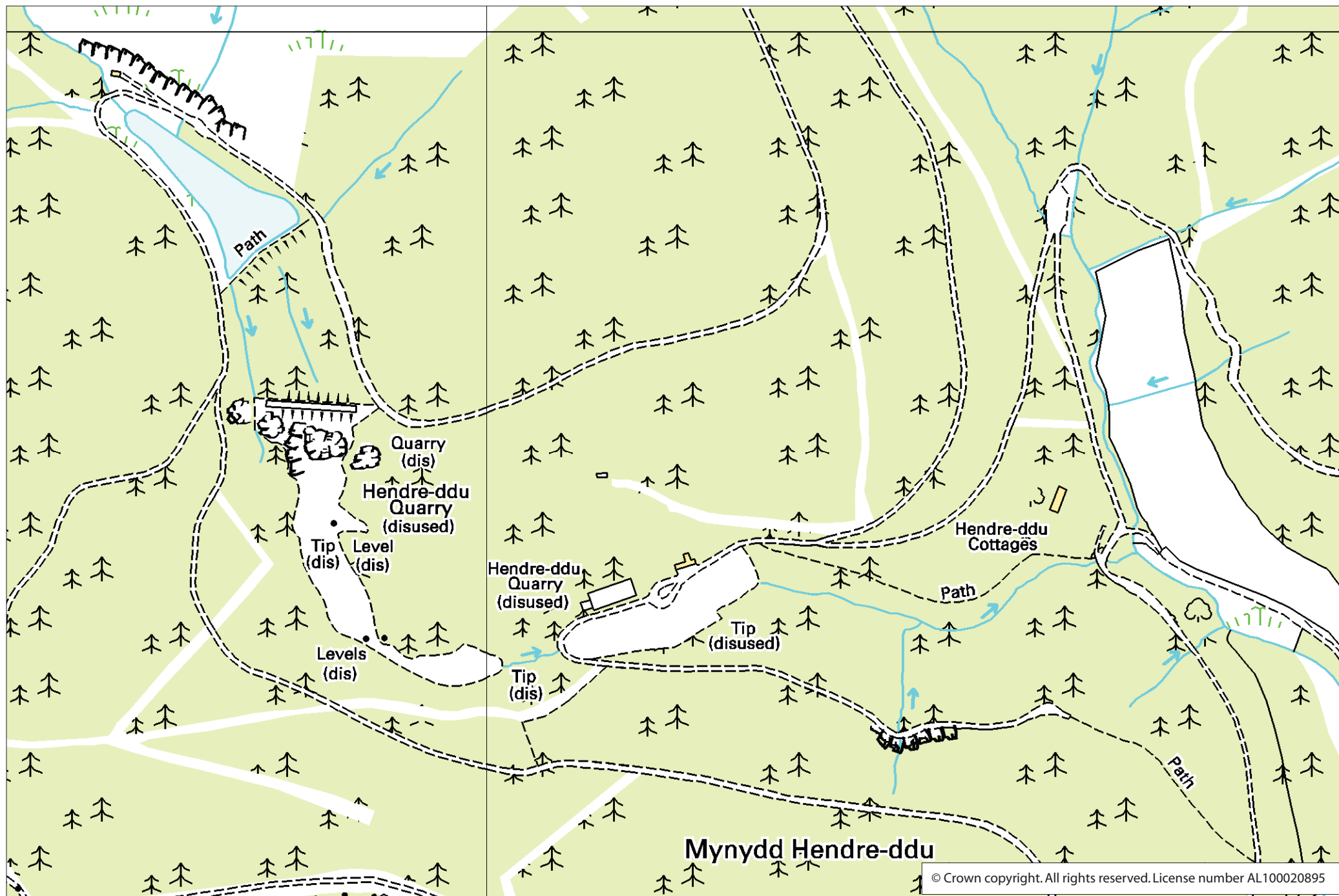
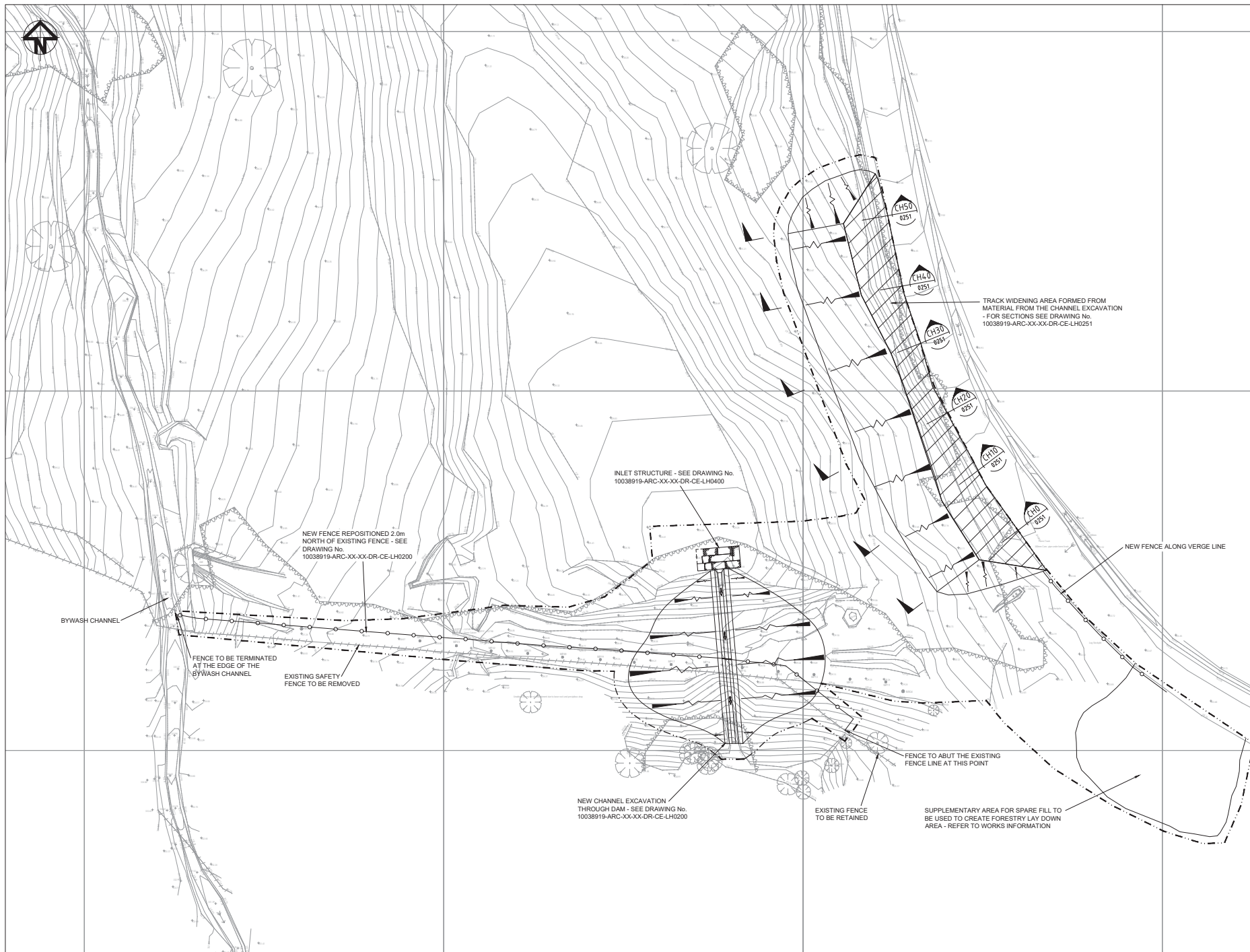


Figure 01: Location Map showing Hendre-Ddu Quarry. Based on Ordnance Survey County Series 1:10000 Map Sheet SH71. Scale 1:5000@ A4.



#### NOTES:

- DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
- ALL DIMENSIONS SHOULD BE READ IN MILLIMETRES UNLESS STATED OTHERWISE.
- ALL LEVELS ARE IN METRES RELATIVE TO ORDNANCE DATUM NEWLYN.

#### LEGEND:

- CONTRACTOR'S WORKING AREA
- /// EXTRA LAYBY CREATED

PT	14JUL20	ISSUE FOR COMMENT	RRS	JP	AH
Rev	Date	Description	Drawn	Check	Review

#### Client



NATURAL RESOURCES WALES

PROJECT: LOWER HENDRE RESERVOIR DISCONTINUANCE

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#### TITLE:

### PROPOSED WORKS OVERALL PLAN

Designed	J PRATTEN	Issued	JP	22JUN20
Drawn	R SEARLE	Issued	RRS	23JUN20
Checked	J PRATTEN	Issued		14JUL20
Reviewed	A HOLT	Issued		
Scale:	1:250	Datum:	NEWLYN	
Original Size:	A1	Grid:	OS	
Suitability Code:	S0	Project Number:	10029559	

Suitability Description:  
**ISSUE FOR COMMENT**

Drawing Number: 10038919-ARC-XX-XX-DR-CE-LH0250  
Revision: P1

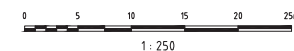




Figure 03: Extract from the Tithe Map of the Parish of Mallwyd of 1838, with Hendre Ddu (Plot 31) outlined in red. Not to Scale

