

# Mynydd Parys Copper Mine: Archaeological Assessment





**Mynydd Parys Copper Mine**  
**Archaeological Assessment (G1469)**

**Report No. 292**

Prepared for  
Cadw: Welsh Historic Monuments  
and  
Amlwch Industrial Heritage Trust

by

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# PARYS MOUNTAIN COPPER MINE: ARCHAEOLOGICAL ASSESSMENT

## Abbreviations

The following abbreviations are standard:

AIHT: Amlwch Industrial Heritage Trust  
AMplc: Anglesey Mining plc.  
*CDH: Caernarfon and Denbigh Herald*  
CRO: Caernarfon Record Office, Victoria Dock, Caernarfon, Gwynedd  
DRO: Dolgellau Record Office, Cae Penarlâg, Dolgellau, Gwynedd  
ICOMOS: International Council of Monuments and Sites  
LIRO: Llangefni Record Office, Shire Hall, Llangefni, Ynys Môn  
*GD/IG: Gwynedd Diwydiannol/Industrial Gwynedd*  
*IAR: Industrial Archaeology Review*  
*JMHS: Journal of the Merionethshire Historical and Record Society*  
NLW: National Library of Wales  
*NWC: North Wales Chronicle*  
PRN: Primary Record Number  
SAM: Scheduled Ancient Monument  
SSSI: Site of Special Scientific Interest  
*TAAS: Transactions of the Anglesey Antiquarian Society*  
*TCHS: Transactions of the Caernarvonshire Historical Society*  
UWB.: University of Wales, Bangor

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## **SUMMARY**

*The present study constitutes an archaeological assessment of the copper mines on Mynydd Parys in the community of Amlwch, Ynys Môn. Desk-top work carried out in the UWB, Llangefni, Caernarfon and Hawarden Record Offices and the Manchester Central Reference Library has furnished details of the mines' revival in the Modern period, its pre-eminence within the copper industry in the late eighteenth century and its slow decline in the nineteenth. Recent archaeological studies have made clear its origins in the early Bronze age. Site visits have established the number and variety of identifiable features on the mountain, and a report has been produced on the basis of both desk-top study and field visits, which argues that Mynydd Parys, though a distinctive and unusual site with a number of possibly unique features, bears some features in common with other copper workings in Wales, in Britain and beyond, and that its archaeology needs to be understood within a world-wide context.*

*A database of all identified features has been prepared, together with recommendations for mitigatory measures to minimise damage to the archaeological resource.*

## 1. INTRODUCTION

### 1.1 Background

Cadw: Welsh Historic Monuments and Amlwch Industrial Heritage Trust have jointly commissioned the Gwynedd Archaeological Trust to carry out an archaeological assessment on the copper, lead and zinc mining sites of Mynydd Parys as a partnership project. The assessment of the site was to include an element of further evaluation to complete the management report. Management recommendations were to be made for the site as a whole and for specific features within it.

### 1.2 Location

Mynydd Parys, known in English as Parys Mountain, and formerly also referred to as Mynydd Trysglwyn, lies two kilometres due south of the town of Amlwch in the community, formerly the civil parish, of Amlwch on Anglesey (Ynys Môn). It is situated between the A5025 and the B5111 roads, the latter of which runs across the north-west side of the mountain. The mountain is approximately two kilometres long and nearly one kilometre wide, the long axis running nearly north-east to south-west. The highest point is 147 metres above Ordnance Datum, whilst the surrounding area averages 80 m above OD.

The mountain was formerly divided between Cerrig y Bleiddiau farm on the east, on which the Mona mine was developed, and Parys Farm on the west, on which the Parys mine came to be worked.

### 1.3 Ownership and leases

The eastern half of the mountain is owned by the Most Hon. the Marquess of Anglesey; the western half by AMplc, though a royalty is payable to the Marquess and Sir Paul Neave, who formerly owned the site in moiety. Small areas are owned by Miss R.E. Hughes and Mr A.M. Hughes. All these properties are managed by Jones Peckover, Land Agents, 129 High Street, Bangor, Gwynedd.

AMplc have a surface lease and a mineral lease of the eastern half until the year 2054, to whom planning consent was granted by Gwynedd County Council in May 1986 (No 1/11/C/79) for the exploitation of zinc, copper and lead sulphide resources. No archaeological conditions were attached to the permission. A further application was submitted by AMplc to Gwynedd County Council in February 1991 (No 1/11/c/77a) to extend the tailings disposal area to the south of the mountain, an area which includes the Dyffryn Coch precipitation pits (see Map 1).

### 1.4 Access

There are believed to be no common rights over the mountain. There are a number of public and discretionary footpaths through the site.

### 1.5 Nature of the threat

The threat to the archaeology of Mynydd Parys derives from a number of factors. Not only is there the active possibility that mining might resume, which would place much of the archaeology under risk, but the mountain is at risk from fly-tipping and domestic dumping. Vandalism is a recurrent problem. A number of the standing buildings are in danger of collapse.

### 1.6 Statutory protection

A number of features of the site have been scheduled as Ancient Monuments. These are:

Mona mine windmill:	A111A	Trust PRN: 3497
The Pearl engine house:	A111B	Trust PRN: 3499
The Hillside precipitation pits:	A111C	Trust PRN: 3498
The Great Opencast:	A111D	Trust PRN: 3496

(See Map 2)

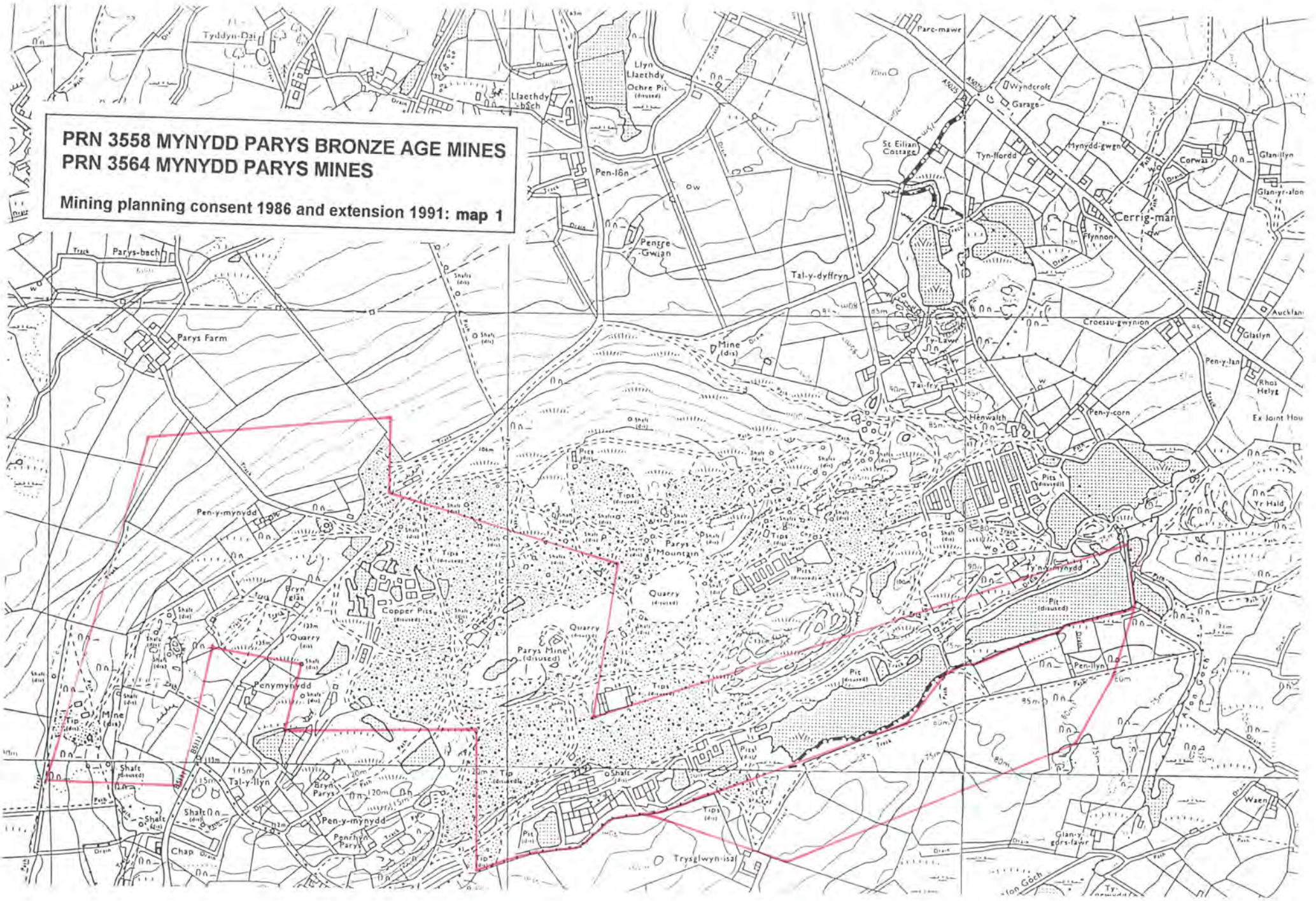
Parts of the site have been designated a Geological SSSI; five are in, or are immediately adjacent to, the Great Opencast, and one is situated at Morfa Du (see Map 3).

Seven areas have been notified as Lichenological SSSIs (see Map 4), including the windmill and the Hillside precipitation pits. Operations likely to damage the Special Interest, as specified by the Countryside Council for Wales, include “construction, modification, removal or destruction of roads, tracks, walls (including buildings), fences, hard-stands, banks, ditches or other earthworks”, and would require the prior approval of CCW. CCW note “The ruined mine buildings and walls provide further distinctive micro-habitats, such as the copper-rich mortar-filled crevices in which a community characterised by *Psillechia leprosa* occurs.”<sup>1</sup>



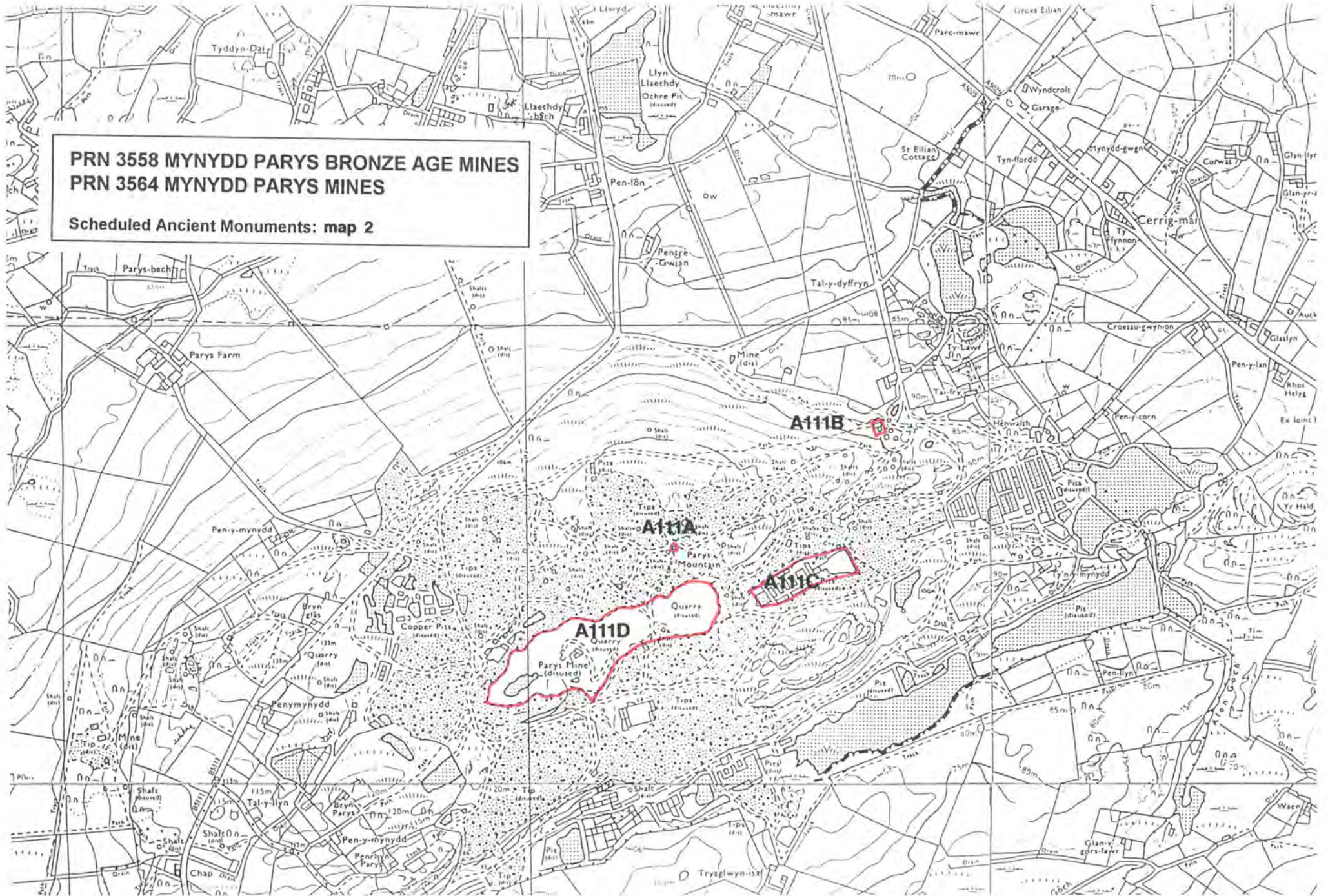
**PRN 3558 MYNYDD PARYS BRONZE AGE MINES  
PRN 3564 MYNYDD PARYS MINES**

**Mining planning consent 1986 and extension 1991: map 1**



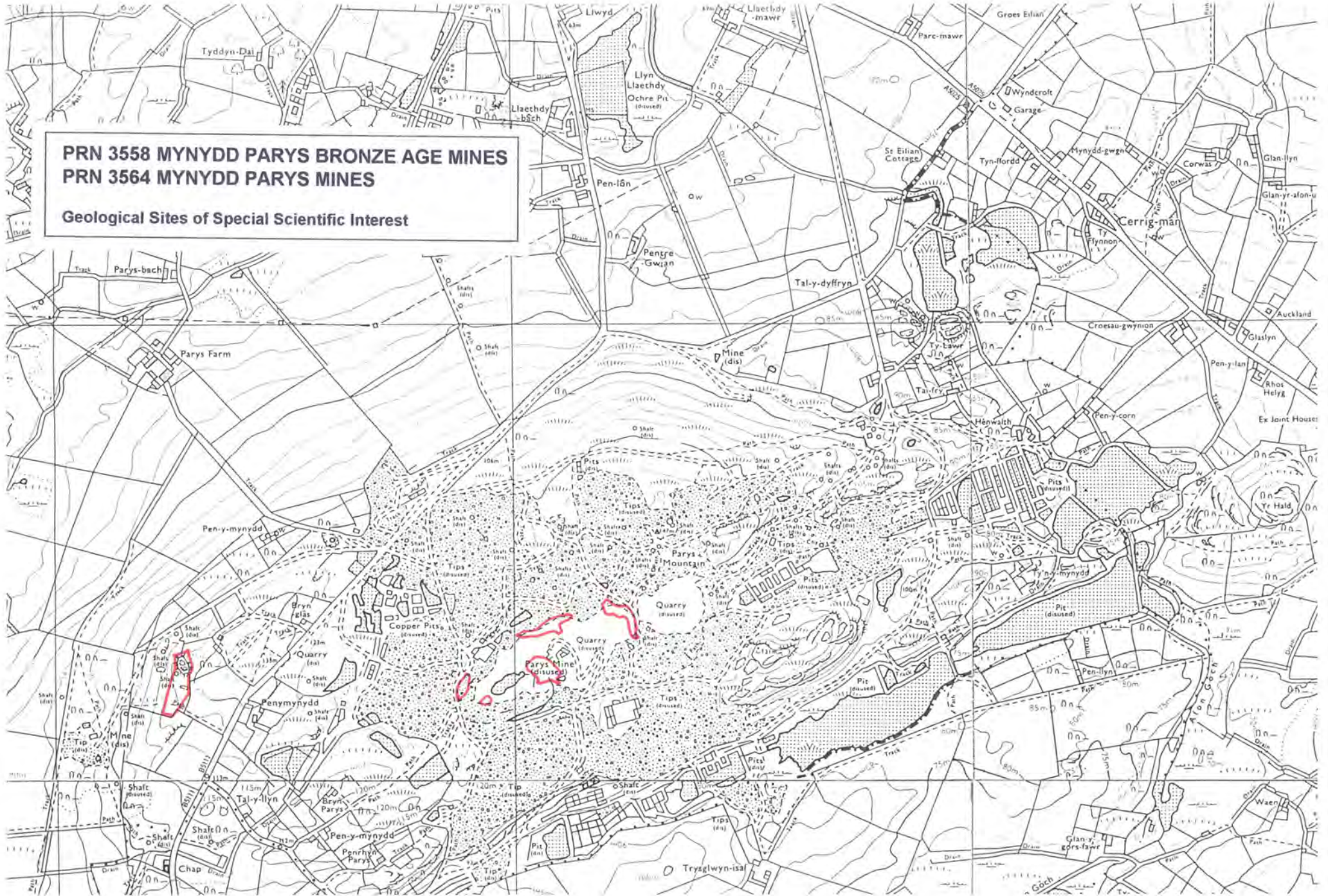
**PRN 3558 MYNYDD PARYS BRONZE AGE MINES  
PRN 3564 MYNYDD PARYS MINES**

**Scheduled Ancient Monuments: map 2**



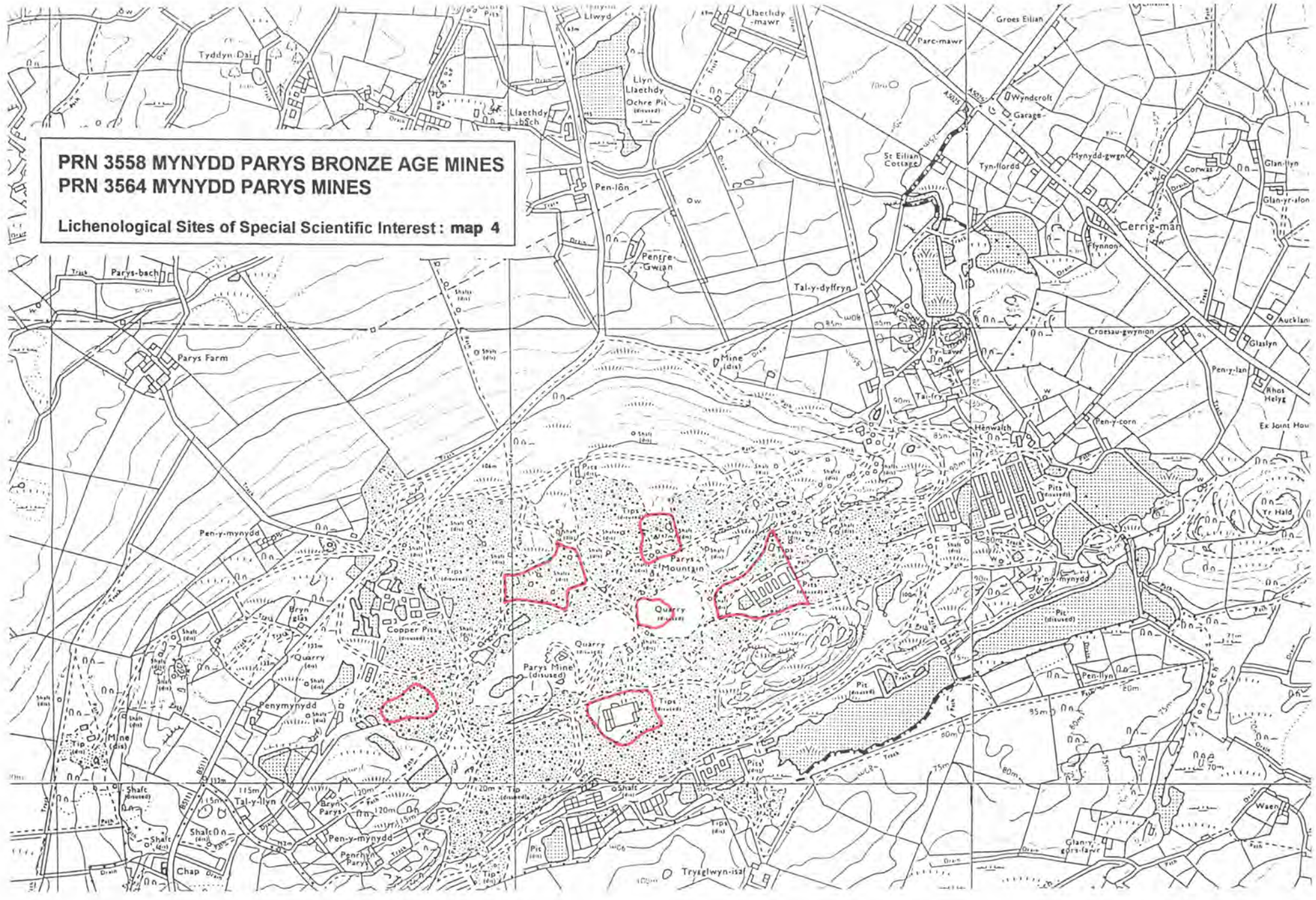
**PRN 3558 MYNYDD PARYS BRONZE AGE MINES  
PRN 3564 MYNYDD PARYS MINES**

**Geological Sites of Special Scientific Interest**



**PRN 3558 Mynydd Parys Bronze Age Mines**  
**PRN 3564 Mynydd Parys Mines**

**Lichenological Sites of Special Scientific Interest: map 4**



## 1.6 Historic landscape

The town and port of Amlwch and the Mynydd Parys mines were designated an Historic Landscape HLW (Gw) 1 (one of thirty-six) in the recent non-statutory *Register of Landscapes of Outstanding Historic Interest in Wales*. It is described in this document as “a landscape of considerable industrial archaeological importance and the only internationally important non-ferrous mining site in Wales.”<sup>22</sup> The site has been submitted unsuccessfully for inclusion as a World Heritage Site.

## 2. AIMS

A report was requested from the Gwynedd Archaeological Trust assessing the importance of all the archaeological remains within the site, ranging from the Prehistoric to the Industrial period.

The basic requirement was for a desk-top study and field-search of the copper, lead and zinc mining and processing areas on Mynydd Parys. The importance and condition of known archaeological remains were to be assessed and new sites identified. Measures to mitigate possible damage to the archaeological resource were to be suggested. Further evaluation was to be carried out at selected sites.

Gwynedd Archaeological Trust’s proposals for fulfilling these requirements were as follows:

- a) to identify and record the cultural heritage of the area
- b) to evaluate the importance of what was identified, both as a cultural landscape and as the individual items which make up that landscape
- c) to recommend ways in which damage to the cultural heritage could be minimised.

## 3. METHODS AND TECHNIQUES

### 3.1 Desk-top study

Consultation of the mines’ archives and other documentary records was carried out in the UWB archives, at Llangefni, Caernarfon and Hawarden Record Offices, and the Manchester Central Reference Library. The Gwynedd Archaeological Trust’s Sites and Monuments Record was also consulted. Secondary sources were also consulted - see (4) below. Archive maps were digitised to form overlays, and dxf copies of maps prepared by and on behalf of Anglesey Mining plc were made available to the Gwynedd Archaeological Trust.

### 3.2 Field Search

The area of the mountain was divided into a number of discrete areas, and field visits were carried out. All upstanding masonry and other structures were noted, as were all shafts, drifts and adits, and all mineral extraction points, together with find-spots of Prehistoric artefacts, but in view of the restrictions of the current project, no attempt was made to differentiate between areas of spoil-tipping. Features thus defined and identified were marked on both the current 1/10,000 ordnance survey map and on the 1900 25” County Series.

### 3.3 Consultation

Liaison was maintained with the trustees of the Amlwch Industrial Heritage Trust throughout the period within which the report was written; Dr David Jenkins, chairman of the AIHT, gave valuable advice particularly on geology and Prehistoric archaeology, and Bryan Hope, secretary of the AIHT and author of *A Curious Place: The Industrial History of Amlwch* accompanied Trust staff on site visits on a number of occasions, and gave much useful and informative advice.

A number of persons connected with the Welsh Mines Preservation Trust were consulted, including John Bennett, Robert Vernon and Chris Williams. Jeremy Wilkinson generously made his list of bibliographic and archive references available to the Trust.

### 3.4 Report

The features as defined and identified in the course of 3.2 were allotted a unique number, entered on a database, assessed and allocated to the categories listed below. The database has been appended to the present report as **Appendix 1**, and the numbers which identify them in the present report refer to the database. Each entry is intended to give an idea of the importance of the site, and specific recommendations for further evaluation or mitigatory measures. The criteria used for allocating sites to categories are based on those used by the Secretary of State when considering ancient monuments for scheduling. These are set out in Welsh Office Circular 60/96 Planning and Environment: Archaeology.

### 3.5 Categories

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

*Category A - Sites of national importance.*

Scheduled Ancient Monuments, Listed Buildings and sites worthy of scheduling or listing *i.e.* those which would meet the criteria for scheduling (ancient monuments) or listing (buildings) or both.

Sites which 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.*

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

For Category D sites, rapid recording, either in advance or, or during, destruction should be sufficient.

*Category E - Sites needing further investigation.*

Sites whose importance 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.

### 3.6 Definition of Mitigatory Recommendations

Where a feature of archaeological significance is affected, mitigation measures should be instituted in accordance with current policies as recommended in Circular 60/96 for rescue archaeology. The various levels of recording are listed below, and appear in the Management field for each of the sites in **Appendix 1** along with other management recommendations.

