

HAFAN MINE, CEREDIGION: HISTORIC ENVIRONMENT DESK-BASED ASSESSMENT



Prepared by DAT Archaeological Services
For: NRW



DYFED ARCHAEOLOGICAL TRUST

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HAFAN MINE, CEREDIGION: HISTORIC ENVIRONMENT DESK-BASED ASSESSMENT

By

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HAFAN MINE, CEREDIGION

HISTORIC ENVIRONMENT DESK BASED ASSESSMENT

Client	NRW
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Event Record No 128834

Report No	2022-29
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Site-visit Undertaken By Philip Poucher

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**HAFAN MINE, CEREDIGION:
HISTORIC ENVIRONMENT DESK-BASED ASSESSMENT**

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HAFAN MINE, CEREDIGION

HISTORIC ENVIRONMENT DESK-BASED ASSESSMENT

EXECUTIVE SUMMARY

DAT Archaeological Services were commissioned by Natural Resources Wales to provide an Historic Environment Desk-Based Assessment to inform proposed environmental remediation works at the former Hafan metal mines in Ceredigion (SN 728 879).

The assessment has identified and mapped known and visible archaeological remains within the study area, assessed their significance, and highlighted the potential for further remains to exist. Outline mitigation measures to protect the historic environment are also suggested.

CRYNODEB GWEITHREDOL

Comisiynwyd Gwasanaethau Archaeolegol YAD gan Cyfoeth Naturiol Cymru i ddarparu Asesiad Desg Amgylchedd Hanesyddol i hysbysu gwaith adfer amgylcheddol arfaethedig ar hen fwyngloddiau metel Hafan yng Ngheredigion (SN 728 879).

Mae'r asesiad wedi nodi a mapio olion archeolegol hysbys a gweladwy o fewn ardal yr astudiaeth, wedi asesu eu harwyddocâd, ac wedi amlygu'r potensial i olion pellach fodoli. Awgrymir hefyd fesurau lliniaru amlinellol i warchod yr amgylchedd hanesyddol.

INTRODUCTION

1.1 Project Proposals and Commission

- 1.1.1 DAT Archaeological Services were commissioned by NRW, to prepare an Historic Environment Desk-Based Assessment on the former Hafan Mine, Ceulanamaesmawr, Ceredigion (SN 728 879), ahead of proposed remediation works at the site.
- 1.1.2 Hafan Mine is an 17th to 20th century metal mine occupying a steep cleft in the rocky uplands near Nant y Moch reservoir in northern Ceredigion. Several former mines lie across this landscape, this assessment focusses on the Hafan mine which largely occupies ground falling to the west, with water courses draining into the Afon Cyneiniog. The identified mine workings cover an area of approximately 9 hectares on the surface.
- 1.1.3 The mine worked deposits of lead, zinc and copper, and it remains a potential source of metal pollutants into local water sources. NRW are undertaking a programme of remediation works in order to combat the risk of contaminants.
- 1.1.4 Hafan Mine is an historic site of archaeological interest, and lies in an area of archaeological importance, including the Scheduled remains of Carn Owen (CD045) a short distance to the north. Therefore Dyfed Archaeological Trust – Heritage Management section responded to initial scoping enquiries from NRW and recommended that a Historic Environment Desk-Based Assessment should be undertaken to identify the archaeological potential of the area and help inform proposals for remediation works.
- 1.1.5 The assessment has been a primarily desk-based study of the site area, identifying any known archaeological or historical sites within the site and its environs, identifying potential setting impacts on designated archaeological assets in the vicinity, identifying any historic landscape areas that may be affected by the proposals and assessing the potential for hitherto unknown archaeological remains to be present within the development area.

1.2 Scope of the Project and Methodology

- 1.2.1 The scope of the assessment follows the Standard And Guidance For Historic Environment Desk-Based Assessment as laid down by the Chartered Institute for Archaeologists (CIfA 2014). The standard is stated by CIfA as:

Desk-based assessment will determine, as far as is reasonably possible from existing records, the nature, extent and significance of the historic environment within a specified area. Desk-based assessment will be undertaken using appropriate methods and practices which satisfy the stated aims of the project, and which comply with the Code of Conduct and other relevant regulations of CIfA. In a development context desk-based assessment will establish the impact of the proposed development on the significance of the historic environment (or will identify the need for further evaluation to do so), and will enable reasoned proposals and decisions to be made whether to mitigate, offset or accept without further intervention that impact.

- 1.2.2 A desk-based assessment is defined by CIfA 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 historic assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of historic assets and, in England, the nature, extent and quality of the known or potential archaeological, historic, architectural and artistic interest. Significance is to be judged in a local, regional, national or international context as appropriate.

- 1.2.3 The desk-based study of the area identifies known archaeological sites within the site and its environs, and assesses the potential for hitherto unknown remains to be present within the proposed development area. This will help inform future decision making, design solutions and potential mitigations strategies, including the potential for further archaeological works.
- 1.2.4 The report also includes a brief assessment of the impact on the settings of surrounding designated historic assets, including scheduled monuments, listed buildings, historic landscape character areas and undesignated archaeological sites. This utilises the best practice guidance in *Setting of Historic Assets in Wales* (Cadw 2017).
- 1.2.5 The report presents relevant information from a number of sources including:
- Dyfed Archaeological Trust Historic Environment Record data;
 - Map regression exercise using earlier cartographic sources;
 - Available and relevant reports on any archaeological work undertaken in the area that affects the site or its setting;
 - Archive records held at the County Archive, the National Library of Wales (NLW) and the Royal Commission on the Ancient and Historic Monuments of Wales (RCAHMS);
 - Aerial photography, satellite imagery and Lidar data;
 - Relevant records held by the developer;
 - Identification of any Scheduled Monuments, Listed Buildings, Registered Parks and Gardens, Registered Historic Landscapes, Historic Landscape Character Areas or Conservation Areas within or in the vicinity of the site area (Cadw, DAT, NRW);
 - Assessment of the archaeological potential of the area;
 - Assessment of potential impacts on any identified remains within the development site (or possible remains) and likely requirements, if any, for further stages of archaeological work.
- 1.2.6 The assessment focusses on identifying the surface limits of the Hafan Mine, but includes an initial search area of 1km from the centre of the site to identify sites recorded on the Historic Environment Record and other sources, including the potential impact on the setting of high status, designated, historic assets in the surrounding landscape.
- 1.2.7 For the purposes of planning policy in Wales, the historic environment is defined as:

All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and deliberately planted or managed (Welsh Government 2017).

A historic asset is:

An identifiable component of the historic environment. It may consist or be a combination of an archaeological site, a historic building or area, historic park and garden or a parcel of historic landscape. Nationally important historic assets will normally be designated (ibid).

1.3 Abbreviations

- 1.3.1 All sites recorded on the regional Historic Environment Record (HER) are identified by their Primary Reference Number (PRN) and located by their National Grid Reference (NGR). Sites recorded on the National Monument Record (NMR) held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) are identified by their National Primary Reference Number (NPRN). Altitude is expressed to a height above Ordnance Datum (aOD). References to cartographic and documentary evidence and published sources will be given in brackets throughout the text, with full details listed in the sources section at the rear of the report.

1.4 Illustrations

- 1.4.1 Printed map extracts are not necessarily reproduced to their original scale. North is towards the top of the page unless otherwise indicated.

1.5 Timeline

- 1.5.1 The following timeline gives date ranges for the various archaeological periods that may be mentioned within this report.

Table 1: Archaeological and Historical Timeline for Wales

Period	Approximate date	
Palaeolithic –	c.450,000 – 10,000 BC	Prehistoric
Mesolithic –	c. 10,000 – 4400 BC	
Neolithic –	c.4400 – 2300 BC	
Bronze Age –	c.2300 – 700 BC	
Iron Age –	c.700 BC – AD 43	
Roman (Romano-British) Period –	AD 43 – c. AD 410	Historic
Post-Roman / Early Medieval Period –	c. AD 410 – AD 1086	
Medieval Period –	1086 – 1536	
Post-Medieval Period ¹ –	1536 – 1750	
Modern –	20th century onwards	

¹ The post-medieval and Industrial periods are combined as the post-medieval period on the Regional Historic Environment Record as held by Dyfed Archaeological Trust

2. POLICIES AND GUIDANCE

2.1 The Historic Environment (Wales) Act

2.1.1 The Ancient Monuments and Archaeological Areas Act 1979 was previously the primary legislation for protecting archaeological remains and scheduled monuments. This has more recently been amended by The Historic Environment (Wales) Act 2016 which has three main aims as defined by Cadw:

- to give more effective protection to listed buildings and scheduled monuments;
- to improve the sustainable management of the historic environment; and
- to introduce greater transparency and accountability into decisions taken on the historic environment.

2.1.2 The new Act amends the Ancient Monuments and Archaeological Areas Act 1979 and also the Planning (Listed Buildings and Conservation Areas) Act 1990. It is supported by a number of planning guidance documents. The Act most specifically provides better safeguards for the protection of scheduled monuments, listed buildings and historic parks and gardens. It also includes further guidance on place names.

2.2 Planning Policy Wales

2.2.1 Planning Policy Wales (Ed.11, 2021) sets out the Welsh Government's land use planning policies. Its primary objective is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation.

2.2.2 Chapter 6, 'Distinctive and Natural Places', explains how planning systems must take into account the Welsh Government's objectives to protect, conserve, promote and enhance the historic environment as a resource for the general well-being of present and future generations. It also sets out the planning policies for the sustainable management of specific categories of historic environment assets.

2.3 Technical Advice Note 24: The Historic Environment

2.3.1 This technical advice note provides guidance on how the planning system considers the historic environment during development plan preparation and decision making on planning and Listed Building consent applications. It also provides specific guidance on how the following historic environment assets should be considered:

- scheduled monuments
- archaeological remains
- listed buildings
- conservation areas
- historic parks and gardens
- historic landscapes
- historic assets of special local interest
- World Heritage Sites

- 2.3.2 The technical advice note usefully gathers together the selection criteria employed in the designation of scheduled monuments and listed buildings and the registration of historic parks and gardens and historic landscapes.
- 2.3.3. Advice and decisions on planning applications affecting nationally significant historic environment features (or designated historic environment assets) is provided by Cadw acting on behalf of Welsh Government.
- 2.3.4 This report will also make reference to other guidance documents published by Cadw, namely: Conservation Principles (March 2011); Heritage Impact Assessment in Wales (May 2017); Managing Historic Character in Wales (May 2017); and Setting of Historic Assets in Wales (May 2017).

2.4 Local Development Plan

- 2.4.1 The Historic Environment is subject to the relevant policies and procedures as laid out in the Ceredigion County Council (CCC) Local Development Plan (LDP) 2007 – 2022.
- 2.4.2 The historic environment is referenced throughout the document in numerous policies, emphasising its significance to the county. The main policy references to the Historic Environment are outlined in the strategic policy DM19:

DM19: Historic and Cultural Landscape

Development affecting landscapes or buildings which are of historical or cultural importance and make an important contribution to the character and interest of the local area, will be permitted where the distinctive appearance, architectural integrity or their settings will not be significantly adversely affected. Where possible development should enhance these qualities and special character.

8.167 Policy DM19 recognises that although conserving and enhancing the landscape in general (Policy DM17) is important, certain historic and cultural elements need specific mention because the Ceredigion landscape is rich in evidence from the past. Many of these features are protected as Scheduled Ancient Monuments or included on the Sites and Monuments record [HER] maintained by Dyfed Archaeological Trust and the Royal Commission for Sites and Monuments Wales.

8.168 The Register of Landscapes, Parks and Gardens of Special Historic Interest in Wales highlights what are considered to be the best examples of different types of historic landscape and gardens in Wales. Upland Ceredigion has been identified as a landscape of outstanding historic interest. A good practice guide explains how the Register should be used in assessing the effect of major developments on the historic landscape. Applicants should consult CADW, CCW or one of Wales' archaeological trusts to view this Register.

3 LOCATION, TOPOGRAPHY AND GEOLOGY

- 3.1 The former Hafan metal mine is located in the upland areas of Ceulanamaesmawr in northern Ceredigion, near Nant-y-moch reservoir (NGR SN 7298 8800 – Figures 1 & 2).
- 3.2 The site comprises a series of mine openings, spoil tips and structures generally occupying steep sloping ground that falls to the west, although mining remains also extend across more level ground at the top of the slope to the east. This upper eastern end of the site lies at around 430mOD, and extends for around 250m with the northern edge defined by rising ground and rocky crags of Cerrig yr Hafan which rise to a summit of around 480mOD. This area is now both disturbed and defined by modern stone quarrying activity associated with nearby reservoir. Ground also rises slightly to the south to a local summit of 439mOD. The mine complex then runs down the steep westerly slopes for another approximately 450m, within a recessed cleft between Cerrig yr Hafan and Cerrig Llwynog. At this point ground begins to level off at approximately 290mOD and the Nant y Maes-mawr watercourse forms, which runs another *circa* 850m west to the Afon Cyneiniog in the Cyneiniog Valley.
- 3.3 To the north, east and south the site is surrounded by sparsely populated uplands of northern Ceredigion, including large tracks of unenclosed ground and forestry plantations. To the west the river valleys drain towards the coast around 12.5km away. The Afon Cyneiniog feeds into the Afon Leri around 4km to the west, which in turn empties into Cardigan Bay via the Dyfi Estuary. Farmsteads and villages lie within these valleys, with larger population centres clustered along the coastline. Aberystwyth is the county town and lies 16km to the southwest.
- 3.4 The underlying geology comprises a complex mix, largely of different types of mudstones, with some sandstone and siltstone intermixed. These originate from several different Members, including Pencerrigtewion Member, Bryn-glas Formation, Mottled Mudstone Member and Cwmere Formation, with a faultline running along the cleft housing the Hafan Mine. Glaciofluvial ice contact deposits of sand and gravel occupy the lower valley slopes to the west (BGS viewer).