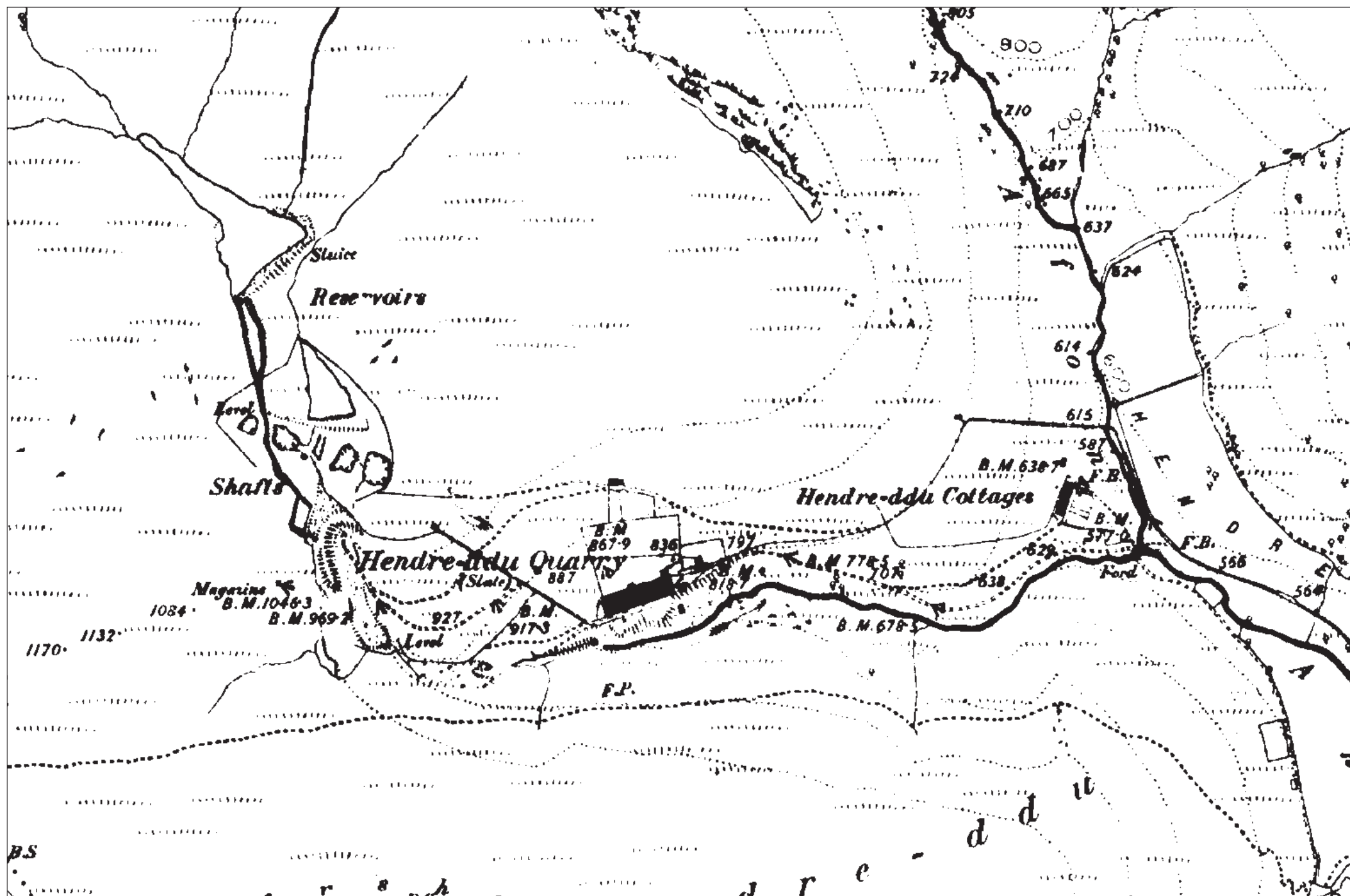


Figure 04: Ordnance Survey Merionethshire County Series 6 inch map 1st edition of 1888, sheet 38SW, showing Hendre-Ddu Quarry. Scale 1:5000@A4

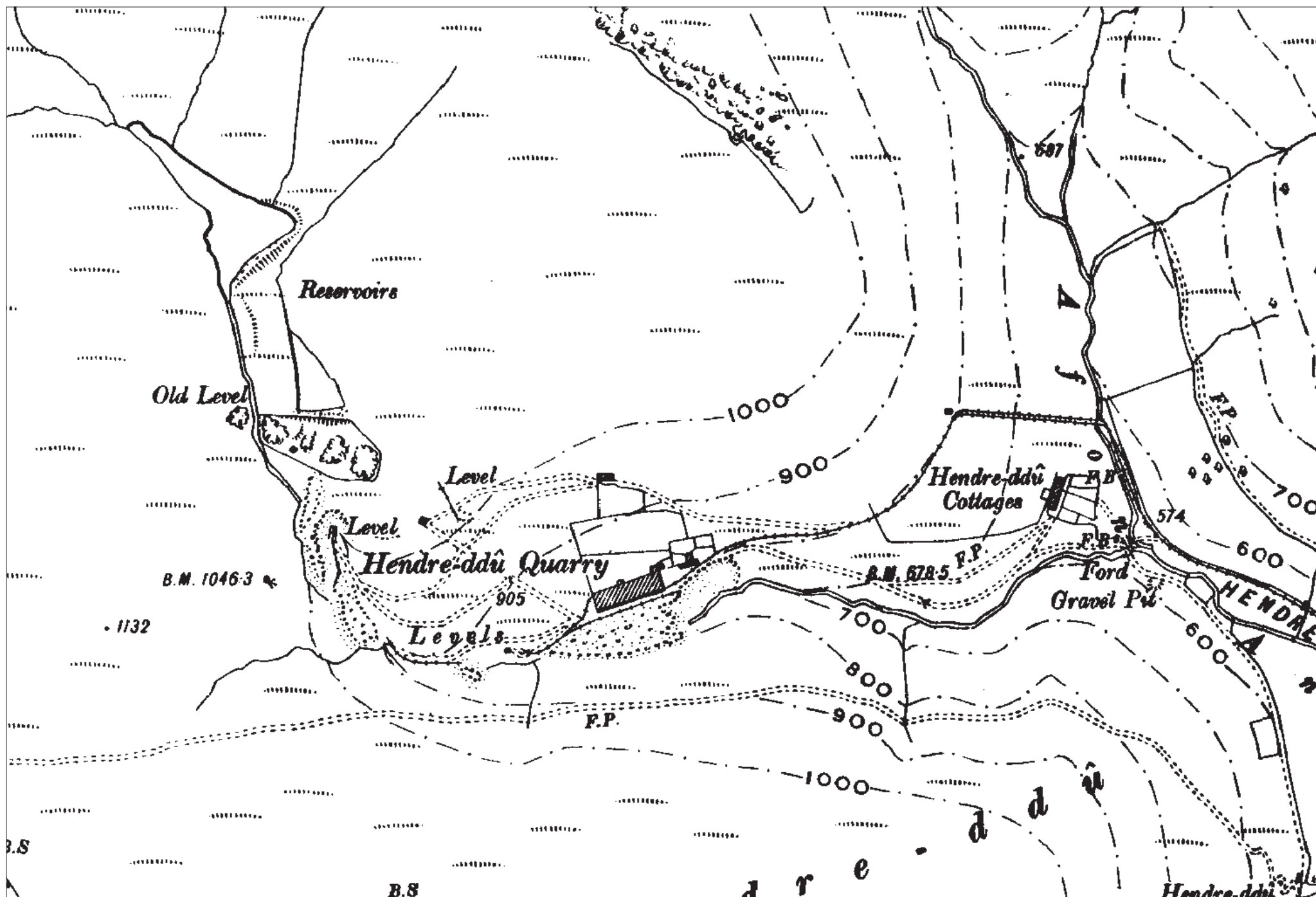


Figure 05: Ordnance Survey Merionethshire County Series 6 inch map 2nd edition of 1899, sheet 38SW, showing Hendre-Ddu Quarry. Scale 1:5000@A4