For the purposes of this report the mitigation and rescue archaeology proposals have been divided into various levels of recording, which can be summarised as:

#### **Level 1: Minimal recording**

- a. A photographic record of principal external views. The photographs to be dated and indexed. Negatives should be indexed and suitably stored for archive.
- b. A brief summary description, related to the photographic record as appropriate.

#### **Level 2: Basic recording**

- a. A photographic record of all principal elevations and selected features of particular interest. Photographs to be taken, as much as is possible, at right angles to the face of the feature and should include a scale. There should also be a few general photographs to set the site in context.

The photographs to be indexed as for Level 1 and related to a basic site plan which might be taken from a published OS map as appropriate.

- b. A simple description of the visible remains relating to the photographic record.

#### **Level 3: Basic recording with survey**

As Level 2 recording, but to include:

c. A measured survey of the ground plan of the site or structure at an appropriate scale (1:200 for buildings or 1:500 for larger areas where individual buildings are of no great significance).

#### **Level 4: Full photographic record**

a. A photographic record of all external and, if appropriate, internal elevations as well as any features of particular interest. The photographs should be taken, so far as is possible, at right angles to the face of the feature and should include a scale. They should be reproduced at a scale where, for example, individual stones may be identified. Steps should be taken to minimise distortion, (*eg* by use of a shift lens) and achieve a consistent scale. These photographs should be supplemented with general photographs showing the site in its setting and, if composite photographs are necessary to cover a large feature or elevation, then general shots of the feature should be included. The photographs to be indexed as for Level 1, and related to a site plan.

b. A general description and a description of all the principal features.

c. A measured survey of the ground plan of the building or site at an appropriate scale as for Level 3.

#### **Level 5 Full record**

This would normally include the full photographic record as described for Level 4, but would be supplemented by a measured survey surveyed to no more than a 1% error. The record may be supplemented by elevations and sections, where appropriate, drawn at a scale consistent with the plans. Individual features should also be surveyed and drawn to scale. The full record would include a detailed description, including measurements wherever necessary.

#### **Excavation**

Excavation has also been recommended where appropriate.

#### 4. RESULTS OF THE DESK-TOP STUDY

The great bulk of the surviving archival information relating to mining on the mountain is contained in the Plas Newydd Mona Mine papers at UWB. These papers include extensive correspondence, accounts, maps, and lists of disbursements to workers, particularly from the second decade of the nineteenth century to the 1860s, the period dominated by the management of James Treweek, from 1811 to 1852. There is therefore little about the mines' heyday in the eighteenth century, and little about their period of decadence from the 1860s onwards. Even for the period in which there is good documentary coverage, the mine papers are disappointingly vague about the location, construction and function of individual structures, and largely concern only the Mona Mine. The archival evidence is therefore weighted very heavily in favour of the eastern half of the site and for one particular period. Nevertheless, they do contain a great deal of information, and even when they are unspecific, there is much that can be inferred from them.

The Fanning Evans papers, recently bequeathed to UWB, contain archival information relating particularly to the second half of the nineteenth century and the first half of the twentieth, a period when the mines were united under one management. They are extensive, but as yet uncatalogued, and access to them at the time of writing is impossible.

Scattered references to the mines survive in other holdings at UWB, such as Llysdulas and Bangor (General collection).

The Llangefni Record Office's Mona Lodge papers contain many references to the mines, and a number of mine-plans which largely duplicate those in UWB. Other holdings include the diaries of Treweek, the Mona mine manager and other captains, for the years 1835 to 1841, and a number of photographs.

There are a number of published works on the mines. The earliest of these date from the mines' revival in the late eighteenth century, when the vogue for the sublime and the terrible brought travellers to this hitherto remote part of Anglesey. So fearsome was their aspect that they induced even so matter-of-fact a traveller as Thomas Pennant to write of "waters as distasteful as Avernus",<sup>3</sup> and the Rev. Mr Bingley, on whom the sublime worked as powerfully as on any, drew a comparison to "the vestibule to Tartarus, described by Vergil."<sup>4</sup> Others had different reasons for making the trip; the letters of the German industrial spy Augustin Lentin are in the process of being translated at the charge of the AIHT from a copy obtained from the National Museum of Wales, and the author of the present report is engaged on a translation of the article on the mines by Victor-Frère-Jean published in the *Annales des Mines* in 1826, obtained from the University Library, Cambridge. Michael Faraday's account of his visit to Mynydd Parys is brief but useful and forms a chapter of a book recently published by Gwasg Gee.<sup>5</sup>

There are extensive references in the *Mining Journal*, copies of which were consulted in the Manchester Central Reference Library; whilst it was not possible to consult the entire run within the scope of the present project, the opportunity was taken to consult those which relate to the later periods of operation, from the 1860s onwards, for which there is little archival evidence in any of the Gwynedd collections. As ever with the *Mining Journal*, the accounts cannot be taken at face value, and reports of the activities of the various companies which tried to re-open the Mynydd Parys mines in this period follow the familiar pattern, beginning with a confident promotion, accompanied by a report on the site by a supposedly independent expert, and an air of mutual back-slapping and goodwill, degenerating over the next few months or years into bad-tempered recrimination, in which anonymous letters in the correspondents' column are loftily and pointedly ignored by managing directors, and shareholders ask inconvenient questions about progress in driving a lode, leading, inevitably, to a debacle in which the company is wound up. Nevertheless, they often contain useful information about the type of machinery in use, or at least promised, and at the least they indicate approximately where work was going on. Even a cursory glance at its pages reveals its indispensability to any study of extractive industries in Britain and indeed world-wide.

The published *Reports of H.M. Inspectors of Mines* in the Manchester Central Reference Library were consulted for the period 1874 to 1896. For the first six years of this period the North Wales district was the responsibility of T. Fanning Evans, an Amlwch man and a son of the mine cashier, who resigned the position to take over the managership of the Mona mine in 1880. This source gives actual, rather than claimed, numbers of workers, but the mines themselves claimed neither life nor limb in this period, possibly due to the small number of workers involved, and the accident reports themselves are not particularly informative.

Archive maps were discovered dating from as early as 1763, when the Modern phase of mining had barely begun. However, not until the first 25" survey in 1887 are they sufficiently accurate to pin-point features precisely.

Secondary histories of the mine may be said to begin with Professor A.H. Dodd, who wrote an article on the mines in the *TAAS* in 1926. Edwin Cockshutt's articles on the mines in the same source, published in 1960, were reprinted in *Archaeologia Cambrensis* in 1965 and include much valuable information. Some of this seems to be corroborated by, and may be derived in part from, the *Mining Journal*, though Cockshutt's research was carried out at a time when it was still possible to tap the memory of the last generation of underground miners at Mynydd Parys. E. Wyn Hughes' account of bygone Anglesey, *Trem yn Ôl*, includes a chapter on the mines and a number of photographs.

An indispensable local account is by Owen Griffith, 1851-1897, who, after a spell in the mine, became a shopkeeper, and published a series of articles in *Cymru* between 1895 and 1897, published as a book, *Mynydd Parys*, at Caernarfon in 1897. As so often, his focus is on local characters and on the growth of religion, rather than on technology, but it nevertheless constitutes an essential source, for



anyone who can make sense of his defiantly demotic Amlwch Welsh.

J.R. Harris's *The Copper King*, published at Liverpool in 1964, is an indispensable account of the life and works of Thomas Williams, *Twm chwarae teg*.

Two particularly valuable secondary sources by locally-based historians are John Rowlands' *Copper Mountain*, published in 1966, which concentrates on the social history of the area, but which does contain much useful material derived from archive sources, and Bryan Hope's *A Curious Place: The Industrial History of Amlwch 1550-1950*, published by Bridge Books, Wrexham in 1994. This is an account of the multiplicity of industries that grew up around the mine and its port as well as of the mine itself. Both are fully researched and comprehensively referenced.

The Gwynedd Archaeological Trust carried out recording work on the Dyffryn Coch precipitation pits in 1995 and on the Pearl engine house in 1996; David Bick carried out a brief archaeological assessment of the site in 1988 on behalf of Anglesey Mining plc.

## **5. SITE LOCATION AND GEOLOGY**

### **5.1 Topography**

Mynydd Parys, known in English as Parys Mountain, is a prominent ridge whose long axis runs north-east to south-west. Two opencasts have been opened on the south-east facing flanks, near to the summit level, the Great Opencast of the Parys Mine and the Hillside Opencast of Mona Mine on the west and east sides respectively of the mountain. The flanks of the mountain are partly covered by the extensive tips from these and the underground workings. The Great Opencast covers an area approximately twice as broad as the other but is shallower.

On the north-western flank of the mountain lies the much smaller Morfa Du Mine, worked in the nineteenth century, and the focus of present operations. The recent Morris shaft was sunk here.

Ochre and precipitation pits are to be found at various points around the mountain; the important Dyffryn Adda pits and furnace lie to the north, and the Dyffryn Coch precipitation systems are situated at the foot of the southern flank of the mountain.

The town of Amlwch includes Porth Amlwch, where ore from the mountain and from other copper mines in North Wales was smelted and shipped. Town and port are connected to the mine by a roadway known as the *Lôn Gopar* ("copper road").

### **5.2 Geology and mine workings**

Before the 1950s geological knowledge was restricted to surface exposure and accessible mine workings. However, between 1955 and 1987, 144 surface boreholes, representing a total length of 46.8 kilometres, were drilled to examine the geology and mode of mineralisation. Further boreholes have also been drilled in recent years from the bottom of the newly sunk Morris Shaft.

The mineralisation occurs within a thin sequence of rocks associated with volcanic events at the margin of an ancient sedimentary basin. The sulphide ores consist of chalcopyrite (copper, iron), sphalerite (zinc) and galena (lead), together with large amounts of pyrite (iron). An ore feature is the "bluestone", comprising an intergrowth of these minerals. The ore minerals were subsequently remobilised, giving rise to a complex ore body, occupying fissures or impregnating the surrounding rock.

Prior to recent discoveries, twelve mineral lodes had been recorded. The lodes on the south-west side are largely bluestone whilst those to the north-east yield mainly pyrite/chalcopyrite.

The Carreg y Doll lode was the most extensive, and was worked predominantly from shafts. It has a range of nearly one mile and although it maintains a thickness of some 20m along much of its length, though it dwindles rapidly to 2m at its eastern extremity and also tends to split up towards its outcrop at Mona Mine.

Several adit levels were driven to dewater the workings. The main one is the Joint Level, which emerges at the Dyffryn Adda adit; this runs northwards from the vicinity of the Carreg y Doll shaft, Parys Mine.

The deepest shaft until the sinking of Morris shaft recently was Gwen, which reaches the 150 fathom level.

The ore reserves which are presently under consideration are predominantly the sulphides of copper, lead, zinc and iron, and are contained within the contact zone of volcanic and sedimentary rocks in the vicinity of Morfa Du Mine.

## **6. HISTORICAL SUMMARY**

## 6.1 Bronze Age Period

Prehistoric mining on Mynydd Parys was first postulated in 1796, when Christopher Sykes referred to cobblestones and fire-set drift workings, which had already been quarried away by the open-cast workings, but which were still a recent memory. He considered that these workings were pre-Roman.<sup>6</sup>

In 1937 Oliver Davies investigated, with a series of trenches, an ancient tip near the Oxen Quarry on the north side of the mountain near the windmill. Within the tip he found twenty-four stone hammers and some charcoal and other artefacts, which he assigned to the “Old Celtic” or Roman Period.<sup>7</sup>

A subsequent investigation by the Early Mines Research Group in August 1988 located Oliver Davies’ original trenches. The Group carried out further trenching and soon found stone hammers and associated flakes. A layer of charcoal gave dates within the range 2000 - 1500 B.C., the Early Bronze Age, some of the earliest dates for Bronze Age mining recorded in Britain.<sup>8</sup>

Other stone hammers have been found during mining operations in the last century.<sup>9</sup> An underground working dating from the late nineteenth century has recently yielded evidence of pre-Modern workings, in the shape of hammer-stones and an early tip; these may date from the Bronze Age. <sup>14</sup>C dates are expected in the summer of 1998.<sup>10</sup>

## 6.2 Roman period

The tradition that there has been Roman mining on the mountain is itself an old one; it is first recorded on a map of 1764,<sup>11</sup> which shows “Roman workings”, and clearly the belief was impressed on the mines’ many visitors. Thomas Pennant was apparently the first to connect this tradition to the discovery of copper cakes at Llanfaethlu and at Caerhun in Dyffryn Conwy.<sup>12</sup> Since then a total of twenty-seven copper ingots which can be ascribed to the Roman period has been discovered in Wales, eighteen on Anglesey (two on Mynydd Parys itself), six in the former Caernarfonshire and three in Clwyd. None has been discovered in England, and one in Scotland may be a reworking of scrap metal.<sup>13</sup> They are plano-convex, about 1’ in diameter and about 2 1/2” deep. Analysis has revealed they contain about 98% to 99% copper. The circumstantial evidence for Roman copper working at Mynydd Parys is therefore extremely strong.

## 6.3 Medieval and Early Modern

No Medieval mining is recorded at Parys Mountain. It was however during this period that the mountain gained its present name, from Robert Parys the Younger who in 1406 was commissioned by Henry IV to collect fines from the Anglesey supporters of Owain Glyn Dwr. He was given the mountain and surrounding lands as a reward for his services.<sup>14</sup>

The first indication of mining after the Bronze Age is a map of Traeth Dulas and Amlwch port, annotated in secretary hand, and otherwise also typical of Tudor cartography, which records that the mines lay one mile distant,<sup>15</sup> possibly at Henwaith (“old workings”), exactly a mile from the port, where later documents also suggest early mining may have taken place. Sir John Wynn on several occasions expressed an interest in the Anglesey copper mines. His letters indicate that mining was taking place on Anglesey in the 1570s for in 1607 he refers to “a great mineral work in Anglesey 28 years ago that one Mr Medley had undertaken by boiling a quantity of iron in water. It made Alum and Copperas and transmuted iron into copper.”<sup>16</sup> Absalom Francis, the mining engineer, who prepared a report on the Mona Mine in 1880, remarked that in an area “300 fms. to the east of the present workings” shafts and workings dating from the seventeenth century, though reworked forty years previously, were still to be seen - and that further to the east again, and reaching almost to the road, there were traces of ancient mining reaching almost as far “the road, which forms the eastern boundary.<sup>17</sup> 600 yards east of Carreg y Doll lies the dwelling Henwaith where a map of 1764 shows both current and past operations.<sup>18</sup> When the modern phase of operations began in the 1760s, there are references to opening out old works,<sup>19</sup> but no dates are mentioned. However, in 1698 there is a reference to “the prince’s mines at Trysglwyn”,<sup>20</sup> suggesting that some working was going on in this period.

## 6.4 Modern period 1761-1851

In 1763 Messrs Roe and Co. of Macclesfield were negotiating for a lease of the eastern half of the mountain, the farm of Cerrig y Bleiddiau, the site of the future Mona mine, with Nicholas Bayly, the sole landowner, where work had been going on since about 1761.<sup>21</sup> In September and October 1762 Sir Nicholas made significant discoveries,<sup>22</sup> and a payment is recorded to a Mr Cartwright, the agent, in 1764.<sup>23</sup> Roe and Co. were granted a lease in 1765 and according to legend the discovery which confirmed the mines’ future was made on 2 March 1768 by an experienced Derbyshire miner called Jonathan Roose in a shaft sunk at Golden Venture.

In 1770 Bayly had begun mining on Parys Farm, the western half of the mountain, but ran into lawsuits brought by joint owner, the Rev. Edward Hughes of Llysdulas. These were to grumble on for several years, in the course of which Hughes secured the services of the attorney Thomas Williams. By 1774 Hughes and Williams were in partnership to work the western mountain, which came to be known as Parys mine, and with Williams’ outstanding commercial skills, soon established offshoots in the form of smelters at Ravenhead in Lancashire and in Swansea, warehouses at London, Birmingham and Liverpool, and works at Holywell in Flintshire, Penclawdd in Glamorgan and Temple Mills in Berkshire.<sup>24</sup> For this he came to be known as “the Copper King”, though to his workmen on Mynydd Parys he was always *Twm chwarae teg* (“Tom fair play”).

This rediscovery of the mine in the late eighteenth century led to Mynydd Parys rapidly becoming the most productive copper mine in the world, resulting in a short-lived boom which was to affect not only the previously rural solitudes of north-east Anglesey but also the copper trade throughout Britain, and beyond, for it was in this period that the industry began to operate on a global scale.

The scale of output from Mynydd Parys represented a serious threat to the established Cornish copper industry, forcing them to mine deeper and obliging them to invest in ever-more sophisticated pumping machinery;<sup>25</sup> it enabled Thomas Williams to break the hold of the Swansea smelters on the copper trade, and ultimately to control half of the British industry.<sup>26</sup> Between 1773 and 1785 output exceeded 3,000 tons *per annum*.

Messrs Roe and Company departed the Mona mine in 1785, and Bayly's son, Henry Paget, Earl of Uxbridge, decided to work the mine directly, with Thomas Williams as agent, his Lordship having concluded that Williams' entrepreneurial skills more than outweighed the fact that he had represented the Llysdulas interest against his father only eleven years before.

By the early nineteenth century the mines were in decline, but were reorganised in 1811, when Vivian and Sons of the Swansea copper smelting firm became directly involved. Following the death of Thomas Williams in 1802 the Mona mine had come to be owned by Lord Uxbridge and the two surviving Williams brothers; they, in conjunction with the Rev. Edward Hughes, held the Parys mine also. In 1811 the Williams brothers sold their shares to Uxbridge, who set up a company with R.H. Vivian and J.H. Vivian as his partners. The reason for the Vivians' involvement is still a matter for debate; it may have been an attempt to break into the Liverpool market, and it may have been connected to the fact that they were able for a number of years to supply the mines with coal - though the number of furnaces at Porth Amlwch was reduced between 1811 and 1817, and the Vivians withdrew in 1826.<sup>27</sup> However, the Mona mines acquired a valuable asset in this period in the person of their new manager, the Cornishman Captain James Treweek.<sup>28</sup> Thereafter, in John Rowlands' phrase, the mines which had wrought havoc with the Cornish copper industry only a few years before, became "administratively a Cornish colony".<sup>29</sup> Despite all the charges of nepotism that were levelled at him, his managerial and technical expertise, combined with the Vivians' capital, enabled him to restore the mines to some prosperity throughout a period when smelters were increasingly being supplied from Chile and Cuba, later from Michigan, Spain and Australia.<sup>30</sup> The Amlwch smelters in this period not only served Mynydd Parys but also ores from Cwm Dyli, Drws y Coed, Llandudno, Sygun and Simdde Dylluan.<sup>31</sup> Some of these were brought in as fluxes for the smelting process.

By 1833 Treweek controlled most operations, including the precipitation pits jointly operated by the Parys and Mona Companies. His death in 1851 was the end of an era for the mountain.

## 6.5 1851-1939

Operations from the mid-nineteenth century onwards were on a small scale only. The East Parys Mining Company Ltd was registered on 14 April 1858 but only operated for a couple of years. Hardly more successful was the Parys Mines Company Ltd, registered in 1860, in which the mining consultants, John Taylor and Sons were major shareholders, but their operations seem not to have outlasted the decade.

Parys Mountain Mines Ltd was established in 1870, and seven years later a special resolution was passed by the shareholders to sell the Morfa Du portion of the Company's property to the Morfa Du Mining Company. This latter Company was formed by Robert Oldrey, a principal shareholder in the Parys Company, to work the Morfa Du Mine.

On 24 March 1879 the Parys Copper Corporation Ltd was formed to acquire the business of Parys Mountain Mines Company Ltd. Again Oldrey was a shareholder, but the names of the Watson Brothers, Henry Dean, Charles Parry, all sharedealers, also appear on the list. Company records confirm that various agreements were made concerning discounted prices of share. J. Watson, for example, was one of twenty people in 1879 to receive shares discounted by 50%, instead of the going rate of £1. Much of the work in this later period of mining took place on the Carreg y Doll Lode 90 fathom level. The Company was wound up in 1885 when a special resolution was passed to merge the Parys Mine with Mona and Morfa Du Mines. The new company was to be called Mona and Parys United Mines Ltd. No records are believed to have survived of this new company, which is unlikely to have been floated on the stock exchange.

Elsewhere on and around Parys Mountain, other mines came into being. The East Mona Company was formed in 1860 to work copper at Tyddynmawr, to the south-east of Amlwch. This organisation was to be managed by Captain Tiddy, but seems never to have done any work. The South Parys Copper Mining Company and the North Parys Mining Company were registered in 1863 and 1864 respectively, but neither company appears to have been successful.

The Mona mine was leased on 20 April 1866 for a period of 31 years to Thomas Fanning Evans and John Wynne Paynter. The smelters at Amlwch were still in production, as a document of 1880 indicates that part was in lease to Henry Hills, who was also smelting Parys ores. Bryan Hope also gives an account of the ore being used for the production of sulphuric acid by the same man.<sup>32</sup> There are also references in the *Mining Journal* for 1871 to the Mona Mines and Smelting Co. During this period, it seems that the Mona Mine operated as a private company, but in 1880 Mona Mines Ltd appears as a registered company, and once again Robert Oldrey is the principal shareholder. Capital was to be limited to 8,000 shares at £5 each; Oldrey held 1,685. Thomas Fanning Evans, John Wynne Paynter and Hugh Roberts were also principal shareholders, as they were paid for the lease of Mona Mine in shares for

the new company. The Company files give a clear indication of what was owned by the previous unregistered Mona Company, and these include land and a pool (369 acres), Trysglwyn Farm (100 acres), a paint mill at Amlwch, a smelting works at Amlwch Port, quays at Amlwch with bins and warehouses, rights under the Amlwch Harbour Act and plant and machinery on the premises.

Early reports by W. Hughes indicates that this company set to work with a will; a new engine was purchased, and smelting operations continued. Underground operations extended to the south and east and Lemin Shaft was sunk. However in 1885 the Company was wound up.

The Mona and Parys mines were eventually merged when Mona and Parys Mines Ltd was formed in 1899. Thomas Fanning Evans had died by this time, but the lease for the mines was still held by his family who sold it to the company for £22,000 in cash and £23,000 in shares. In the early years of this Company some underground work was carried out, but it seems likely that much of their output was derived from the precipitation of copper and ochre. The centre of operations was probably the ochre works adjacent to the Joint Level adit, as a photograph dated on internal evidence to about the turn of the century shows work going on here.<sup>33</sup>

By 1921 a Receiver had been called in but precipitation continued. In 1928 Thomas Fanning Evans II informed Companies House that the Mona and Parys Mines were “now a private concern carried out by myself” and they continued on this basis until 1958, when the last of the precipitation pits were abandoned.<sup>34</sup>

## **6.6 Post-World War II**

Since the second world war a succession of companies has carried out geological exploration on Parys Mountain.

Between 1955 and 1957, Anglesey Mining Exploration Ltd, a subsidiary of New Consolidated Goldfields, carried out a detailed surface and underground geological survey on the Mona and Morfa Ddu Mines. From 1961 to 1962 exploration was continued by Anglesey Copper Mines (UK) Ltd., a subsidiary of the Irish-Canadian Northgate Exploration Ltd, who carried out further geological mapping and drilled eleven surface boreholes. Canadian Industrial Gas and Oil Ltd (CIGOL) explored the site from 1966 to 1970 with several partners, but despite drilling fifty-two boreholes, no promising reserves were found.

On 16 September 1971, the mineral lease for an area of about five square kilometres was granted to Parys Mountain Mines (UK) Ltd. for a term of ninety-nine years from 25 March 1969. A further eighteen boreholes were drilled between 1971 and 1972 by the Intermin Ltd/Noranda Ltd partnership.

Cominco Ltd, who began work in 1973, were eventually successful. Having initially concentrated exploration on the traditional bluestone areas, they turned their attention northward and by 1978 had made significant discoveries.

The present tenant, Anglesey Mining plc, a subsidiary of the Imperial Metals Corporation of Vancouver, was incorporated in 1984 and floated on the stock exchange in May 1988. They sank a vertical shaft adjacent to the proven ore reserves and drove laterals into it to test the reserves. A small building was erected to carry out milling trials.

Cementation Ltd began the sinking of Morris Shaft (named after Dr Hugh Morris, the Company Chairman) on 11 October 1988. By September 1990 the shaft was down 300 metres and a 280 metre level had been driven north-westward towards the ore reserves. A series of boreholes was also drilled to prove the immediate ore reserves in detail. Having confirmed the reserves, operations were suspended, because of the low value of metal prices on the international markets. Both the shaft site and the mill are at the time of writing (November 1997) out of use, though the drilling of boreholes continues and AMplc have recently acquired land on the site.

## **7. ARCHAEOLOGICAL SUMMARY**

### **7.1 Extraction sites**

*(Numbers in brackets refer to the gazetteer of features printed as **appendix 2**)*

#### *7.1.1 Pre-Modern*

Evidence of pre-Modern extraction has been discovered at several points. The hammer-stones discovered by Oliver Davies in 1937 lay immediately to the north of the Oxen Quarry, an open working to the north of the main Modern opencasts, and it is possible, as Simon Timberlake suggests, that this was itself a copper-extraction area. There is no evidence of shot-holes in its shallow face, though any copper has long been worked out here, and the quarry possibly used for stone subsequently.