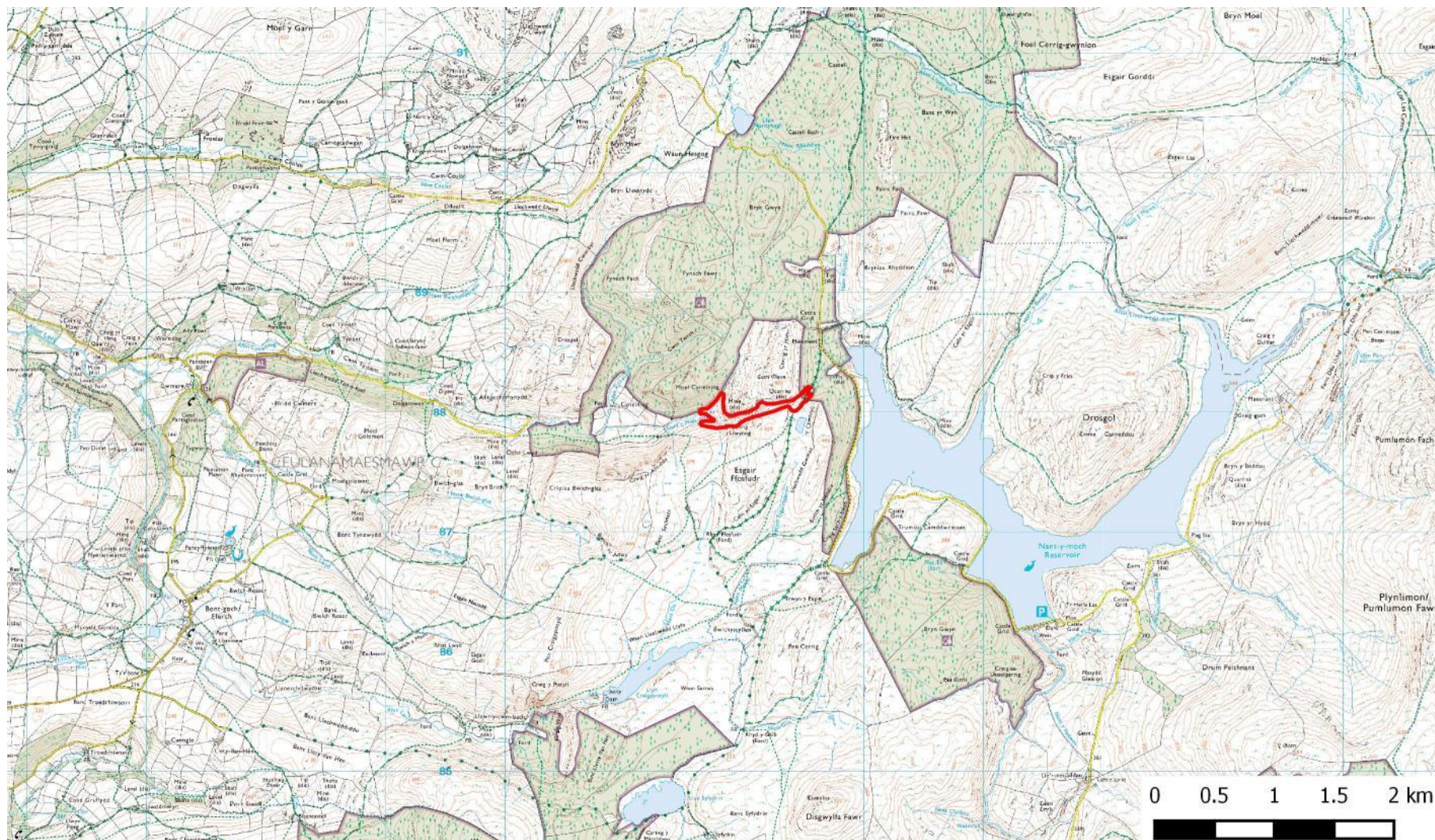


Figure 1: Location map, showing the approximate outline of Hafan Mine in red.

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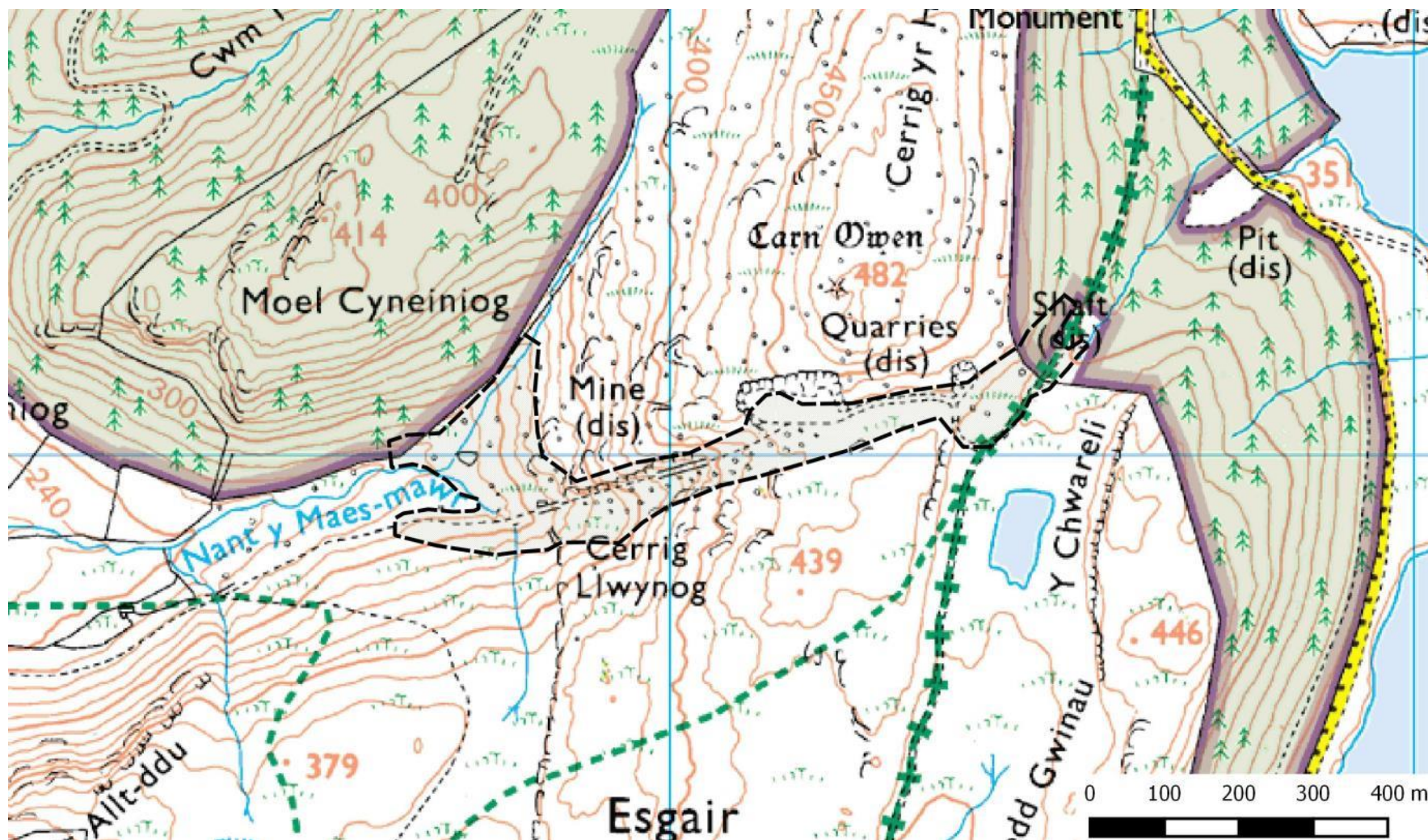


Figure 2: Location map in greater detail, showing the approximate outline of Hafan Mine.

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4 DESIGNATED HISTORIC ASSETS (Figure 3)

4.1 General

- 4.1.1 A search of data held on several databases was made of historic assets within the 1km radius search area. Designated assets beyond this search area were also considered for potential wider-ranging impacts. These designated assets are described first, as they largely comprise assets with some form of statutory protection.

4.2 Scheduled Monuments

- 4.2.1 Scheduled Monuments are historic and archaeological sites considered to be of national importance. These sites are given legal protection, and consideration of the impact of development upon these sites and their settings are considerations of the planning process.

- 4.2.2 There is one Scheduled Monument (SM) within the 1km radius study area: **CD045 Carn Owen, Cerrig y Hafan** (Photos 1 – 5). This site lies around 160m to the north of the nearest identified mine element, occupying the high point of Cerrig yr Hafan. The site is recorded on the Dyfed Historic Environment Record as PRN 4127. The following is the SM description:

The monument comprises the remains a burial cairn, probably dating to the Bronze Age (c. 2300 - 800 BC), located on the highest point of Cerrig yr Hafan. It measures c.10m in diameter and up to 1.5m high, but has been extensively disturbed. The interior has been hollowed and shelters have been built at its western edge and to its immediate north. Cairn material has also spilt down the steep slope to its south-east. A small satellite cairn or cairns have been noted to the north-east.

The monument is of national importance for its potential to enhance our knowledge of prehistoric burial and ritual practices. The monument is an important relic of a prehistoric funerary and ritual landscape and retains significant archaeological potential, with a strong probability of the presence of both intact burial or ritual deposits, together with environmental and structural evidence. Cairns may be part of a larger cluster of monuments and their importance can further enhanced by their group value.

The scheduled area comprises the remains described and areas around them within which related evidence may be expected to survive.

- 4.2.3 Given the nature of the site described above there is some degree of inter-visibility with similar Bronze Age funerary and ritual monuments occupying the summits of prominent surrounding hills. Approximately 1.8km to the southwest lies CD251 Bwlch yr Adwy Round Barrow, with CD250 Pencraig y Pistill Round Cairn another 600m beyond that. CD252 Carneddau Round Cairns sits on top of Drosgol, 2.7km to the east, and CD030 Disgwylfa Fawr Round Barrow also sits on a prominent summit 3.5km to the south. In between the two CD034 Y Garn also sits on a very prominent hilltop to the southeast, although at just over 5km away the cairn itself is not clearly visible.



Photo 1: View SW of CD045 Carn Owen occupying its prominent location on Cerrig yr Hafan.



Photo 2: View SW of the hollowed-out interior of CD045 Carn Owen. 1m scale.



Photo 3: View W from the interior of CD045 Carn Owen, showing a later stone shelter built on its western edge, and looking out towards the coastline. 1m scale.



Photo 4: View E from CD045 Carn Owen, across Nant-y-moch Reservoir. Drosgol is the green hill on the left.



Photo 5: View S from CD045 Carn Owen showing some of the prominent peaks often surmounted by similar cairn sites.

4.3 Registered Historic Landscapes

- 4.3.1 Registered Historic Landscapes are landscapes of historic interest included on the Register of Landscapes of Historic Interest in Wales (Cadw 1998). The landscape boundaries and associated details have been created as non-statutory advice to assist decision makers and landscape managers to help ensure that the historic character of the landscape is sustained, and that where change is contemplated, it is well-informed.
- 4.3.2 The site area lies within the **Upland Ceredigion Landscape of Outstanding Historic Interest (HLW (D) 2)**. This area is important for prehistoric and mining features. The area includes the rocky summits of Plynlimon and is a remote, wild, expansive area of rugged moorland and blanket bog with dramatic scarp slopes along western fringes. Popular as a tourism/recreational resource, it includes Nant-y-Moch reservoir, areas of forestry and occasional windfarms.
- 4.3.3 In order to better characterise the historic environment of the Historic Landscape it has been sub-divided into a number of Historic Landscape Character Areas (HLCA). The proposed development area lies in one such area - **HLCA 71 Disgwylfa**.
- 4.3.4 Historically this area was probably largely crown land, with part of the southwest corner lying within Cwm-hir Abbey's Nantyrarian Grange. By the 18th century (if not earlier) much of this area was part of the Gogerddan Estate, with estate maps depicting the area as unenclosed sheep-walk with a few isolated cottages. Important metal mines lie towards the northern edge of the area, including Hafan, worked by Sir Hugh Myddelton as early as the early 17th century.

- 4.3.5 Unenclosed upland forms the main landscape characteristic, with some enclosed ground on lower valley slopes. Relict earth banks are evident, but the enclosures are now largely formed by post and wire fencing. Remains of the metal mines along the northern fringes are important and impressive components of the historic landscape. Modern forestry plantations form the upland boundaries of this area, with lower-lying enclosed farmland forming the remaining boundaries.

4.4 Listed Buildings

- 4.4.1 Listed Buildings are buildings and structures of national importance given legal protection by being placed on a 'List' of Buildings of Special Architectural or Historic Interest. Buildings on the List are given one of three grades which denote their level of importance (Grade I, II* & II), Grade I being the highest. A listed building may not be demolished, extended, or altered without special permission from the local planning authority.
- 4.4.2 There are no listed buildings within search area. The nearest Listed Building is Alltgochmynydd, a Grade II listed late 18th century farmhouse lying around 2km to the west. This building shares no clear link to the site area.

4.5 Conservation Areas

- 4.5.1 Conservation Areas are designated to preserve and enhance the special character of areas of architectural or historic interest. The purpose of designating a Conservation Area is to provide the Planning Authority with an additional measure of control over an area that they consider to be of special historic and/or architectural value.
- 4.5.2 There are no Conservation Areas within the study area, the nearest being over 14km to the southwest.

4.6 Registered Historic Parks and Gardens

- 4.6.1 Parks and gardens of special historic interest in Wales are included on a Register of Historic Parks and Gardens, designed to provide comprehensive information to assist decision makers to help protect and preserve essential features of these parks and gardens, and enable their significance and character to be protected through the planning system.
- 4.6.2 There are no historic parks and gardens within the study area, the closest being over 8km to the northwest.