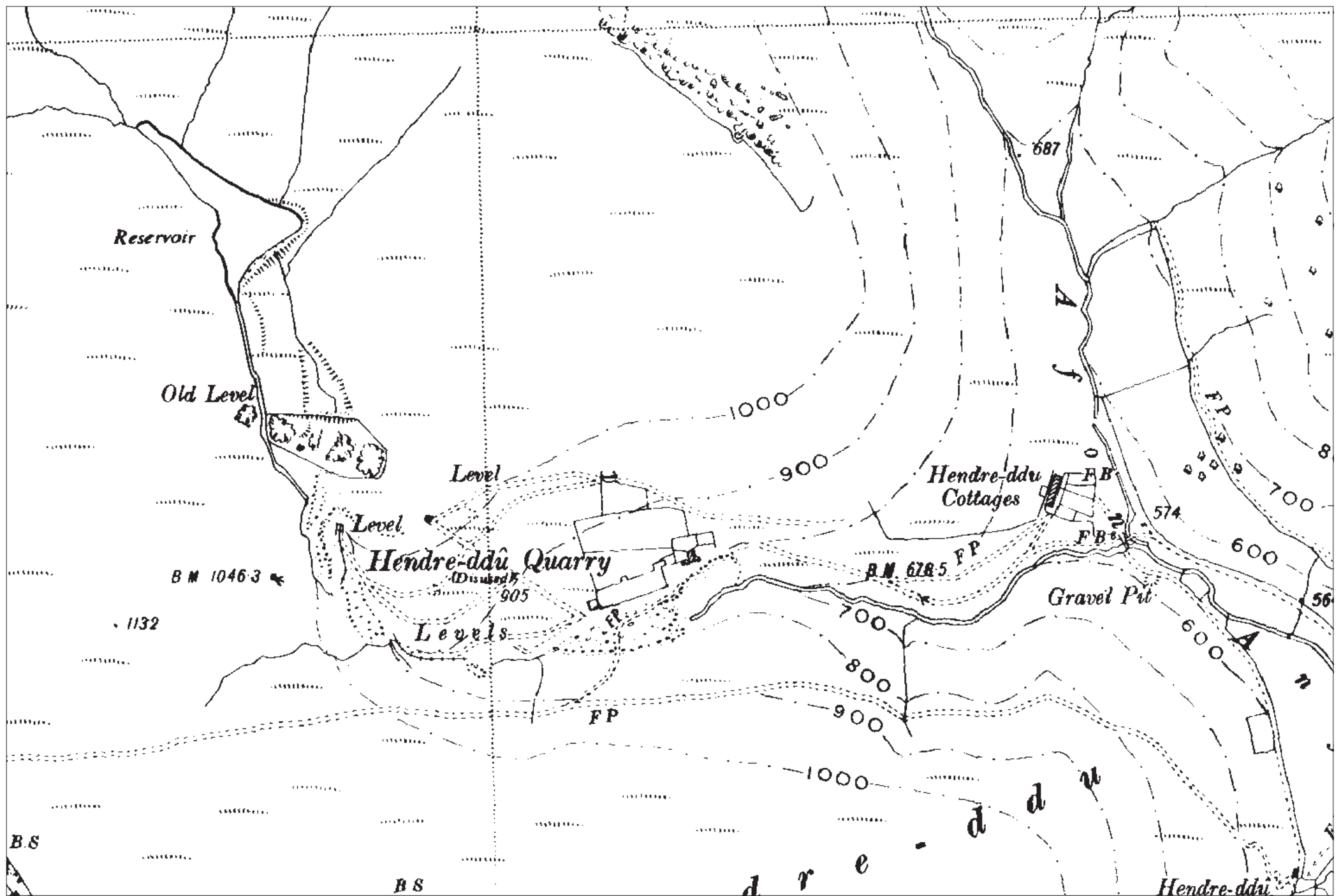
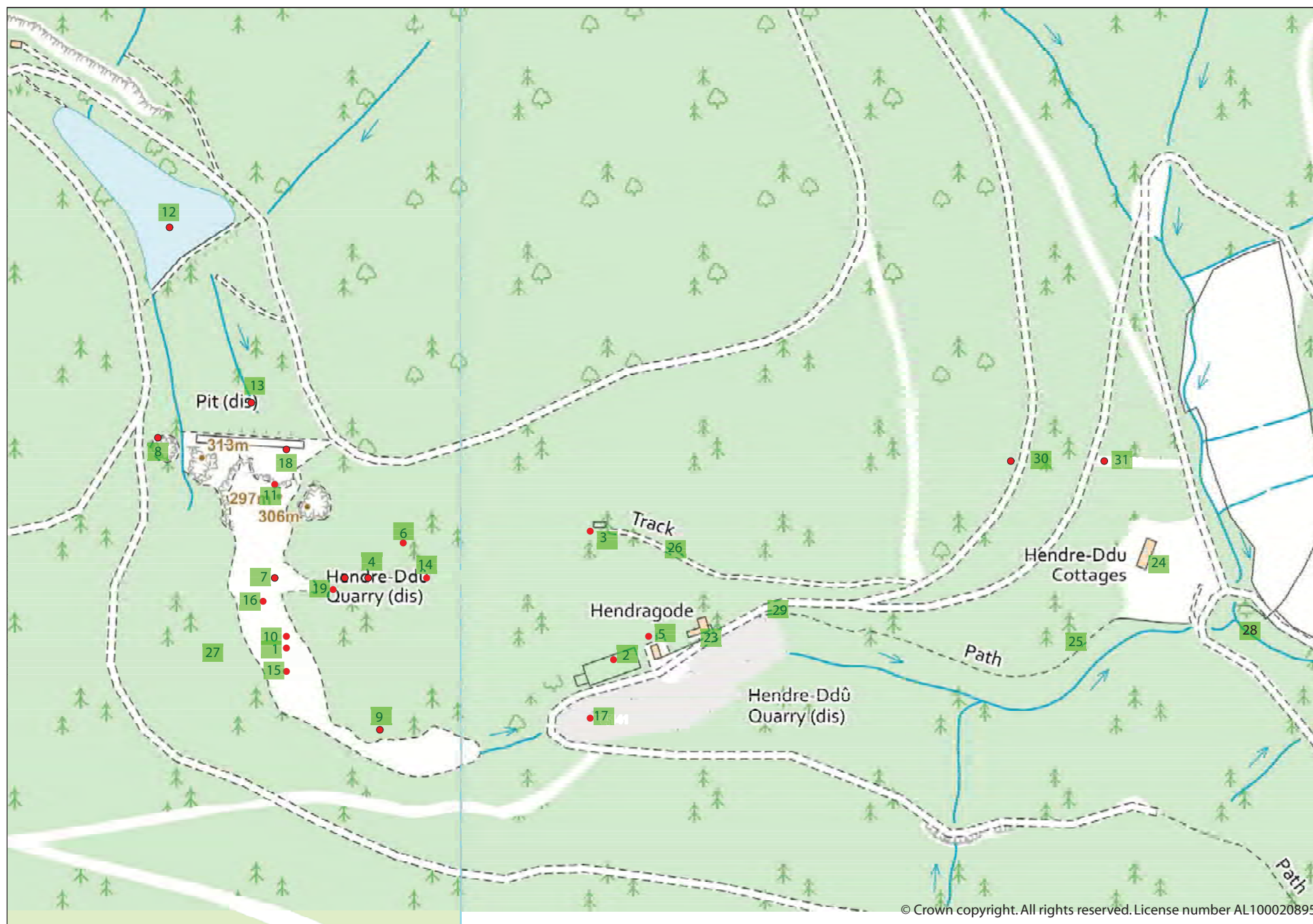


Figure 06: Ordnance Survey Merionethshire County Series 6 inch map 3rd edition of 1913, sheet 38SW, showing Hendre-Ddu Quarry. Scale 1:5000@A4

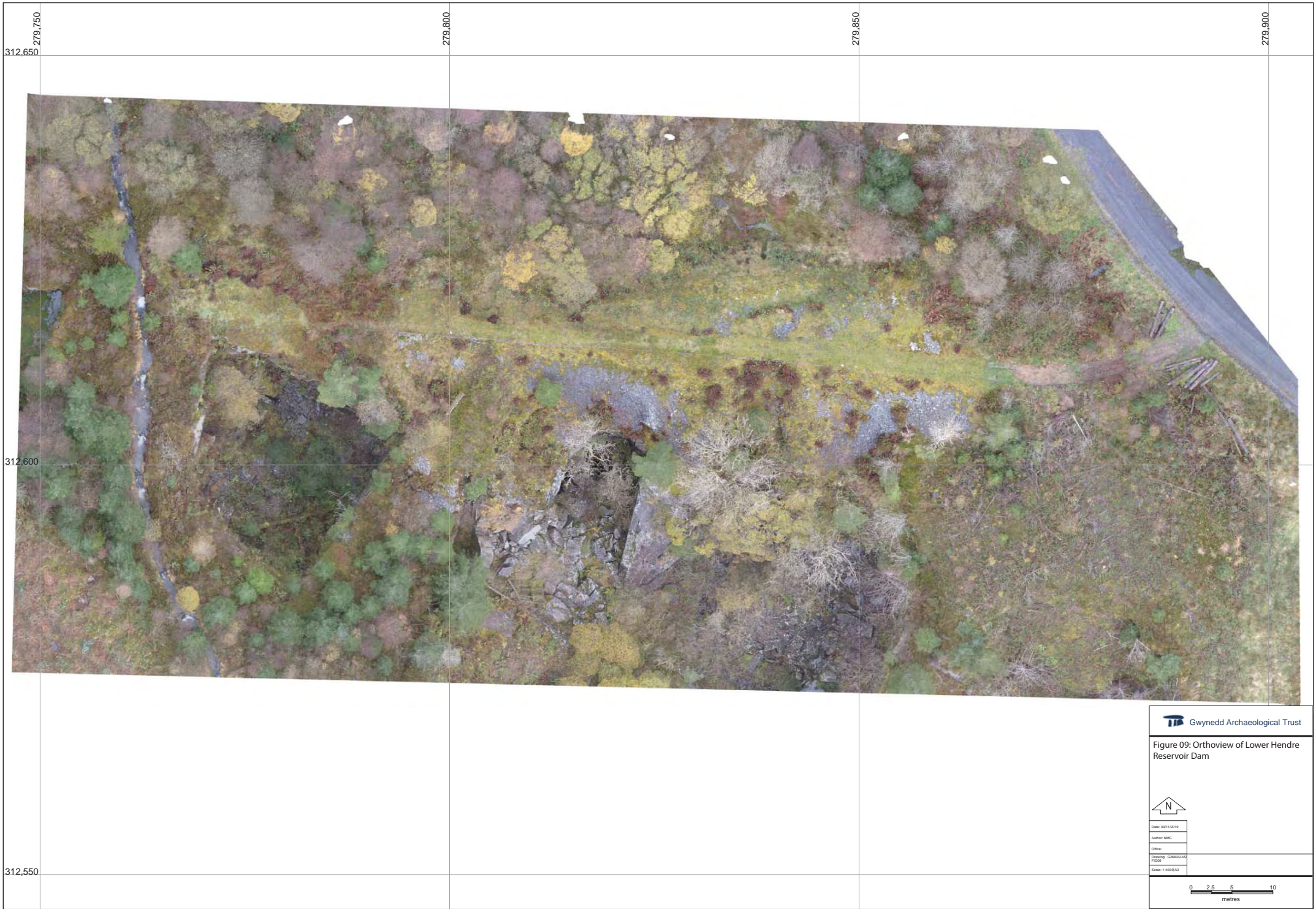


Figure 07: Detail from RAF Aerial Photograph 4801540 39 frame 5087 taken on 6th May 1948 showing Hendre Ddu Quarry. Not to Scale