Other hammer-stones have being found during mining operations in the last century,<sup>35</sup> and during the course of the present survey. It is possible that other surface sites may also preserve evidence of Bronze-Age extraction, such as the quarry to the south of the mine (333)

More recently, evidence for pre-Modern underground working has been discovered. Access was regained into the Parys incline shaft, an entry not marked on the abandonment plans of 1876, which leads to levels at 10m, 16m and 20m depth. Some lengths contain compressed air piping, which suggests that these were the focus of the abortive re-opening of Parys in the late 1870s and early 1880s. In a chamber at the end of a passage at 16m depth, the roof has been excavated into spoil in older workings above. The spoil is strongly cemented by hydrous iron oxides and contains hammer-stones of fine, hard-grained quartzose rock. Accompanying the cemented spoil are ponded deposits of banded clay containing charcoal fragments and organic debris, including acorns, leaves and fronds. At the other end of the chamber is more recent loose spoil from an infilled shaft, no longer visible at the surface, which also contains hammer-stones and organic debris.<sup>36</sup>

There are hints in the documentary evidence of other methods of extraction before the Modern period. Thomas Fanning Evans observed in 1878 that copper-rich peat on the southern perimeter of the mines had been burnt and smelted at times in the recent past,<sup>37</sup> as at Dolfrwynog near Dolgellau, and in 1826 Victor-Frère-Jean observed that copper found in the turbary had been smelted there, by, he suggested, the Romans.<sup>38</sup> A map of 1764 shows a turbary as occupying the site of the later Dyffryn Coch precipitation systems, overlooked by a “mineral well” and “the old washing place” on a site near the present Mona mine yard. These may have been the source of a stream which impregnated the turf downslope, and also have been the focus for Sir John Wynn’s experiments in 1607.<sup>39</sup>

### 7.1.2 Modern

Within the Modern period, the Mynydd Parys mines were worked by three different methods - in two large opencasts, known as the Great Opencast and the Hillside Opencast, as an underground mine accessed by shafts and drifts, and by precipitation of the waters from the mine at a number of locations.

#### Opencast working

The two large opencasts are the most visually spectacular features of the whole site, and the Great Opencast is a Scheduled Ancient Monument. Though it is only 30m deep, and the Hillside is 50m deep, the steep sides and the vivid colours give them both an impression of considerable depth. Though the fearsome overhang on the north side of the Great Opencast which was commemorated in a number of early paintings has now been obliterated by gradual collapse of the rock face, both recall the working methods of the eighteenth century.

An account of the first phase of modern operations at the two mines, written in the early nineteenth century, speaks of extraction as being carried out initially by both underground and open workings. “The method in the Old Mine (*Mona*) being to dig pits or shafts wch are said to be 30 yards deep before they come to the bed or rock of ore .... In the new work (*Parys*) they also use this method but by far the greatest part of their Ore, being nearer the Surface is raised by taking it away, at least a great part of it, by wch they have made a tremendous Chasm.”<sup>40</sup>

There are several references to both the opencasts as having come about as a consequence of underground workings being deliberately collapsed.<sup>41</sup> An engraving purporting to show the Mona mine in 1780 shows an open quarry in the face of which seven levels, each large enough to take a horse and cart, have been driven,<sup>42</sup> and a map of the Mona mine prepared in 1786-8<sup>43</sup> marks the Mona mine’s share of the Great Opencast as a series of falls.

The Hillside Opencast may have come into being in part by this method. It is possible that the the large opening or “heavy hanging” on its west side known as Gwaith Robin Ellis is a survivor of this eighteenth-century tunnelling technique. The same map of 1786-8 shows the site of the future Hillside Opencast as partly a fall and partly as an area of underground workings accessed by shafts. No less than 144 are marked, of which some were already out of use and had been capped.<sup>44</sup>

The Great Opencast was already of enormous size by the time of the first visual records of the mine, in the 1780s and 1790s, which show deep pits, from which the ore was wound by windlass and horse-gin.<sup>45</sup> Opencast exploitation of copper ore is a feature of a number of other substantial copper workings elsewhere in the world, such as Stora Koparberg in Sweden, and is a particularly apt method where, as at Mynydd Parys, a particularly wide seam of low grade ore lies at a very slight distance below the surface.

Though it is likely that the opencasts have quarried away very many earlier features, including the alleged Roman workings, traces of other surface workings were observed. To the north of the Hillside Opencast are three parallel cuts, each about 10m deep, orientated south-west to north-east, which appear to contain no evidence for blasting, in the form of shot-holes, and no evidence of mineralisation, but which have yielded neither charcoal for fire-setting nor hammer-stones. These workings may be typical of early Modern practice on the mountain, and perhaps date to the mid-eighteenth century.

#### Underground working

As well as the open workings, mine-shafts giving access to underground workings are a common feature on Mynydd Parys. These have for the most part been capped with a concrete block, and identified by a unique number cemented into a concrete pillar set into the ground near each shaft-site. Others have been blocked by fallen rubble to within a number of metres of the surface, though the walls of some have collapsed badly, creating an ever-larger crater as the sides continue to degrade. Where it is possible to form an

estimate of their size, most appear small in cross-section, some with ginging visible, others cut straight through bedrock, of a size typical of late-eighteenth and early nineteenth-century workings, making use for the most part of horse-gins and hand-windlasses rather than mechanical prime-movers (see 7.3 below). A number of level adits were also observed.

It is known from the documentary record that the near-exhaustion of the ores accessible by opencasting in the early nineteenth century obliged the managers to revive and extend the practice of underground working, particularly in the area to the north and east of the opencasts. It is likely that most of the surviving shafts date from this period, and in some cases documentary evidence survives for their sinking. Early maps, however, show existing shafts which had already been capped,<sup>46</sup> and it is possible that shallow shafts from the earliest Modern phase of workings may come to light in the event of ground-disturbance.

## Precipitation

Ample archaeological evidence survives of the third method of extraction, precipitation of copper by iron in water, in the form of extensive chequer-board patterns of shallow ponds, some covering many acres, often in conjunction with larger and deeper lakes for the extraction of ochre. Precipitation was a low-cost method which sought to extract the copper ore from waters flowing out of the deep mine or which had been passed through the tips, either as rainwater or deliberately by sparging. Several different accounts have been published of this method, of which the following is perhaps one of the clearest and most detailed:

“The water is raised by means of wooden pumps, and stored in reservoirs specially prepared for its reception. Here it desposits any clay and grit contained, and when clear it is tapped off as required into their precipitation tanks. These tanks are filled with old iron, and the cupreous water is allowed to flow first into the head “pit,” and from it continuously flows through a series which is lengthened or shortened as found necessary with the varying strengths of the water passing through. Four times a year the precipitate thus obtained is thus collected. The water is first drawn off, all the iron is then placed upon the “backs” of the wavy bottom, and the copper attached to it is washed away by throwing violently against it by means of scoops the water still remaining in the hollows. This process accomplished, the precipitate is allowed to subside, and the clear water is drawn off by taking out the plugs placed in the middle of each trough. The precipitate is then carried in casks to a pit, where it gradually acquires the consistency of soft mud, and is then taken to a reverberatory furnace where it is dried and made ready for smelting. The water afterwards flows into large reservoirs, some of several acres extent, and there by a natural process deposits a sediment of sub-persulphate of iron, or precipitated yellow ochre. Some thousands of tons of this article are annually sold; it is used largely as a gas-purifying material, and considerable quantities are calcined for the production of the various iron oxide paints and Venetian red. These mineral waters must have issued from the ground for a very long period, for south of the mountain there is an extensive peaty tract, portions of which are cupreous, while others contain so much ochre as to produce an excellent gas purifying material. When the price of copper was so high the cupreous peat was largely burned, and the ashes thus obtained, containing from 2 to 4 per cent. of metallic copper, were smelted with others ores of the mine. The streams of water proceeding from the mine are of a deep port wine colour when first pumped out, they gradually become lighter in colour as they deposit the ochre; when they enter the sea they impart to it a yellow tinge, which sometimes stretches out a mile or more into the channel.”<sup>47</sup>

Whilst there are a great number of separate systems, many appear to run into each other, such as those grouped around the Great Opencast, which all make their way by one means or another to the Dyffryn Coch systems, which formed the subject of a GAT measured survey in 1995. The extensive Hillside precipitation system has been Scheduled as an Ancient Monument.

This system has been practised at a number of copper mines in Europe, particularly at Hern Grundt in Hungary, but is said to have been first adopted in northern Europe at one of the County Wicklow copper mines when a miner left his shovel in the water and found that it attracted copper ore but that the iron itself came to be eaten away. Equally possible is that it was devised at Mynydd Parys and exported to Ireland; after the Macclesfield Copper Company lost the Parys lease in 1785, they took out a lease of Cronebane mine in County Wicklow, and may have taken Parys miners over with them.<sup>48</sup> In 1791 they took out a lease on Llanberis copper mine, where precipitation was also tried.<sup>49</sup> The date for its introduction to Mynydd Parys is uncertain, though at the Mona mine it was clearly no later than 1772,<sup>50</sup> and extensive pits on the south side of the mountain and in Dyffryn Coch, the valley to the south, are marked on both mines on a map of 1784-6.<sup>51</sup> By 1815 the joint level was in operation, which fed precipitation pits at Dyffryn Adda, to the north of the mountain, where a furnace to dry the precipitate had been constructed.<sup>52</sup> By 1819 the extensive systems on the east of the mountain, known as the Hillside precipitation pits were in existence.<sup>53</sup>

Whilst the various methods of extracting the ore at Mynydd Parys have their parallels elsewhere in the archaeology of copper mining, they have to be sought far afield. No other copper mine site in Britain made use of opencasting to the same extent as Mona and Parys, and precipitation is only found at a small number of sites, including Hern Grundt, Rio Tinto and the Arklow mining region in Ireland.

## 7.2 Processing sites

### 7.2.1 Pre-Modern

Little archaeological evidence has been discovered to shed any light on pre-Modern processing on the mountain. Simon Timberlake records the discovery of a stray find of copper slag at Mynydd Parys (26), but considers that the hammer-stones were used for extraction rather than cobbing.<sup>54</sup> The discovery of copper ingots at Mynydd Parys itself implies on-site smelting, and the extensive

turbaries which are recorded on early maps would have provided fuel for the process. Ingots are recorded as having been variously stamped SOCIO ROMAE, NATSOL, IVFS and IVLS.<sup>55</sup>

### 7.2.2 Modern

There are several detailed accounts of ore-processing at Mynydd Parys, which describe the various stages involved. Whilst archaeological evidence survives *in situ* for some parts of the process of treatment, others have left no visible mark.

Processing of the ore took various forms. The ore was hand-crushed and possibly jigged and buddled on site and some was calcined on site as well. Calcination also took place at the smelter at Porth Amlwch. The preparation of the ore also yielded a number of useful by-products.

#### Mechanical processing

Faraday describes in 1819 how the ore, once raised from the mine “in large heavy masses .. is then thrown over a stage onto the ground below where it comes into charge of cobbers, principally women and boys. We came up to a large group of these, about 8 or 9 women were sitting on the ground in the midst of heaps of ore of the large and small, their mouths were covered with cloth to keep the dust of the ore from entering with the breath.” The boys fetched lumps and the worthless rock was removed by cart.<sup>56</sup>

Evidence for this first stage of the process, in the form of cobbing floors, was observed at a number of points, most notably the badly-damaged but clearly extensive area known as *Iard Charlotte* in the Mona mine. This has been partly quarried away by twentieth-century reworking for roadstone of the spoil-heaps on which it was constructed. Here the *coparledis* (“copper-ladies”) hammered at the ore, and operated jiggers. Until well into the nineteenth century this work was carried on in the open; a correspondent in the *Mining Journal* in 1871 suggested that it would be “a not unwise economy, as well as a philanthropic gesture, if the company were to provide for the showy and picturesque looking girls who work the jiggers a light zinc or galvanised iron roof over their heads”.<sup>57</sup> Owen Griffith’s account, written in 1895-7, states that as many as eighty women might work together, housed in a long wooden shed.<sup>58</sup>

Archival evidence suggests these preliminary stages were increasingly being carried out by machines from the 1870s onwards. A crusher, powered by a steam engine, was at work in the Parys mine by 1872,<sup>59</sup> of which no archaeological evidence was observed, and a building known as the Calciner at Mona mine (263) may have housed a rotary crusher or possibly stamps, but for which, conversely, no documentation has come to light.

#### Calcining

The best of the ore produced by the first stage of processing was taken to the smelters at Porth Amlwch or elsewhere without further treatment, and the poorer rock or halvans was put through a number of other processes on site before it could be smelted. Buddling was practised in 1770, when payments are recorded to workmen building dams for buddles and to carpenters for building the buddles themselves,<sup>60</sup> and was revived from 1872,<sup>61</sup> but has left no visible archaeological trace. For most of the mines’ modern history the poorer ore was calcined, initially near the sea-shore, but before long at the mines themselves.<sup>62</sup>

Calcination is a process which removes sulphur from the ore by burning. In the early days of the mines, this meant burning the ore in oblong heaps between 4’ and 5’ high, which would be set on fire in the same manner as a brick kiln and left to burn for several months, a method little different from those set out in the pages of Agricola’s *De Re Metallica* and the *Pirotechnia* of Biringuccio in the sixteenth century.<sup>63</sup> In 1770 miners were paid for “cutting of Turff at the Turbary & cutting of Gorse upon the mountain for the burning of copper ore at the Undivided Estate at Paris Mt”<sup>64</sup> -- in other words, the Mona mine site. The residue would be broken with hammers almost to a powder, then washed. Turf was used in preference to coal in the early stages because substances carried by coastal vessel from one port to another paid a duty, at least until Thomas Williams finally succeeded in persuading Parliament to suspend it in 1786.<sup>65</sup> The furnaces themselves would be rebuilt every few months.<sup>66</sup>

Though initially the fumes of sulphur dioxide thus released were left to drift away, Roe and Company realised that sulphur (brimstone) could be manufactured from them;<sup>67</sup> early accounts refer to a horizontal brick chimney over the roasting ore which would feed the sulphur fumes emitted from the ore into a brick arch 40 or 50 yards long and 6’ high and wide. The sulphur would be condensed into a fine yellow powder 1’ or more deep, then put into furnaces and gently heated into a liquid, drawn off through a cock, cooled to a solid and sold to the chemical industry and to gunpowder manufacturers.<sup>68</sup>

Slightly later eighteenth century accounts suggest that this process was before long being carried out on a more ambitious scale, involving heaps about 35’ long, 10’ wide and 10’ high, held in place by larger pieces of ore, and into which four or five holes were made, in the manner of ash pits. Flues were constructed over the top of these heaps communicating with flues at ground level covered with earth. John Champion, who joined forces with Roe and Company to calcine Mona ore in exchange for the sulphur, used a batch process with large horizontal ovens similar to the original kilns,<sup>69</sup> and the Mona mine papers record the construction of horizontal kilns, condensers and flues for calcining and sulphur extraction after the departure of Messrs Roe and Company in 1785.<sup>70</sup> At least five are shown on the plan of 1784-6,<sup>71</sup> and Dr Lentin’s letter of 1800 makes it clear that these were being used at the time of his visit.<sup>72</sup> Pennant gives a clear description of how the ore was burnt when he came to the mountain:

“For that purpose [*burning*] it is placed between two parallel walls of vast length: some kilns are twenty, others forty, and fifty yards in length; some ten, others twenty feet wide, and above four feet in height. The space between is not only filled, but the ore is piled many feet higher, in a convex form. from end to end: the whole is then covered with flat stones, closely luted with clay; and above is placed a general integument of clay, and small rubbish of the work, in order to prevent any of the fumes from evaporating. Of late some kilns have been constructed with brick arches over the ore, which is found to be the best method of burning. Within these few years, attempts are made to preserve the sulphur from flying away; and that is done by flues, made of brick, whose tops are in form of a Gothic arch, many scores of feet in length: one end of these opens into the beds of copper which are to be burnt. Those beds are set on fire by a very small quantity of coal, for all the rest is affected by its own *phlegiston*. The volatile part is confined, and directed to the flues; in its course the sulphurous particles strike against their roofs, and fall to the bottom in the form of the finest brimstone; which is collected, and carried to adjacent houses, where it is melted into what is called in the shops stone brimstone.”<sup>73</sup>

A number of what appear to be later versions of these kilns survive, though the sulphur chambers are stone-built rather than brick. Four calcining kilns and their related flues and sulphur chambers were noted at Parys mines (4, 6-9, 11-13, 15-17), believed to be for copper ore, and eight at Mona (294-303), believed to be for iron ore, along with other structures on both mines that may also have been connected with calcining (263, 276). The kilns themselves are visible as rounded oval depressions, anything up to 17m long and 6m across, some of which appear to feed into long but barely defined flues and which are associated with sulphur sublimation chambers, visible as parallel stone walls, typically 16m long, 1m high, each 0.8m wide and 0.6m apart. Around the kiln-sites the spoil is a distinctive pinkish colour.

However, it is clear that this was not the only type of kiln to have been used. Another method was adopted on the mine sites themselves and at the smelters at Porth Amlwch. Matthew Boulton in a letter to his son dated 1787 describes a visit to the “Anglesey Copper Mine” where he saw the kilns then in use for calcining the ore - conical brick-built structures from the top of which a flue led to a condensing chamber, where the sulphur was condensed in the form of “Flowers of Brimstone” in a separate chamber, “a large empty space built with brick in the Ground when that is nearly full it is put into a Cast Iron Cylindrical vessel & melted by a gentle heat into a solid form & ladled and poured into Moulds. This Brimstone is sold for the purpose of making Oyl of Vitriol.”<sup>74</sup> The 1788 valuation speaks of “coal calciners and condensers” at Mona worth £1283 2/7d and “Horizontal do.” worth £783 13/3d, as well as “cone calciners and condensers” worth £488 14 14/3 1/2d at the port.<sup>75</sup> Parys mine had allocated ground immediately to the north and south of the Great Opencast for new calcining kilns in 1815,<sup>76</sup> and these had been constructed by 1819, apparently of the horizontal variety.<sup>77</sup> A calciner, valued initially at £100, makes its appearance in 1832,<sup>78</sup> and payments to calciners are recorded in the Mona mine wages list from when they begin in 1822.<sup>79</sup> A building at the Mona mine which has traditionally been known as the Calciner (263) bears no similarity to any of the other kilns and appears latterly at least to have housed either stamps or a rotary crusher, but is connected to a lengthy flue which climbs to the top of the nearby outcrop of Carreg y Doll. On the northern part of the Parys mine are a number of flues built into the sides of tips leading to the base of a chimney which may have been part of calcining kilns (47-51).

According to Thomas Fanning Evans, calcining ceased to be carried out on the mountain some years prior to 1878.<sup>80</sup>

## Smelting

Only one modern smelting site has so far been discovered on the mountain, a brick-built structure near the eastern perimeter of the Mona mine (352), from which a lengthy flue (353) runs to the summit of a nearby outcrop. A pile of slag survives nearby. A survey and assessment excavation appears as **Appendix 1** of the present document.

Whilst there may be other smelters as yet unidentified, it appears that the bulk of the smelting was carried out off-site, mostly at Porth Amlwch or at Swansea or elsewhere. A “Smelting hous” was established in 1770 - where is not known - which may not have lasted, as Thomas Williams struck a deal for the ore to be smelted at Ravenhead on the Mersey and at Upper Bank works in Swansea. In 1797 Mona and Parys were making joint use of thirty-one reverberatory furnaces, which may represent the peak of their activity.<sup>81</sup> The Mona mine abstracts of dead capital for the years 1818 to 1837 record between sixteen and eighteen furnaces, valued variously at £90 and £60, at work at any one time. In 1827 ten new furnaces valued at £80 each are recorded as having been fired for the first time,<sup>82</sup> but the dead stock accounts for the 1860s show by how much things had declined. The “Furnaces, Roasters, Kilns &c” were valued at £1,630 in 1867, but otherwise they only refer to three furnaces at £80 each, as well as the calciners.<sup>83</sup>

The precipitated copper removed from the precipitation pits needed little treatment beyond drying in specially-constructed furnaces before being taken to the smelters. Several buildings to house these furnaces survive, including one at Dyffryn Adda, in existence by 1815-1819,<sup>84</sup> which preserves the reverberatory furnace itself, and which appears to have remained in use until perhaps 1958 (387). Others survive roofless and heavily dilapidated. Little documentation survives for them, though one of the mine captains noted in his diary for 1841 that he was trying new furnaces at Dyffryn Coch.<sup>85</sup> However, the precipitation system resulted in a number of other useful products.

Ochre was extracted from the spent water from the precipitation pits by being agitated whilst still in the final pit, then diverted into large ponds, where it was allowed to stand. It became further oxidised by exposure to air and settled as a fine yellow precipitate. It was redirected several times to different ponds and the ochre was drained before being taken to covered drying floors. It was dried out by coal-fired kilns, and then carted away to be ground off-site. It is unclear whether this process took place in the same furnaces as were used to dry the copper precipitate.



Spent iron sulphurate water was also used to make sulphuric acid, a substance which continued to be called vitriol even after it ceased to be made from green vitriol. A works had been established at Trysglwyn by 1793, when it is noted by Aitken, and it was leased in 1803 to Dr Joshua Parr, a manufacturing chemist from Carmarthenshire, and it is marked in 1815.<sup>86</sup> The works seems not have functioned in the period 1817-1818, but it is again marked on a map of 1835. The sulphuric acid was used to make pigments and dyes. This site is extremely overgrown, and is only visible as a series of shallow pits and piles of leached spoil.

Mynydd Parys in its Modern phase of operations harked back to methods that had been current in the sixteenth century. There was little mechanisation, and very little use of such common techniques as power-crushing and buddling. Instead the mines relied for over a hundred years on simple low-cost systems, involving hand-cobbing and slow calcination.

### 7.3 Power systems

#### 7.3.1 Pre-Modern

No evidence is known to survive for pre-Modern power system on the mountain.

#### 7.3.2 Modern

Both the Mona and the Parys mines made consistent use of human and animal power, intermittent use of wind and of steam power, and limited use of water.

##### Human and animal power

Early illustrations of the mines show windlasses perched on flimsy platforms on the edge of the opencasts, hauling kibbles and sometimes men on hemp ropes. As an example, “Turn Trees Rolls & Stages” worth £17 13/- are recorded at Mona Mine in 1788<sup>87</sup> and three “hand-whimseys” are recorded at Parys mine in 1815 along the edge of the opencast.<sup>88</sup> Such devices survived to haul up shafts for many years, but by their nature leave little physical evidence. The one feature on the mountain which shows evidence of having depended on human muscle alone is the capstan pit associated with the Pearl shaft, which would have been used for raising and lowering sections of pump-rods when repairs were being made (123). This feature has recently been restored with grant-aid from Cadw

A number of horse-gin sites were noted in the course of the survey, all of them the “whim-gin” variety, in which the horse circle is to one side of the shaft rather than around it. They are seen most clearly in association with the capped Charlotte shaft (77-78) where it is surrounded by a low bank and with shaft (138-139). No pivot stones survive. Gins were clearly once very common, and were being installed as late as 1880.<sup>89</sup> They were used not only to raise ore but also to raise water. An account of the Parys mine written in the early nineteenth century, looking back at the period 1753 to 1790, refers to water to be used for precipitation being “work’d up by engine”,<sup>90</sup> a word which at the time is as likely to mean a pump or a horse-gin as a steam engine, and may refer to a shaft at the south-western extremity of the Great Opencast referred to in 1854 as the “water whimsey shaft” or “south engine shaft” (though known colloquially as *twill drwg*, “the bad pit”), from which water was ducted to the Parys precipitation system (212). It is marked on the earliest Parys map, dated 1815.<sup>91</sup> Possibly a gin operated a pump, an unusual arrangement.

At the Mona mine horse-gins raised water in kibbles; the wages abstracts record payments to partnerships for raising water until June 1846 when they cease,<sup>92</sup> probably as a consequence of installing a steam engine at Carreg y Doll shaft, which first appears in the records the following month.<sup>93</sup>

##### Wind power

The Mona mine stock-list of 1788 refers to pumps valued at £22 18/- and “water shafts”, presumably a rising main,<sup>94</sup> which may have been powered by a windmill, since the same source includes a “wind engine” valued at £178 13/-. A windmill - and there may have been several in the late eighteenth century<sup>95</sup> - is depicted in John “Warwick” Smith’s watercolour of 1785, a small tower mill with vertical walls, believed to have been demolished by 1790.<sup>96</sup> There is an obscure reference to “fixing air machine at New shaft” in 1836,<sup>97</sup> which may be interpreted as a wind-pump rather than as a fan, but otherwise nothing more is heard of wind-power until 1878, when the Cairns shaft windmill was built.<sup>98</sup>

This impressive feature is the single most prominent landmark on the mountain, and is visible over a considerable distance. It is a stone-built conical tower mill, which measures 8m in diameter across the base and stands approximately 20m high. Uniquely for Anglesey, it was a five-sailed mill; the cap and all the machinery are missing, but it is believed to have contained an upright shaft driven by bevel-gearing from the sail-shaft, which in turn operated 200’ of flat-rods by means of a crank in its foot. The flat-rods operated a pump in Cairns’ shaft, and were supported on intermediate dolly-posts. The windmill was still operating in 1901.<sup>99</sup> Its importance as the only surviving pump-windmill in an extractive industry in Britain was recognised by scheduling as an Ancient Monument in 1995.

##### Steam, gas and air power

The earliest attempts to use steam power at the mines seem to be in the latter years of the eighteenth century. A steam engine is believed to have been installed at the Parys mine to wind in about 1790, but to have seen little use owing to the problems of the cupriferous water damaging it.<sup>100</sup> Steam winding engines had only been in use since the early 1780s, so Parys was early in the field.<sup>101</sup> Its site may be indicated by the stone retaining wall on the north side of the Great Opencast, where cinders have been found in the grass (216), though it is clear that portable and other steam engines were in operation at Parys mine, possibly hereabouts, in the nineteenth century.