Hafan Mine, Ceredigion: Historic Environment Desk-Based Assessment

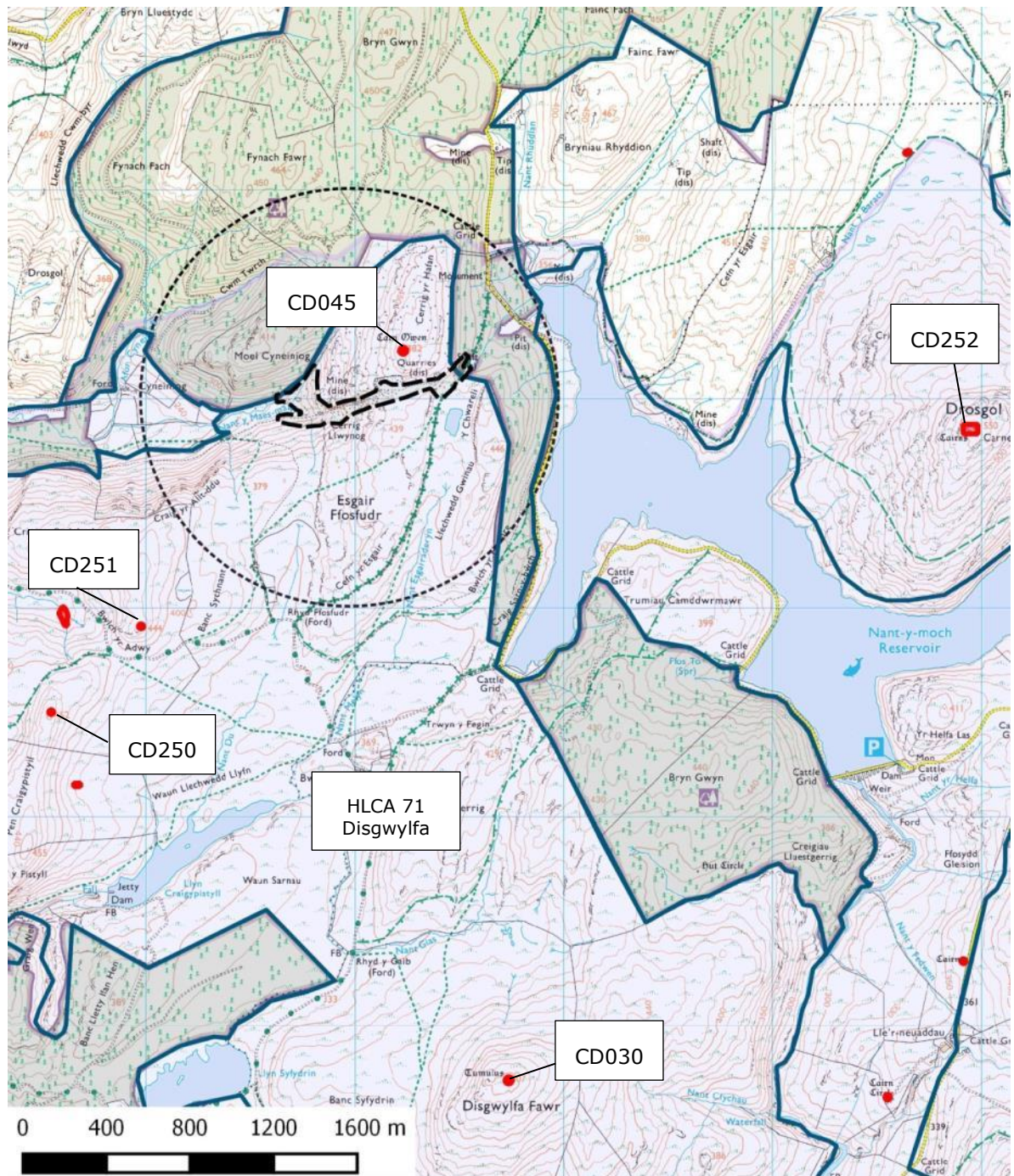


Figure 3: Location map showing Designated assets mentioned above. SM in red, HLCA in blue.

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5 NON-DESIGNATED HISTORIC ASSETS (Table 2 and Figure 4)

5.1 General

- 5.1.1 A search of the regional Historic Environment Record (HER) and other databases was made within the 1km search area around the proposed development.
- 5.1.2 The HER records 68 assets within the search area. These records include Hafan Mine (PRN 9166) and a large number of individual features within this mine complex. Ten assets are recorded on the NMR record, held and maintained by the RCAHMW, all of which are included in the HER records. Hafan Mine is recorded as NPRN 33878.
- 5.1.3 The following information is laid out chronologically to provide a brief archaeological and historical background for the area for each period, along with the relevant HER entries pertaining to that period. The historical development of the Hafan Mine is included, but a detailed description of individual features is outlined later in the report (Section 7).

5.2 Palaeolithic, Mesolithic & Neolithic

- 5.2.1 There are no sites of these periods recorded within the 1km study area. Evidence of activity during the Palaeolithic and Mesolithic periods in the wider landscape also appears very sparse.
- 5.2.2 Some Neolithic artefacts have been recovered from the surrounding upland landscape, but these objects are few in number and widely dispersed, therefore potential for archaeological remains of these periods in the immediate area appears very low.

5.3 Bronze Age

- 5.3.1 The summit of Cerrig yr Hafan to the north of the site is surmounted by a stone cairn, likely the remnants of a Bronze Age funerary and ritual monument (PRN 4127). The cairn comprises a circular spread of stones, between 10m to 16m in diameter, clearly disturbed and hollowed out on the interior, with shelters built on its western side. Potential satellite cairns have been noted to the northeast, and there is the possibility that this cairn forms part of a more extensive complex spread across the summit of this ridge.
- 5.3.2 Such monuments were often constructed in prominent locations in these upland landscapes, and it is often thought that visibility played an important role in their siting, with visibility between sites a key factor in the determination of site location. This can be seen in the wider landscape, with several of the prominent hilltops in the surrounding landscape surmounted by similar cairns, often at some distance from the Cerrig yr Hafan site, as can be seen with the Scheduled sites visible in Figure 3.
- 5.3.3 What is less clear is the form and extent of contemporary activity in these upland regions. Standing stones, cup-marked stones, burnt mounds and further smaller cairn sites are known on lower slopes, particular around the Nant-y-Moch reservoir area, suggesting a more complex ritual landscape, but the location and distribution of associated settlement sites in the area is not clear. Therefore, although there is only one Bronze Age site recorded in the study area, this likely only represents a fragment of the active

landscape and the potential for Bronze Age archaeological remains in the area exists.

5.4 Iron Age & Roman

- 5.4.1 There are no recorded sites of Iron Age or Roman date within the study area. Such sites in the wider landscape are also remarkably sparse for this area. Although this is likely due to a lack of identified sites, rather than a total absence of activity, there still appears to be a relatively low potential for such sites within the site area.

5.5 Early Medieval & Medieval Period

- 5.5.1 There are no Early Medieval sites recorded within the study area, and the occupation and use of this area during this period is unknown. Boundary banks are recorded on the edge of Nant-y-Moch reservoir, some now submerged, that are recorded as early medieval in date, but the provenance of these is unclear.
- 5.5.2 There is one medieval site recorded in the study area, that of a circular dairy store (PRN 126439), 4m in diameter, located towards the base of the steeply sloping ground at the confluence of two small watercourses that form the Nant y Maes Mawr. A large number of these dairy stores have been identified throughout this upland landscape, often visible as embanked platforms cut into the sloping ground, and originally of turf, or earth and timber construction, with some stone-built stores. These features are presumably part of a wider pastoral landscape which persisted well into the post-medieval period, comprising a landscape of open pasture, perhaps semi-enclosed in some lower valley areas, scattered with animal pens and shelters and occasional dwelling sites, some of which may only have been occupied seasonally. There is little evidence of any nucleated settlement sites in the area.

5.6 Post Medieval & Modern Period

- 5.6.1 The majority of the sites recorded on the HER relate to the post-medieval and modern periods. The pastoral landscape noted during the medieval period persisted, or in some cases developed, throughout and during the post-medieval period. Many of the building platforms, enclosures, small farmsteads, animal pens, shelters and hafodau date to the post-medieval period, and it is possible sites such as PRN 126439 are post-medieval in origin. The development of small farmstead complexes can be seen at Allt-du (PRN 7207 & 125326) 500m to the west of Hafan Mine, and Ffos Fudr (PRNs 9373 & 9374) 900m to the south, often consisting of just one or two buildings and surrounding enclosures, largely situated in the slightly more fertile and sheltered valleys. Many of these sites began to be abandoned during the 19th century as agricultural practices changed and developed, although both Allt-du and Ffos Fudr appear to have persisted into the mid-20th century before finally being abandoned.
- 5.6.2 Clearly the bulk of the sites recorded within the study area relate to the exploitation of the mineral reserves across this landscape, which largely began in the 18th century, intensified during the 19th century, and began to decline in the early 20th century. Lead was the main mineral being mined, although copper, zinc, silver and Pyrite were also being extracted. Northern Ceredigion lies on the Central Wales orefield and subsequently there are a

great number of mine complexes in this landscape, with the two main complexes in the study area being Hafan Mine (PRN 9166 / 25856) itself and the nearby Henflwch Mine (PRN 9164) some 300-400m to the northeast. The two mines do not appear to have been directly connected underground, but they did operate alongside each other in the 19th century, and possibly back into the mid-18th century as well. A large number of HER records describe individual features associated with these mines, resulting from a site visit undertaken back in 1993 (Protheroe-Jones 1993). Mine levels, shafts, dressing floors, leats and buildings are recorded at Henflwch (PRNs 36153 - 55, 39913, 39934 - 36, 39941, 95894, 95895 - 99), along with adjacent workings at Henflwch East/Spain Mine (PRN 25858) and Camddwr-bity Mine (PRN 64245).

- 5.6.3 Similarly a large number of individual features are recorded in the Hafan Mine complex (PRNs 38231 - 43 & 95900 - 20). These are described in more detail later in the report (Section 7), but a history of the site is provided below.
- 5.6.4 In the late 1560s Queen Elizabeth established the Society of Mines Royal, one of two mining monopolies in England and Wales. By the early 17th century Ceredigion was becoming one of its main centres of operation with characters such as Sir Hugh Myddleton heavily involved in the mining operations. Several sources (eg. Foster-Smith 1979, Bick 1988, Hague 1994) cite Myddleton as creating the initial workings at Hafan, under the name Caninog, in around 1620. 'Caninog' being an early spelling of Cyneiniog, the name of the nearby stream, hill, and farmstead, and therefore thought to be a reference to mining at this site before it changed its name to Hafan in the 19th century. The extent and success of these early 17th century workings is unclear, although clearly there was sufficient available ore to warrant intermittent workings for the next 300 years. This intermittent working was typically the case until more intensive mining from the mid-19th century, as mining activity would often fluctuate with the market, only taking place when trade was good.
- 5.6.5 By the 17th century this area formed part of the extensive estates of Gogerddan, belonging to the Pryse family. Meyrick (1810) notes that extensive, potentially rich, deposits of workable ore were discovered across these estates in the mid-17th century, possibly a reference to the initial workings under Myddleton, although seemingly relating to a slightly later period, but this appears to have prompted further workings in the area, and a return to Hafan in the late 17th or early 18th century. Sir Carberry Pryse of Gogerddan obtained an Act of Parliament in 1690 to exploit the ore on his estate more systematically, bringing in William Waller as an experienced mine manager. Carberry Pryse was to die shortly afterwards, and flooding issues caused much of the mining to stop by the late 1690s but Waller was convinced of the riches that could be mined from these hills, and along with Sir Humphrey Mackworth, who had been working collieries in South Wales, the Company of Mine Adventurers were formed and funding obtained to start mining again. These new workings at Coninogg/Hafan appear to have started in 1702 and raised several hundred tons of lead ore (Bick 2004). In his *Description of the Mines of Cardiganshire* Waller provides a description and plan of the mines (Figure 5). The main level appears to be located close to the base of the sloping ground, although it is described as 'Eighty Eight Yards deep', which would instead suggest it began roughly midway up the main slope. This level is described as nearly a mile long once it strikes the ore, with both lead and copper ore visible. Plans for further levels are also indicated. At the foot of the slope stood the 'Smiths Forge'. Extensive leats are also indicated in Waller's description of the mine. A list

subsequently produced by Waller in 1708 describes a total of 383 fathoms (700m) being sunk at the mine, extracting over 266 tons of ore (reproduced in Bick 1988). The mine had closed by August 1708 (Bick 2004).

- 5.6.6 The mine may have been worked again in the late 18th or early 19th century when Job Sheldon & Co were working the nearby Henfwlch Mine, as the company reputedly made a handsome profit from both these mines (Bick 1988; 46), and workings at Hafan were reputedly 70 fathoms (128m) in length (Spargo 1976). Despite this, Meyrick produced a list of the 'principle' mine workings operating at the time he was writing (1810), but made no mention of Coninog, Cyneiniog or Hafan.
- 5.6.7 A tremendous expansion of mine working activity occurred during the 19th century, with a peak of activity in Ceredigion between 1850 and 1870, after which period there was a general decline through over-working of the veins and cheaper ore becoming more readily available overseas. The Hafan Mine was operational between 1850-54, likely run by the short-lived Mining Company of Wales (Bick 1988) who were working other mines and slate quarries in the area at the time. A deep adit was sunk at this time, going well below the previous workings of Sheldon which lay slightly further south (ibid). By 1853 the Mining Company of Wales appear to have stopped operating here, but workings were continued by the Hafan & Henfwlch Company, run by James Stride and managed by Michael Barbary. Another deep shaft ('Davies' shaft) was sunk, and a pumping wheel was required, which included the construction of the wheel pit, which is still visible, on the surface in 1853, and a leat over 2¼ miles (just over 3.5km) long. The company stopped working in 1854, but mining started once more under a Captain Hughes just two years later. These workings were even shorter lived and do not appear to have continued beyond 1857. However, once more a new company took possession soon after in 1864 and began working the Hafan and Henfwlch Mines again. Four men worked Hafan, driving the deep adit, and repairing Sheldon's Shaft to a depth of 20 fathoms (36m). By 1867 600 tons of lead ore, and a little copper, had been sold, although mostly from the neighbouring Henfwlch Mine (Bick 1988).
- 5.6.8 Both Hafan and Henfwlch were reworked on several, short-lived, occasions in the later 1880s and 1890s, but little ore was retrieved. Only 17 tons of lead ore was sold in 1889/90 (Bick 1988). There appears to have been a last flurry of activity in the early 20th century, with the Hafan Mining Company formed in 1910 (NA), although this too was short-lived and there is little evidence of any extensive mining.
- 5.6.9 By the end of the 19th century quarrying was taking over as the predominant local industry. In 1895 the Plynlimon Mining Company was formed, primarily working Bwlchglas Mine in the Leri Valley to the west, but also exploiting Hafan Mine and Henfwlch to the northeast, as well as seeking to set up gritstone quarries along Cerrig yr Hafan. Towards the northern end of the ridge the White Stone (PRNs 8578, 38230 & 38231) and Brynniau Rhyddion (PRN 38578) quarries were established. In order to service these quarries a new tramway was built, the Plynlimon & Hafan Tramway (PRN 38239 & 38234). The tramway was largely constructed in 1896, opening in 1897. It ran for just over 7 miles, from the foothills of Plynlimon Fawr to the main Cambrian Railways at Talybont. It served quarries to the north of Hafan, running through the Hafan Mine site via a steep incline, partly burying some former mine openings and re-purposing much of the mine waste. From the base of the incline westward it also included a passenger service. The tramway however was not profitable, Bwlchglas mine failed to produce much ore, the passenger service was

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serving a rural community of less than 100 people, and the steep inclines throughout the route meant running costs were high. As a result the tramway closed in 1899.