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Figure 08: Location Map showing features noted at Hendre Ddu Quarry. Based on Ordnance Survey County Series 1:10000 Map Sheet SH71. Scale 1:4000@ A4. Green boxes with feature numbers indicate sites identified during the assessment



 Gwynedd Archaeological Trust

Figure 09: Orthoview of Lower Hendre Reservoir Dam



Date: 09/11/2019  
Author: NMC  
Office:  
Drawing: G0905/04/05  
Project:  
Scale: 1:400 (A3)

0 2.5 5 10  
metres

## **APPENDIX I**

### **Gwynedd Archaeological Trust written scheme of investigation**

# LOWER HENDRE RESERVOIR (G2660)

## WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL ASSESSMENT

*Prepared for*

*Natural Resources Wales*

***August 2020***



Ymddiriedolaeth Archaeolegol Gwynedd  
Gwynedd Archaeological Trust

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

Name

Signature

Date

## LOWER HENDRE RESERVOIR (G2660)

# WRITTEN SCHEME OF INVESTIGATION FOR AN ARCHAEOLOGICAL ASSESSMENT

Prepared for *Natural Resources Wales*, August 2020

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# 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been commissioned by Natural Resources Wales (NRW) to prepare a Written Scheme of Investigation (WSI) for an archaeological assessment in advance of proposed discontinuance works at Lower Hendre Reservoir, Gwynedd (NGR SH80141242; postcode SY20 9RU; [Figure 01](#)). The reservoir forms part of the Hendre Ddu slate quarry (Primary Reference Number 20447), which is situated at the head of the Angell valley, northwest of Aberangell that was in operation from the mid-nineteenth to mid-twentieth century. The proposed discontinuance works are aimed at stopping the reservoir holding any significant volumes of water by excavating a trench through the reservoir dam, as detailed on *Arcadis* Drawing No. 10038919-ARC-XX-XX-DR-CE-LH0250 ([Figure 02](#)). The assessment will include desk-based research and a field survey of the accessible quarry infrastructure at Hendre Ddu. The assessment will be undertaken in August 2020 and will be completed in accordance with the following guidance:

- *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* Version 1.1 (The Welsh Archaeological Trusts, 2018);
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015);
- *Management of Archaeological Projects* (English Heritage, 1991);
- *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England, 2015);
- *Standard and Guidance for Desk Based Assessment* (Chartered Institute for Archaeologists, 2017);
- *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (Chartered Institute for Archaeologists, 2014)
- *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (Chartered Institute for Archaeologists, 2014);
- *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures* (Chartered Institute for Archaeologists, 2014); and
- *Understanding Historic Buildings: A Good to Good Recording Practice* (Historic England, 2016).

Gwynedd Archaeological Trust is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

## **1.1 Aims and Objectives**

The key aims and objectives are to:

- Complete a desk-based assessment and field survey/record of quarry infrastructure at Hendre-Ddu in advance of any proposed works to the Lower Hendre Reservoir, to assist with characterising and possibly dating the features recorded and gain a better understanding of the quarry site.

## **1.2 Monitoring Arrangements**

The archaeological mitigation will be monitored by the Gwynedd archaeological Planning Service (GAPS); the content of this WSI and all subsequent reporting by GAT must be approved by GAPS prior to final issue.

### 1.3 Historic Environment Record

In line with the Gwynedd Historic Environment Record (HER) requirements, the HER will be contacted at the onset of the project to ensure that any data arising is formatted in a manner suitable for accession to the HER and follows the guidance set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). The HER will be informed of the project start date, location including grid reference, estimated timescale for the work, and further relevant information associated with the project.

The GAT HER Enquiry Number for this project is GATHER1302 and the Event PRN is 45948. The GAT HER will also be responsible for supplying Primary Reference Numbers (PRN) for any new assets identified and recorded.

Prior to submission of data to the HER on completion of the project, a bilingual event summary document will be prepared in *Microsoft Word* based on the format defined in section 4.2 of *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1).

## 2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Hendre Ddu slate quarry (Primary Reference Number (PRN) 20447) is remotely situated at the head of the Angell valley, northwest of Aberangell. The quarry was in the old county of Merioneth and was in operation from the 1850s to the 1940s (Richards 1991). The quarry is partly underground and includes a large mill and other quarry buildings, with material sent out via the Hendre Ddu incline and tramway, which was connected to the privately financed Mawddwy Railway. Visible remains in 1991 included workings on four levels, a compact mill area, adits associated with massive spoil heaps (containing sizeable blocks), traceable tramroad formations and inclines, and a well-preserved reservoir at the top of the site (the upper reservoir); the quarry was known to have had a ward for injured workers attached to it (*ibid.*). Multiple PRNs have been assigned across the quarry to denote various buildings and features (including PRNs 9130 to 9147; PRN 20447, PRN 21056 and PRN 44353). The general area is now heavily forested, with access tracks leading to the quarry and around the upper reservoir. The upper reservoir still retains water and is triangular in shape, with a dam and outfall at the southern end; the lower reservoir is of similar shape but is smaller in size, also with a dam at the southern end, but does not regularly hold water. The upper and lower reservoirs (PRN 9147 and 9146 respectively) are located to the northwest of the main quarry buildings which are located in a clearing.

An examination of the First to Third Edition 6-inch to 1-mile Ordnance Survey Merionethshire County Series Map Sheet 38SW (published 1888, 1899 and 193 respectively; cf. [Figures 03](#), [04](#) and [05](#)) shows the extent of the visible quarry infrastructure. The distribution of the main quarry buildings does not appear to alter, but it is notable that the quarry is listed as “disused” on the Third Edition and the lower reservoir, listed and clearly visible on the First and Second Edition maps, is not listed on the Third Edition, with only the outline of the reservoir visible as an earthwork. This suggests the lower reservoir ceased in purpose in the early twentieth century.

## 3 METHODOLOGY

### 3.1 Introduction

The proposed discontinuance works are aimed at stopping the Lower Hendre Reservoir holding any significant volumes of water by excavating a trench through the reservoir dam, as detailed on *Arcadis* Drawing No. 10038919-ARC-XX-XX-DR-CE-LH0250 (Figure 02). The assessment and field survey will be undertaken in August 2020 in advance of the proposed works and the aim will be to characterise and date quarry buildings and infrastructure, with a view to gaining a better understanding of the site and to inform further decision making.

### 3.2 Assessment (Desktop Study)

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

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

1. The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the study area, defined as Hendre Ddu slate quarry (PRN 20447) including both upper and lower reservoirs, quarry buildings and infrastructure as located in Figure 01. Examination of the core HER will be undertaken, including the 6-inch and 25-inch County Series Ordnance Survey maps and any secondary information held within the HER, including D.Gwyn, *Welsh Slate: the Archaeology and History of an Industry* (RCAHMW 2015) and A.J.Richards, *A Gazetteer of the Welsh Slate Industry* (1991). All identified features will be mapped, described and added to a gazetteer of sites and the relative importance of any sites defined;
2. The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be checked for sites additional to the HER;

3. Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be examined for potential features. This will include 1946 RAF vertical aerial photographs;
4. The online catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU);
5. Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives, if open and accessible. Archive data will include historic mapping such as the local tithe map and schedule (Mallwyd, 1838). Hendre Ddu quarry was in the parish of Mallwyd, which was the remotest southern parish in Meirionydd, bordering Montgomeryshire. The landowner was Sir Watkin Williams Wynn of Wynnstay, Denbs; the archives of that estate are in Ruthin and these will also be consulted if accessible;
6. Light Detection and Ranging (LiDAR) data will be examined from the Lle Geo-Portal at <http://lle.gov.wales/home> for information on potential surface features using digital terrain modelling and digital surface modelling;

### 3.3 Field Survey

A field survey will be undertaken that will incorporate the assessment area study area, defined above. The aim will be to visit and record known quarry features, including the two reservoirs. The features will be mapped and located in advance as part of the desk based assessment, using a combination of historic and GIS based data; this information will then be used to geo-locate features, which will then be located and described on GAT pro-formas. The sites will then be added to the overall gazetteer and their relative importance defined. Any newly identified assets will also be recorded. Only features that can be safely accessed will be directly recorded. A handheld GPS unit will also be used during the walkover survey. A photographic record will be maintained in RAW format using a digital SLR set to maximum resolution (Nikon D3000; resolution: 3,872 × 2,592 [10.2 effective megapixels]) and photographic metadata table will be completed and included in the report. Photographic images will be archived in TIFF format; the archive numbering system will start from G2659\_001. If practical, an Unmanned Aerial Vehicle (UAV) will be used for additional photographic recording if access to certain structural elements is impractical or unsafe on foot. GAT has Permission for Commercial Operations (PfCO) for using a DJI Phantom 4 Pro V2; photographic images will be taken using the on-board digital camera set to a resolution of 5472 x 3648 (19 megapixels) in JPEG format; a photographic record will be digitised in *Microsoft Excel* as part of the archive and dissemination process. Photographic images will be archived in TIFF format using Adobe Photoshop; the archive numbering system will start from the next sequential number available.

Following the completion of the respective assessment/evaluation stages, archiving will be completed based on following task list:

1. Pro-formas: all cross referenced and complete;
2. Photographic Metadata: completed in *Microsoft Access* and cross-referenced with all pro-formas;

All data will be processed and a report will be produced which will detail and synthesise the results.