When Thomas Williams petitioned for the duty on coal delivered by coast to be suspended in 1786, one of his reasons was that by “reason of the increasing depth of the said Mines, and the Situation of the Ore, it will be impossible for the Water to be kept out of them without the help of Fire Engines”<sup>102</sup> - even so, no steam pumping engine was to be installed until well into the next century.

This was the Cornish engine to pump the already existing Pearl shaft, installed in 1819 in a purpose-built engine house, believed to be the oldest surviving example in Wales,<sup>103</sup> and Scheduled as an Ancient Monument in 1995. It has recently been consolidated with grant-aid from Cadw. The engine was purchased by the Mona mine from Neath Abbey ironworks in 1819, and installed on the north-eastern perimeter of the site that year, where it replaced a horse-gin.<sup>104</sup> It first worked on 27-30 March 1819.<sup>105</sup> Faraday describes it as “a small steam engine employed to drain one of the workings of the mine ... good and preserved in very neat order within the house, the outdoor parts were of timber” but adds:

“The miners found themselves at first very much embarrassed in working this engine in consequence of the peculiar nature of the waters in this neighbourhood. For being a solution of sulphate of copper they acted on the cylinder and other iron parts of the engine rapidly corroding them and rendering the whole useless. Now they very carefully collect the waters from the higher parts of the mountain where they are more free from sulphate of copper, and they neutralise what portion of that salt may be in them with the acid also that they contain by lime and they also preserve the condensed water and cooling it in reservoirs they use it again.”<sup>106</sup>

Effective though lime, and chalk, which they had also been using, may have been, it was not long before Treweek was on the look-out for cheaper ways of neutralising the acidity of the water, as they were costly and could not be recycled.<sup>107</sup> This engine powered a lifting pump and a forcing pump in a 360' shaft.<sup>108</sup> The original pumps were of iron, for which wooden pumps with brass moving parts had to be quickly substituted.<sup>109</sup>

A French visitor of 1826 appears to be referring to this machine when he describes the mine as dewatered by “*une seule machine à feu, de la force de 6 chevaux, placée à quelque distance de la grande ouverture.*”<sup>110</sup> How long it remained in use is doubtful, for the Mona mine wages lists, which survive from 1822 onwards, consistently refer to the steam engine department until 1829, and the accounts refer to men working on the steam engine until March of that year,<sup>111</sup> suggesting it was taken out of use then, and a curious reference of 1819 suggests that the engine was only intended to work for ten years.<sup>112</sup> By 1833 the abstracts of dead capital refer to it as “old steam engine”, possibly to distinguish it from a new arrival.<sup>113</sup> In 1853 a 24” engine was bought from the Perran Foundry through Messrs Hocking and Loam of Redruth, consulting engineers, for a total of £632 and installed in the Pearl engine house,<sup>114</sup> but it was not long before it needed attention, for the spring beams were observed to be rotten in 1857 and had to be replaced.<sup>115</sup> It was still at work “in an efficient manner” in 1880.<sup>116</sup> Though commonly referred to as the “pearl engine”, Owen Griffith calls it “*ingian Cerrig y Bleiddiau.*”<sup>117</sup> It was valued at between £820 and £750 between 1865 and 1870,<sup>118</sup> suggesting that Hocking and Loam only supplied some parts of the machine, and that a number of components remained from the previous engine.

To the south of this feature is a heavily dilapidated and overgrown structure (140) which may also have been an engine house, and which lines up with a row of substantial pillars (131) leading to a pump-shaft (127).<sup>119</sup>

Another steam engine arrived in, or by, 1834, evidently a small affair, for it was valued at no more than £425.<sup>120</sup> What function it served is not clear, but there is a reference to steam power in a mine captain's diary for 1836 (“at Port saw Mr Treweek there Mr Scott, & Harrison & R.M. Jones about Steam Engines”)<sup>121</sup> and there are scattered references to “engines” in a mine captain's diary for 1841, in contexts that suggest that these were not all of them necessarily pumps - one of them, for instance, suffered a broken crank (so clearly a rotative engine), and another had to have water carted to it. A “surface engine”, an “underground engine” and an engine in the opencast are noted in 1841,<sup>122</sup> suggesting that there had been more than one arrival in the 1830s. The “surface engine” may have powered an uphaulage incline from the opencast.

The overgrown remains of a small engine-house (242) for pumping the Carreg y Doll shaft at the Mona Mine (241) probably date from July 1846 when workmen were paid for carting water to the engine,<sup>123</sup> which was valued at £250 in the 1860s. In 1860 the unfortunate Captain Tiddy took refuge in the engine house from the workmen during a strike meeting, only to find that the engine's wheels broke loose and shattered over him whilst the building shook to its foundations.<sup>124</sup> The engine here was patched up and supplied with a new boiler in May 1865, but the want of a powerful unit was still felt.<sup>125</sup> The Carreg y Doll shaft at the Parys mine also acquired a steam engine for winding at some stage; a photograph shows corrugated iron buildings and a timber headframe here.<sup>126</sup>

A steam winding engine at Mona mine's “New Shaft” (Cairns) is recorded in the period 1865-1870, valued at £260.<sup>127</sup> Pumping this shaft was carried out by the windmill, once it had become clear that the Carreg y Doll engine was not capable of dewatering this part of the mine by itself, but the need of a more powerful engine was felt, and a pumping engine came to be erected at the head of

the Cairns' shaft. Its site is marked by a substantial stone base and twisted holding-down bolts; it is possible on the evidence of the site that the engine itself was a differential compound, such as were frequently advertised in the *Mining Journal* at this time. The engine was manufactured by the Sandycroft foundry on the river Dee, and first steamed on 8 December 1880; it took the labour of seventeen horses to drag the boiler to the top of the hill.<sup>128</sup>

The inclined plane out of the Hillside opencast had a steam engine by 1852,<sup>129</sup> valued at no more than £50 to £30 in the 1860s stock accounts, suggesting that it had been there in 1841 for the Captain to refer to in his diary. In 1889 a "new engine" is noted at the summit of the plane from the Hillside.<sup>130</sup> The possible site of such a machine was noted in the course of the present assessment, (258 ) but the incline itself appears to have degraded.

Absalom Francis, in his report on the mine in 1880, refers to a 16" winding engine "which draws from three main shafts by means of a vertical drum"<sup>131</sup> which Cockshutt appears to gloss as the Calciner engine, operating Black Rock (260), Tiddy Newydd (134?) and Job (236) shafts, as well as the Calciner shaft itself (266).<sup>132</sup> It is possible that this engine also powered whatever machinery was installed in the calciner itself (263), though the suggestion that it bored wooden pipes and drums is not borne out by the archival evidence, which suggests that this was done by the Cairns' shaft winder.<sup>133</sup>

At Parys mine the first steam engine after the unsuccessful Boulton and Watt winder was *Ingian yr Open Cast Mawr*, which, as its name suggests, was situated in the great open cast, and which operated a pump-shaft. This machine was in existence by the 1850s, when it is shown in a water-colour by the mines inspector Warrington Smythe.<sup>134</sup>

A pumping-engine was installed on the Morfa Du shaft in 1872-3.<sup>135</sup>

One other heat engine used on the mountain was a gas suction engine at Ty Main which drew water out of the Dyffryn Coch precipitation system through an enclosed pipe (349) across the Hillside area to sparge the head of the tips near the Cairn's shaft.<sup>136</sup>

Some use was made of compressed air. The Sandycroft foundry quoted Parys mine for a compressor "to be attached to the back of our engine" in 1878.<sup>137</sup> A feature at the mouth of the Parys mine drift (2) has been identified as a possible compressor-house, and archival references make it clear that a Dunne's boring machine was in use in 1881.<sup>138</sup>

## Water power

Very little use was observed to have been made of water-powered machinery. The one water-wheel associated with the mines, (111) at Tal Dyffryn, appears to be marked on the map of 1815-1819, and a painting<sup>139</sup> of the house shows that it operated a pump shaft (112) by means of flatrods and angle-bobs. Absalom Francis' report states that it was used to pump water to the steam engines.<sup>140</sup>

A "water engine with appurtenances" is noted at the mines in the period 1865 to 1870,<sup>141</sup> probably a water-pressure engine to pump lower levels, since it is unlikely at that stage that a pump would be called anything other than a pump. No evidence was observed of this feature, but it is possible that it was situated underground

The location, topography and, unusually, even the geology, of Mynydd Parys were determinants of the power systems used. Its exposed situation encouraged the use of wind-power, and the problems of arranging a fresh water supply discouraged the use of steam. However, its hill-top location ruled out extensive use of hydraulic power, such as was a feature of most other metalliferous mines in Wales, and the mines were forced to use steam winders and pumping engines once the task became too arduous for horse-gin and windlasses.

## 7.4 Transport systems

### 7.4.1 Pre-Modern

No evidence was observed for pre-Modern transport within the study area.

### 7.4.2 Modern

The ore is recorded as having been moved by hand, by barrow, by cart and by internal narrow gauge railway.

Early paintings show wheelbarrows being used in the opencast, and Owen Griffith quotes Llew Llwyfo (Lewis William Lewis, the future novelist and impresario) in his old age remembering how as a boy he would wheel a box-barrow down to the assay office.<sup>142</sup> It is also clear from the substantial roadways that connect the different parts of the mines that many internal movements were carried out by cart,<sup>143</sup> and throughout its modern history the mine made use of horses and carts to transport ore to Porth Amlwch as well as for back-carriage of coal, bricks and other necessities. Previously, in the 1760s, Roe and Company were paying miners 3d a bag of ore delivered at the port;<sup>144</sup> but after they left, the Mona mine built a road to the port in 1788.<sup>145</sup> This is the *Lôn gopar*, (118), a remarkable example of an eighteenth-century industrial road, described after it had been in use for thirty years as "a very dusty, dirty road for when bad it is mended with slag and as there are always 12 or 14 carts moving backwards and forwards on it these materials are soon ground into black and disagreeable powder."<sup>146</sup> From perhaps 1811 onwards William Hughes of Madyn Dysw

near Amlwch held a monopoly of carting for them, whilst Parys Mine, which built its own road at an uncertain date, relied on a number of local farmers.<sup>147</sup>

A proposal to construct a railway from both mines went as far as commissioning C.B. Vignoles, the distinguished civil engineer, to survey a route to the port, and a short length of railway, including an incline powered by a steam engine, was, as noted above, in existence between the port and the smelters by 1834.<sup>148</sup> This was 2' 6" gauge, and the rails survived on the quay until recently.<sup>149</sup> Though work began on the link to the mines themselves, and the plan was still being discussed as late as 1863,<sup>150</sup> the ore continued to be carried by cart for as long as mining lasted.

Internal railways were on a small-scale; Faraday, writing in 1819, remarks "There are no trams used on these roads or in the mines in consequence of the corrosive effects which the waters from the workings would have on them and which would destroy them in a short time."<sup>151</sup> By September 1827, however, a number of the Parys mine tributaries were making use of short lengths of railway, almost certainly unconnected to each other.<sup>152</sup> This may reflect the fact that the previous month the mine had purchased nearly two miles' worth of cast-iron plate rails at the bargain price of £4 a ton second-hand from the Nantlle Railway,<sup>153</sup> but it is equally possible that the plates were purchased as scrap for the precipitation pits or to build a railway to the port, though Vignoles had strongly recommended wrought-iron edge rails. A photograph published in *Trem yn Ôl* shows lengths of bridge rail at the head of the Parys mine Carreg y Doll shaft,<sup>154</sup> and a chair discovered on site for bar-rail is in possession of the AIHT.<sup>155</sup> An incline plane from the Great Opencast was in existence by the 1850s, and one from the Hillside by 1852.<sup>156</sup> A map of 1889 marks a "new engine" at the summit of a plane from the Hillside. In a number of places, such as south of the Charlotte shaft and at the summit of the Great Opencast incline, tips appear to have grown in a way that suggests the use of railed wagons, possibly side-tipping.

Mynydd Parys was therefore unusual by the standards of most industrial undertakings of the Modern period in making very little use of railed transport, and in depending to a great extent on road vehicles.

## 7.5 Ancillary structures

### 7.5.1 Pre-Modern

No evidence was observed for pre-Modern ancillary structures.

### 7.5.2 Modern

Ancillary structures connected with both the Parys and the Mona mine survive at various locations. Very little remains of the Parys mine yard (217), which is shown on the 1815 map,<sup>157</sup> and rather more of the Mona Mine yard (322) in 1786, when it is described as "New Yard".<sup>158</sup> Both are quadrangular arrangements with a cart-entrance in one wall. The Mona yard was described by Owen Griffith in 1897 as containing a smithy, lime-store, wagon shed, furnace, carpenter's shops, assay office, stables, a turnery shed for producing the wooden piping and a place for the bier. He records that at the turn of the eighteenth and nineteenth centuries the then mine manager took it into his head to demolish the chapel at Rhos y Bol, and that the pulpit found its way to the Mona mine yard loft.<sup>159</sup> Whilst the variety of buildings is typical of a large metalliferous mine, the enclosed yard is unusual.

In common with any sizeable mine, Mynydd Parys had a number of smithies. The main Mona smithy (202) lay near the eastern limit of the Great Opencast, and it was this which Owen Griffith describes as the scene of the mine's regular preaching meetings.<sup>160</sup> A smithy is marked on or near this site as early as 1786, as well as "Sir Nick's smithy" near the Parys boundary, and a smithy which lay perilously close to a fresh collapse.<sup>161</sup> A valuation of Mona mine in 1788 refers only to the "upper smithy", possibly because the lower smithy had collapsed or prudently been demolished in the interim, and its functions already transferred to the New Yard. The assay office was also threatened by a collapse in this period. The Brimstone yard (*Iard brwmstan*) (69) is marked on the Parys mine map of 1815;<sup>162</sup> its site is heavily overgrown and little can be made out of the arrangements which prevailed here.

## 7.6. Domestic buildings

### 7.6.1 Pre-Modern

No evidence was observed for pre-Modern settlement associated with the study area.

### 7.6.2 Modern

"Cabins" valued at £23 17/- are noted on the 1788 Mona mine valuation, which may be represented by the perspective drawings of two room dwellings on the 1786-8 map. One of the falls is described as "back of Mr Roose's house", either the dwelling of Jonathan Roose who "first yon mountain's wondrous riches found"<sup>163</sup> or of one of the prosperous dynasty he established, implying that workers of several different grades built dwellings in an *ad-hoc* fashion on the mountain.<sup>164</sup> However, none is marked on the Parys map of 1815.

Some domestic structures are noted in the nineteenth century at various locations within the Mona mine. In Dyffryn Coch there stood the remains of ty Cadi Rondol, "Catherine Randles's house", a famous local character converted from a life of sin by John Elias

himself, and next to it the house of the steward who looked after the precipitation pits.<sup>165</sup> The dwelling Fron Heulog (colloquially Ty Main) was the home of the man responsible for the gas engine.<sup>166</sup>

## 7.7. Commemorative features

### 7.7.1 Pre-Modern

No commemorative, ceremonial or ritual features appear to be associated with the site before the Modern period.

### 7.7.2 Modern

A number of rock-cannon are believed to have been drilled on Mynydd Parys, to celebrate the coronation of King George IV in 1821, when the newspaper report notes “We are happy to have to add, that the whole passed off without any serious accident; two men were scorched in their faces with Gunpowder, rather badly, but not so as to endanger the sight of either of them”, and the occasion was also marked by cutting the first sod of the Coronation shaft;<sup>167</sup> these cannon or others were fired in December of that year to celebrate the birth of a son and heir to Colonel Hughes.<sup>168</sup> However, no example of these distinctive regional features has so far been located. The coronation of King William was celebrated by a feast in the Oxen quarry, attended by 1,400, at which “a moderate but sufficient allowance of ale to prevent all excesses” was offered.<sup>169</sup>

## 7.8 Conclusions

The Mynydd Parys copper mines constitute an archaeological resource of the utmost importance not only within a British archaeological context but internationally. Their scale and the impact they made on the world copper industry establish their significance.

Recent evidence makes it clear that this site was worked on both the surface and underground in the early Bronze age; whilst it is probable that most workings from this period will have been quarried away, it is possible that some of the presently-flooded shallower levels from the Modern period may have broken in on Prehistoric workings.

The evidence for early mining within the Historic period is strong. Whilst the distribution of ingots does not suggest that the mines were being worked on an extensive scale in the Roman period, there is ample circumstantial evidence for their exploitation in this period. No archaeological evidence has so far confirmed the persistent traditions and documentary evidence of mining in the Late Medieval-Early Modern period, but it is clear that the mines were active at several periods from Prehistory to the 1760s cannot be sustained.

In terms of its Modern archaeology, it is clear that Mynydd Parys was one of the focal points of an industry dominated by a particular mining area at any one time, and that its remains therefore need to be understood within the context of archaeology of copper-mining world-wide. However, despite its size, it has left comparatively few substantial masonry structures other than the Pearl engine house and the windmill, unlike, for instance, a number of considerable smaller metalliferous mines, where crushing plant, kilns and smelters or engine houses are often on a much larger scale. Clearly its nineteenth century managers were wise enough to adapt to local conditions, rather than heedlessly import the techniques and technology they had learnt in Cornwall and elsewhere. In this respect the mountain is *sui generis*; whilst many features on Mynydd Parys have been destroyed, the comparative paucity of large-scale buildings reflects a number of factors -- the ease with which the ore could be won, its susceptibility to processing by simple means, and the fact that smelting was for the most part not carried out on site but at Amlwch and elsewhere.

Whilst clearly many individual features are of considerable importance in their own right, it is their interrelationship as components of an historic landscape that makes Mynydd Parys a site of the utmost archaeological significance. Furthermore, this landscape extends beyond the mountain itself, to include the town and port of Amlwch.

## 8. MANAGEMENT

Mynydd Parys constitutes an outstanding archaeological landscape, and contains a multiplicity of features, some of outstanding importance in their own rights as well as components of the whole. Its future is a matter of concern to a number of organisations, including the Amlwch Industrial Heritage Trust, as well as other conservation bodies.

However, any attempt to conserve the mountain's archaeological heritage needs also to take account of the statutory protection afforded to mineralogical and lichenological features and areas, as well as of the possible future needs of modern mining in an area of high unemployment. The fact that the mountain is easy of access means that it is a frequent place of resort for parties of students, for amateur groups of various sorts, interested individuals and families out for a walk. While this has maintained public awareness of the site, it also means that vandalism, motor-bike scrambling and unauthorised dumping each constitute a problem. In addition, even though the known shafts have been capped, there is every possibility that others may open up.

The topography of the mountain, however, makes it ideally suited to the creation of footpath trails, such as have been proposed by the AIHT, which would have the added benefit of encouraging visitors in particular directions and away from areas of possible collapse or danger. Certain features have therefore been highlighted in Appendix 2 for their suitability for inclusion in particular trails.

### 8.1 Detailed survey

A number of features on the mountain are undiagnostic, and detailed survey would enhance understanding of how the mines functioned. The following list enumerates those considered a priority for detailed survey; the management recommendations in the site gazetteer also indicate other features where a detailed survey is appropriate.

1. Further excavation should take place at the Mona mine smelter site (352 -see **Appendix 1**). Analysis of the various slags and other debris would add to an understanding of this feature.
2. The Dyffryn Adda furnace (387) is the only building directly connected with the mine to stand largely intact and roofed. It should be recorded by measured survey, together with its associated buildings. It is, however, at risk from vandalism, and would need to be cleared and made secure before work could begin.
3. The building known as the calciner (263) is a substantial upstanding structure, yet its function remains obscure. Whilst the existence of a long zig-zag flue from it to the summit of Carreg y Doll suggests that it was indeed a calciner, it is radically different in plan to the open calcining kilns with their sublimation chambers. Furthermore, there is trace of a water-feed system to and from the building and traces of copper-dust spatter on the walls, suggesting that it housed crushing plant of some description. It is therefore recommended as a priority that this feature be recorded by measured survey.
4. Whilst the function and basic structure of the calcining kiln sites and their associated sublimation chambers is known, the details of the process remain little understood. It is therefore proposed that a contour-survey of a selected group of sites (4, 6-13, 15-16) be carried out, together with chemical analysis of the waste.

### 8.2 Outstanding archaeological importance

The following features are considered to be of outstanding archaeological importance.

1. The Mona Mine kilns and their associated sulphur sublimation chambers (4, 6-13, 15-16), as the better-preserved examples of a type of processing-technology which lasted at Mynydd Parys well into the second half of the nineteenth century.
2. The Dyffryn Adda kiln (387) and its associated features (weighbridge, cottage [388]) as a unique surviving example of a furnace associated with the precipitation process.
3. The capstan pit associated with the Pearl engine house (123), as an integral part of the mechanisms connected with the earliest surviving beam-engine house in Wales. This has recently been consolidated with aid from Cadw.
4. The *Lôn Gopar* (118), the Mona Mine road from the near the Pearl engine house area towards the port up to the point where it joins the A5025 into Amlwch. It remains partly in use for access to Henwaith and other dwellings. It is a rare survivor of an eighteenth century industrial road, constructed at a time when most large-scale extractive industries were moving over to rail transport. It still retains part of its metalling,

### 8.3 Conservation

1. The Dyffryn Adda furnace building (387) needs to be secured as well as assessed for less obvious structural flaws. It and its associated structures therefore represent an urgent conservation priority.

2. Conservation work has already been carried out at the Pearl engine house (122), and on the capstan pit (123). This feature is an integral part of the whole, and it is suggested that the boundaries of the Scheduled Area be extended to include it. The boiler house (121) has recently been cleared of vegetation by the Welsh Mines Preservation Trust. A future conservation priority is the re-erection of the chimney.

#### **8.4 Reconstruction**

Consideration might be given to the reconstruction of a small number of replica features, such as a horse-gin and a precipitation pit.

#### **8.5 Further study**

A number of thematic studies are suggested:

1. Whilst it is now clear that there is evidence for Early mining at Mynydd Parys, both on the surface and underground, and 14C dating has confirmed early Bronze Age activity, little is known about its extent. Archaeological evidence for mining between the Roman period and 1760 is particularly lacking, though the present study has confirmed that documentary evidence exists. Identification of hammer-stone find-spots and dating of charcoal and slags will yield evidence for the extent and period of early mining. In particular, the area to the east of the mine, between Henwaith and Pen y Sarn, might repay investigation. Spoil mapping is an essential part of any future work programme on the mountain, in that spoil-tips constitute the most tangible remains of mining of any period, and can sometimes be typologically dated. Their stratigraphy can reveal sequential operations that may relate to activity other than the physical removal of the ore-body. This could not be undertaken within the scope of the present study.

2. The modern archaeology of Mynydd Parys is still in many respects little understood. Further assessment, in particular taking into account the relationship between surface and underground features, is necessary in order to develop a fuller understanding of the mines' evolution.

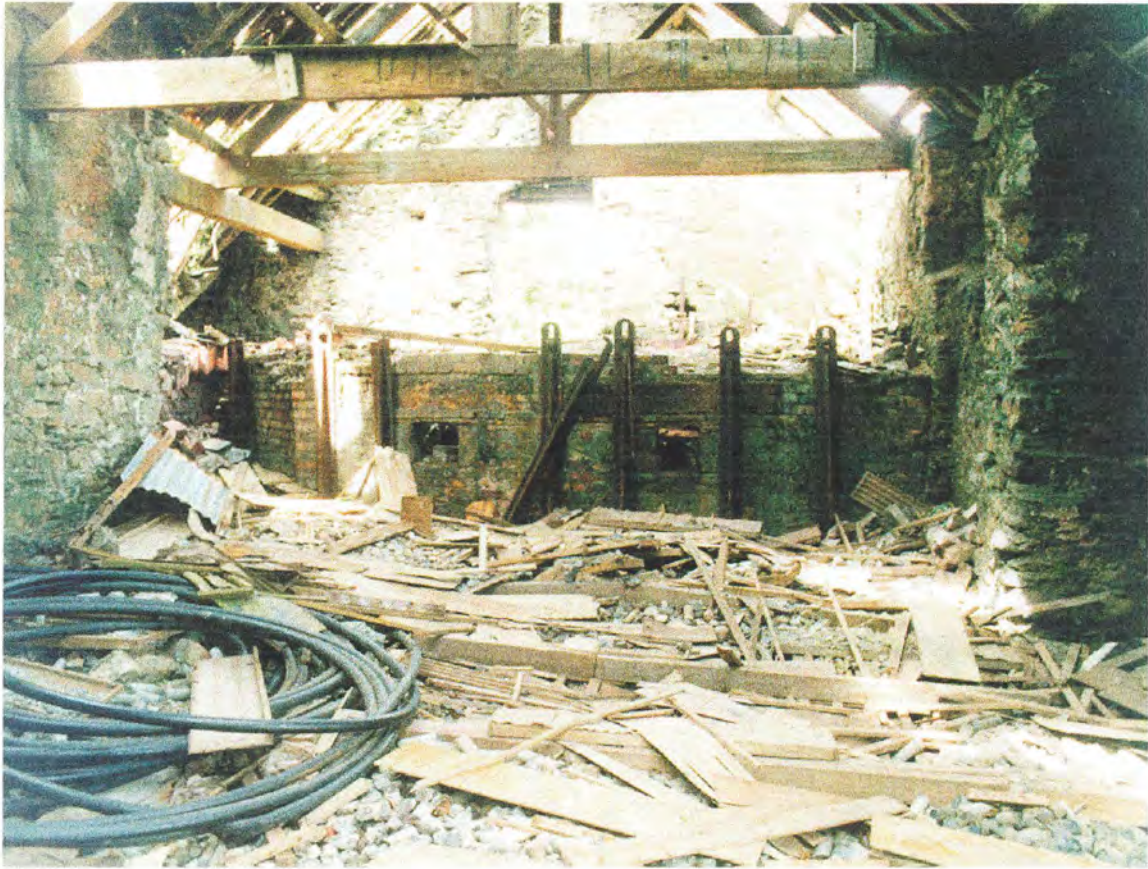
3. The bibliography which forms part of the present document (see 9. below) attempts to set down all known sources for the study of the mines and their locations, rather than to record sources consulted in the course of the present study. The Amlwch Industrial Heritage Trust is in process of starting an archival collection of its own, and the acquisition or purchase of photocopies or originals of these sources would add immeasurably to an understanding of the mines, as well as of the port and town on Amlwch. Editions of some documents might be published either as an occasional series or in one or other of the relevant academic journals.