5.6.10 More recently the construction of the nearby Nant-y-Moch Reservoir has left its mark on the area. A large quarry, operated by MacAlpine, on the south side of Cerrig yr Hafan (PRN 38249) provided stone in the construction of the reservoir in the early 1960s, removing some elements of the former Hafan Mine and Plynlimon & Hafan Tramway.

Table 2: All sites recorded on the HER

Prn	Site Name	Type	Period	NGR
4127	Cerrig Yr Hafan; Carn Owen	Round Barrow	Bronze Age	SN73248819
7207	Allt-ddu	Farmhouse	Post Medieval	SN7226687795
8578	White Stone	Quarry; Spoil Heap	Post Medieval	SN7326688711
9164	Henfwlch Mine; Llechwedd Gwineu	Copper Mine; Lead Mine; Zinc Mine	Post Medieval	SN7374388316
9166	Hafan Mine	Copper Mine; Lead Mine; Zinc Mine	Post Medieval	SN728879
9373	Ffos Fudr	Farmstead	Post Medieval	SN72528721
9374	Ffos Fudr	Cottage	Post Medieval	SN72488723
19965	Capel Tabor	Chapel	Post Medieval	SN7363188597
25856	Cyneiniog; Conineg; Kaninog; Ceiniog; Caninog; Bbwlch Caninog	Metal Mine	Post Medieval	SN726880
25858	Spain; Henfwlch East	Lead Mine	Post Medieval	SN734885
36153	Henfwlch Level	Level	Post Medieval	SN7370088301
36154	Henfwlch	Dressing Floor	Post Medieval	SN7375088350
36155	Henfwlch	Leat	Post Medieval	SN7393388117
38230	White Stone Quarry	Quarry Building	Post Medieval	SN7331388708
38231	Craig Yr Hafan	Structure	Post Medieval	SN7341088753
38232	Cerrig Yr Hafan Level I	Level	Post Medieval	SN7348188543
38233	Cerrig Yr Hafan Level II	Level	Post Medieval	SN7347388669
38234	Cerrig Yr Hafan Tramway (e)	Tramway	Post-Medieval	SN7343488109
38235	Hafan East Shaft I	Shaft	Post Medieval	SN7346988101
38236	Hafan East Level	Level	Post Medieval	SN7342288056
38237	Hafan East Shaft II	Shaft	Post Medieval	SN7332788047

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38238	Hafan Shaft II	Shaft	Post Medieval	SN7316188018
38239	Plynlimon & Hafan Tramway	Tramway	Post-Medieval	SN7310988003
38240	Hafan Level I	Level	Post Medieval	SN7305287964
38241	Hafan Mine Structure	Structure	Post Medieval	SN7299587952
38242	Hafan Level II	Level	Post Medieval	SN7271687958
38243	Hafan Mine Structure II	Structure	Post Medieval	SN7272787893
38244	Nant Y Maes-mawr	Stepping Stones	Post Medieval	SN7231587879
38249	Hafan Quarry	Quarry	Modern	SN7321588041
38250	Spain House	Cottage	Post Medieval	SN7362588653
38578	Brynniau Rhyddion Quarry II	Shaft	Post Medieval	SN7332888895
38581	Cerrig Yr Hafan Trig Point	Triangulation Point	Modern	SN7322488225
38582	Spain Boundary Stone	Stone	Post Medieval	SN7363888704
39913	Henfwlch Old Shaft	Shaft	Post Medieval	SN7365388264
39934	Henfwlch	Structure	Post Medieval	SN7370088321
39935	Henfwlch	Structure	Post Medieval	SN7371188330
39936	Henfwlch	Ore Bin	Post Medieval	SN7373088336
39941	Henfwlch Mine	Structure	Post Medieval	SN7371788300
64245	Camddwr-bity	Building	Post Medieval	SN73878840
95894	Henfwlch Mine; Llechwedd Gwineu	Mine Shaft	Post Medieval	SN73858831
95895	Henfwlch Mine; Llechwedd Gwineu	Leat	Post Medieval	SN73838833
95896	Henfwlch Mine; Llechwedd Gwineu	Spoil Heap	Post Medieval	SN73768835
95897	Henfwlch Mine; Llechwedd Gwineu	Walls	Post Medieval	SN73748836
95898	Henfwlch Mine; Llechwedd Gwineu	Walls	Post Medieval	SN73728835
95899	Henfwlch Mine; Llechwedd Gwineu	Retaining Wall	Post Medieval	SN73728834
95900	Hafan Mine	Spoil Heap	Post Medieval	SN73548813
95901	Hafan Mine	Mine Building	Post Medieval	SN73458809
95902	Hafan Mine	Spoil Heap	Post Medieval	SN73498811
95903	Hafan Mine	Level	Post Medieval	SN72968796

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95904	Hafan Mine	Spoil Heap	Post Medieval	SN73028797
95905	Hafan Mine	Mine Working	Post Medieval	SN73068797
95906	Hafan Mine	Spoil Heap	Post Medieval	SN72978793
95907	Hafan Mine	Walls	Post Medieval	SN72998796
95908	Hafan Mine	Retaining Wall	Post Medieval	SN72868792
95909	Hafan Mine	Mine Shaft	Post Medieval	SN72868793
95910	Hafan Mine	Retaining Wall	Post Medieval	SN72828792
95911	Hafan Mine	Wheelpit	Post Medieval	SN72838793
95912	Hafan Mine	Level	Post Medieval	SN72838789
95913	Hafan Mine	Culvert	Post Medieval	SN72818791
95914	Hafan Mine	Gulley	Post Medieval	SN72728797
95915	Hafan Mine	Level	Post Medieval	SN72808815
95916	Hafan Mine	Level	Post Medieval	SN72648801
95917	Hafan Mine	Level	Post Medieval	SN72828798
95918	Hafan Mine	Level	Post Medieval	SN72938792
95919	Hafan Mine	Level	Post Medieval	SN72958793
95920	Hafan Mine	Magazine	Post Medieval	SN73528820
125326		Farmstead	Post Medieval	SN7226987794
126439	Hafan	Dairy	Medieval	SN72738799

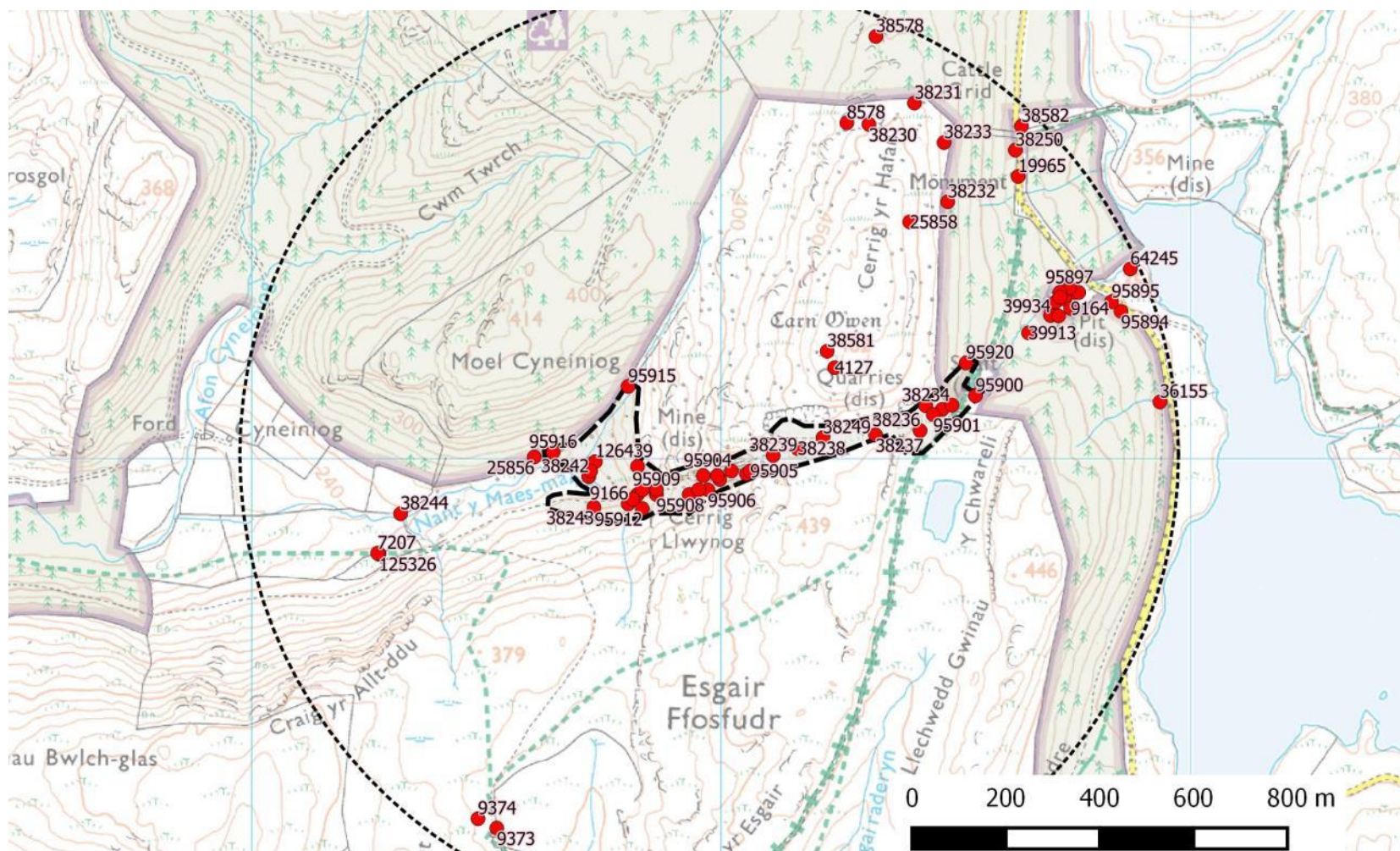


Figure 4: Map showing the assets recorded on the regional HER within 1km (dotted line), labelled by PRN.

Reproduced from the Ordnance Survey 1:50,000 scale map with the permission of The Controller of Her Majesty's Stationery Office, © Crown Copyright Dyfed Archaeological Trust Ltd., Corner House, 6 Carmarthen Street, Llandeilo, Carmarthenshire SA19 6AE. Licence No 100020930

6 ASSESSMENT OF EVIDENCE

6.1 General

- 6.1.1 Sections 4 and 5 have laid out the known archaeological resource for the area, recorded on the regional databases of historic assets. The following section examines some of the main sources of information that could expand the current understanding of the archaeological resource and highlight previously unrecorded historic assets.

6.2 Previous Archaeological Work

- 6.2.1 No intrusive archaeological investigations (excavations, evaluations or watching briefs) have previously been undertaken at the site.
- 6.2.2 Archaeological investigations associated with the Hafan Mine site are all linked to walk-over surveys of the surface remains. One such visit was undertaken in 1993 by Protheroe-Jones, the current Principal Curator of Industry at the National Museum of Wales, as part of a survey of Ceredigion Metal Mines. The records from this visit have formed the basis of the current HER records. The site was visited again in 1997-8 as part of a survey of deserted rural settlements (Sambrook & Ramsey 1998), although mining remains were not the focus of this survey. As a follow-up to the 1993 survey, the site was visited once again in 2002 as part of the Metal Mines Project (Sambrook 2002). This survey recommended the site for Scheduling, but otherwise added few details to the previous 1993 survey records. The most recent site visit was in 2008, as part of the Tir Gofal agri-environmental scheme (Ings 2008).
- 6.2.3 Generally the information from these archaeological surveys have already been incorporated into the HER database, and along with other established sources on the metal mines of this area (eg. Foster-Smith 1979, Bick 1988 & 2004, Hague 1994) form the basis of the known archaeological and historical record previously described.

6.3 Historic Mapping

18th – mid 19th century maps

- 6.3.1 There are no records of the earliest potential workings at Hafan in the 17th century, however Waller, in his *Description of the Mines of Cardiganshire* does include a plan of the early 18th century workings at Hafan (Figure 5), named 'Bwlch Kaninog' by Waller. This information is already included in the general archaeological and historical background, but it shows the main level starting either close to the base of the slope, or roughly midway up, and also indicates a Smiths Forge / Smelt Mill building stood close to the base of the slope.

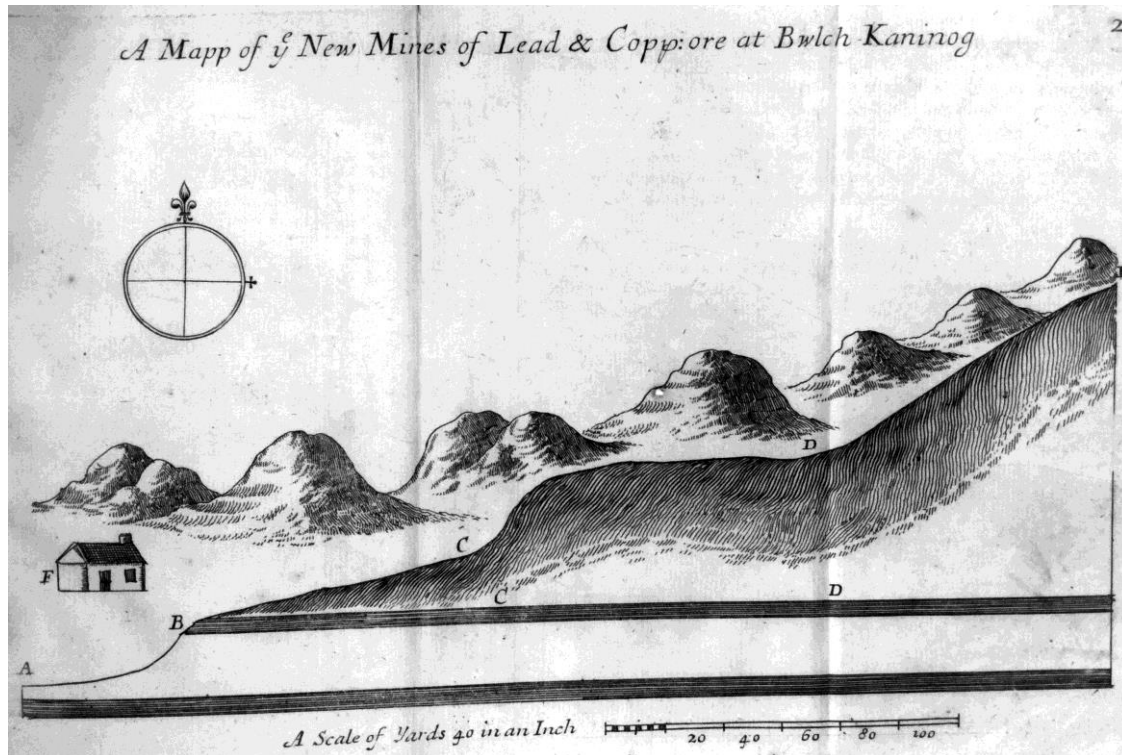


Figure 5: Waller's map of the mine workings in the early 18th century. (A) marks the lowest part of the site, (B) Level entrance, (C) start of the mine stopes, (D) the ore begins to widen, (E) top of the hill, and (F) the 'Smiths Forge'.