### 3.4 Gazetteer of Features

A gazetteer will be compiled for any existing and newly identified sites, based on information sourced from the desk based assessment and field survey ; the gazetteer will be prepared in the following format and will include:

<b>Feature Number</b>	
<b>Site name</b>	
<b>PRN number</b>	
<b>Grid reference</b>	
<b>Period</b>	
<b>Site type</b>	
<b>Assessment category</b>	
<b>Description</b>	
<b>Impact</b>	
<b>Recommendation for further assessment/evaluation</b>	
<b>Recommendation for mitigatory measures</b>	

**The following categories will be used to define the assessment category of the archaeological asset:**

*Category A - Sites of National Importance.*

Scheduled Monuments, Listed Buildings of grade II\* and above, as well as those that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both. Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

*Category B - Sites of regional or county importance.*

Grade II listed buildings and sites which would not fulfil the criteria for scheduling or listing, but which are nevertheless of particular importance within the region. Preservation *in situ* is the preferred option for Category B sites, but if damage or

destruction cannot be avoided, appropriate detailed recording might be an acceptable alternative.

*Category C - Sites of district or local importance.*

Sites which are not of sufficient importance to justify a recommendation for preservation if threatened. Category C sites nevertheless merit adequate recording in advance of damage or destruction.

*Category D - Minor and damaged sites.*

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

*Category E - Sites needing further investigation.*

Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A - D are temporarily placed in this category, with specific recommendations for further evaluation.

**The impact of the proposed works on any asset will be identified using the following impact criteria, defined either as *none, slight, unlikely, likely, significant, considerable or unknown* as follows:**

*None:*

There is no construction impact on this asset.

*Slight:*

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

*Unlikely:*

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

*Likely:*

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

*Significant:*

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

*Considerable:*

The total removal of an asset or its partial removal which would effectively destroy the remainder of the site.

*Unknown:*

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

### 3.5 Data processing and report compilation

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

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

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

A full archive including plans, photographs, written material and any other material resulting from the project will be prepared. The archaeological assessment/survey outlined in this written scheme of investigation will be submitted in draft format in August 2020; a final report will be submitted to the Historic Environment within six months of submitting the draft report (February 2021).

The following dissemination will apply:

- A digital report(s) will be provided to the client/consultant and GAPS (draft report then final report);
- A paper report plus a digital report will be provided to the regional Historic Environment Record, Gwynedd Archaeological Trust; this will be submitted within six months of project completion (final report only), along with any relevant, digital information such as the project database and photographs. All digital datasets submitted will conform to the required standards set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1); and
- A digital report and archive (including photographic and drawn) data will be provided to Royal Commission on Ancient and Historic Monuments, Wales (final report only), in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information will include the photographic archive and associated metadata.

## **4 PERSONNEL**

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section and undertaken by a team of project archaeologists. The project archaeologists will be responsible for the desk based assessment and field survey, as well as Gwynedd Archaeological Planning Service liaison, NRW liaison and main contact liaison (Arcadis). The project archaeologists will be responsible for completing the field survey pro-formas and the archive itemised in Sec 3.7. The project archaeologists will also be responsible for submitting a draft final report to the project manager for review and approval. The reports will then be submitted as per the arrangements defined in Sec 5.

## 5 HEALTH AND SAFETY

The GAT Project Archaeologist(s) will be CSCS certified. Copies of the site specific risk assessment will be supplied to the client prior to the start of the field survey. All GAT staff attending will be issued with required personal safety equipment, including high visibility jacket, steel toe-capped boots and hard hat.

Due to the location and terrain, specific allowance will need to be made and appropriate control measures applied, including for the following:

- Access on foot only, with frequent overgrowth, over uneven terrain;
- Intermittent phone signal
- Steep drops; e.g., it is not safe to walk on the downstream slope of the dam as if a person falls they could roll over the quarry face;
- Adverse weather;
- Trees at risk of falling/ falling branches in high winds.

Access to the site will be via an entrance near Hendre Ddu cottages SH80201240 and Hendre Coed (NGR SH80601240). A risk assessment will be prepared in advance of attendance that will include a dynamic risk assessment element. No lone working will be undertaken and Covid-19 control measures will be applied, following governmental and GAT guidelines. *Arcadis* drawing 10038919-ARC-XX-XX-DR-CE-LH0100-P1, which details known hazards, will be consulted prior to access and for preparation of the risk assessment.

## **6 SOCIAL MEDIA**

One of the key aims in the GAT mission statement is to improve the understanding, conservation and promotion of the historic environment in our area and inform and educate the wider public. To help achieve this, GAT maintains an active social media presence and seeks all opportunities to promote our projects and results. With permission, GAT would like the opportunity to promote our work on this scheme through our social media platforms. This could include social media postings during our attendance on site as well as any postings to highlight results. In all instances, approval will be sought from client prior to any postings.

## **7 INSURANCE**

### **7.1 Public/Products Liability**

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

INSURER Aviva Insurance Limited

POLICY TYPE Public Liability

POLICY NUMBER 24765101CHC/UN/000375

EXPIRY DATE 21/06/2021

### **7.2 Employers Liability**

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

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

INSURER Aviva Insurance Limited

POLICY TYPE Employers Liability

POLICY NUMBER 24765101 CHC / UN/000375

EXPIRY DATE 21/06/2021

### **7.3 Professional Indemnity**

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

INSURER Hiscox Insurance Company Limited

POLICY TYPE Professional Indemnity

EXPIRY DATE 22/07/2021

## 8 SOURCES CONSULTED

1. Richards A.J 1991, *A Gazetteer of the Welsh Slate Industry*
2. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Desk Based Assessment*
3. Chartered Institute for Archaeologists, 2014, *Standard and guidance for the collection, documentation, conservation and research of archaeological materials*
4. Chartered Institute for Archaeologists, 2014, *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives*
5. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures*
6. English Heritage, 1991, *Management of Archaeological Projects (MAP2)*
7. *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs) Version 1.1* (The Welsh Archaeological Trusts, 2018);
8. *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015);
9. Historic England, 2015, *Management of Research Projects in the Historic Environment (MoRPHE)*
10. Royal Commission on Ancient and Historic Monuments of Wales, 2015, *Guidelines for digital archives*
11. The Welsh Archaeological Trusts, 2018, *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*

## **FIGURE 01**

**Location Map showing Hendre-Ddu Quarry. Based on Ordnance Survey County Series 1:10000 Map Sheet SH71. Scale 1:5000@ A4.**

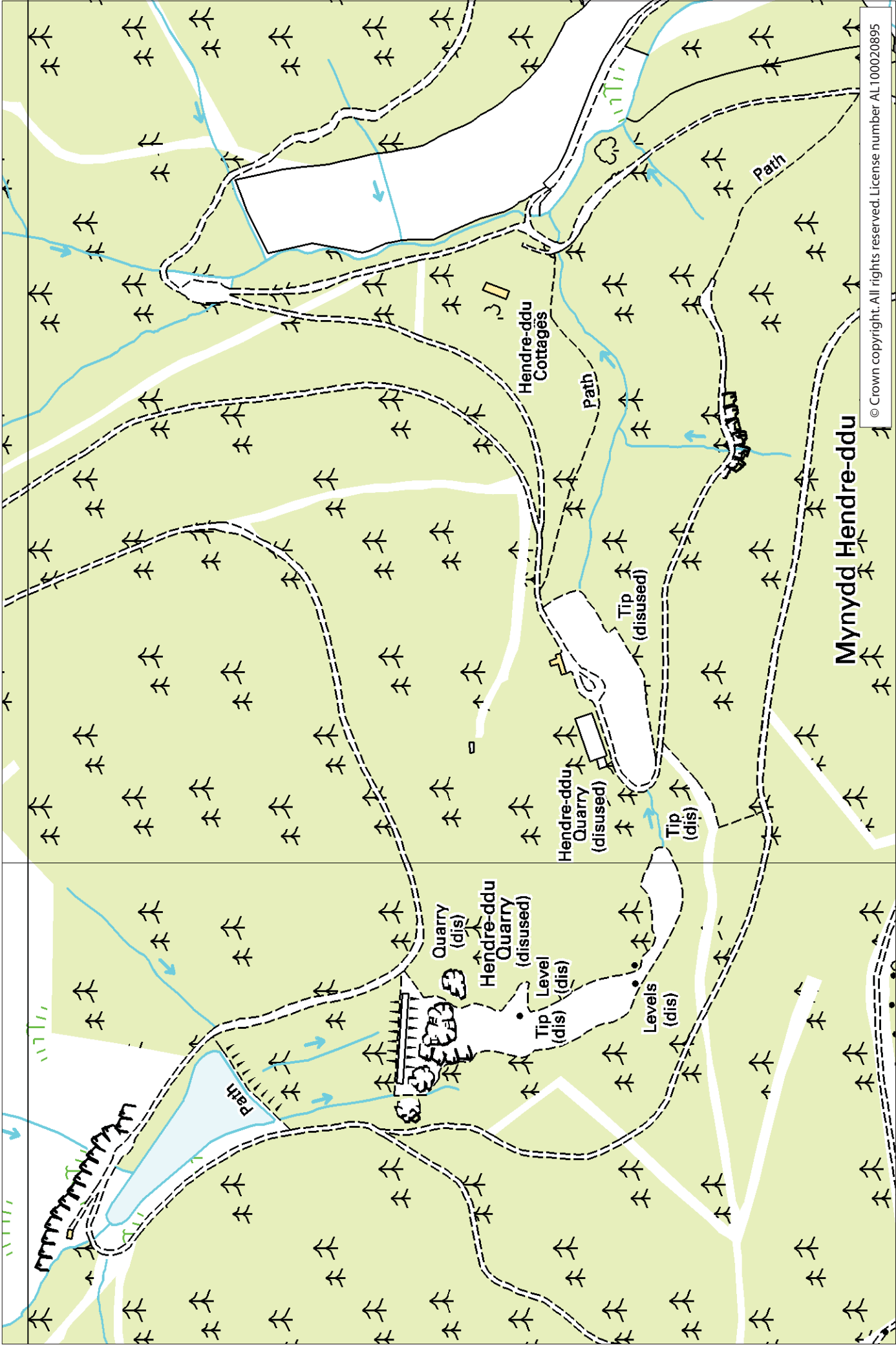


Figure 01: Location Map showing Hendre-Ddu Quarry. Based on Ordnance Survey County Series 1:10000 Map Sheet SH71. Scale 1:5000@ A4.