4. The Modern archaeology of Mynydd Parys has an important regional dimension, yet it must also be placed within a broader context. Firstly, it has to be placed within the history of copper-mining and -processing throughout Wales, especially in its relation to the Swansea smelters. In addition, it needs to be considered in the context of sites in England and Ireland. As well as the important Cornish industry, the mines of County Wicklow form an instructive contrast, not only because of the historical links between them (as well as between the port of Arklow and the port of Amlwch) but also in view of recent proposals to conserve some of the Wicklow mine sites. Thirdly, it needs to be considered in relation to the other substantial copper-mine sites world-wide, particularly those which came into being, or which were expanded, in the Early Modern period. Any opportunity, therefore, for creating institutional contacts with academic, statutory or voluntary organisations should be welcomed.



1 The Dyffryn Adda furnace (feature no. 387) was constructed in the early years of the nineteenth century for drying the copper precipitate from the Joint Level which drained both the Parys and the Mona mines. It remained in use until 1958, when the precipitation system was finally abandoned. Its situation near the Amlwch to Llanerchymedd road makes it an easy target for vandals.





2 The interior of the Dyffryn Adda furnace (feature no. 387) showing the reverberatory furnace and the upstanding cast iron beams which hold it in place. The degree of recent damage to the furnace is apparent in this photograph.



3 The Mona Mine windmill (feature no. 74) was constructed in 1878, and operated a pump by means of 200 feet of flat-rods. It was supplemented from 1880 by a steam engine. Uniquely for Anglesey, it was a five sail mill, and is believed to be the only surviving mine pump windmill in Britain. It is a Scheduled Ancient Monument.



4 The Monna Mine, looking west. In the foreground stand the remains of the magazine (feature no. 293) and beyond a number of the sulphur calcination kilns and their associated stone-built flues (feature nos. 300-303). The distinctive pinkish spoil is a sign of calcination having been carried out.



5 The Pearl engine house of 1818/19 (feature no. 122) is a Scheduled Ancient Monument -



6 - but the associated capstan pit (feature no. 123) does not fall within the scheduled area.

## 9. ACKNOWLEDGEMENTS

The Trust wishes to acknowledge Cadw: Welsh Historic Monuments and the Amlwch Industrial Heritage Trust for their role in jointly funding this project. Thanks are particularly due to Dr Peter Wakelin of Cadw for his advice, and Dr David Jenkins, David Wagstaffe and Bryan Hope of the Amlwch Industrial Heritage Trust, without whom this report would have been much less full and comprehensive. Anne Hope also made available her own notes and conclusions about a number of features on the mountain, which helped to amplify the present document.

Thanks are due to the librarians and archivists of the various research collections consulted in the course of the project, in particular to Tomos Roberts of UWB who went out of his way to look for documents that could not initially be located. The help of the Llangefni Record Office staff is also gratefully acknowledged, as is the contribution made towards the project by staff at Caernarfon, the Manchester Central Library and the Hawarden Record Office. Michael Lewis, David Bick, John Bennett, Robert Vernon and Chris Williams have all given valuable help and advice,

The assistance of Chris Jones, a student at UWB on placement to the Gwynedd Archaeological Trust for the autumn semester, is gratefully acknowledged. Elements of Mr Jones's own study, of power sources and transmission systems on the mountain, have been incorporated in the present report, in accordance with the workplace module, and very many of the conclusions reached are the result of discussion with him, either on site or in libraries.

Griff Jones passed on to GAT his references to the firing of rock cannon on the mountain in advance of the publication of his forthcoming book on the subject, and Jeremy Wilkinson made available a copy of his bibliography of the mine sites, which forms the basis of the bibliography of the present document.

Thanks are owed to Anglesey Mining plc, and in particular to Ian Cuthbertson for his help in arranging access, in locating documents and for his advice and support throughout.

## 10 GLOSSARY OF TERMS USED AT MYNYDD PARYS

*Argia*: from *argaeau*; the walls between the precipitation pits.

Assay: the product in metal of one ounce of ore, or the process of knowing the product of metal or mineral

Captain: an overseer or mine manager. Captain Treweek had several assistant Captains at Mynydd Parys.

*Coparledi* (pl. *coparledis*): a woman who hand-crushed the ore at Mynydd Parys

*Chwimsi* (pl: *chwimsis*): horse-whim; from the English “whimsey”, q.v.

Engine: defined by *Mineralogia Cornubiensis* as “A machine to unwater mines. Those which are worked by water are termed water engines. Others which perform their office by fire are fire-engines. There are other sorts called horse-engines.” Also the pump itself.

*Fflodiard* (pl. *fflodiardau*): floodgate or sluice in a precipitation pit.

*Gillwng*: to drop (a kibble).

Halvaner: one who works in a halvans, q.v.

Halvans: the poorer ore; by extension an ore-dressing area, where dressers were permitted to retain part of the processed ore.

*Lôn gopar*: “copper road”; the road from Mynydd Parys to Amlwch; also known as *Lôn melyn* (“yellow road”) and *Lôn menyn* (“butter road”)

*Mwn*: ore, mine

*Pwll haearn* (pl. *pyllau heyrn*): precipitation pit, literally ‘iron pit’.

Stem: a miner’s shift, traditionally six hours.

Tutwork: work undertaken for a fixed price; generally development work such as sinking shafts.

*Tyntri* (pl. *tyntris*): hand-windlass; from the English “turntree”.

Whimsey: a horse-engine for uphaulage. Also known as a *gin* or *whim*.

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p. 221, p. 233, p. 235, p. 249, p. 263, p. 276, p. 291, p. 304, p. 308, p. 318, p. 319, p. 346, p. 374, p. 403, p. 429, p. 430, p. 458, pp. 486-7, p. 515, p. 543, p. 557, p. 559, p. 571, p. 574, p. 586, p. 599, p. 605, p. 612, p. 624, p. 627, p. 655, p. 687, p. 717, p. 747, p. 775, p. 801, p. 806, p. 813, pp. 834-5, p. 862, p. 863, p. 890, p. 918, p. 919, p. 932, p. 945, p. 947, p. 974, p. 975, p. 1002, p. 1003, p. 1030, p. 1031, p. 1058, p. 1059, p. 1086, p. 1087, p. 1118, p. 1134, p. 1146, p. 1147, p. 1152, p. 1154, p. 1163, p. 1174, p. 1180, p. 1206, p. 1234, p. 1239, p. 1252, p. 1262, p. 1263, p. 1268, p. 1290, p. 1310, p. 1322, p. 1323, p. 1354, p. 1355, p. 1387, p. 1418, p. 1419, p. 1447, p. 1478.

1881

p. 60, p. 172, p. 227, p. 319, p. 345, p. 349, p. 380, p. 383, p. 410, p. 457, p. 502, p. 504, p. 530, p. 531, p. 565, p. 567, p. 594, p. 629, p. 630, p. 691, p. 727, p. 770, p. 862, p. 912, p. 988, p. 996, p. 1013, p. 1039, p. 1040, p. 1046, p. 1048, p. 1078, p. 1276, p. 1351, p. 1379, p. 1498, p. 1574,

1882

p. 279, p. 300, p. 331, p. 343, p. 349, p. 362, p. 380, p. 410, p. 428, p. 430, p. 460, p. 502, p. 510, p. 531, p. 564, p. 565, p. 574, p. 594, p. 604, p. 614, p. 617, p. 629, p. 681, p. 785, p. 809, pp. 864-5, p. 912, p. 988, p. 996, p. 997, p. 1083, p. 1116, p. 1223, p. 1255, p. 1289, p. 1396, pp. 1574-5

1883

p. 68, p. 69, p. 159, p. 178, p. 229, p. 249, p. 349, p. 656, p. 749, p. 1204, p. 1404, p. 1452, p. 1463

1884

p. 83, p. 186, p. 220, p. 221, p. 266, p. 343, p. 367, p. 416, p. 675, p. 756, p. 923, p. 988, p. 1185

1885

p. 5, p. 36, p. 37, p. 92, p. 387, p. 644, p. 663, p. 1043

1886

p. 210, p. 1420

1887

p. 452

1888

p. 967, p. 1105

1889

p. 195, p. 284, p. 285, p. 967

1891

p. 161, p. 527

1897

p. 215

## 11.6 Official documents

*An Act for Allowing a Drawback of the Duties upon Coals used in Smelting Copper and Lead Ores and in Fire Engines for raising water therefrom ... within the Isle of Anglesey* (26 Geo. III, cap. CIV) (Copy in UWB Welsh Library Rare Books X/KF 379 PAR).

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1876, p. 374

1877 p. 424, p. 431

1878, p. 464, p. 475

1879, p. 382, p. 392

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1882, p. 367

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## 11.8 Photographs

### 11.8.1 Llangefni Record Office

- WSY/30: *coparledi*
- WSB/30: precipitation pits in use
- WSB/31: Mona mine windmill
- WSB/32: yard buildings

WSB/41: recent photograph of opencast  
WSB/42: recent photograph of opencast  
WSB/83: engine house and windmill  
WSB/246: recent photograph  
WDA/241: photograph of a watercolour based on that of John “Warwick” Smith in NLW.

### 11.8.2 Other collections

Photographic collections are believed to be held by Countryside Council for Wales, AMplc, UWB, Ynys Môn County Council, Gwynedd County Council and the Welsh Office (Central Registry of Air Photography, Wales).

## 11.9 Paintings

### 11.9.1 NLW

Julius Caesar Ibbetson: *Paris Mine*: aquatint after watercolour, shows the opencast with windlasses and whimseys, 1795; (PZ 3209 A1/1-A115).

Edward Pugh: *Paris mines in 1800*, aquatint (PA 4393, A1/1-A116).

-- *Paris mines in 1804*, aquatint (PA 4396 A1/1-A114).

John “Warwick” Smith: the opencast and the early windmill, c. 1790, oil.

Warrington Smyth: the great opencast, c. 1850, water-colour.

### 11.9.2 Plas Newydd: collection of the Most Hon. the Marquis of Anglesey

William Havell: the opencast, late eighteenth-early nineteenth century, oil.

## (Footnotes)

<sup>1</sup> Countryside Council for Wales leaflet, *Mynydd Parys SSSI*.

<sup>2</sup> Cadw, Countryside Council for Wales, ICOMOS UK, *Register of Landscapes of Outstanding Historic Interest in Wales* (Cardiff, 1998) p. 70.

<sup>3</sup> T. Pennant, *Tours in Wales* vol. 2 (London: Henry Hughes, 1783) p. 275.

<sup>4</sup> Rev. E. Bingley, *A Tour Round North Wales performed during the summer of 1798* (London, 1801).

<sup>5</sup> D Tomos (ed.), *Michael Faraday in Wales* (Denbigh, n.d.).

<sup>6</sup> NLW: MS2258C, C.S. Briggs, “Note on Prehistoric Mining on Anglesey” *Historical Metallurgy* 10 1 (1976) p. 43.

<sup>7</sup> O. Davies, “Mining Sites in Wales” *British Association Journal Annual Reports 1937*, pp. 229-41.

<sup>8</sup> Simon Timberlake, “Excavations at Parys Mountain and Nantyreira” *Early Mining in the British Isles* (Maentwrog, 1990) pp. 15-21.

<sup>9</sup> W.O. Stanley, “Note on Great Orme and Parys Mountain Copper Mines” *Archaeological Journal* 7 (1850) pp. 68-9, “Notes on Vestiges of Roman Workings for Copper in Anglesey” *Archaeological Journal* 30 (1873) pp. 59-62.

<sup>10</sup> Pers. comm., Dr David Jenkins.

<sup>11</sup> HRO D/KK/534

<sup>12</sup> T. Pennant, *op. cit.*, p. 275.

<sup>13</sup> A.W. Tyler, *Prehistoric & Roman Mining for Metals in England and Wales* (University of Wales, Cardiff PhD thesis, 1982) pp. 352-359.

<sup>14</sup> J. Rowlands, *Copper Mountain* (Llangefni, 1981) pp. 15-16.

<sup>15</sup> Public Record Office SP 46/36 MPF 11, B. Hope, *A Curious Place* (Wrexham, 1994) pp. 16-17.

<sup>16</sup> NLW Wynn Papers, 470.

<sup>17</sup> *Mining Journal* 1880, p. 134.

<sup>18</sup> HRO D/KK/534.

<sup>19</sup> UWB Mona Mine 2242.

<sup>20</sup> A.H. Dodd, “Parys Mountain”, *TAAS* (1926) p. 92.

<sup>21</sup> HRO D/KK/534.

<sup>22</sup> UWB Mona Mine 3025, 3026.

<sup>23</sup> UWB Mona Mine 2242.

<sup>24</sup> J. Rowlands, *op. cit.*, pp. 22-38.

<sup>25</sup> W.H. Pascoe, *The Cornish Copper Company* (Redruth, n.d.) p. 36.

<sup>26</sup> R.R. Toomey, *Vivian and Sons, 1809-1924* (New York and London, 1985) p. 7.

<sup>27</sup> R.R. Toomey, *op. cit.*, pp. 81-89.

<sup>28</sup> See John Rowlands, “Cornishmen at the Amlwch Copper Mines: James Henry Treweek” *TAAS* (1963) pp. 1-15.

<sup>29</sup> *Ibid.*, p. 1. The archaeological implications of Cornish mining skills and technology transfer in a period when the industry was moving on to an international footing were underlined recently by the discovery of Cornish buddles at Ohio Trap Rock Mine on Michigan’s Keweenaw Peninsula; see David B. Landon, “Cornish buddles unearthed at a Michigan copper mine”, *Industrial Archaeology News* 96 (Spring 1996) pp.1-2.



- <sup>30</sup> R.R. Toomey, *op. cit.*, pp. 52-81.
- <sup>31</sup> UWB Mona Mine 3613.
- <sup>32</sup> B. Hope, *op. cit.*, pp. 90-91.
- <sup>33</sup> LIRO WSB/30.
- <sup>34</sup> Personal communication from Tomos Roberts, UWB archivist, from information contained in the uncatalogued Fanning Evans papers.
- <sup>35</sup> W.O. Stanley, "Note on Great Orme and Parys Mountain Copper Mines" *Archaeological Journal* 7 (1850) pp. 68-9, "Notes on Vestiges of Roman Workings for Copper in Anglesey" *Archaeological Journal* 1873 vol. 30, pp. 59-62.
- <sup>36</sup> David Jenkins, "Mynydd Parys Copper Mines, Anglesey" *CBA Archaeology in Wales* 35 (1995), pp. 35-7.
- <sup>37</sup> *Mining Journal* 1878, p. 943, B. Hope, *op. cit.*, p. 86.
- <sup>38</sup> Victor-Frere-Jean, "Esquisse Géologique de l'Isle d'Anglesey", *Annales des Mines* 13 (1826), pp. 229-238.
- <sup>39</sup> NLW Calendar of Wynn Papers 455, 456, 460, 462.
- <sup>40</sup> UWB Mona Mine 3544 p. 9.
- <sup>41</sup> B. Hope, *op. cit.*, p. 33.
- <sup>42</sup> *Mining Journal* 12 June 1880p. 670.
- <sup>43</sup> UWB Bangor 31603.
- <sup>44</sup> UWB Mona Mine 31603.
- <sup>45</sup> The word "gin" is used in the present document to mean any horse-powered machine at a shaft-head, since the word "whim" has a narrower context of winding ore. The purpose of most of the gin-sites at Mynydd Parys is unclear. The word "whim" is used when quoting from original documents; in Welsh these features were referred to as a *chwimsi* or *chwimsi ceffyl*.
- <sup>46</sup> UWB Bangor 31603
- <sup>47</sup> *Mining Journal* 1878 p. 943.
- <sup>48</sup> D. Cowman, "The Mining Community at Avoca 1780-1880" in K. Hannigan and W. Nolan *Wicklow: History and Society* (Dublin: Geography Publications, 1994) pp. 761-788.
- <sup>49</sup> P. Crew, "The Copper Mines of Llanberis and Clogwyn Goch", *TCHS* 37 (1976) p. 68.
- <sup>50</sup> UWB Plas Newydd 2242 notes the delivery of "old iron" from 29 August 1772 - p. 46.
- <sup>51</sup> UWB Bangor MS 31603.
- <sup>52</sup> UWB Bangor MS 31602.
- <sup>53</sup> Map in possession of Bryan Hope, copy of original in the British Library.
- <sup>54</sup> Simon Timberlake, "Excavations at Parys Mountain and Nantyreira" in *Early Mining in the British Isles* (Penrhyndeudraeth, 1989) p. 15, pp. 20-21.
- <sup>55</sup> Royal Commission on Ancient and Historic Monuments in Wales and Monmouthshire, *An Inventory of the Ancient Monuments in Anglesey* (London, 1937) p. lxxxvii.
- <sup>56</sup> D Tomos (ed.), *Michael Faraday in Wales* (Denbigh, n.d.) pp.79-80.
- <sup>57</sup> *Mining Journal* 24 June 1871, p. 552.
- <sup>58</sup> O. Griffith, *Mynydd Parys* (Caernarfon, 1897) p. 41.
- <sup>59</sup> *Mining Journal* 17 February 1872, pp. 142-3.
- <sup>60</sup> UWB Mona Mine 3750
- <sup>61</sup> *Mining Journal* 17 February 1872, pp. 142-3.
- <sup>62</sup> J. Rowlands, *Copper Mountain* (Llangefni 1981) p. 42.
- <sup>63</sup> Georgius Agricola, *De Re Metallica* (Basileae: Cum Privilegio Imperatoris, 1556), Vannoccio Biringuccio, *De La Pirotechnia* (Venice, 1540). See Richard Smith, "An Overview of the Principles of Copper Metallurgy and the Practice at Keswick 1567-1602" in *Mining before Powder* (Matlock Bath, 1994) pp. 116-123 for an account of how German copper-processing was applied in a British context in the sixteenth century.
- <sup>64</sup> UWB Plas Newydd 2242, p. 15, p. 16.
- <sup>65</sup> *An Act for allowing a Drawback of the Duties upon Coals used in smelting Copper and Lead Ores, and in Fire Engines for draining water out of the Copper and Lead Mines, within the Isle of Anglesey*, (26 George III cap. CIV)
- <sup>66</sup> UWB Mona Mine 3750.
- <sup>67</sup> B. Hope, *op. cit.*, p. 38.
- <sup>68</sup> UWB Mona Mine 3544, ff. 12r-14r.
- <sup>69</sup> B. Hope, *loc. cit.*.
- <sup>70</sup> UWB Mona Mine 3040.
- <sup>71</sup> U.W.B General Collection 31603.
- <sup>72</sup> B. Hope, *op. cit.*, p. 39.
- <sup>73</sup> T. Pennant, *op. cit.*, p. 278.
- <sup>74</sup> Birmingham Reference Library Boulton and Watt coll., 6/6/85.
- <sup>75</sup> UWB Mona Mines 3040.
- <sup>76</sup> UWB General MS 31602.
- <sup>77</sup> Map in collection Bryan Hope, from original in British Library.
- <sup>78</sup> UWB Plas Newydd 167.
- <sup>79</sup> UWB Mona Mine 105.
- <sup>80</sup> *Mining Journal* 1878 p. 943.
- <sup>81</sup> B. Hope: *op. cit.*, pp. 44-8.
- <sup>82</sup> UWB Mona Mine 2636.

- <sup>83</sup> UWB Mona Mine 2025-2029.
- <sup>84</sup> Map in possession of B. Hope, copy of original in British Library.
- <sup>85</sup> LIRO W/DC/27, entry for 22 April.
- <sup>86</sup> Map in possession of B. Hope, copy of original in British Library.
- <sup>87</sup> UWB Mona Mine 3040.
- <sup>88</sup> UWB Bangor MS 31602.
- <sup>89</sup> *Mining Journal* 1880, p. 374.
- <sup>90</sup> UWB Mona Mine 3544 fol. 14r.
- <sup>91</sup> UWB General Collection 31602.
- <sup>92</sup> UWB Mona Mine 109.
- <sup>93</sup> UWB Mona Mine 109, entry for 4 July 1846.
- <sup>94</sup> UWB Mona Mine 3040.
- <sup>95</sup> T. Pennant, *op. cit.*, p. 279.
- <sup>96</sup> B. Guise, G. Lees, *Windmills of Anglesey* (Painscastle, 1992) pp. 138-9.
- <sup>97</sup> LIRO W/DC/26, entry for 15 August 1836.
- <sup>98</sup> E. Cockshutt, "The Parys and Mona Copper Mines", *TAAS* (1960) p. 18
- <sup>99</sup> B. Guise, G. Lees, *op. cit.*, p. 137.
- <sup>100</sup> Pers. comm., Messrs John Bennett and Chris Williams, Birmingham Public Library, Boulton and Watt collection 6/6/85.
- <sup>101</sup> H.W. Dickenson, Rh. Jenkins, *James Watt and the Steam Engine* (Southampton 1989), pp. 162-3.
- <sup>102</sup> J. Rowlands, *op. cit.*, pp. 35-6, UWB Welsh Library Rare Books X/KF 379 PAR, *An Act for Allowing a Drawback upon Coals used in smelting Copper and Lead Ores, and in Fire Engines for draining Water out of the Copper and Lead Mines, within the Isle of Anglesey* (26 George III cap. CIV).
- <sup>103</sup> D. Bick, "The Beam-Engine House in Wales" *IAR* 12 1(Autumn 1989) p. 88.
- <sup>104</sup> UWB Mona Mine 280. The Neath Abbey Ironworks papers in the West Glamorgan Record Office contain plans for an 18" engine for an unspecified Anglesey firm, dated 1818 to 1820 (D/D NAI/M 10/1-6, 246/1-3). Advice concerning an engine dated 17 July 1818 from Joseph Tregelles Price (of Neath Abbey works) is recorded in UWB Mona Mine 232, and payment of the balance owing for an engine (£387 12/2d) to the same individual is recorded in UWB Mona Mine 304, dated 5 May 1819.
- <sup>105</sup> UWB Mona Mines 288-230.
- <sup>106</sup> D. Tomos (ed.), *Michael Faraday in Wales* (Denbigh, n.d.) p. 79.
- <sup>107</sup> UWB Mona Mines 292, 295.
- <sup>108</sup> D. Tomos (ed.), *op. cit.*, pp. 85-6.
- <sup>109</sup> UWB Mona Mines 292, 294.
- <sup>110</sup> Victor-Frère-Jean, *op. cit.*, pp. 229-238.
- <sup>111</sup> UWB Mona Mine 105-106, 1096.
- <sup>112</sup> UWB Mona Mines 232.
- <sup>113</sup> UWB Mona Mine 167.
- <sup>114</sup> UWB Mona Mine 2786.
- <sup>115</sup> UWB Mona Mine 2787.
- <sup>116</sup> *Mining Journal* 1880, p. 134.
- <sup>117</sup> O. Griffith, *Mynydd Parys* (Caernarfon, 1897) plate 4.
- <sup>118</sup> UWB Mona Mine 2025-2039
- <sup>119</sup> Other engines worked at Porth Amlwch, and it is sometimes difficult to disentangle them from those which worked in the mine in the documentary record. A four-h.p. engine to draw coal up the incline from Porth Amlwch to the smelting house yard first appears in the accounts for 1828-9, (UWB Mona Mine 1097) and was valued at £800 in 1834 (Mona Mine 167). Despite having arrived at least five years previously, it does not seem to have been put to work until June 1834, when Treweek wrote that it was working well and that when the turnout roads (presumably pointwork) were laid, the port would be able to handle three vessels or 200 tons a day (Mona Mine 3285). A second-hand Cornish boiler was installed for this engine in about 1862, which exploded after eight years' work, killing a workman (*Mining Journal* 12 November 1870, p. 954) - the inquest was resumed on 29 October 1870. A steam crane was at work here by 1880 (*Mining Journal* 1880, p. 134).
- <sup>120</sup> UWB Mona Mine 167.
- <sup>121</sup> LIRO W/DC/26, entry for 12 September 1836.
- <sup>122</sup> LIRO W/DC/27, entries for 11 and 12 January, 6 February, 30 July, 3-5 August, 27 September, 1 October 1841.
- <sup>123</sup> UWB Mona Mine 109, entry for 4 July 1846.
- <sup>124</sup> O. Griffith, *Mynydd Parys* (Caernarfon 1897) p. 60.
- <sup>125</sup> E. Cockshutt, *op. cit.*, p. 17.
- <sup>126</sup> E.W. Hughes, *Trem yn Ol*; it is likely that Tiddy's discomfiture took place at the Mona mine site, not, as Mr Hughes suggests, at the Parys Carreg y Doll shaft, since it is clear from Owen Griffith that the engine in question was being used for pumping, and the Parys Carreg y Doll shaft, on the evidence of *Trem yn Ol*, is clearly an uphaulage shaft.
- <sup>127</sup> UWB Mona Mine 2025-2029.
- <sup>128</sup> *Mining Journal* 6 November 1880, p. 262, 11 December 1880, p. 1418.
- <sup>129</sup> R. Vernon, "Parys Mountain Copper Mine: past, present and future" *GD/IG* 1 (1996), p. 44, UWB Mona Mine 3358.
- <sup>130</sup> UWB General Collection fs 31590.
- <sup>131</sup> *Mining Journal* 1880, p. 134.
- <sup>132</sup> E. Cockshutt, *op. cit.*, p. 23, E. Greenly, *The Geology of Anglesey* (HMSO, 1919) p. 842.