6.3.2 The early Ordnance Survey drawings of the area (Giles 1833) note some interesting details in the local landscape, but the mine itself is not marked (Figure 6). Of interest however is the annotation of 'Castell' on the ridgetop to the north. It is assumed that this refers to the cairn site of Carn Owen, although such a name, in such an upland setting as this, often references prehistoric enclosures such as Iron Age hillforts or defended enclosures, and a seemingly later annotation appears to mark the cairn site, with another enclosure to the west. No such prehistoric enclosure has ever been identified here, although there is the potential that it may have been lost to quarrying activity in the 1960s. The site lies in an open upland area, with the lower slopes to the west part of the enclosed farmland around Cyneiniog Farm, the boundaries of which have remained the same.



Figure 6: Extract from the Ordnance Survey map of 1833 showing the name 'Castell', and the later faint annotation of Carn Owen cairn above it, and a possible enclosure just above the 'C'. The Hafan Mine site lies along the stream line shown below the name.

- 6.3.3 The Llanbadarn Fawr Parish tithe map of 1846 provides no detail for the site. Neither the mine, nor any surrounding features of note, are shown, save the nearby small farmsteads of Allt Ddu and Ffos Fudr.

Ordnance Survey 1:2500 map 1888 (Fig 7).

- 6.3.4 The Ordnance Survey map of 1888 provides the first detailed record of the layout of the mine workings toward the end of its operational life, but crucially prior to the establishment of the tramway and later quarrying activity.
- 6.3.5 The mine workings are spread across almost 1km, with a small concentration of activity on the higher ground to the northeast, but the main area of activity on the sloping ground to the west. To the northeast one, potentially two, shafts are noted, along with an old shaft, some spoil heaps, a magazine building, and a variety of trackways. To the west a structure is marked at the head of the slope, with a level and shafts alongside an open cutting along the south side of the cleft, a shaft and building close to the wheelpit, and a level towards the base of the slope. Further structures are shown on the lower ground, two alongside the main trackway from the wheelpit, presumably associated with the mine workings, and one close to the junction of two watercourses, presumably related to the 'dairy' PRN 126439.
- 6.3.6 In the surrounding landscape the small farmstead of Allt Ddu is shown, with the larger Cyneiniog complex further west. The neighbouring lead mine of Henfwlch is marked to the northeast, with a small lake topping the ridge to the east of Hafan. Carn Owen is marked to the north, at the southern end of the summit of the Cerrig yr Hafan ridge, with a triangulation point built into its northwest corner.

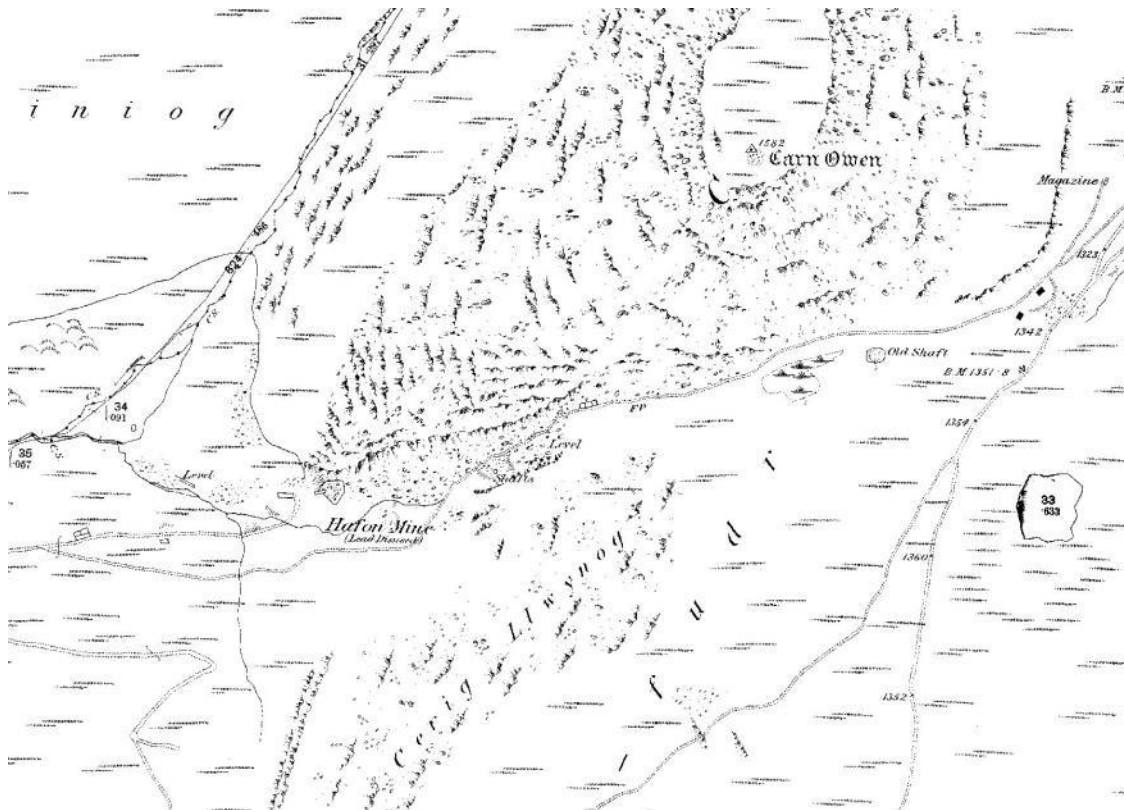


Figure 7: Extract from the Ordnance Survey map of 1888 showing the layout of the Hafan Mine.

Ordnance Survey 1:2500 map 1906 (Fig. 8).

- 6.3.7 The subsequent Ordnance Survey map captures the site after the construction, and abandonment, of the tramway, and the establishment of the White Stone quarry at the northern end of the Cerrig yr Hafan ridge. To the northeast a new level is marked on the higher ground, presumably therefore one of the later workings on the site. A new shaft is also marked at the top of the sloping ground, on the line of the tramway, potentially therefore a very recent addition. Further detail is marked around the old levels in the rock cleft midway down the slope, and the tramway has cut across the site of a former shaft close to the wheelpit. An old level is marked to the south of the wheelpit, not shown on the previous map. To the northwest another old level is marked, beyond the old sheepfold, identified as a later slate working. To the west the tramway has removed one of the building sites at the base of the slope. Other than the quarrying activity to the north, the remaining landscape appears relatively unchanged.

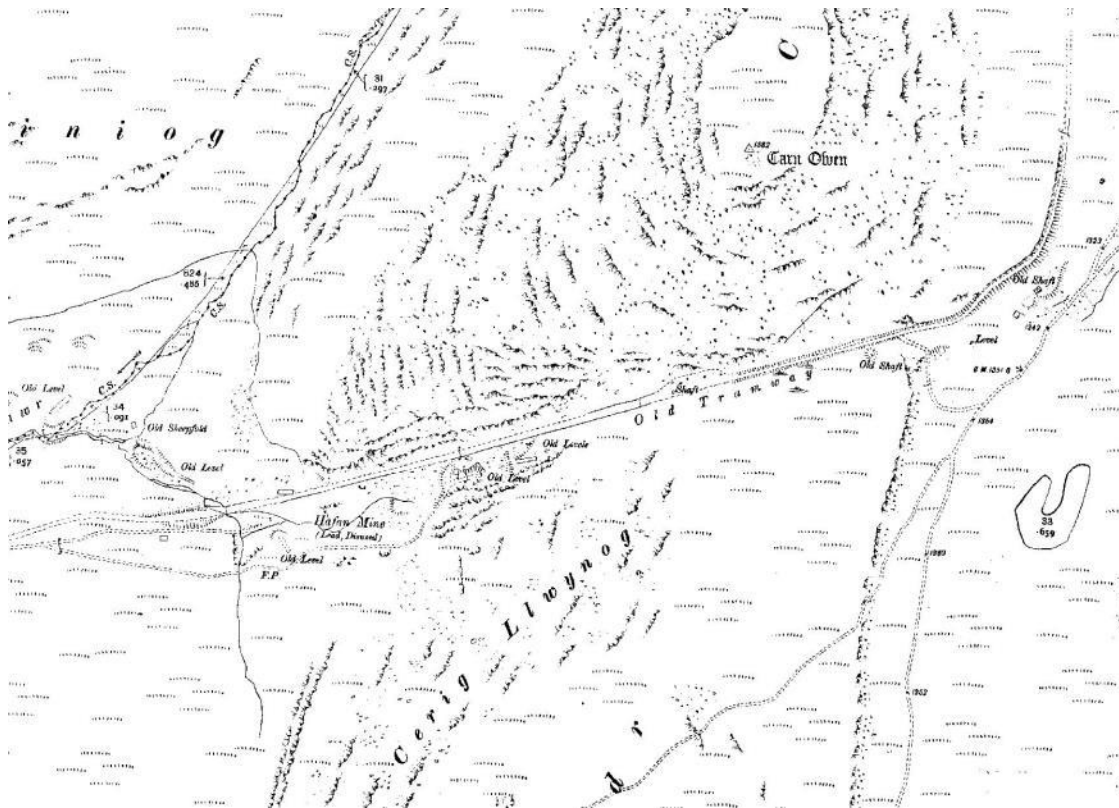


Figure 8: Extract from the 2nd edition Ordnance Survey map of 1905 showing the layout of Hafan Mine and tramway.

6.4 Aerial & Historic Photography

- 6.4.1 A search was made of available historic aerial photographs and modern aerial photographs. Unfortunately, there appears to be few historic aerial photographs covering this area. The area was covered by an RAF sortie in 1948, but these images are at low resolution and the only identifiable features are two former shafts on higher ground to the east (PRNs 38235 & 28237), the line of the tramway (PRN 38239) and spoil tips at the base of the slope (PRN 95914).
- 6.4.2 Modern satellite imagery from 2006 provides a clearer image of the site, as do a series of photographs taken by the RCAHMS (NPRN 33878). The satellite images confirm much of what is visible at ground level, but also provides a clearer indication of activity around the 'dairy' site PRN 126439 (Photo 6). This indicates that the building remains are only one part of the complex, with boundary banks visible to the north, and a larger enclosure on the opposite bank of the stream to the east. An unmarked trackway also appears to connect this site to Allt Ddu (PRN 125326) to the west. An additional potential mine level and spoil heap is also shown at the western end of the mining complex (Photo 6). Also of interest, but not seemingly related to the mine site, is the potential for structural remains on the ridge top to the north of the site. Two possible rectilinear features are visible on the satellite images approximately 60m to the west of Carn Owen, seemingly tucked against a west facing outcropping stony ridge (Photo 7). The provenance of these features has not been tested on the ground, but they may represent sheep shelters or similar utilising the readily available stone, but the proximity to Bronze Age monument of Carn Owen is of interest.



Photo 6: Extract from the 2012 satellite imagery, showing the remains of PRN 126439 (red arrow), with associated enclosure banks (blue arrows). Additional potential mine level and spoil heap also visible (green arrow) © Google Earth.

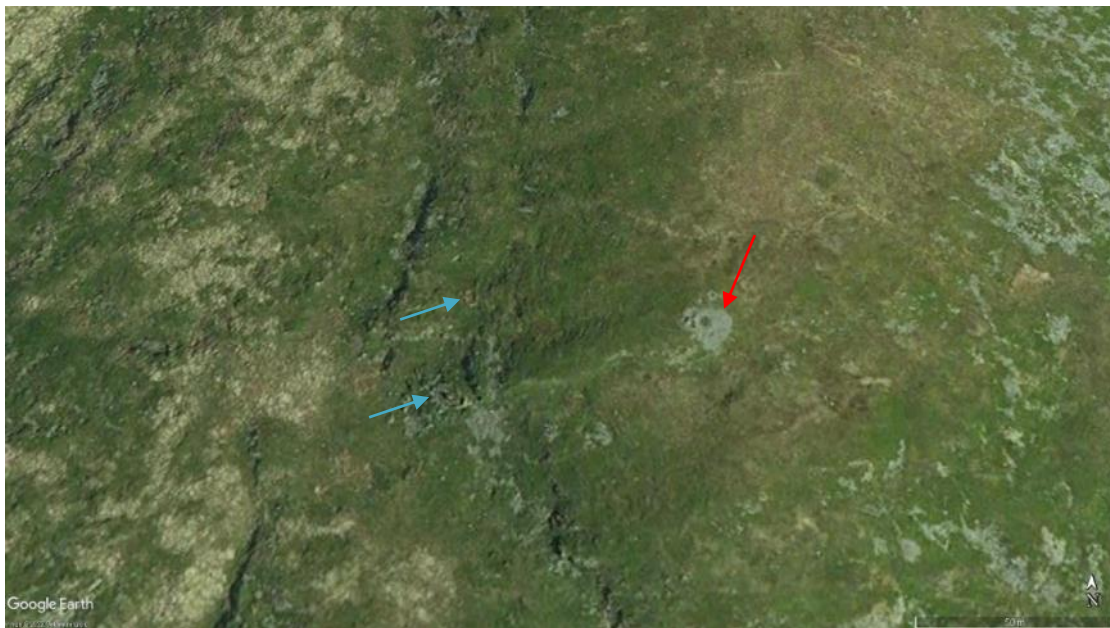


Photo 7: Extract from the 2009 satellite image, showing Carn Owen (red arrow) and possible built structure to the west (blue arrows). © Google Earth.