## **FIGURE 02**

**Reproduction of *Arcadis* Drawing No. 10038919-ARC-XX-XX-DR-CE-LH0250**

1. DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
2. ALL DIMENSIONS SHOULD BE READ IN MILLIMETRES UNLESS STATED OTHERWISE
3. ALL LEVELS ARE IN METRES RELATIVE TO ORDNANCE DATUM NEWLYN.

1. DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
2. ALL DIMENSIONS SHOULD BE READ IN MILLIMETRES UNLESS STATED OTHERWISE
3. ALL LEVELS ARE IN METRES RELATIVE TO ORDNANCE DATUM NEWLYN.

CONTRACTOR'S WORKING AREA

[illegible]

## NATURAL RESOURCES



Lower Hender Reservoir

Natural Resources Wales  
Plas Gwenddwr Cross Hands  
Heol Parc Mawr, Llanelli, SA14 6RE  
+44 (0) 3000 654057  
[www.naturalresourceswales.gov.uk](http://www.naturalresourceswales.gov.uk)



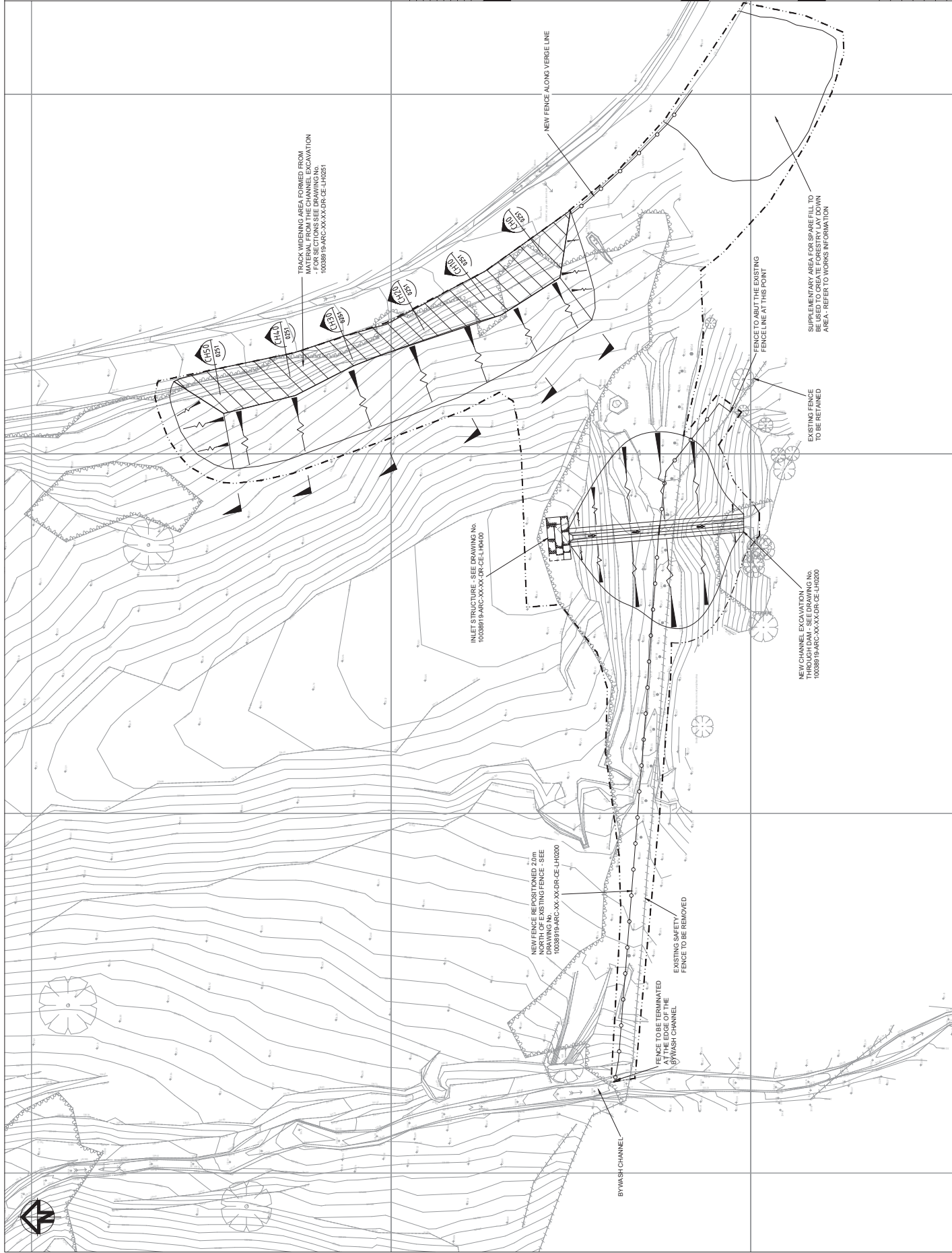
## PROPOSED WORKS OVERALL PLAN

Designed	J.PRATTEN	JP	04/06/20
Drawn	R. SEARLE	RS	23/JUN/20
Checked	J.PRATTEN		14/JUL/20
Reviewed	A. HOLT		
Scale:	1:250	Datum:	NEWLYN
Original Size:	A1	Grid:	OS
Suitability Code:	S0	Project Number:	10029559

Issue for comment

Drawing Number: 10038919-ARC-XX-XX-DR-CE-LH0250	Revision: P1
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© Copyright reserves



### **FIGURE 03**

**Reproduction of Ordnance Survey First Edition 6-inch to 1-mile Merionethshire County Series Map Sheet 38SW, published 1888. Scale 1:5000@ A4.**

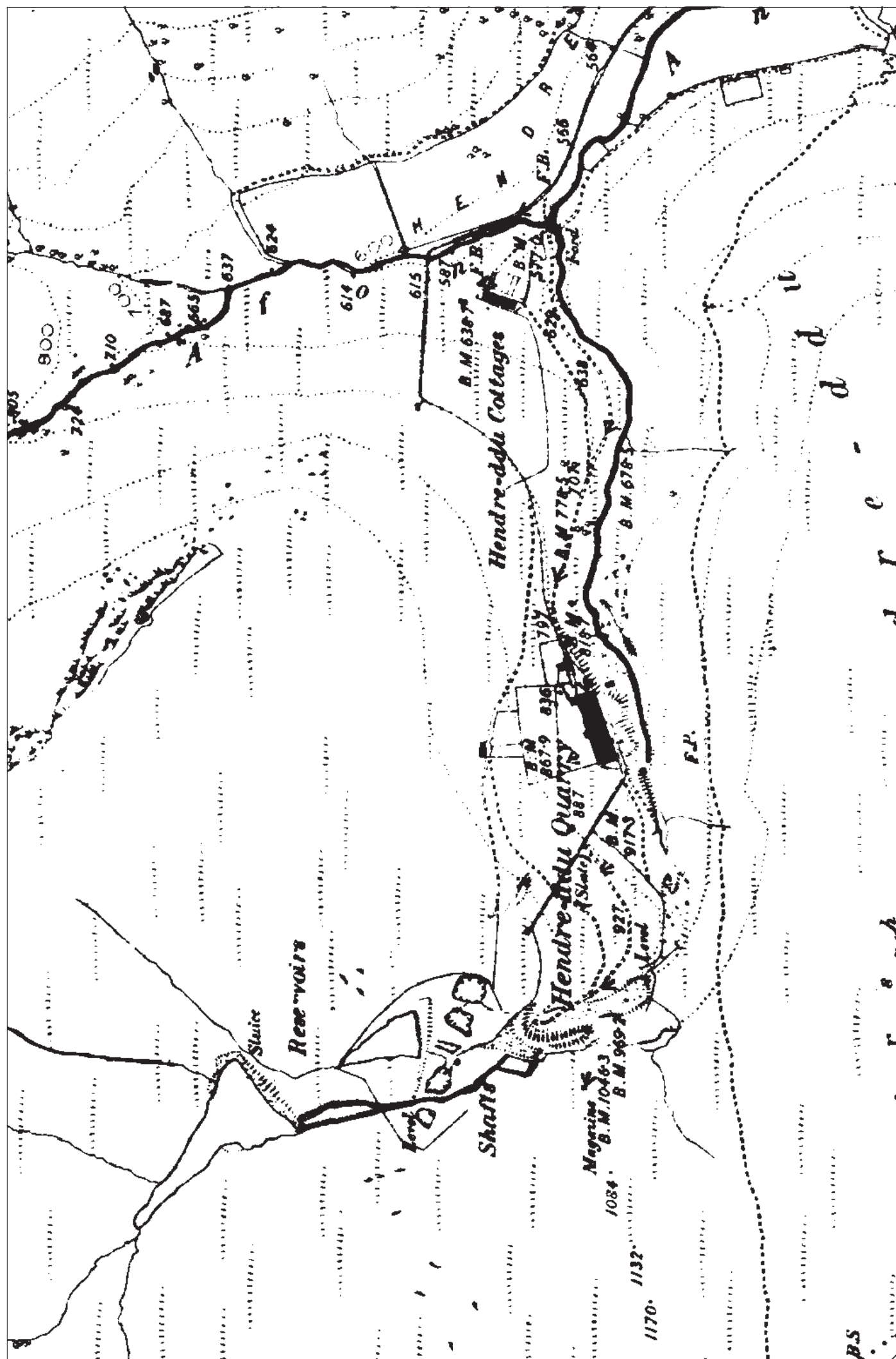


Figure 03: Reproduction of Ordnance Survey First Edition 6-inch to 1-mile Merionethshire County Series Map Sheet 38SW, published 1888. Scale 1:5000@ A4.