- <sup>133</sup> *Mining Journal* 1880, p. 134, Cockshutt, *loc. cit.*
- <sup>134</sup> R. Vernon, *op. cit.*, p. 43.
- <sup>135</sup> *Mining Journal* 23 November 1872, p. 628, 17 February 1872, pp. 142-3, 6 January 1872, p. 6.
- <sup>136</sup> E. Cockshutt, *loc. cit.*
- <sup>137</sup> HRO D/DM/279/1.
- <sup>138</sup> *Mining Journal* 23 April 1881, p. 504.
- <sup>139</sup> Copy in possession of Bryan Hope.
- <sup>140</sup> *Mining Journal* 1880, p. 134.
- <sup>141</sup> UWB Mona Mine 2025-2029.
- <sup>142</sup> W. Havell, The Great Opencast (in possession of the Most Hon. the Marquess of Anglesey), O. Griffith, *op. cit.*, p. 39.
- <sup>143</sup> See, for instance, LIRO: WDAP3.
- <sup>144</sup> UWB Mona Mine 3536.
- <sup>145</sup> UWB Mona Mine 3040.
- <sup>146</sup> D. Tomos (ed.), *op. cit.*, p. 78.
- <sup>147</sup> J. Rowlands, *Copper Mountain* (Llangefni 1981) pp. 73-5.
- <sup>148</sup> UWB Mona Mine 3285.
- <sup>149</sup> Pers. comm., Bryan Hope.
- <sup>150</sup> UWB Mona Mine 1051, 1550, 2792.
- <sup>151</sup> D Tomos (ed.), *loc. cit.*
- <sup>152</sup> LIRO: WDAP3, cost-analysis of Parys mine, 3 September 1827.
- <sup>153</sup> UWB Mona Mine 2636, Boyd 1986.
- <sup>154</sup> E.W. Hughes, *Trem yn Ol* (Llangefni, 1987) p. 55.
- <sup>155</sup> The chair was discovered by Mr Peter Swift, who cannot recall the exact location at which it was discovered. The jaws are 1” deep and can accommodate a bar 1” wide. Such permanent way was being introduced into local slate quarries and into Cornish mines in the 1820s - pers. comm., Dr M.J.T. Lewis.
- <sup>156</sup> R. Vernon, *op. cit.*, p. 44, plate 1., UWB Mona Mine 3358.
- <sup>157</sup> UWB Bangor MS 31602.
- <sup>158</sup> UWB Bangor MS 31603.
- <sup>159</sup> O. Griffith, *op. cit.*, pp. 15-16.
- <sup>160</sup> O. Griffith, *op. cit.*, pp. 53-57.
- <sup>161</sup> UWB Bangor MS 31603.
- <sup>162</sup> UWB Bangor MS 31602.
- <sup>163</sup> Lines on Roose’s tombstone, Amlwch church yard.
- <sup>164</sup> UWB General Collection 31603, Mona Mine 3040.
- <sup>165</sup> O. Griffith, *op. cit.*, pp. 71-7.
- <sup>166</sup> E. Cockshutt, *op. cit.*, p. 23.
- <sup>167</sup> *North Wales Gazette* 26 July 1821; I am grateful to Griff Jones of Blaenau Ffestiniog for this and the following reference.
- <sup>168</sup> *Ibid.*, 6 December 1821.
- <sup>169</sup> Bryan Hope, *op. cit.*, p. 64.



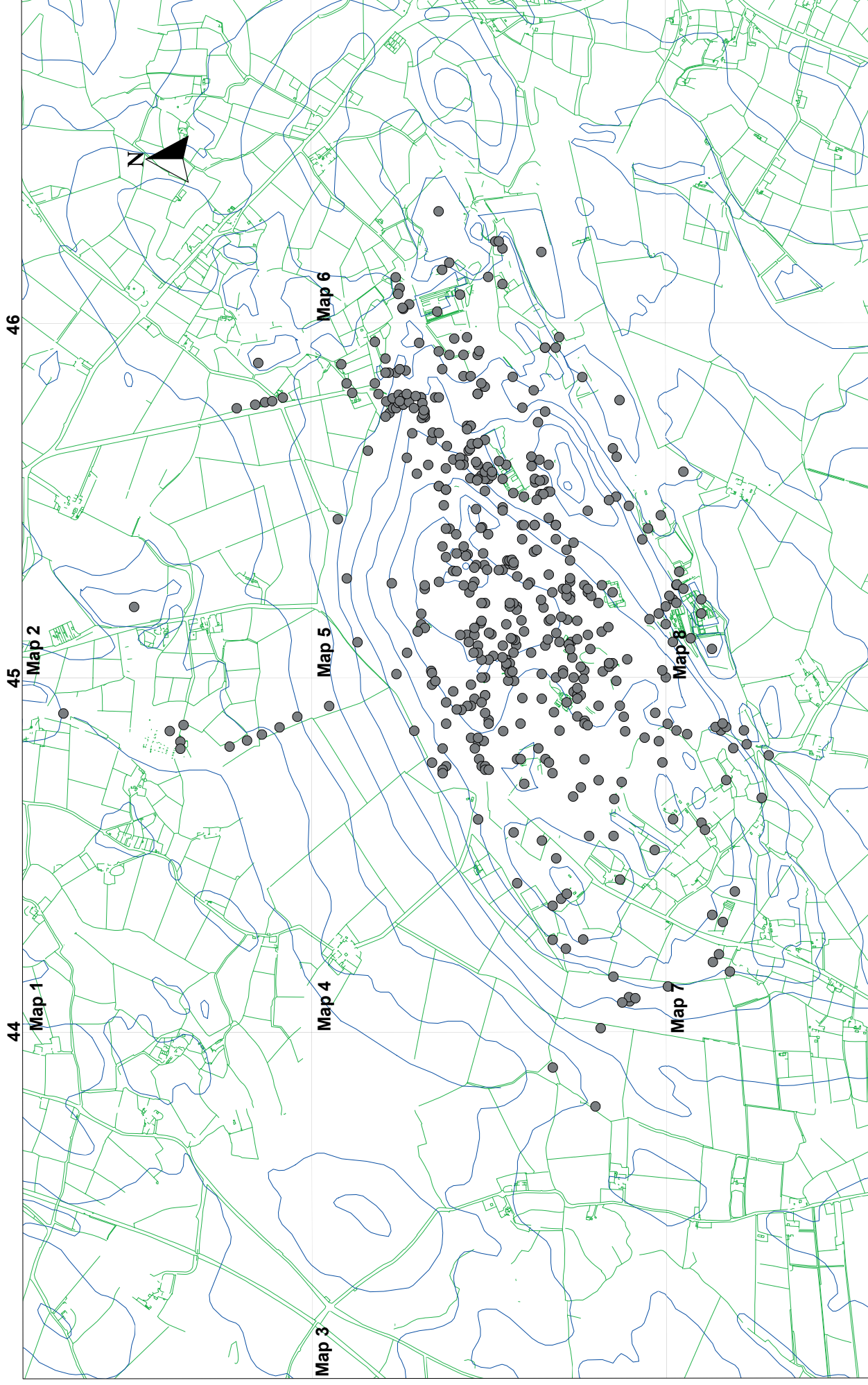
**Mynydd Parys Copper Mine**  
**Archaeological Assessment (G1469)**

Appendix 1  
SITE GAZETTEER

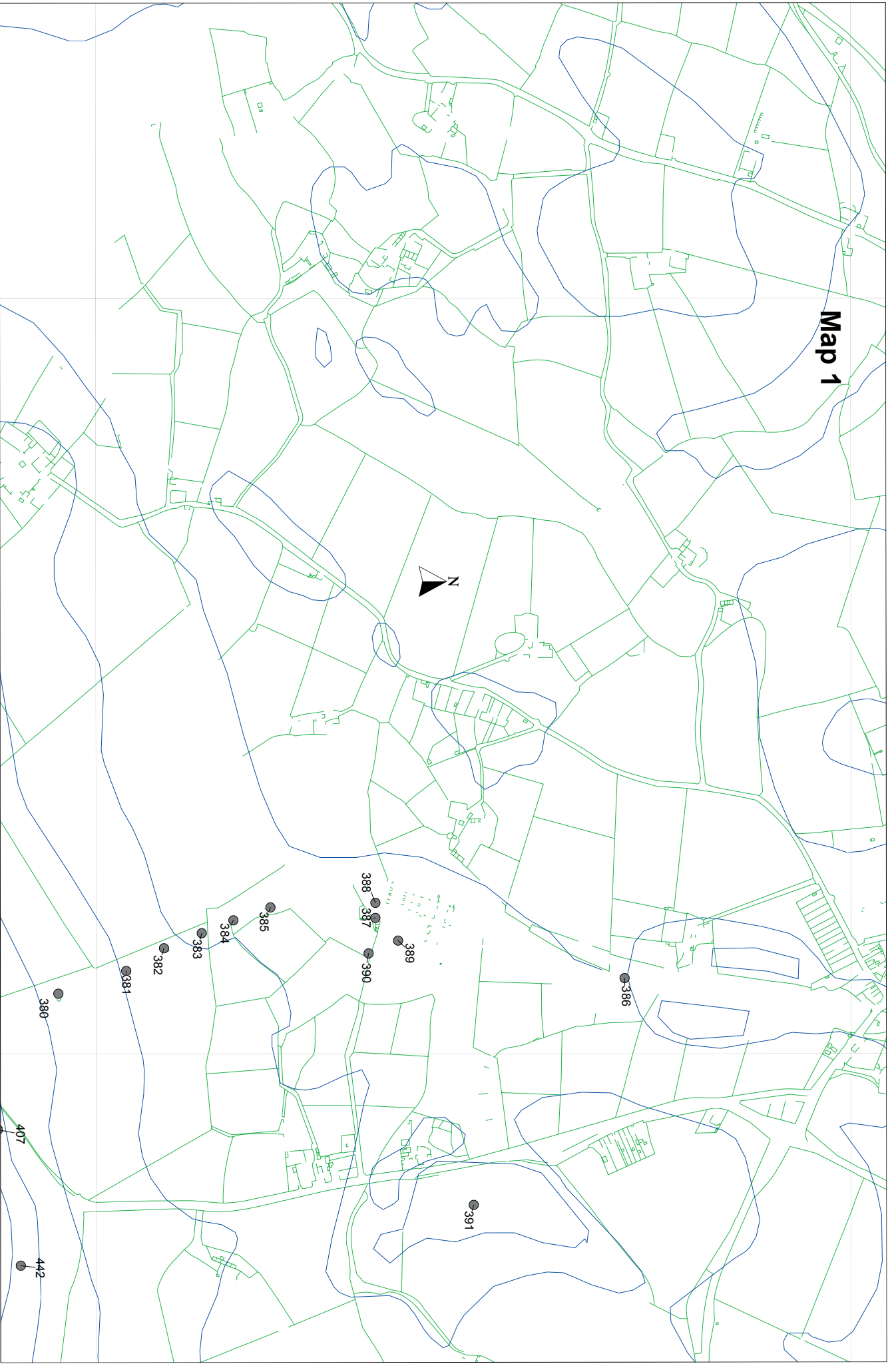
**Ymddiriedolaeth Archaeolegol Gwynedd**  
**Gwynedd Archaeological Trust**



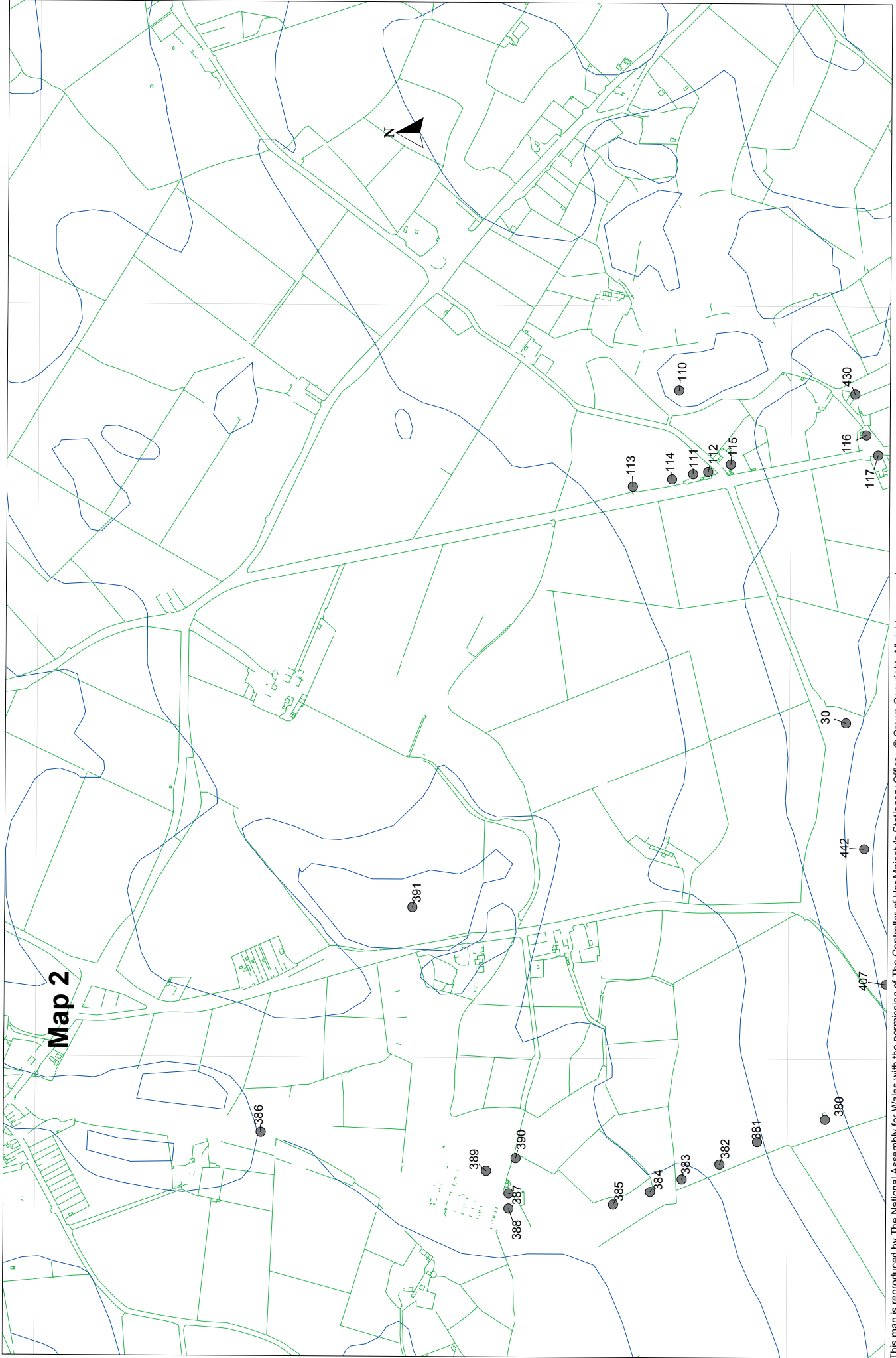
# Order of maps and distribution of features