6.5 LiDAR

6.5.1 LiDAR data for this area does not capture the main Hafan Mine site.

6.6 Site Visit

- 6.6.1 A site visit was undertaken on the 22nd June 2022. The weather conditions were bright and dry with good visibility. Access to the entire site was possible, although potential mine openings were noted closely examined due to safety considerations.
- 6.6.2 The site visit allowed all known sites to be re-examined, updating descriptions, conditions and interpretations. Some recorded sites no longer appear visible, but several potential new sites were also noted. Records were made in note form, photographs were taken of each identified feature with high-definition digital camera, and locations were recorded using a hand-held Garmin GPS Map unit.
- 6.6.3 Full descriptions, photos and a plan of all identified features are laid out in Section 7.

7 HAFAN MINE FEATURES

7.1 General

- 7.1.1 The following section details features related to mining activity at the Hafan Mine site, including sites that may potentially be related. Sites related to other mines and later quarrying, and outlying sites within the 1km study area, are not included here.
- 7.1.2 A written description of these sites is included in Table 3, laid out in numerical order according to the PRN, with additional sites included at the end of the table.
- 7.1.3 Photos of the sites are included in Photos 8 - 47. A plan of the mine features is provided in Figure 9, with an overall outline of the Hafan Mine complex provided in Figure 10. These locations can also be provided in GIS file formats to accompany this report.



Photo 8: General view west from the top of the sloping ground containing the bulk of the mining remains.



Photo 9: View east from the base of the slope looking at the Hafan Mine complex running up the slope.

Table 3: Hafan Mine Features

PRN / Ref.No	NGR	Type	Description	Photos
9166	SN728879	Metal Mine	General PRN for the metal mine, largely working lead, but including copper and zinc. First worked in the early 17 th century. Worked intermittently until the early 20 th century. Various surface and below ground elements survive, see below.	8 & 9
25856	SN726880	Metal Mine	Same as above, referencing the pre-19 th century mine working.	
38234	SN7343488109	Tramway	Line of the tramway along the eastern slopes of the ridge, connecting White Stone Quarry (and beyond) with tramway PRN 38239. Built 1896/7, operated until 1899. Track removed in 1914. Route survives as a broad terraced track, stone-revetted in parts.	10
38235	SN7347388112	Shaft	Mine shaft. Appears on the 1 st edition OS map, possibly part of the later 19 th century workings. Shaft infilled and fenced off.	10
38236	SN7342288056	Level	Mine level. Appears on the 2 nd edition OS map of 1906, so appears to have been worked in the late 19 th /early 20 th century. No longer visible at ground level, probably infilled during quarrying works in the 1960s.	10
38237	SN7332788047	Shaft	Mine shaft. Disused by 1 st edition OS map of 1888, possibly therefore mid-19 th century in date. Survives as a partly infilled and water-logged hollow, fenced off.	11

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38238	SN7316188018	Shaft	<p>Mine shaft.</p> <p>Marked on the 2nd edition OS map of 1906, on the line of the tramway, possibly therefore post 1899 when the tramway closed.</p> <p>Not visible at ground level, possibly infilled with quarry waste.</p>	12
38239	SN7310988003	Tramway	<p>The Plynlimon & Hafan Tramway.</p> <p>Visible as a steep incline as it passes through the Hafan Mine area, along the northern side of a rocky cleft. Well-constructed dry stone revetment along much of its southern edge, it continues as an overgrown trackway from the base of the incline to the west, and along the eastern edge of Cerrig y Hafan to the east (PRN 38234).</p> <p>Built in 1896/7, operated from 1897 until 1899, accessing stone quarries and lead mines, as well providing a passenger service west of Hafan. Proved financially unsuccessful, track removed in 1914.</p> <p>Well-preserved as a steep trackway, with stone revetment walling. The level track bed can be traced along the valley bottom to the west.</p>	13 – 16
38240	SN7305287964	Level	<p>Open cut mine workings leading into levels.</p> <p>A series of narrow open-cut excavations (at least 3 to 4 individual ones visible) into the rising ground, all now largely blocked with stone, mining waste and turf. Includes PRN 95905 as in the current form the levels are indistinguishable.</p> <p>This marks one of the main areas of mine workings, and may be the site of Sheldon's workings of the late 18th/early 19th century, or even some of the Waller workings of the early 18th century. The levels likely extend for some distance underground, the Sheldon workings said to extend some 128m.</p> <p>Visible as deep, steep sided channels in the rock, surrounded by spoil heaps and areas of loose scree.</p>	17 - 20
38241	SN7297587958	Shaft	<p>Collapsed mine shaft.</p> <p>Initially identified as a structure, but actually represents a mine shaft, visible only on the 2nd edition OS map of 1906, so one of the later workings at the site.</p> <p>Visible as a large open rock-filled crater, appears to collapsed the corner of structure PRN 95907</p>	21

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			with it.	
38242	SN7274787950	Level	<p>Mine level.</p> <p>Lying at the base of the incline. Marked on the 1st edition OS map of 1888, out of use by the 2nd edition OS map of 1906. It is approached by a long entrance cutting, with drystone revetment walling. The opening is now infilled, and water passes along the entrance cutting.</p>	22
38243	SN7272787893	Structure	<p>Mine building.</p> <p>Small rectangular building marked on the 1st edition OS map of 1888. Lies alongside the access track to Hafan Mine, and therefore assumed to be associated, but date and function unknown. It is possible this structure may be related to the smelt mill, or 'Smiths Forge' mentioned by Waller, or a storage building.</p> <p>Currently visible as low tumbled stone walls, largely turf covered.</p>	23
95900	SN73548813	Spoil Heap	<p>Earthworks depicted on the eastern edge of Hafan mine complex (PRN 9166) on the 1888 1st edition Ordnance Survey map.</p> <p>"Barely detectable tips" when recorded in 1993. Lies adjacent to the current trackway to the site, on the edge of the forest plantation. Not examined during current survey.</p>	10
95901	SN73458809	Shaft?	<p>Possible mine shaft.</p> <p>Initially recorded as a small building visible on the 1st edition OS map of 1888 (and the 1906 edition), at the far eastern end of the Hafan Mine complex. The map depiction however may in fact represent a mine shaft, operating towards the end of the 19th century.</p> <p>The area appears to have been bulldozed, and no visible surface remains survive.</p>	10
95902	SN73498811	Spoil Heap	<p>Earthworks depicted on the 1888 1st edition Ordnance Survey map at the far eastern end of the Hafan mine complex (PRN 9166) and associated with shaft (PRN 38235). Expanded between 1888 and the subsequent map of 1906.</p> <p>Recorded during 1993 survey of the site as "tip bulldozed: mixture of development rock and veinstuff, quite coarse". No visible surface remains</p>	10
95903			Same as PRN 38241	

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95904	SN7302087970	Spoil Heap	<p>Large spoil heap</p> <p>Located midway down the incline, a large spread of loose stone, with distinctive deposits of brown spoil collected within structure PRN 95907. Largely associated with level PRN 95903. Also visible as a series of steps alongside the level, therefore potentially originating from a variety of other workings as well, and the spoil itself may have been reworked.</p>	24 & 25
95905		Level	See PRN 38240	
95906	SN7296787952	Spoil Heap	<p>Spoil Heap associated with shaft PRN 38241, and possibly Level HM06.</p> <p>It may partly cover the site of a run-in level PRN 95919 (RPJ survey 1993, No.33) as well. PRN 95919 not shown on the accompanying maps as it no longer appears to be visible at ground level, and the description does not appear to correspond to two levels that were visible (PRN 95918).</p>	15
95907	SN72998796	Structure	<p>Walled enclosure</p> <p>Irregular three-sided walled enclosure, likely enclosing the dressing floor at the base of the main mine levels, where the mined material would be sorted to extract the good ore from the dead rock containing no ore. The enclosure first appears on the 2nd edition OS map of 1906, so likely part of the late 19th/early 20th century workings.</p> <p>Visible as a drystone built wall, up to 1.2m high externally, 2.2m high internally. Collapsed into a former adit (PRN 38241) in the northwest corner, containing and partly buried by mining spoil (PRN 95904).</p>	21, 24, 26 & 27
95908	SN72868792	Retaining wall	<p>Remains of a drystone retaining wall.</p> <p>Likely associated with adjacent mine shaft PRN 95909 and possibly part of the structure containing the dolly wheel or angle bob, but no structural elements of these remain.</p> <p>When surveyed in 1993 'remains of heavy wood and metal work' were visible within the centre, these are no longer readily visible.</p>	28
95909	SN72868793	Shaft	<p>Part buried mine shaft.</p> <p>A mine shaft marked on the 1st edition OS map 1888, with a possible angle bob pit alongside it for flat rods from the water wheel to the west (PRN 95911). The associated with the wheel pit may indicate it was part of the mid-19th century workings, possibly the 'Davies' Shaft sunk by the Hafan</p>	29

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			<p>& Henfwlch Company in the mid-1850s.</p> <p>The shaft was presumably sealed as it was partly covered by the subsequent tramway of 1896/7, but has since collapsed leaving a visible crater alongside the tramway. Described as a 'recent collapse' when surveyed in 1993.</p>	
95911	SN72838793	Wheelpit	<p>Stone-built wheelpit.</p> <p>A fine wheelpit built in 1853 by Barbery, of the Hafan & Henfwlch Company.</p> <p>Rectangular, stone built, with an arched tailrace to the west. Late 20th century photos show an upper level arched opening on this west face, but that has now gone.</p>	30 & 31
95912	SN72838789	Level	<p>A run-in mine level.</p> <p>First marked on the 2nd edition OS map of 1906, although already out of use by that time, so likely dating to the late 19th century/early 20th century workings.</p> <p>Level not examined closely. A grassy dump lies at the mouth of the level</p>	32
95913	SN7281387921	Culverts / Levels	<p>Pair of early mine levels or culverts.</p> <p>Two similar drystone-built arched culverts, both currently directing the flow of water down the hillside. The northernmost is currently the most visible, with an opening <i>circa</i> 0.4m high, and 0.8m wide. This lies along a stream marked on the 2nd edition OS map of 1906. The southernmost lies on slightly higher ground, constructed in the same manner but largely blocked, possibly partly by a drystone built section of walling. This lies on a stream line marked on the 1st edition OS map of 1888.</p> <p>These culverts are thought to potentially represent the early mine workings of Waller in the early 19th century (Bick 1988).</p>	33 – 35
95914	SN72728797	Gully & Spoil Heap	<p>Large Spoil Heap and adjacent drainage gully at the base of the slope.</p> <p>A long gully running northwest from the approach to mine level PRN 38242, and draining water from it. This lies adjacent to a large spoil heap. This heap may have originated from the same level, but the form also suggests it lay at the end of a tipping run, so may derive from multiple sources. First marked on the 2nd edition OS map of 1906, presumably therefore part of the later workings on the site.</p>	36 & 37

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95915	SN72808815	Level	<p>A small mine level.</p> <p>Located halfway up an adjacent stream valley to the north of the main Hafan Mine workings. Identified during the 1993 survey, where it was described as a "minor level: rock cut; open. Minimal tip at entrance" (RPJ survey, 1993).</p> <p>The site is not marked on any OS mapping, but lies adjacent to the start of a mid-19th century leat (HM11). Not visited during present survey.</p>	38
95916	SN72648801	Level	<p>Slate mine level.</p> <p>Marked as an 'Old Level' on the 2nd edition OS map of 1906. Subsequently identified as exploratory workings associated with potential slate quarrying. This may be associated with the Plynlimon Mining Company who took over the Hafan site in 1895 looking to exploit the mine and surrounding quarrying opportunities. Alternatively it may be part of the mid-19th century workings of the Mining Company of Wales which also sought to quarry stone, but the workings are not marked on the 1888 Ordnance Survey map.</p> <p>Workings not visible amongst the tree line at time of current survey, but aerial photographs suggest associated enclosure banks or spoil may extend across the stream to the south, close to Dairy PRN 126439.</p>	-
95917	SN72828798	Level	<p>A run-in mine level</p> <p>Lies on higher ground to the north of Wheelpit PRN 95911. It was recorded during the 1993 survey, with a small grassy dump in front. Not marked on any Ordnance Survey mapping, but it lies adjacent to the line of a mid-19th century leat HM11.</p> <p>It was not visible during current survey.</p>	-
95918	SN7295987935	Level	<p>Pair of mine levels.</p> <p>A pair of adjacent levels, both with drystone walled entrance cuttings, roughly 1.2m wide. The two levels are set 5m apart. The levels are blocked, the northernmost is the better preserved of the two, and now acts as the head of a stream which runs down the hillside. The southernmost is largely blocked and turf covered.</p> <p>Not marked on either OS map, so potentially early workings (mid-19th century or earlier)</p>	39 & 40

Hafan Mine, Ceredigion:
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95920	SN73528820	Magazine	<p>Mining Magazine Store.</p> <p>Small square structure on the eastern edge of Hafan mining complex (PRN 9166) recorded on the 1888 1st edition Ordnance Survey map as the magazine, storing the mine explosives, hence its isolation from the main mine areas.</p> <p>Not visited during current survey, but previous surveys have noted no surviving above-ground elements.</p>	-
126439	SN7270187996	Shelter	<p>Dairy Store / shelter / structure and enclosures.</p> <p>Previously recorded as a circular dairy store of medieval date, shown as a rectangular structure on the 1st edition OS map of 1888, and marked on the 2nd edition OS map (1906) as 'Old Sheepfold'. It was also noted during a previous survey (Sambrook 2002) as a possible deserted rural settlement, including sheepfold, enclosures and a sheep dip.</p> <p>The site comprises remains of a simple drystone built rectangular structure, approximately 2m by 4.5m, with walls 0.5/0.6m thick. Aerial photographs indicate the structure stood within a small enclosure, a second enclosure lying to the east, separated by a stream which may have been deliberately channelled from the north. This may be associated with the adjacent mine workings (operated intermittently between the early 17th and early 20th centuries), and indeed some former Smelt Mill/Smith Forge mine buildings in the Yorkshire Dales contained sunken areas that were later re-used as sheep dips, however this simple structure appears more agricultural in nature, possibly as a small shelter and sheep enclosure, later re-used as a sheepfold.</p>	41
HM01	SN7312188073	Shaft?	<p>Possible collapsed shaft</p> <p>A sub-circular depression in the northwest corner of the modern stone quarry, holding water at the time of the current survey. Not identified on any mapping or previous survey, it is possible this originates just from quarrying activity, but may represent a mine shaft exposed during the quarrying works.</p>	-
HM02	SN7308888016	Building	<p>Mining building.</p> <p>Three-celled structure lying next to a mine trackway at the head of the slope, visible on the 1st edition OS map of 1888, but gone by the 2nd edition map of 1906.</p> <p>Only partially survives as a low segment of drystone walling at the western end, roughly built, approximately 2.5m long and 0.8m high. No clear interior features survives, the site is largely</p>	42