## **FIGURE 04**

**Reproduction of Ordnance Survey Second Edition 6-inch to 1-mile Merionethshire County Series Map Sheet 38SW, published 1899. Scale 1:5000@ A4.**

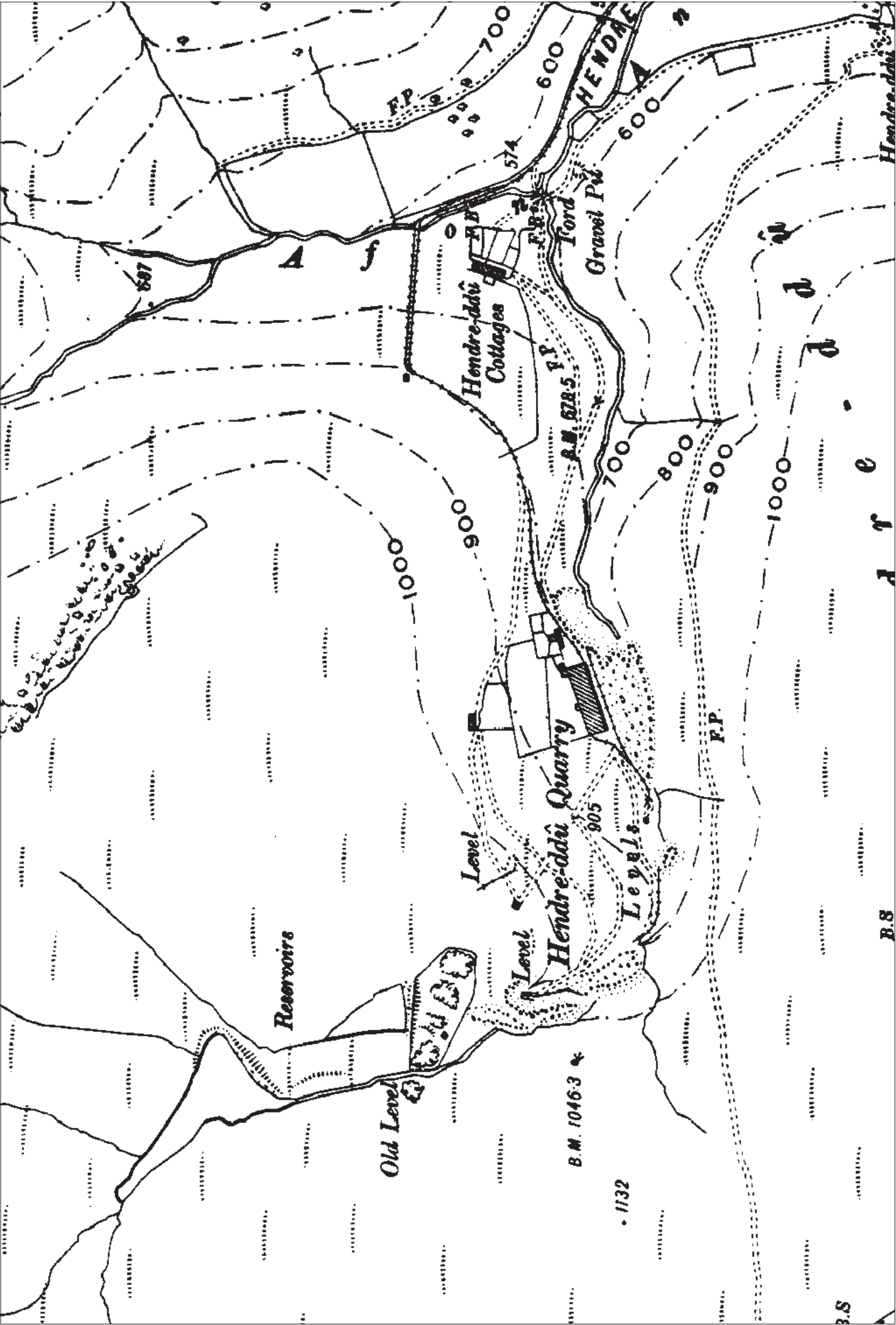


Figure 04: Reproduction of Ordnance Survey Second Edition 6-inch to 1-mile Merionethshire County Series Map Sheet 38SW, published 1899. Scale 1:5000@ A4.

## **FIGURE 05**

**Reproduction of Ordnance Survey Third Edition 6-inch to 1-mile Merionethshire County Series Map Sheet 38SW, published 1913. Scale 1:5000@ A4.**

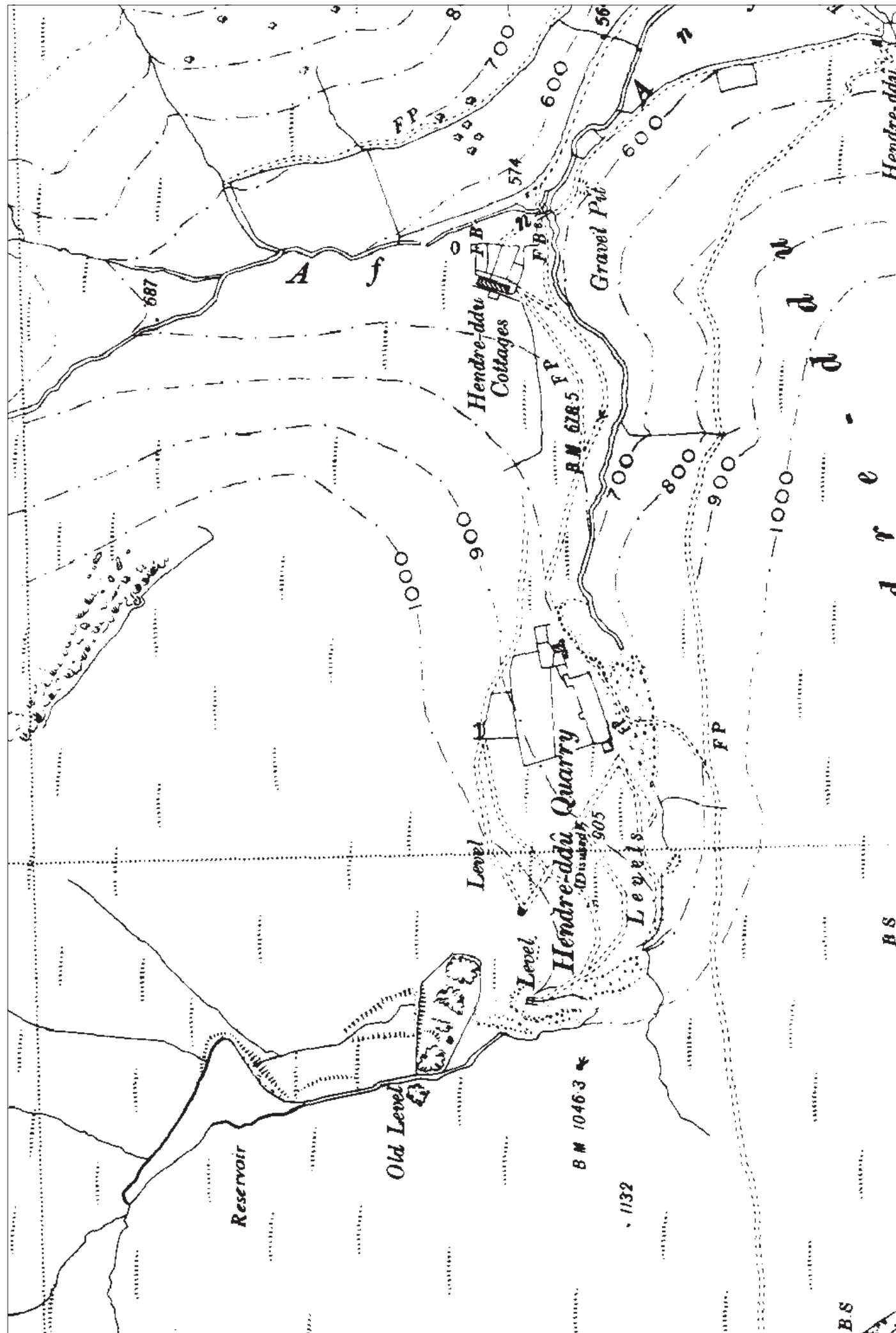


Figure 05: Reproduction of Ordnance Survey Third Edition 6-inch to 1-mile Merionethshire County Series Map Sheet 38SW, published 1913. Scale 1:5000@ A4.

## **APPENDIX I**

### **Gwynedd Archaeological Trust basic recording pro-forma**

YMDDIRIEDOLAETH ARCHAEOLEGOL GWYNEDD ARCHAEOLOGICAL TRUST		
BASIC RECORDING FORM	<i>Project name</i>	<i>Project number</i>
<i>Feature name</i>		<i>Feature Number</i>
<i>NGR</i>		
<i>Description</i>		
<i>Recommendations for further assessment</i>		
<i>Photographic record numbers</i>		
<i>Digital</i>		
	<i>Visit date</i>	<i>Visit by</i>

## **APPENDIX II**

### **Gwynedd Archaeological Trust photographic metadata pro-forma**

# Digital Photographic Record

Include main context numbers for each shot, drawing numbers for sections and any other relevant numbers for cross referencing. Regularly upload photographs to computer. Delete any unwanted photos **immediately** from the camera.