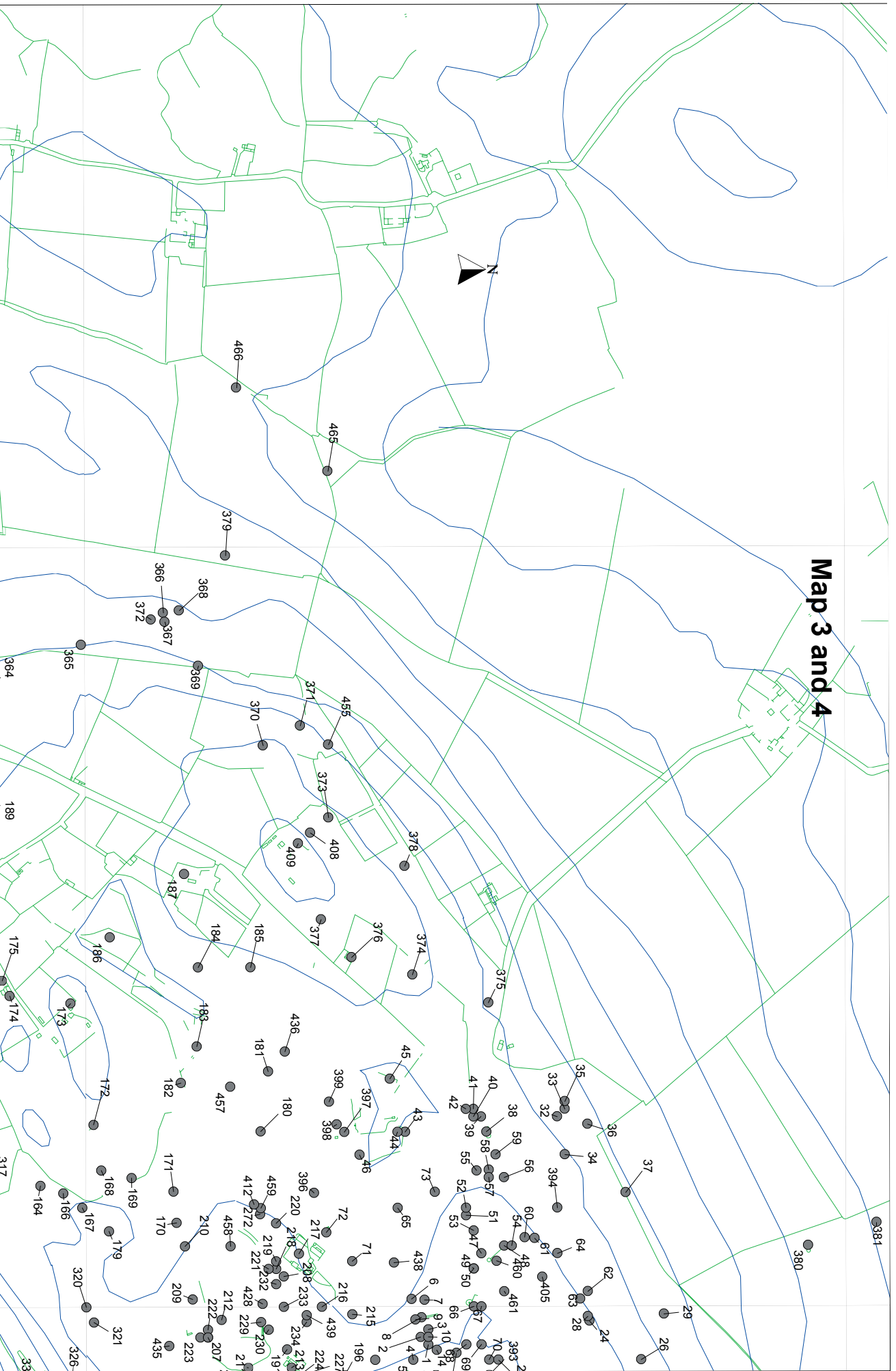
# Map 1

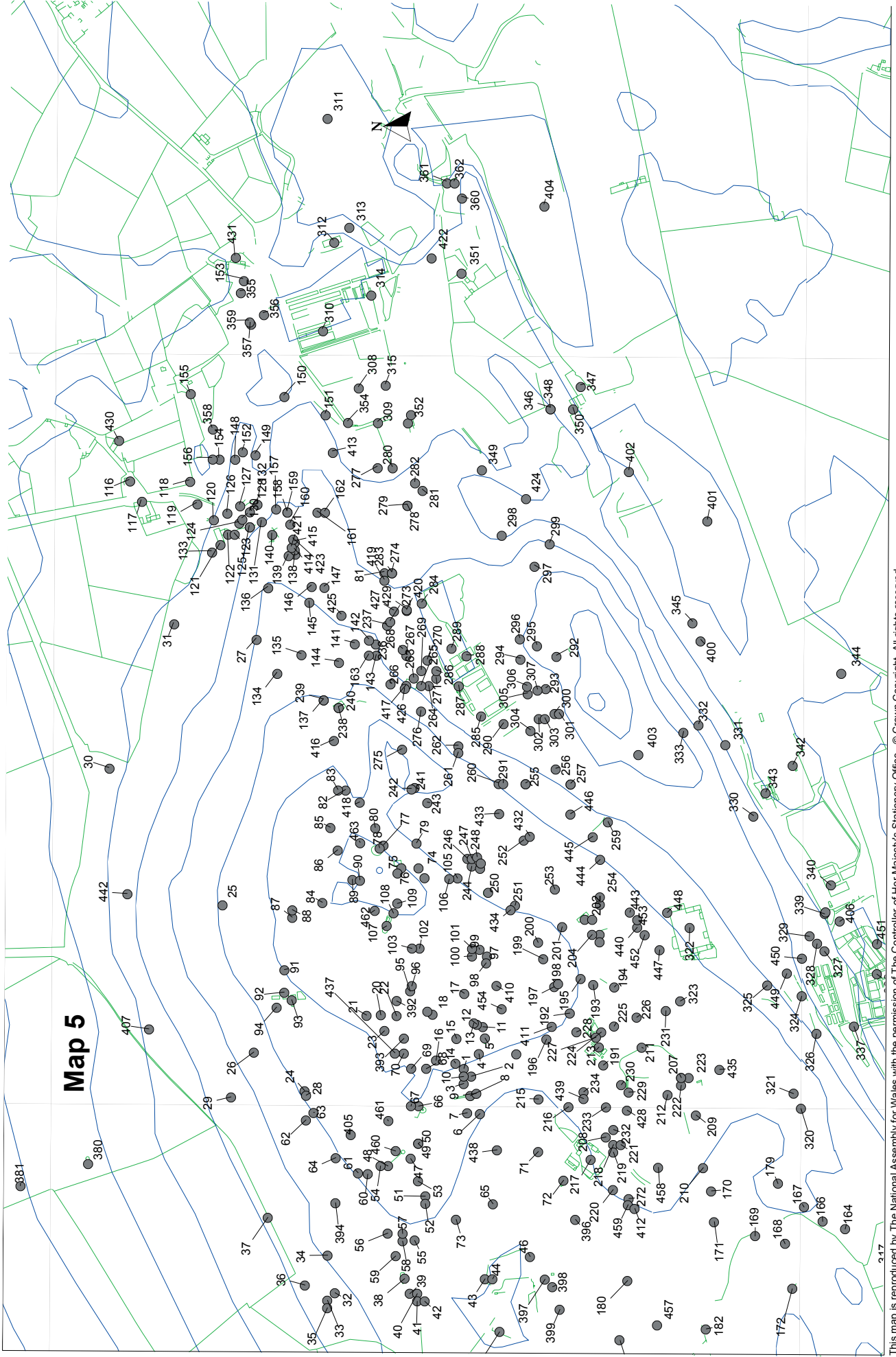






# Map 3 and 4

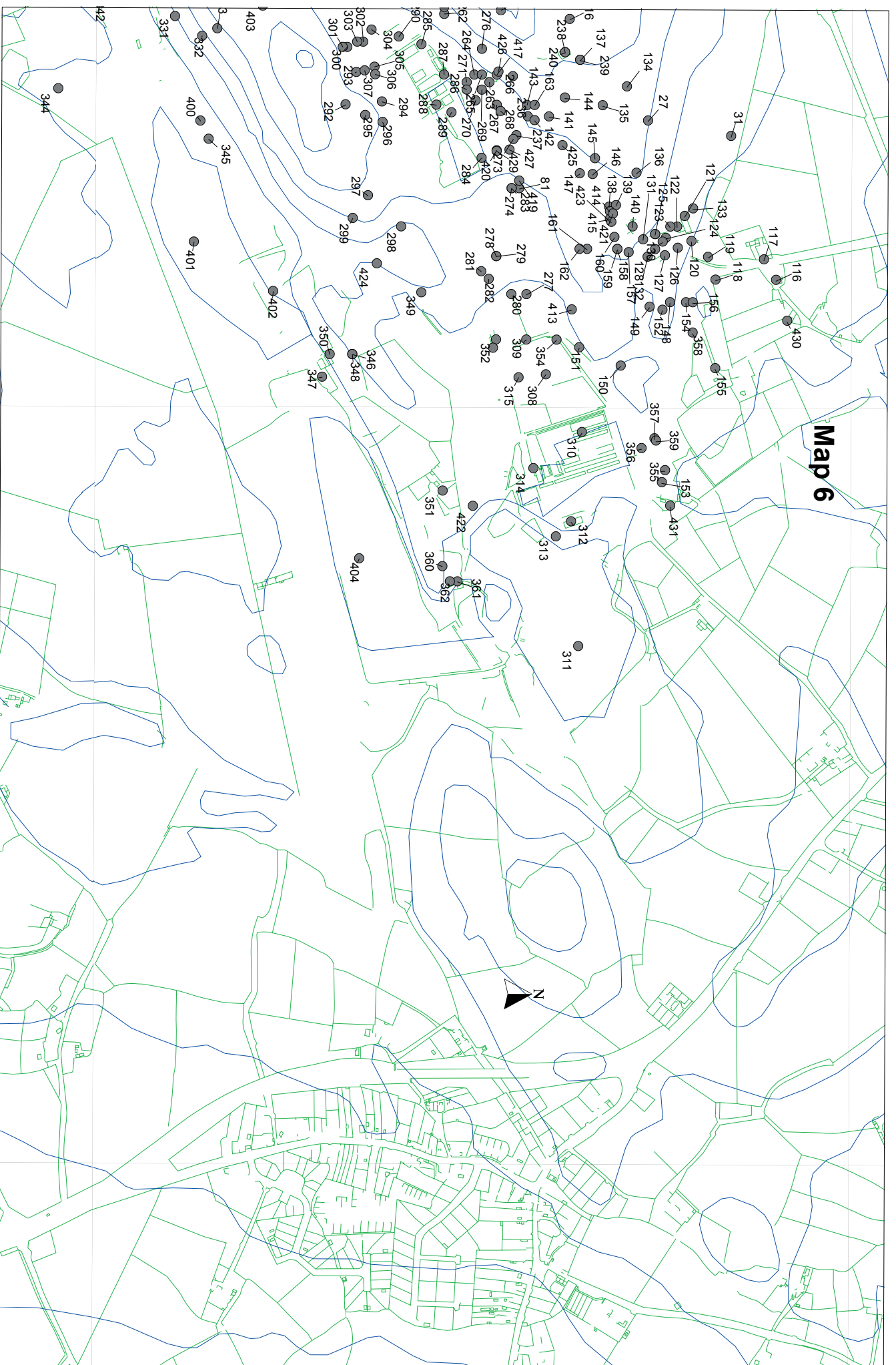


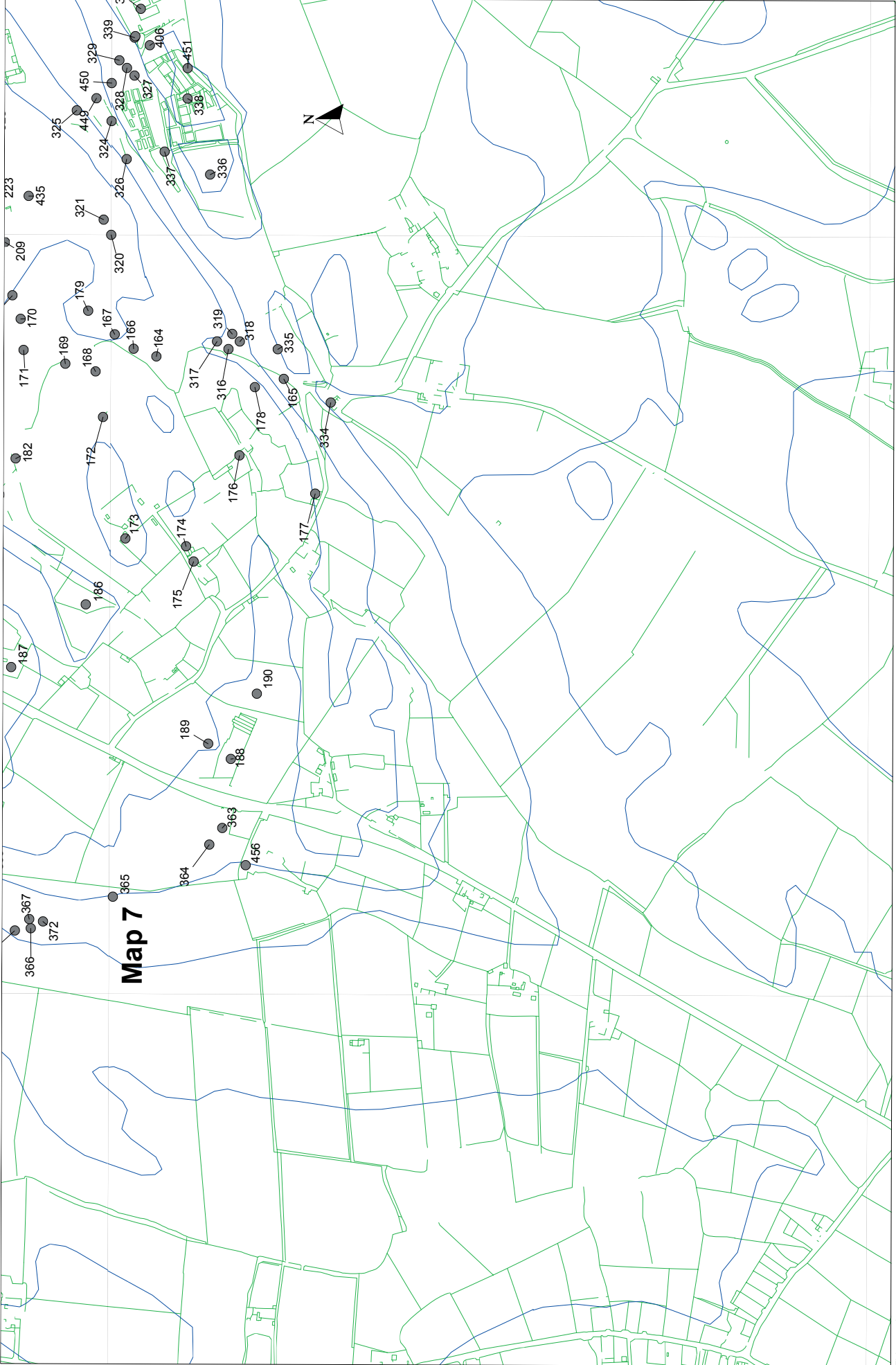


**Map 5**

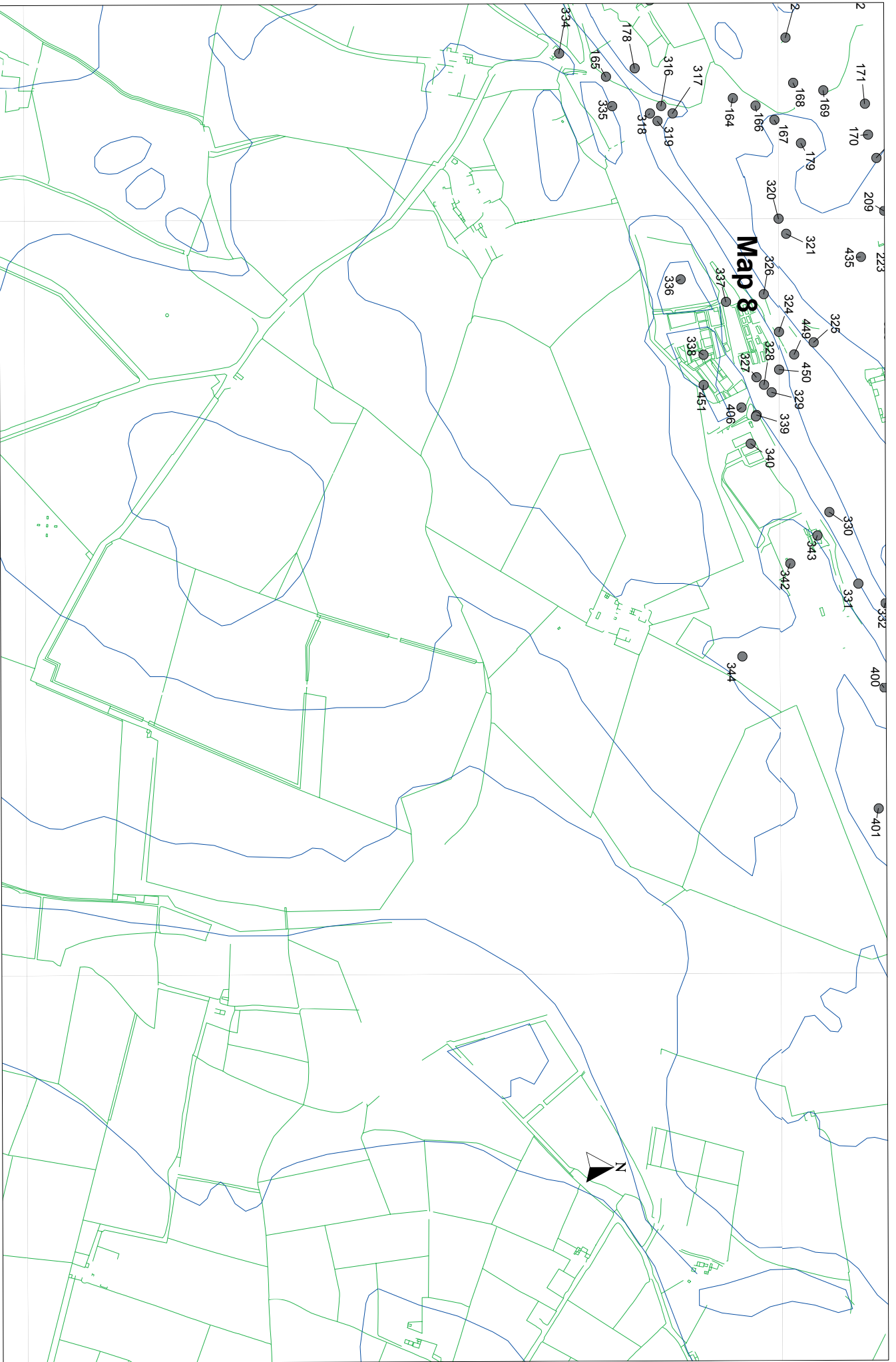
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# Map 6





**Map 7**



1	Extraction area					SH44059045
	<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>	Lichenological SSSI
	<b>Description</b>					
	A working face, approximately 2m high, with a small fan of waste to the south.					
	<b>Threat</b>					
	Resumption of mining (planning consent May 1986)					
	<b>Management</b>					
	Level 2 recording.					
2	Structure					SH44049044
	<i>Site grade</i>	E	<i>Category</i>	Unassigned	<i>Site status</i>	Lichenological SSSI
	<b>Description</b>					
	Constructed out of oxidised stone; only the longitudinal walls survive, up to a maximum of 2m high, apart from a fragment of the south gable. The structure measures 2m across inside the walls and 7m Long inside the walls. It may have been connected with (10), and the fact that the underground workings to which (10) gives access contain piping for compressed-air suggests that a compressor and a prime mover were installed here. It may also have housed a winch for hauling the ore up the inclined section of the tunnel accessed by (10).					
	<b>Threat</b>					
	Resumption of mining (planning consent May 1986); bulldozing..					
	<b>Management</b>					
	Level 2 recording.					
3	Shaft					SH44039045
	<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	Lichenological SSSI
	<b>Description</b>					
	Site only; capped but the number on the concrete post erected to mark its position is illegible. There is evidence of bulldozing disturbance nearby.					
	<b>Threat</b>					
	Resumption of mining (planning consent May 1986); bulldozing					
	<b>Management</b>					
	Level 1 recording..					
4	Flue					SH44079043
	<i>Site grade</i>	A	<i>Category</i>	Processing	<i>Site status</i>	Lichenological SSSI
	<b>Description</b>					
	A stone-built sulphur flue. consisting of two parallel stone walls 20m long, each 0.7m wide and high, separated by 0.8m. This feature is much overgrown with heather.					
	<b>Threat</b>					
	Proximity to roadway; vegetation; collapse; resumption of mining (planning consent May 1986)					
	<b>Management</b>					
	This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.					
5	Shaft					SH44099042
	<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	Lichenological SSSI
	<b>Description</b>					
	Site only; capped, no. 42.					
	<b>Threat</b>					
	Resumption of mining (planning consent May 1986)					
	<b>Management</b>					
	Level 1 recording,					
6	Kiln					SH43999042
	<i>Site grade</i>	A	<i>Category</i> .	Processing	<i>Site status</i>	Lichenological SSSI
	<b>Description</b>					
	Site only; visible as a sub-oval depression in an area of built-up waste, approximately 2m deep, 6m wide at its widest point and 17m long. There is much pinkish discolouration in the stone. This feature appears to be related to (7).					
	<b>Threat</b>					
	Proximity to roadway; collapse; resumption of mining, (planning consent May 1986)					

## Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

7 Flue SH43999044

*Site grade* A *Category* Processing *Site status* Lichenological SSSI

### Description

A stone-built sulphur flue, orientated north-east to south-west, related to (6) and parallel to its longer axis. The two parallel walls are 16m long, >1 m high, 0.8m wide and 0.6m apart. A slot for a duct is visible in the south-west facing wall. To the north-east of the flue near its northern end is an enclosed area, visible only as the lowest courses of a stone wall, measuring 12 by 3m within the walls.

### Threat

Proximity to roadway; vegetation; collapse. resumption of mining (planning consent May 1986)

### Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

8 Flue SH44019044

*Site grade* A *Category* Processing *Site status* Lichenological SSSI

### Description

A substantial stone-built sulphur flue, consisting of parallel walls T-shaped in plan, 28m long on their longer axis, 20 on the shorter (cross-stroke) axis. The walls are 1m high, 0.8m wide and 1.5m apart; there are traces of side ducts. This feature appears to be related to (9).

### Threat

Proximity to roadway; vegetation; collapse; resumption of mining (planning consent May 1986)

### Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

9 Kiln SH44019043

*Site grade* A *Category* Processing *Site status* Lichenological SSSI

### Description

An ore kiln, visible as a sub-oval depression, 4m deep on its up slope side, 15m wide north-east to south-west, 15m wide north-west to south-east.

### Threat

Proximity to roadway; collapse; resumption of mining (planning consent May 1986)

### Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

10 Adit SH44049045

*Site grade* A *Category* Extraction *Site status* Lichenological SSSI

### Description

An inclined shaft, offering access to the underground workings, deliberately obscured and covered with an lockable metal grating in order to discourage unauthorised access. This leads to a three largely horizontal levels, respectively 10m, 20m and 30m below the surface, evidently for the most part of late nineteenth century date, as compressed-air piping, possibly generated in (2), survives in situ. However, at its furthest reach, it extends to an area of pre-Modern mining, in which a working area has been backfilled by a slightly later tip, in which horizons of clay were also observed, as well as a considerable number of hammer-stones. The foot of a shaft (405) is visible here.

### Threat

Resumption of mining (planning consent May 1986)

### Management

The entry is kept locked, and access to the underground workings is only possible to properly authorised persons. As the only access to underground workings, this feature is of great importance.

11 Kiln SH44119042

*Site grade* A *Category* Processing *Site status* Lichenological SSSI

### Description

Visible as a depression built into a gently-sloping hillside, 3m deep on the up slope side, measuring 24m by 8m in plan.

### Threat

Proximity to roadway; collapse; resumption of mining (planning consent May 1986)



## Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

12 Flue SH44129043

*Site grade* A *Category* Processing *Site status* Lichenological SSSI

### Description

A possible sulphur condensing chamber, up slope of and associated with (11), measuring 20m by 5m, extremely dilapidated.

### Threat

Proximity to roadway; vegetation; collapse; resumption of mining (planning consent May 1986)

### Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

13 Kiln SH44119044

*Site grade* A *Category* Processing *Site status* Lichenological SSSI

### Description

A substantial depression, 20m by 5m in plan, apparently a kiln-site.

### Threat

Proximity to roadway; collapse; resumption of mining (planning consent May 1986)

### Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

14 Shaft SH44069046

*Site grade* C *Category* Extraction *Site status* Lichenological SSSI

### Description

Site only; capped, no. 43.

### Threat

Resumption of mining (planning consent May 1986)

### Management

Level 1 recording

15 Kiln SH44099046

*Site grade* A *Category* Processing. *Site status* Lichenological SSSI

### Description

Visible as a depression built into a sloping hillside, sub-oval in plan and measuring 19m south-west to north-east, 10m south-east to north-west. It is approximately 4m deep on the up slope (north-western) side and 1 m deep on the downslope face. It is associated with (16).

### Threat

Proximity to roadway. collapse; resumption of mining (planning consent May 1986)

### Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

16 Flue SH44069049

*Site grade* A *Category* Processing *Site status* Lichenological SSSI

### Description

A sulphur condensing flue, associated with (15), now extremely dilapidated.

### Threat

Proximity to roadway; vegetation; collapse; resumption of mining (planning consent May 1986)

### Management

This feature should be preserved in situ. It should be a priority for a full photographic record and measured survey, to include a contour survey of the area adjacent to it.

17 Shaft SH44159045

<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	Lichenological SSSI
<b>Description</b>					
Collapsed and now only visible as a depression on which there is a profuse growth of heather. Part of the stone shaft-collar wall is visible on the south. There is much light-coloured waste around this feature.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
Level 2 recording.					
<b>18</b>	Shaft				SH44129049
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	Lichenological SSSI
<b>Description</b>					
The Parys mine Carreg y Doll shaft - site only; capped. A photograph in Trern yn Ol shows a timber uphaulage headframe here and a corrugated iron building which presumably housed the steam winding engine.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
Level 2 recording.					
<b>19</b>	Structure				SH44129050
<b>Site grade</b>	E	<b>Category</b>	Unknown	<b>Site status</b>	Lichenological SSSI
<b>Description</b>					
Dilapidated stone walls, possibly forming part of the winding-engine house for Carreg y Doll shaft (18).					
<b>Threat</b>					
Resumption of mining (planning, consent May 1986)					
<b>Management</b>					
Level 2 recording.					
<b>20</b>	Structure				SH44129056
<b>Site grade</b>	D	<b>Category</b>	Unknown	<b>Site status</b>	
<b>Description</b>					
The site of a building and an associated walled enclosure, heavily dilapidated and overgrown with heather.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
Level 2 recording.					
<b>21</b>	Structure				SH44129058
<b>Site grade</b>	D	<b>Category</b>	Unknown	<b>Site status</b>	
<b>Description</b>					
An enclosed area, heavily dilapidated and overgrown with heather.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986); vegetation.					
<b>Management</b>					
Level 2 recording.					
<b>22</b>	Shaft				SH44129054
<b>Site grade</b>	D	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>					
Visible as a depression 8-9m deep, sub-square in plan and measuring approximately 15m across.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
Level 2 recording.					
<b>23</b>	Shaft				SH44109055
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>					

Site only, capped.

**Threat**

NA.

**Management**

Level 1 recording,

24 Water-course SH44019066

*Site grade* C *Category* Extraction *Site status*

**Description**

A contour leat at 288m above ordnance datum, approximately 1 m wide, excavated from the topsoil, and making some use of stones and earth.

**Threat**

Erosion.

**Management**

Level 2 recording.

25 Shaft SH44269077

*Site grade* D *Category* Extraction *Site status*

**Description**

A collapsed shaft, visible only as a pile of spoil.

**Threat**

Collapse.

**Management**

Level 2 recording.

26 Hammerstone find-spot SH44079073

*Site grade* A *Category* Processing *Site status*

**Description**

A concentration of hammer-stones was observed in this area and a stray find of slag.

**Threat**

Proximity to footpath.

**Management**

Analysis of the slag.

27 Extraction area SH44629073

*Site grade* B *Category* Extraction *Site status*

**Description**

A small and shallow open working, L-shaped in plan, showing no evidence of jumper-holes or blasting, and in which the rock may have been cracked by heat.

**Threat**

Collapse.

**Management**

If the area is to be disturbed. any hammer-stones should be recovered.

28 Precipitation system SH44019066

*Site grade* B *Category* Extraction *Site status*

**Description**

A possible precipitation pit, fed by water carried on (24).

**Threat**

Erosion.

**Management**

Level 2 recording.

29 Shaft SH44019076

*Site grade* C *Category* Extraction *Site status*

**Description**

A shaft, blocked by a concrete plug through which a length of cast-iron piping emerges, 1.5m below its lip, surrounded by spoil. Traces of ginging are evident. T

**Threat**

Collapse.

**Management**

Level 2 recording.

30 Adit SH44479092

*Site grade* C *Category* Extraction *Site status*

**Description**

An adit mouth, much overgrown, from which water emerges. It is believed that this extends south for 250m then comes to an abrupt end.

**Threat**

Collapse.

**Management**

Level 2 recording. The course of the adit should also be surveyed.

31 Precipitation system SH44649084

*Site grade* C *Category* Extraction *Site status*

**Description**

A series of three precipitation pits built along the contour, now heavily overgrown.

**Threat**

Vegetation.

**Management**

Level 2 recording,

32 Precipitation system SH43759062C

*Site grade* C *Category* Extraction *Site status*

**Description**

A series of now ill-defined copper and ochre precipitation pits built onto the north-west facing slopes of the mountain below the level of the Llanerchymedd to Amlwch road. The system has been partly buried by the construction of the lay-by and is elsewhere much decayed. The traces of possible wooden ducting from one pit to another survive in the path at one point. Immediately downslope are a number of substantial tips containing much ochreous material.

**Threat**

Proximity to road.

**Management**

Level 3 recording.

33 Structure SH43749063

*Site grade* E *Category* Unknown *Site status*

**Description**

Two substantial circular-plan features are noted here on the 25" ordnance survey, of which no trace was noted.

**Threat**

NA.

**Management**

Level 1 recording.

34 Structure SH43809063

*Site grade* E *Category* Unknown *Site status*

**Description**

A structure is noted here on the 25" ordnance survey, apparently roofless by 1900, of which no trace was observed.

**Threat**

NA.

**Management**

Level 1 recording.

35 Cobbing floor SH43739063

*Site grade* C *Category* Processing, *Site status*

**Description**

Part of a possible cobbing floor is exposed at this point; elsewhere the area is much overgrown by heather,

**Threat**

Vegetation.

**Management**

Level 1 recording.

36 Structure SH43769066  
*Site grade* E *Category* Unknown *Site status*

**Description**

A roofless structure is marked here on the 25" ordnance survey, of 1900. The site is now heavily over-grown.

**Threat**

Vegetation.

**Management**

Level 3 recording.

37 Road SH43859071  
*Site grade* C *Category* Transport *Site status*

**Description**

An engineered cart road to the precipitation system (32) from the Llanerchymedd to Amlwch road.

**Threat**

Vegetation.

**Management**

Level 1 recording.

38 Shaft SH43779053  
*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped, no. 46.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

39 Precipitation system SH43759052  
*Site grade* B *Category* Extraction *Site status*

**Description**

A single pit, partly disturbed by road widening and partly by the construction of a roadside gully. It is defined alone, three sides by feature (40).

**Threat**

Resumption of mining (planning consent May 1986); proximity to road.

**Management**

Level 2 recording.

40 Retaining wall SH43759051  
*Site grade* B *Category* Structural *Site status*

**Description**

A stone retaining wall, 2m high, which has suffered some collapse in places.

**Threat**

Resumption of mining (planning consent May 1986); collapse.

**Management**

Level 2 recording.

41 Water-course SH43749051  
*Site grade* C *Category* Extraction *Site status*

**Description**

Collapse in feature (40) has exposed some timbering, which may have formed part of a ducting system into (39).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.,

42 Structure SH43749050

*Site grade* E *Category* Unknown *Site status*

**Description**

Two exposed timber baulks, one vertical, one horizontal, which may possibly have formed part of a wooden staging either to carry water or a tramway.

**Threat**

Resumption of mining (planning consent May 1986); collapse.

**Management**

Level 1 recording,

43 Pillars SH43779042

*Site grade* C *Category* Power *Site status*

**Description**

A row of four stone-built pillars, 1m high, possibly for carrying a launder or flatrods. They appear to line up with (38) and to be associated with (44), and may have been intended to carry pump-water from (38) to (45).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

44 Structure SH43779041

*Site grade* E *Category* Unknown *Site status*

**Description**

A projecting timber exposed on the northern periphery of (45), and in alignment with (43).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

45 Precipitation system SH43709040

*Site grade* B *Category* Extraction *Site status*

**Description**

An extensive copper and ochre precipitation system, in which brick floors were noted and argia constructed out of stone enclosing heaped precipitate. The southern limit of the system has been disturbed by the construction of a recent road and spoil has been dumped on the north-west side.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording

46 Structure SH43809036

*Site grade* E *Category* Processing *Site status*

**Description**

A structure marked on the 25" ordnance survey of 1900 as roofed, and which now only survives to the first few courses.

**Threat**

Resumption of mining (planning consent May 1986); proximity to road.

**Management**

Level 3 recording

47 Chimney SH43939052

*Site grade* B *Category* Processing *Site status*

**Description**

The base only survives, a stone structure, much collapsed, 1 m high, 1.5 by 2m in plan, associated with (48), q.v.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

48 Flue SH43929055

*Site grade* B *Category* Processing *Site status*

**Description**

A flue, 0.6m wide and 0.5 deep, stone-lined, which ascends the tip to the base of (47), and which is surrounded by a fine yellow material on either side. For the most part it is visible as a shallow depression, but capping stones survive on the lower part. There is no evident trace of a kiln or smelter at its foot apart from the collapsed stone which constitutes (54), q.v.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording.

49 Structure SH43959051

*Site grade* E *Category* Unassigned *Site status*

**Description**

Low (>1m) stone walls may be evident at this point, though it is hard to be certain that these are built features. There is much fine yellow waste at this point, and a flue (50), q.v.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

50 Flue SH43959051

*Site grade* C *Category* Processing *Site status*

**Description**

A possible flue was noted on the level part of the tip, apparently associated with (49) and possibly connecting on to (48). It is apparent only as a shallow depression marked by a growth of heather.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording.

51 Structure SH43889050

*Site grade* E *Category* Unknown *Site status*

**Description**

A mound of stones 1.5m high, which includes a built wall on its east side, situated on the lip of the tip; immediately to its south-east is a depression 1 m deep by 20m, by 5m in plan, and down slope to the north is a further depression 20m by 6m in plan built into slope of the tip.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

52 Structure SH43879050

*Site grade* E *Category* Unknown *Site status*

**Description**

An inclined stone embankment of uncertain purpose.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

53 Structure SH43909051

*Site grade* E *Category* Unknown *Site status*

**Description**

A stone-lined sub-rectangular depression 3m by 4m in plan, 1 m deep.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

54 Structure SH43929056

*Site grade* E *Category* Unknown *Site status*

**Description**

Area of collapsed stone, suggesting a that there was a substantial structure here, possibly a smelter or kiln associated with (47) and (48).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording.