Hafan Mine, Ceredigion:
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			covered in loose stone.	
HM03	SN7310888007	Shaft?	<p>Possible infilled shaft.</p> <p>Area of marshy ground with aa slight central depression, lying close to the top of the slope a short distance south of the Tramway revetment wall. It possibly represents an infilled shaft given the context of the site, although it has not been identified on previous surveys and no feature is marked at this point on historic mapping.</p>	43
HM04	SN7306088002	Shaft?	<p>A largely buried mine shaft, or possible level.</p> <p>Lies on the rising rocky ground to the north of the Tramway, visible as part of an opening below exposed bedrock. The opening is largely filled by loose scree on the hillslope, leaving a narrow gap approximately 0.8m wide and 0.3m high.</p> <p>Not marked on any maps, and part buried by the late 19th century tramway.</p>	44
HM05	SN7300987958	Shaft	<p>Mine shaft</p> <p>Marked on the 1st edition OS map of 1888. Not marked on the subsequent map of 1906.</p> <p>Area now covered in loose mine waste/scree.</p>	-
HM06	SN7299187953	Level	<p>Open cut mine level,</p> <p>This level may previously have been recorded as part of the series of open-cut levels that constitute PRN 38240, but may belong to a later period of workings. It first appears on 2nd edition OS map of 1906, by which point it is already out of use, so likely dating to the late 19th century (post 1888) workings.</p> <p>The vertical sides of the open cutting are visible, lying alongside Structure PRN 95907, but the interior is rock filled.</p>	24
HM07	SN7298687959	Shaft	<p>Late 19th century mine shaft.</p> <p>Shaft marked on the 1st edition OS map of 1888. Infilled and overlaid by wall of structure PRN 95907 by the time of the 2nd edition OS map in 1906.</p> <p>No surface remains visible.</p>	-

Hafan Mine, Ceredigion:
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HM08	SN72938793	Spoil Heap	<p>Small spoil heap.</p> <p>Associated with mine levels PRN 95918, which are potential mid-19th century or earlier. The heap is largely turf covered, also suggesting it is of some age. The stream currently runs around the southern edge of the spoil.</p>	40
HM09	SN7292187952	Shaft?	<p>Potential early infilled shaft.</p> <p>Potential rock filled shaft alongside the later tramway. Not marked on any map sources, but visible as a slight hollow filled by large boulders, with a slight channel running to the south, now turf covered.</p>	45
HM10	SN7291687887	Level	<p>Outlying infilled level</p> <p>Cut into the rising ground to the south, with drystone walling evident at the level entrance. The level opening is largely infilled and turf covered. Not marked on any map sources, although access by a track visible on the 1st edition OS map of 1888.</p>	46
HM11	SN7280187944	Shaft?	<p>A possible infilled shaft, or level</p> <p>Lies in rocky ground to the west of the wheel pit. Visible as a grass filled hollowed within the rocks, but it is unclear if it is naturally occurring or an infilled feature. It does not appear on any previous OS mapping.</p>	47
HM12	SN7280088020	Leat	<p>A rock-cut leat.</p> <p>Marked on the 1st edition OS map of 1888 as a curvilinear watercourse around the western slopes of Cerrig yr Hafan, but feeding into the top of the wheelpit PRN 95911 and therefore likely to represent the an artificial watercourse. Visible on some modern aerial photographs, particular those taken by the RCAHWW, as a rock-cut terrace into the hillside. The wheelpit dates to 1853, which may therefore provide a date for this leat, but extensive leats are also recorded as part of the early 19th century works by Waller, but largely un-located.</p>	-
HM13	SN7265687905	Structure	<p>Mine building.</p> <p>Marked on the 1st edition OS map of 1888 as a rectangular two-celled structure with an adjacent long cell or enclosure along one side. It lies alongside the access track to Hafan Mine and therefore assumed to be associated, but function and date unknown. It is possible it represents the former Smelt Mill / Smiths Forge, but there are few clues in the remains to suggest a function. It was gone</p>	-

			by the time of the 2 nd edition OS map of 1907, possibly removed during the construction of the adjacent tramway in 1896/7. Visible only as a terraced, turf covered platform.	
HM14	SN7269487960	Spoil Heap & Gulley	Linear channel ending in spoil dump. Not identified during the survey, but visible on aerial photographs as a long linear gulley, approximately 50 – 60m long, ending in a teardrop shaped earthwork likely representing a dump of mining waste. It is not marked on any map sources, it is possible that it is directly linked to a mine level at the end of the gulley, but the area was under thick bracken at the time of the survey.	6



Photo 10: View N showing the eastern end of the Hafan Mine complex. The route of Tramway PRN 38234 is visible terraced into the side of Cerrig yr Hafan on the left (red arrow), the fenced and blocked mine shaft PRN 38235 lies at the foot of the slope (blue arrow). Shaft PRN 95901 and Spoil Heap PRN 95902 lie adjacent to this shaft, but surface elements appear to have been terraced away. Level PRN 38236 would lie in the level turf-covered area on the right, but is also no longer visible. Spoil Heap PRN 95900 would lie on the lower edge of the tree line to the rear.



Photo 11: View SE of fenced off and water-filled Shaft PRN 38237.



Photo 12: View W across the level area at the top of the slope, with the rocky face of the modern quarry forming the background. The approximate location of Shaft PRN 38238 would lie on the left.



Photo 13: View W down the sloping ground, showing the incline of the Tramway PRN 38239 on the right. Levels PRN 38240 / 95905 lie in the shadow on the left.



Photo 14: View N showing a section of the drystone wall revetment of Tramway PRN 38239 towards the top of the incline. 1m scale.



Photo 15: View NNW showing the incline of Tramway PRN 38239. Spoil Heap PRN 95906 also lies centrally within this shot.



Photo 16: View ENE up the incline of Tramway PRN 38239. 1m scale.



Photo 17: View W from the top of a series of Levels PRN 38240 / 95905 cut into the hillside.



Photo 18: View E, looking back from the bare ground visible in the previous photo, showing two infilled levels, part of Levels PRN 38240 / 95905.



Photo 19: View E at the middle of three main level cuttings forming Levels PRN 38240 / 95905,



Photo 20: View E at the lower of three main rock-cut levels forming Level PRN 38240 / 95905. 1m scale.



Photo 21: View W, showing collapsed Mine Shaft PRN 38241 in the foreground.



Photo 22: View WNW along the approach to Level PRN 38242. The level entrance lies at the bottom right, with the water in the centre running along the drystone-walled approach.

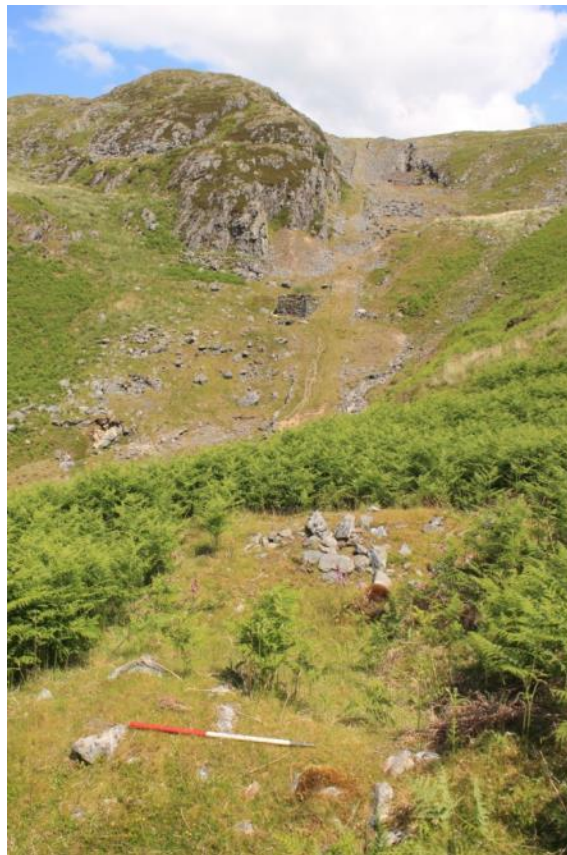


Photo 23: View E showing the remains of Structure PRN 38243 in the foreground (the rectangular area within the bracken) with Hafan Mine workings on the incline in the background. 1m scale.



Photo 24: View ENE up the slope showing the extensive Spoil Heap PRN 95904. The distinctive brown oxidised rock is visible in the foreground. Mine Level HM06 is visible as the open cutting to the right of the brown rock.



Photo 25: View SW downslope across the upper part of Spoil Heap PRN 95904. The small grassy areas picking out steps in the spoil.



Photo 26: View S showing the external face of Structure PRN 95907. 1m scale.



Photo 27: View ENE showing the internal face of the upper wall of Structure PRN 95907. Somewhat difficult to pick out the drystone construction against the background of loose stone from Spoil Heap PRN 95904. 1m scale.



Photo 28: View N of fragment of retaining wall PRN 95908. 1m scale.

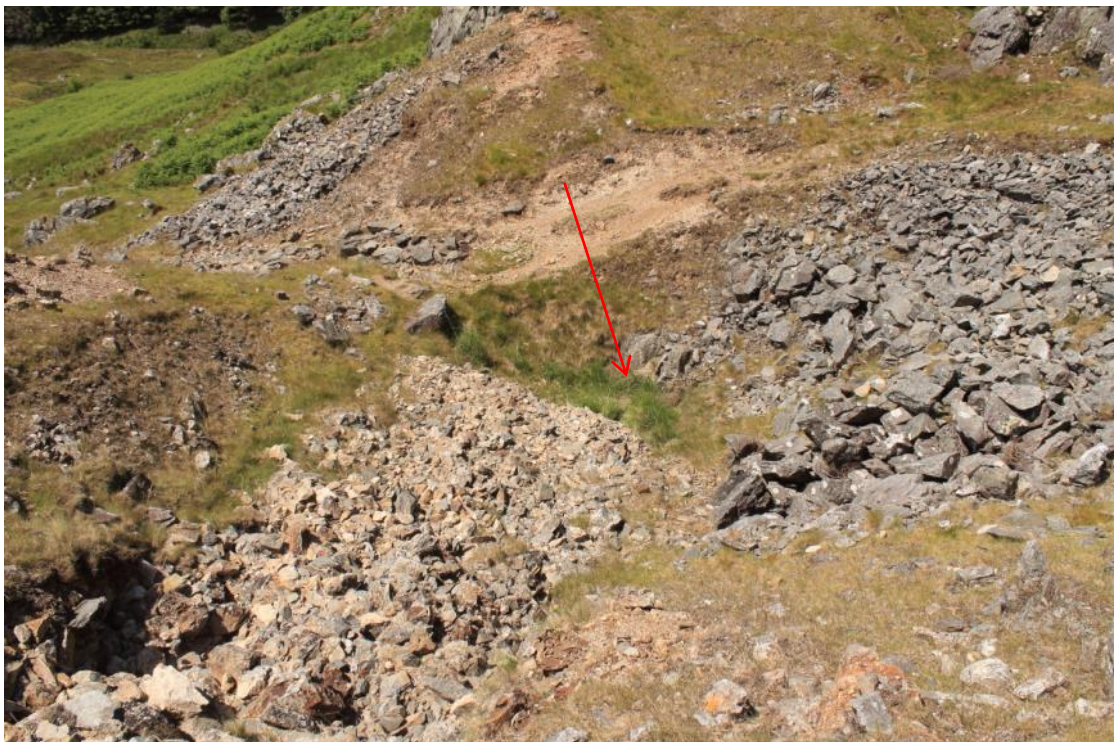


Photo 29: View W showing the collapsed mine shaft PRN 95909 (arrow) with the tramway across the top, and retaining wall PRN 95908 on the right.



Photo 30: View W along the valley showing the Wheelpit PRN 95911, currently fenced off. The later Tramway PRN 38239 runs alongside to the left.



Photo 31: View E of the lower outer face of Wheelpit PRN 95911, with arched tailrace at the base. 1m scale.



Photo 32: View S, showing approach to overgrown Mine Level PRN 95912.



Photo 33: View SE showing the two Culverts/Mine Levels PRN 95913 (red arrows).



Photo 34: View E, detailed shot of the lower, northernmost, of the two Culverts/Levels PRN 95913. 1m scale.



Photo 35: View ESE, detailed shot of the higher, southernmost, of the two Culverts/Levels PRN 95913. 1m scale.



Photo 36: View SE along the gulley (arrow), part of Gully & Spoil Heap PRN 95914.



Photo 37: View SE, the large spoil heap at the base of the slope, part of Gully & Spoil Heap PRN 95914.



Photo 38: View NE looking up an adjacent stream valley, the stream running close to the tree line, and general site of mine level PRN 95915 towards the top of the slope. Not located during survey.



Photo 39: View NW across the northernmost Level PRN 95918 with its drystone walled approach currently channelling water. The stone wall revetment to the Tramway is visible to the rear. 1m scale.



Photo 40: View W down Level PRN 95918, with Spoil Heap HM08 visible beyond and to the left. 1m scale.



Photo 41: View SE of Dairy Store or Shelter PRN 126439. 1m scale.



Photo 42: View NE of remains of building HM02. Roughly built drystone wall stands behind the 1m scale.



Photo 43: View N of reed-filled hollow possible representing an infilled Mine Shaft HM03. The Tramway revetment wall lies in the background. 1m scale.



Photo 44: View NE of narrow opening below exposed bedrock, potentially representing a partially infilled shaft or level HM04



Photo 45: View N of potential infilled shaft HM09 (red arrow). Visible as a boulder-filled hollowed, with a turf-covered channel (blue arrow) running into the foreground.



Photo 46: View SW of entrance to Level HM10, cutting into the hillside on the left, with a section of drystone walling at the entrance on the right.



Photo 47: View N of approach to uncertain infilled shaft or level HM11. 1m scale.