[illegible]

## **APPENDIX II**

**Sites listed on Gwynedd Archaeological Trust Historic Environment  
Record**

Sites on the Gwynedd HER within 500m of Hendre Ddu Lower Reservoir					
PRN	SITE_NAME	DESCRIPTIO	PERIOD	TYPE	NGR
9138	Hendre Ddu Quarry Bench, Mawddwy	Stone bench 1 x 1m, 0.5m high besides track to 9137.	MODERN	BENCH	SH79851244
9142	Hendre Ddu Quarry Building 1, Mawddwy	Footings only survive	MODERN	BUILDING	SH80131243
9130	Hendre Ddu Quarry Building 2, Mawddwy	Building 10 x 6m end walls survive to near roof line, side walls collapsed.	MODERN	BUILDING	SH80111254
9133	Hendre Ddu Quarry Building 3, Mawddwy	Building 3 x 7m with sloping roof. Roof partly survives, slab roof. Possible external stair on W side.	MODERN	BUILDING	SH79921250
9143	Hendre Ddu Quarry Building 4, Mawddwy	Footings only survive	MODERN	BUILDING	SH80161245
9131	Hendre Ddu Quarry Level 1, Mawddwy	Adit mine c.2m wide and up to 2m high.	MODERN	LEVEL	SH79951253
9134	Hendre Ddu Quarry Level 2, Mawddwy	Adit 2.5m wide and 2m high in places leading back into hill side.	MODERN	LEVEL	SH79841250
9144	Hendre Ddu Quarry Level 3, Mawddwy	Adit tunnel 2m wide and 1.5m high	MODERN	LEVEL	SH79741262
9140	Hendre Ddu Quarry Level 4, Mawddwy	Adit mine 2m wide and 2m high.	MODERN	LEVEL	SH79931237
9137	Hendre Ddu Quarry Level 5, Mawddwy	Adit mine 2m wide and up to 1m high.	MODERN	LEVEL	SH79851245
9136	Hendre Ddu Quarry Pit 1, Mawddwy	Large quarry with several levels and possible adit mines	MODERN	QUARRY	SH79841258
9146	Hendre Ddu Quarry Reservoir 1, Mawddwy	Triangular reservoir with dam at S end.	MODERN	RESERVOIR	SH79821265
9147	Hendre Ddu Quarry Reservoir 2, Mawddwy	Triangular reservoir with dam at SE end. Outfall from S end.	MODERN	RESERVOIR	SH79751280
9132	Hendre Ddu Quarry Spoil Tip 1, Mawddwy	Waste tip for 9131.	MODERN	SPOIL TIP	SH79971250
9139	Hendre Ddu Quarry Spoil Tip 2, Mawddwy	Waste tip from 9137. Five smoothed tracks are defined in the top of the tips marking the line of tramways.	MODERN	SPOIL TIP	SH79851242

Sites on the Gwynedd HER within 500m of Hendre Ddu Lower Reservoir					
PRN	SITE_NAME	DESCRIPTIO	PERIOD	TYPE	NGR
9135	Hendre Ddu Quarry Spoil Tip 3, Mawddwy	Waste tip from 9134. Top surface has six smoothed area probably the line of trackways.	MODERN	SPOIL TIP	SH79831248
9141	Hendre Ddu Quarry Spoil Tip 4, Mawddwy	Waste tips from 9140. Partly disturbed by later dumping.	MODERN	SPOIL TIP	SH80111238
9145	Hendre Ddu Quarry Spoil Tip 5, Mawddwy	Waste tip from 9144 joined to 9144 by track.	MODERN	SPOIL TIP	SH79851261
9309	Hendre Ddu Quarry Track, Mawddwy	Track joining 9131 to 9134. Well made track c.1m wide supported in places by well made revetting wall.	MODERN	TRACKWAY	SH79891249
20447	Hendre Ddu Slate Quarry, Mawddwy		POST MEDIEVAL	SLATE QUARRY	SH799125
9166	Mynydd Hendre-ddu Boundary Sto, Corris	Seen on OS 2nd Edition	UNKNOWN	BOUNDARY STONE	SH79881212
21056	Slate Quarry, Hendre Ddu		POST MEDIEVAL	SLATE QUARRY	SH800124

## **APPENDIX III**

### **Definition of mitigation terms**

## **Definition of field evaluation techniques**

Field evaluation is necessary to fully understand and assess most class E sites and to allow the evaluation of areas of land where there are no visible features but for which there is potential for sites to exist. Two principal techniques can be used for carrying out the evaluation: geophysical survey and trial trenching. Topographic survey may also be employed where sites are thought to survive as earthworks.

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

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

## **Definition of Mitigatory Recommendations**

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

*None:*

No impact so no requirement for mitigatory measures.

*Detailed recording:*

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

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

*Basic recording:*

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

*Strip, Map and Sample:*

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

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

*Watching brief:*

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

*Avoidance:*

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

*Reinstatement:*

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

## **APPENDIX IV**

### **Photographic metadata**

PHOTO RECORD NUMBER	DESCRIPTION	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO	DATE OF CREATION OF DIGITAL PHOTO	ORIGINATING ORGANISATION	PLATES
G2660_001	General view of stream crossing/ford, now entirely modern culvert	n/a	N	1x1m	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_002	General view of stream crossing/ford, now entirely modern culvert	n/a	NW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_003	Feature 24: PRN 90856, Hendre Ddu Cottages	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	01
G2660_004	Feature 28: PRN 90590, stream crossing/ford	n/a	W	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_005	Feature 28: PRN 90590, stream crossing/ford	n/a	W	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_006	General view of stream crossing/carriageway	n/a	SE	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_007	Feature 23: PRN 90585, view of house <i>Hendregoad</i>	n/a	SSW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	02
G2660_008	Feature 23: PRN 90585, general view of garden and shed; no visible quarry features	n/a	SSW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_009	Feature 23: PRN 90585, general view of garden and shed; no visible quarry features	n/a	SSE	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	

PHOTO RECORD NUMBER	DESCRIPTION	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO	DATE OF CREATION OF DIGITAL PHOTO	ORIGINATING ORGANISATION	PLATES
G2660_010	Feature 29: PRN 90591 possible remains of tramway	n/a	SE	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	03
G2660_011	Feature 29: PRN 90591 possible remains of tramway	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	04
G2660_012	View of channelled stream (NGR SH8008512377)	n/a	W	1x1m	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_013	General view of slate workings south of Lower Hendre Reservoir	n/a	ESE	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_014	General view of slate workings south of Lower Hendre Reservoir, showing the lack of access through workings to the reservoir	n/a	ESE	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_015	Feature 14: PRN 9132, view of spoil tip	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	05
G2660_016	Feature 29: Wide angle view of tramway	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	06
G2660_017	Feature 30: PRN 9127: view of drum house	n/a	SE	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_018	Feature 30: PRN 9127: view of drum house	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	07

PHOTO RECORD NUMBER	DESCRIPTION	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO	DATE OF CREATION OF DIGITAL PHOTO	ORIGINATING ORGANISATION	PLATES
G2660_019	PRN 9127: view of drum house detailing metal and wood structural remains	n/a	SE	1x1m	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	08
G2660_020	Feature 23: PRN 90585, general view in woodland	n/a	NW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_021	PRN 9128: possible remains of tramway	n/a	NW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_022	Feature 09: PRN 9140, view of adit	n/a	N	not used	Carol Ryan Young	29/08/2020	Gwynedd Archaeological Trust	09
G2660_023	Feature 13: PRN 9147, view along Lower Hendre Reservoir dam	n/a	W	1x1m	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	10
G2660_024	Feature 11: PRN 9136, view of Hendre Ddu Quarry, Pit 1	n/a	NW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	12
G2660_025	Feature 11: PRN 9136, view of Hendre Ddu Quarry, Pit 2	n/a	N	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_026	Feature 08: PRN 9144, view of channelled watercourse	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_027	Feature 08: PRN 9144, view of channelled watercourse	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	13

PHOTO RECORD NUMBER	DESCRIPTION	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO	DATE OF CREATION OF DIGITAL PHOTO	ORIGINATING ORGANISATION	PLATES
G2660_028	Feature 13: PRN 9147, view of face of Lower Hendre Reservoir dam slope and beyond	n/a	N	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	
G2660_029	Feature 13: PRN 9147, view from Lower Hendre Reservoir dam wall showing overgrowth within reservoir	n/a	S	1x1m	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	14
G2660_030	Feature 13: PRN 9147, view of Lower Hendre Reservoir dam wall	n/a	E	1x1m	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	11
G2660_031	Feature 12: PRN 9146, view along Upper Hendre Reservoir dam	n/a	SW	1x1m	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	15
G2660_032	Feature 12: PRN 9146, view along Upper Hendre Reservoir dam	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	16
G2660_033	Feature 12: PRN 9146, view of modern revetment works to the Upper Hendre Reservoir dam	n/a	SW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	17
G2660_034	Feature 12: PRN 9146, view from Upper Hendre Reservoir spillway	n/a	NW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	18
G2660_035	Feature 04: PRN 9133, view across site of a possible drum house	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	19
G2660_036	Feature 03: PRN 9130, general view	n/a	SW	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	20

PHOTO RECORD NUMBER	DESCRIPTION	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO	DATE OF CREATION OF DIGITAL PHOTO	ORIGINATING ORGANISATION	PLATES
G2660_037	General view of quarry workings, showing general view of PRNs 9134 to 9139, which were inaccessible during walkover survey	n/a	S	not used	Carol Ryan Young	28/08/2020	Gwynedd Archaeological Trust	21



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