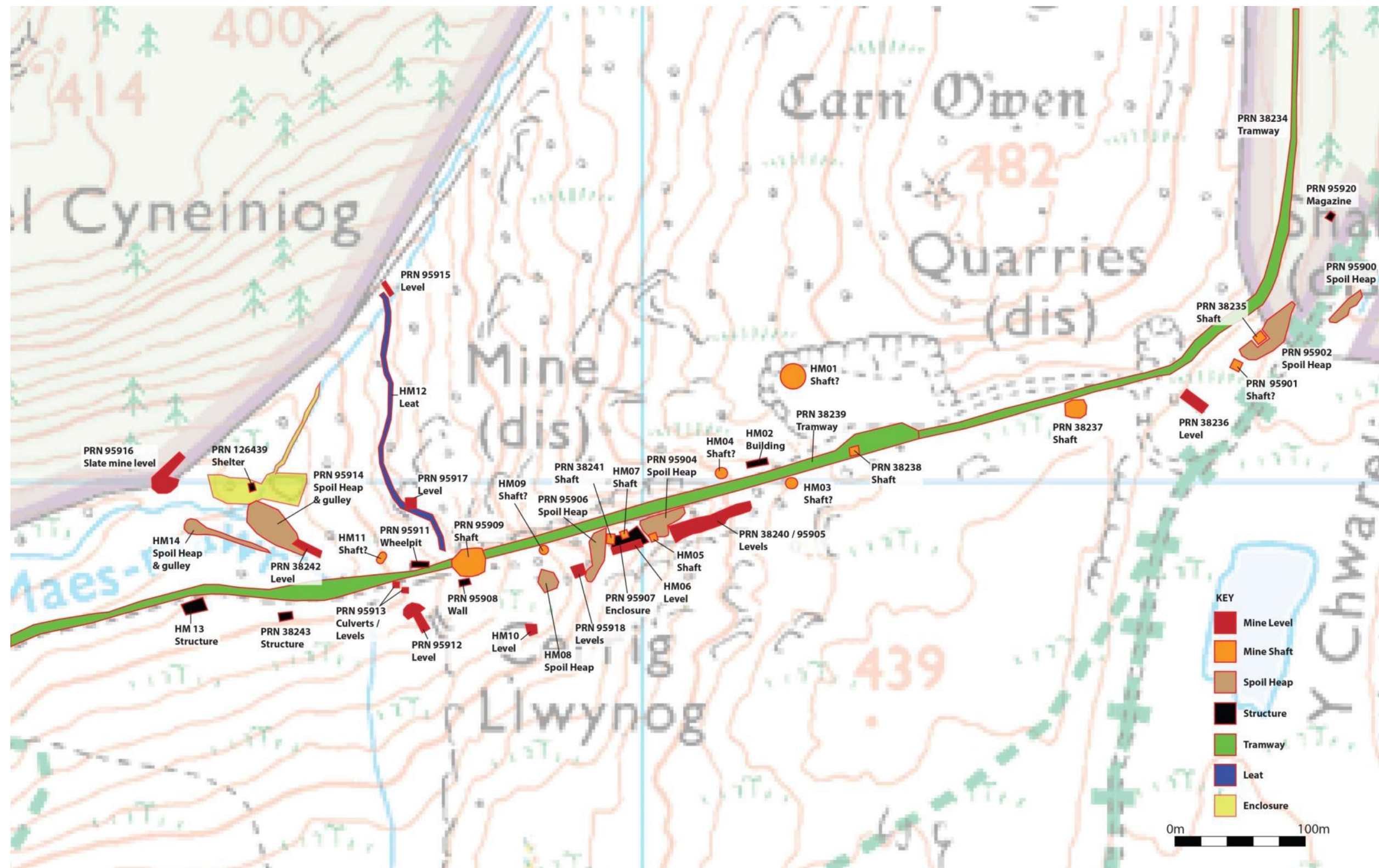


Figure 9: Plan of the individual identified mine features that make up the Hafan Mine complex.

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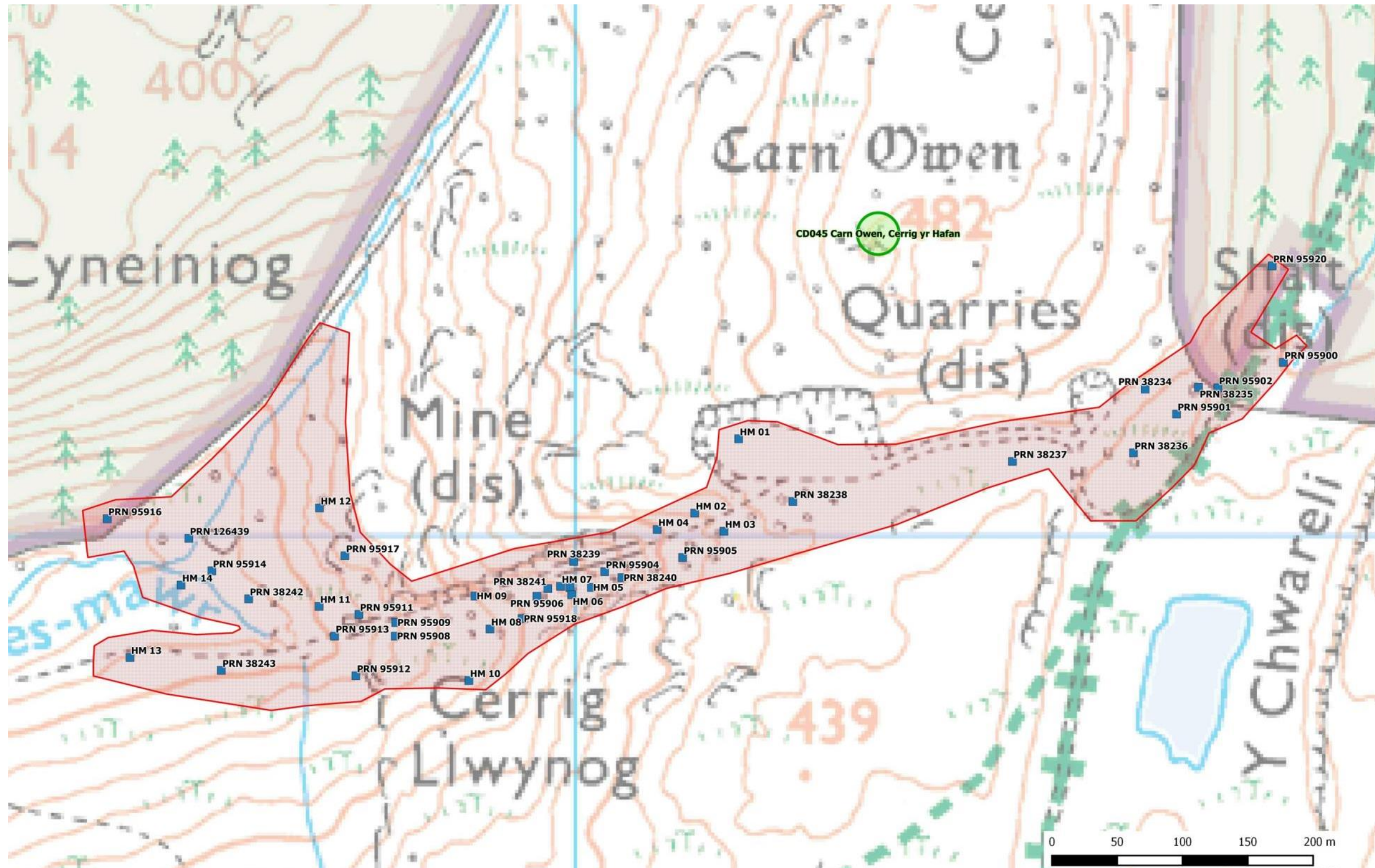


Figure 10: Individual mine features as point data, referenced by PRN and new reference numbers. An outline has been drawn around these features in red, to give an indication of an area of archaeological sensitivity associated with the surface mining remains. The Scheduled extent of CD045 Carn Owen is also marked, in green.

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8 CONCLUSIONS

8.1 Development Details

- 8.1.1 Planned remediation work at the Hafan Mine are currently in the early stages of development, therefore no detailed proposals currently exist.
- 8.1.2 Remediation work may require surface water management interventions, clearance works, and potential ground investigation works. Enabling works may also be required, such as the construction of access routes, parking and storage areas, establishing a constructor's compound, and associated services.
- 8.1.3 Such works are likely to require ground-disturbing activities that could have physical impact upon historic assets by potentially exposing, damaging or destroying archaeological remains.

8.2 Archaeological Constraints

- 8.2.1 The assessment has examined and detailed the historical and archaeological background to the site, identified the archaeological potential, and detailed specific features and areas of archaeological interest to allow a greater understanding of the archaeological importance and sensitivity of the site. This in turn can help inform appropriate remediation work proposals.

Bronze Age archaeology

- 8.2.2 Aside from the mine site itself, a general potential for Bronze Age archaeological activity has been identified in the area. Such remains would be of high archaeological value, although currently the only positively identified site is that of Carn Owen, lying on top of the Cerrig yr Hafan ridge to the north of the site. This site is legally protected as a Scheduled Monument (CD045). Given the nature of subsequent development on the mine site it would appear unlikely that potential Bronze Age archaeological remains would survive within the limits of the Hafan Mine site, although the potential for previously unrecorded Bronze Age archaeological remains to survive lower down the valley to the west of the mine site should not be discounted.
- 8.2.3 Any proposed remediation works are unlikely to, and should not, directly affect the site of CD045 Carn Owen. There is however the potential for any works in the area to affect the setting of such a monument, which should be taken into consideration when producing remediation work proposals. A detailed analysis of the setting of CD045 has not been undertaken as part of this assessment, however, it is likely that the extent of the setting is focussed on the ridge top of Cerrig yr Hafan, which largely extends to the north of the monument, its inter-visibility with other similar monuments to the east and south, as well as its extensive panoramic views. As the Hafan Mine site lies within a cleft of lower ground along the southern base of the ridge it would appear unlikely that remediation works would impact significantly upon this setting, but that may be dependent upon the scale of works required.

Medieval archaeology

- 8.2.4 A potential for medieval archaeological activity has also been identified within the assessment, focused on the site of PRN 126439. This potential

however can be included in the general potential associated with the post-medieval mining activity.

Hafan Mine

- 8.2.5 The assessment has allowed the identification of a large number of individual features associated with nearly 300 years of mining activity on the site. The Hafan Mine complex as a whole is a site of high archaeological importance, highlighted by a recommendation made in 2002 that the site should be afforded Scheduled status (Sambrook 2002). The significance of the site is also highlighted by Bick (1988;48), who states:

“There is hardly a more impressive mining site in Wales than Hafan, and the industrial archaeologist intent on unravelling the various periods of workings will find his task a busy and fascinating one”

- 8.2.6 Individual features visible at surface level and associated with the mine workings have been identified, located and described. Attempts to ascribe features to a particular period of operation have been made, for example early 18th century features associated with Waller and the Company of Mine Adventurers, and mid-19th workings associated with Job Sheldon & Co. and the Hafan & Henfwlch Company under Stride and Barbery. It is clear however that the layout of these mine features is complex and interlinked. Old workings could be re-worked at a later date, many mining operations were short-lived ventures, and extensive areas of mine waste could hide potentially well-preserved archaeological remains, as was shown as the Frongoch lead mine in Ceredigion (Murphy et al 2015). Therefore, although individual features can be shown (see Figure 9), areas of greater or lesser archaeological potential within the mine complex as a whole cannot be laid out with any confidence. Instead, a general area can be drawn around the known remains (see Figure 10), encompassing the bulk of activity over 300 years, to highlight an area of archaeological significance. The potential fragility of some of these archaeological remains should also be highlighted. The construction methodology at the site appears consistent throughout its history, with all built structures using drystone construction, utilising the readily available mined stone which can therefore become undistinguishable from the loose mining waste. It is also clear from photographs of 1965 (illustrated in the NMR, see NPRN 33878) that even some of the better built features such as the wheelpit PRN 95911, and statutorily protected features such as Carn Owen, have suffered degradation in modern times.
- 8.2.7 Beyond this area the archaeological potential for mining remains is reduced, but a potential still exists, particularly as early and short-lived mining activity has never been accurately mapped. Broadly speaking this can be divided into four main areas surrounding the main area of workings.
- 8.2.8 To the east of the Hafan Mine area, in the Llechwedd Gwinau area, modern quarrying activity is likely to have reduced the potential for archaeological remains to exist, although the site of the neighbouring and associated Henfwlch Mine to the northeast remains an exception.
- 8.2.9 To the north there is no clear indication that surface workings extended beyond the rising ground on to the ridge of Cerrig yr Hafan. No access tracks, or mine workings (beyond the uncertain HM01 and the seemingly minor outlying level of PRN 95915). Therefore, archaeological potential associated with the mine is reduced, but significant Bronze Age

archaeological remains are highlight (see section 8.2.2). Similarly, to the south the focus of mining activity does not appear to have extended onto Cerrig Llwynog beyond PRN 95912 and HM10, therefore the archaeological potential for mining remains to the south is also relatively low.

- 8.2.10 To the west, along the lower valley, no further mining remains have been identified. However, there remains more of a potential in this direction. Relatively few structural remains and processing areas have been identified at the Hafan site, for example no buddle pits have been identified, and the Smelt Mill has not been positively located. Such sites are likely to be located on the lower ground at the foot of the mining complex, if they existed, and therefor the potential for associated structure to extend westward along the lower ground cannot be discounted.

8.3 Mitigation

- 8.3.1 Due to the archaeological sensitivity of Hafan lead mine, with its remarkably long history; it is clear that any future remediation scheme will require archaeological mitigation, due to the significance of the surviving archaeological remains.
- 8.2.2 It is hoped that this assessment will help inform the design of any remediation scheme, as well as decisions on archaeological mitigation. The identification of individual features and a more general area of mining activity is intended to provide a baseline understanding of the resource and identify opportunities where further work may be required.
- 8.2.3 Any ground-breaking activity has the potential to impact upon the archaeological resource. It is generally advised that any identified archaeological remains should be avoided and left in situ and undisturbed. Proposed ground-breaking activity may require intrusive archaeological investigation and/or recording prior to a final design scheme being agreed or work commencing. Given the archaeological sensitivity of the area it is likely any ground-breaking activity will also require archaeological monitoring.

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