55 Road SH43829051

*Site grade* B *Category* Transport *Site status*

**Description**

An engineered cart-road, running in places on a built-up embankment.

**Threat**

Resumption of mining (planning, consent May 1986)

**Management**

Level 1 recording.

56 Engine house SH43839055

*Site grade* C *Category* Power *Site status*

**Description**

The base for the steam engine which powered Gwen's shaft (38), q.v. The base includes both stonework and brickwork, and four holding-down bolts are evident. with square-section nuts. The assemblage suggests a single-cylinder horizontal engine.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording.

57 Bridge SH43839053

*Site grade* C *Category* Transport *Site status*

**Description**

Exposed timbers here (two near vertical and one horizontal) suggest a bridge carrying either a launder or a tramway across the road into the mine site as well as over (58).

**Threat**

Resumption of mining, (planning consent May 1986), collapse.

**Management**

Level 1 recording,

58 Precipitation system SH43829053

*Site grade* C *Category* Extraction *Site status*

**Description**

A possible precipitation pit was identified at this point.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

59 Structure SH43809054

*Site grade* E *Category* Unknown *Site status*

**Description**

Two upright timbers, lining up with (56).



**Threat**

Resumption of mining, (planning consent May 1986)

**Management**

Level 1 recording.

60 Shaft SH43919058

*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped, no. 45.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

61 Cobbing floor SH43919059

*Site grade* C *Category* Processing *Site status*

**Description**

Part of a cobbing floor is exposed at this point.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

62 Precipitation system SH43989066

*Site grade* C *Category* Extraction *Site status*

**Description**

A shallow rectangular depression at this point may have been a copper precipitation pit.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

63 Precipitation system SH43999065

*Site grade* C *Category* Extraction *Site status*

**Description**

An irregularly-shaped depression in which water has gathered, and which may have been constructed as a copper precipitation pit.

**Threat**

Erosion.

**Management**

Level 1 recording.

64 Precipitation system SH43939062

*Site grade* C *Category* Extraction *Site status*

**Description**

An irregular area bounded by a road and by the foot of the tips in which water has gathered and which may have been purpose-built as a copper precipitation pit.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

65 Structure SH43879041

*Site grade* E *Category* Unknown *Site status*

**Description**

A stone-built feature enclosing a rectangular area on the east of the uppermost pit of (45). possibly a retaining wall.

**Threat**

Collapse.

**Management**

Level 1 recording.

66 Shaft SH44009051  
*Site grade* C *Category* Extraction *Site status*  
**Description**  
Possible site; visible as depression only.  
**Threat**  
NA.  
**Management**  
Level 2 recording.,

67 Flue SH44009052  
*Site grade* C *Category* Processing *Site status*  
**Description**  
A low stone wall partly on the flat, partly built up the slope of a tip; 1.5m wide, 2m high.  
**Threat**  
Collapse.  
**Management**  
Level 2 recording

68 Retaining wall SH44059050  
*Site grade* C *Category* Structural *Site status*  
**Description**  
Trace of retaining wall, built of country rock, 2m high.  
**Threat**  
Collapse.  
**Management**  
Level 1 recording.

69 Structure SH44059052  
*Site grade* E *Category* Unknown *Site status*  
**Description**  
The former Iard Brwmstan (“Brimstone Yard”); the walling marked on the 1900 25” ordnance survey is no longer visible, but some stone flooring is apparent, though much disturbed.  
**Threat**  
Vegetation; collapse.  
**Management**  
Level 2 recording.

70 Structure SH44079053  
*Site grade* E *Category* Unknown *Site status*  
**Description**  
An area shown on the 1900 25” ordnance survey map as an enclosed area with a building on its western perimeter; the whole area is now very heavily overgrown with gorse and heather, though the remains of collapsed structures are visible.  
**Threat**  
Vegetation; collapse.  
**Management**  
Level 2 recording.,

71 Structure SH43949035  
*Site grade* E *Category* Unknown *Site status*  
**Description**  
A small rectangular-plan feature is marked here on the 1900 25” ordnance survey, of which no trace remains.  
**Threat**  
NA.  
**Management**  
Level 1 recording.

72	Shaft					SH43909032
<i>Site grade</i>	E	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>						
A shaft is marked here on the 1900 25" ordnance survey, of which no trace is visible. Six finger-run tips radiating to the south may indicate its position.						
<b>Threat</b>						
Resumption of mining (planning consent May 1986)						
<b>Management</b>						
Level 2 recording.						
73	Shaft					SH43859046
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>						
A shaft, now visible as a circular depression, surrounded by a low (>1m) stone wall, 10m in diameter. There is no trace of the linear feature extending to the south-east marked on the 1900 25" ordnance survey map.						
<b>Threat</b>						
Resumption of mining (planning consent May 1986)						
<b>Management</b>						
Level 2 recording.,						
74	Windmill					SH44329051
<i>Site grade</i>	A	<i>Category</i>	Power	<i>Site status</i>	SAM/Lichenological SSSI	
<b>Description</b>						
A windmill constructed in 1878 as an auxiliary to the existing steam engine (109) which pumped Cairns' shaft (107), and which was connected to the engine by 200' of flatrods moving on dolly posts (108). It was unusual in having five sails. It is believed to be the only surviving windmill on an extractive site in the United Kingdom.						
<b>Threat</b>						
Collapse.						
<b>Management</b>						
Level 5 survey. This feature is a Scheduled Ancient Monument, and is also an element in a lichenological SSSI.						
75	Structure					SF144329053
<i>Site grade</i>	E	<i>Category</i>	Unknown	<i>Site status</i>	Lichenological SSSI	
<b>Description</b>						
A severely dilapidated structure, whose walls stand to a maximum of 1m high. There are shattered Cambrian roofing slates within the building.						
<b>Threat</b>						
Collapse.						
<b>Management</b>						
Level 1 recording,						
76	Bench mark					SH44319054
<i>Site grade</i>	D	<i>Category</i>	Other	<i>Site status</i>	Lichenological SSSI	
<b>Description</b>						
A modern bench mark.						
<b>Threat</b>						
NA.						
<b>Management</b>						
None.						
77	Shaft					SH44379056
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	Lichenological SSSI	
<b>Description</b>						
Site only, capped. no. 30.						
<b>Threat</b>						
NA.						
<b>Management</b>						
Level 1 recording.						

<b>78</b>	Horse-whim circle					SH44349056
<i>Site grade</i>	C	<i>Category</i>	Power	<i>Site status</i>	Lichenological SSSI	
<b>Description</b>	Associated with feature (77); 14m in diameter, overgrown with heather, and surrounded by a low stone wall.					
<b>Threat</b>	Vegetation.					
<b>Management</b>	Level 1 recording,					
<b>79</b>	Road					SH44359052
<i>Site grade</i>	C	<i>Category</i>	Transport	<i>Site status</i>	Lichenological SSSI	
<b>Description</b>	A mine road to the area around the windmill (74).					
<b>Threat</b>	Motorbike scrambling.					
<b>Management</b>	Level 1 recording,					
<b>80</b>	Cobbing floor					SH44379057C
<i>Site grade</i>	B	<i>Category</i>	Processing	<i>Site status</i>		
<b>Description</b>	An extensive cobbing floor on two levels, one 2m higher than the other., this whole area has been extensively reworked for hardcore, and a roadway has been built through the feature. There are now no remains of the buildings shown on the 1900 25" ordnance survey map.					
<b>Threat</b>	Collapse; reworking.					
<b>Management</b>	Level 2 recording.					
<b>81</b>	Shaft					SH44719056
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	Possible site only; visible as a depression 12m in diameter, 4-5m deep. On the east side 2m down a large slab of rock is set like a lintel - possibly a natural feature. On the north side of the depression is a trace of stone walling.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 1 recording.					
<b>82</b>	Road					SH44429061
<i>Site grade</i>	B	<i>Category</i>	Transport	<i>Site status</i>		
<b>Description</b>	A cart road. in fair condition, embanked in places.					
<b>Threat</b>	Scrambling.					
<b>Management</b>	Level 1 recording,					
<b>83</b>	Structure					SH44429062
<i>Site grade</i>	E	<i>Category</i>	Unknown	<i>Site status</i>		
<b>Description</b>	A stone retaining wall in an area exposed by recent tip working, 6m+ in height.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 1 recording.					

84 Structure SH44279064

*Site grade* E *Category* Unknown *Site status*

**Description**

A low ridge or wall, overgrown with heather and covered with moss, but apparently stone-built. Probably a water-course.

**Threat**

Vegetation.

**Management**

Level 1 recording.

85 Precipitation system SH44379063

*Site grade* C *Category* Extraction *Site status*

**Description**

An earth or stone dam, whose walls stand to 1 m high, overgrown with heather; it appears to have formerly fed into (86).

**Threat**

Vegetation.

**Management**

Level 1 recording.

86 Water-course SH44349062

*Site grade* C *Category* Extraction *Site status*

**Description**

A shallow contour gully apparently inclined downwards to the east.

**Threat**

Erosion.

**Management**

Level 1 recording.

87 Shaft SH44259068

*Site grade* D *Category* Extraction *Site status*

**Description**

A shaft, blocked to within 1 m of the lip; there is no spoil present, suggesting a shallow trial.

**Threat**

Collapse.

**Management**

Level 1 recording.,

88 Extraction area SH44269068

*Site grade* D *Category* Extraction *Site status*

**Description**

A tiny trial, 0.5m deep.

**Threat**

Collapse.

**Management**

Level 1 recording,

89 Extraction area SH44309060

*Site grade* A *Category* Extraction *Site status*

**Description**

The Oxen Quarry, where on 8 September 1831 1,400 were entertained by the mine management on the occasion of the coronation of King William IV. The quarry is a shallow cutting approximately 15m in diameter and has been partly obscured by later nineteenth century tipping and by stone quarrying, but may have been worked in Prehistory as an opencast for copper, and is associated with a tip immediately to the north (90) in which Oliver Davies carried out excavations and which were subsequently located and re-excavated by Simon Timberlake and the Early Mines Research Group. There are no visible shot-holes in the quarry face.

**Threat**

Vegetation.

**Management**

Further work to establish the scope and extent of Prehistoric working.

<b>90</b>	Hammer-stone find				SH443109059
<i>Site grade</i>	A	<i>Category</i>	Processing	<i>Site status</i>	
<b>Description</b>	A Prehistoric tip excavated by Oliver Davies in the summer of 1937, consisting of layers of shale and quartz and with hammer-stones and lenses of charcoal overlaying a red-yellow clay. This was subsequently re-excavated in 1988 by Simon Timberlake and the Early Mines Research Group, which identified over thirty pebble hammer-stones, the most likely source for which Dr Timberlake considers to be the coastline west of Amlwch.				
<b>Threat</b>	Vegetation.				
<b>Management</b>	This area has already been excavated by Oliver Davies and Simon Timberlake, and the results published.				
<b>91</b>	Structure				SH44189069
<i>Site grade</i>	E	<i>Category</i>	Unknown	<i>Site status</i>	
<b>Description</b>	Two iron tubes set into the 2round on a north to south axis - possibly boundary markers.				
<b>Threat</b>	NA.				
<b>Management</b>	Level 1 recording.				
<b>92</b>	Precipitation system				SH44159069C
<i>Site grade</i>	B	<i>Category</i>	Extraction	<i>Site status</i>	
<b>Description</b>	A series of five copper precipitation pits, apparently fed by a channel down the slope of the tip to the south, now marked as a linear growth of heather; thereafter the flow is from east to west from the first to the second pit, then south to north down-slope.				
<b>Threat</b>	Proximity to path.				
<b>Management</b>	Level 3 recording.				
<b>93</b>	Structure				SH44149068
<i>Site grade</i>	E	<i>Category</i>	Unknown	<i>Site status</i>	
<b>Description</b>	A small structure, marked on the 25" ordnance survey of 1900 as roofless, and which survives only as the first course of stonework.				
<b>Threat</b>	Collapse; proximity to path.				
<b>Management</b>	Level 1 recording.				
<b>94</b>	Road				SH44139070
<i>Site grade</i>	C	<i>Category</i>	Transport	<i>Site status</i>	
<b>Description</b>	Cart-road access to the mine.				
<b>Threat</b>	Scrambling; vehicular access to modern workings.				
<b>Management</b>	Level 1 recording.				
<b>95</b>	Shaft				SH44159052
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	
<b>Description</b>	A depression, 13m in diameter, and between 5 and 6m, deep, which exposes bedrock. There is a possible trace of a constructed lip on the south side, and the feature probably represents a collapsed shaft-head. Tradition speaks of it as a footway access to the underground workings.				
<b>Threat</b>	Collapse.				

**Management**

Level 1 recording..

96 Structure SH44169052  
*Site grade* E *Category* Unknown *Site status*

**Description**

An iron tube, possibly a boundary marker.

**Threat**

NA.

**Management**

Level 1 recording.

97 Precipitation system SH44209042  
*Site grade* C *Category* Extraction *Site status*

**Description**

Three shallow pits on either side of the road up to the windmill.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording,

98 Road SH44199042  
*Site grade* C *Category* Transport *Site status*

**Description**

The roadway access to the Cairn's shaft and windmill area, diverted to the north at its junction with (94).

**Threat**

Resumption of mining (planning, consent May 1986)

**Management**

Level 1 recording

99 Water-course SH44219043  
*Site grade* C *Category* Extraction *Site status*

**Description**

A shallow gulley, possibly feeding (97).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording..

100 Precipitation system SH44209044  
*Site grade* D *Category* Extraction *Site status*

**Description**

A possible copper precipitation pit, bounded by a tip and much disturbed.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

101 Precipitation system SH44219044  
*Site grade* D *Category* Extraction *Site status*

**Description**

A possible copper precipitation pit, bounded by the road and tipping, much disturbed.

**Threat**

Resumption of mining, (planning consent May 1986)

**Management**

Level 2 recording.

<b>102</b>	Shaft					SH44219051
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	Site only, capped, no. 37.					
<b>Threat</b>	NA.					
<b>Management</b>	Level 1 recording.					
<b>103</b>	Horse-gin circle					SH44219052
<i>Site grade</i>	C	<i>Category</i>	Power	<i>Site status</i>		
<b>Description</b>	Very overgrown; associated with (102).					
<b>Threat</b>	Vegetation.					
<b>Management</b>	Level 1 recording.					
<b>104</b>	Shaft					SH44309050
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	Lichenological SSSI	
<b>Description</b>	Site only, capped, no. 3 1; an aperture in the windmill (74) lines up with this feature, suggesting that the windmill wound the shaft.					
<b>Threat</b>	NA.					
<b>Management</b>	Level 2 recording.					
<b>105</b>	Shaft					SH44309046
<i>Site grade</i>	E	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A shaft, visible as a sub-rectangular depression, 5m by 9m in plan and 2.5m deep. A cross-section through a stone-built structure, possibly a flue or a retaining wall, is exposed on the north side. Pieces of timber, possibly for a staging are exposed on the west side. The site corresponds with Sanderson's shaft.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 2 recording.					
<b>106</b>	Horse-gin circle					SH44309047
<i>Site grade</i>	C	<i>Category</i>	Power	<i>Site status</i>		
<b>Description</b>	The site is much disturbed and the identification is only tentative; it is associated with 105).					
<b>Threat</b>	Erosion; ground disturbance.					
<b>Management</b>	Level 1 recording.					
<b>107</b>	Shaft					SH44249055
<i>Site grade</i>	A	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A bracing timber for a headframe survives on the south of the pit, suggesting that the shaft uphauled as well as pumped. Power was supplied to this shaft from the windmill (74) as well as by the engine (109) by means of a flatrod-system (108).					
<b>Threat</b>	Collapse.					
<b>Management</b>	Though this feature has been infilled nearly to the surface, it is of great importance for its relationship with the windmill (74) and the Cairn's engine house (109). The feature should be consolidated.					



- 108** Flatrod system SH44269054  
*Site grade* A *Category* Power *Site status* Lichenological SSSI  
**Description**  
The site of a flatrod system which connected the Cairn's shaft ( 107) with the windmill (74) and the steam engine (109). Photographs shows that this was operated on dolly posts, of which no trace was observed, but a substantial balance-box pit, stone-lined, survives immediately to the south-east of the shaft.  
**Threat**  
Ground disturbance.  
**Management**  
Level 2 recording,: though this feature is barely evident, it is of great importance for its relationship with the windmill (74).
- 109** Engine-house SH44279054  
*Site grade* A *Category* Power *Site status* Lichenological SSSI  
**Description**  
The remains of a once-substantial engine-house and boiler-room. The buildings themselves have left practically no visible trace, though the stone bed of a substantial horizontal steam engine is apparent, and a number of holding-down bolts are apparent, much twisted. A photograph in Owen Griffith's book shows that the buildings were constructed of stone and roofed with slate.  
**Threat**  
This feature is stable.  
**Management**  
Level 3 recording; though this building only survives in very poor condition, it is of great importance for its relationship with the windmill (74).
- 110** Water-course SH44899115  
*Site grade* C *Category* Power *Site status*  
**Description**  
Visible only as a contour feature in the field; this channel appears to have fed the waterwheel formerly located in (111).  
**Threat**  
Erosion.  
**Management**  
Level 1 recording.
- 111** Water-wheel pit SH44789113  
*Site grade* B *Category* Power *Site status*  
**Description**  
A stone-built water-wheel pit, extremely dilapidated and overgrown. A recent brick structure and associated piping, probably connected to the sewage system serving the dwell in.CV Tal y Dyffryn ( 115), was noted at this point. It appears that the wheel pumped the shaft immediately to the south-east (112), and may have operated a feature at (113) by means of a flatrod system (114). This is the only water-wheel site noted on Mynydd Parys.  
**Threat**  
Collapse; vegetation.  
**Management**  
Level 1 recording.
- 112** Shaft SH44789111  
*Site grade* B *Category* Extraction *Site status*  
**Description**  
A pump-shaft, now collapsed and heavily overgrown. A small hand-pump was noted in a tree which grows out of the shaft-head. There is a trace of a small stone structure on the north side of this feature which appears to be the one recorded in a nineteenth century watercolour of Tal y Dyffryn (115), and which suggests that it formed the base for two angle-bobs from the water-wheel itself (111). The painting shows kibbles hanging off the angle-bobs, suggesting that they were being used as counterbalances.  
**Threat**  
Collapse.  
**Management**  
Level 1 recording.
- 113** Structure SH44769121  
*Site grade* E *Category* Unknown *Site status*

**Description**

Low stone walls at this point are much overgrown, and water flows between them. It is possible that this feature was itself a shaft-head, or a balance-box base for the putative flatrod system identified as (114).

**Threat**

Collapse; vegetation.

**Management**

Level 1 recording.,

114 Flatrod system SH44779116

*Site grade* B *Category* Power *Site status*

**Description**

An open area by the side of the Lon Gopar (118) which may have formed the site of a flat-rod system connecting (111) to (113).

**Threat**

This area is stable.

**Management**

Level 1 recording.

115 Dwelling SH44799108

*Site grade* C *Category* Domestic *Site status*

**Description**

A two-storey dwelling, Tal y Dyffryn, in occupation.

**Threat**

NA.

**Management**

Level 2 recording.

116 Dwelling SH44839090

*Site grade* C *Category* Domestic *Site status*

**Description**

A two-storey dwelling, Cerri y Bleiddiau, in occupation.

**Threat**

NA.

**Management**

Level 2 recording.

117 Stable SH44809088

*Site grade* A *Category* Transport *Site status*

**Description**

A stone-built monopitch roof structure on the south-west side of the Lon Gopar, with a large doorway on the road side. Its form and location suggests that it was a day-stable for horses engaged in pulling carts to and from Porth Amlwch and the mines.

**Threat**

Collapse.

**Management**

Level 4; though this is an unremarkable structure, it is important for its group value with (118).

118 Road SH44839082

*Site grade* A *Category* Transport *Site status*

**Description**

A straight road, built in 1788, connecting the Mona Mine with Porth Amlwch, running slightly west of north; also known as the Lon Melyn and the Lon Menyn. The formation is in places 5m wide, and between Cerrig y Bleiddiau house (116) and the mine itself. It was observed that the western lane of the formation was built out of copper waste, the eastern half out of consolidated hard-core.

**Threat**

Continued use as road.

**Management**

A cross-section diagram should be undertaken of this feature. It is of outstanding importance as a rare example of an eighteenth century industrial road, and should be disturbed as little as possible.

- 119 Water-course SH44809081  
*Site grade* E *Category* Unknown *Site status*  
**Description**  
 Three ponds, which unite at their northern end and feed into a water-course that runs down the west side of the Lon Gopar. It is unclear whether these are a precipitation system or whether they are connected with a boiler feed-water system for the Pearl engine-house (122).  
**Threat**  
 Vegetation.  
**Management**  
 Level 2 recording.
- 120 Shaft SH44789079  
*Site grade* E *Category* Unknown *Site status*  
**Description**  
 A shaft, 1 m in diameter, whose collar consists of slabs laid on edge situated on the edge of the made-up around and overlooking (111). It is blocked to the surface. It may be connected with the Pearl engine house, and possibly also with (111).  
**Threat**  
 NA.  
**Management**  
 Level 1 recording
- 121 Boiler-house SH44759078  
*Site grade* A *Category* Power *Site status* SAM  
**Description**  
 The site of a stone-built boiler house whose axis runs parallel to the bob wall of the Pearl engine house (122) but has not been built integrally with it. From photographs it appears to have had a monopitch roof. It is very heavily dilapidated. An integral chimney situated in the south-western corner has collapsed into the boiler-house-site. It falls within the Scheduled area.  
**Threat**  
 This feature has recently been cleared of vegetation by the Welsh Mines Preservation Trust.  
**Management**  
 Consolidation, and reconstruction of the chimney. This feature is a Scheduled Ancient Monument.
- 122 Engine-house SH44769077  
*Site grade* A *Category* Power *Site status* SAM  
**Description**  
 The Pearl engine-house; believed to have housed a beam engine pumping engine constructed by the Neath Abbey Ironworks in 1819, and later to have housed a beam engine of 1853 built by the Perran Foundry through the consulting engineers Messrs Hocking and Loam. An unusual feature is the hooded cowl over the beam, of which traces remain in the stonework. This is believed to be the oldest beam-engine house in Wales. It has recently been consolidated with grant-aid from Cadw. It is a Scheduled Ancient Monument.  
**Threat**  
 This feature is stable.  
**Management**  
 This feature is stable. It forms a Scheduled Ancient Monument.
- 123 Capstan-pit SH44769076  
*Site grade* A *Category* Power *Site status*  
**Description**  
 A pit for a manually-operated capstan to haul pump-rods up and down the shaft for repair and renewal (124); recently (November 1997) consolidated with grant-aid from Cadw.  
**Threat**  
 This feature is stable.  
**Management**  
 This feature has recently been conserved. It does not fall within the area of the Scheduled Ancient Monument, the boundaries of which should be extended to include it.
- 124 Shaft SH44779075  
*Site grade* A *Category* Extraction *Site status* SAM  
**Description**

The site of a pump-shaft, now capped. This is believed to be the Pearl shaft.

**Threat**

NA.

**Management**

This feature is stable. It forms part of a Scheduled Ancient Monument.

125 Water-course SH44779074

*Site grade* B *Category* Power *Site status*

**Description**

A possible water-course, apparent as a stone-lined depression immediately south of shaft (124).

**Threat**

Erosion; vegetation.

**Management**

Level 1 recording.

126 Shaft SH44799077

*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped. no. 14.

**Threat**

Bulldozing.

**Management**

Level 1 recording.

127 Shaft SH44809075

*Site grade* E *Category* Extraction *Site status*

**Description**

Site only, capped; this feature lines up with a row of pillars (13 1), and may also be connected with (128).

**Threat**

Bulldozing.

**Management**

Level 1 recording.

128 Adit SH44799074

*Site grade* E *Category* Extraction *Site status*

**Description**

An excavation which exposes bedrock, approximately 4m deep, overgrown at its southern end where an entry is visible. It may be the entrance to an inclined shaft, but timbers exposed on the western side suggest that it may have carried a flatrod system supported on (131) to (127).

**Threat**

Bulldozing

**Management**

Level 1 recording.

129 Wall SH44779074

*Site grade* B *Category* Structural *Site status*

**Description**

A low (1 m high) stone wall. built partly on tipped material. There is the trace of circular-plan chimney near the northern limit of the wall.

**Threat**

Collapse.

**Management**

Level 2 recording.

130 Water-course SH44789075

*Site grade* B *Category* Power *Site status*

**Description**

A square-plan pond measuring 7m by 10m, shallow with a stone floor, containing some water, apparently fresh. It is probably

associated with the Pearl engine's (122) supply system, and may have been fed by (159). An early photograph appears to show a cast-iron pipe feeding it from the east.

**Threat**

Erosion.

**Management**

An EDM survey of this feature has already been carried out.

131 Pillars SH44789072

*Site grade* E *Category* Power *Site status*

**Description**

A row of five stone-built tapering, pillars, measuring (maximum) 3m by 3m at the base and reaching to a maximum height of 2m. They appear to be too substantial to be laundry pillars, and may possibly have carried a flatrod system, possibly from (140), or from (122) by means of a fend-off bob to turn it through an acute angle, to (127).

**Threat**

Bulldozing.

**Management**

Although an E13M survey of this feature has already been carried out, a contour survey of this feature would establish its relationship with other undiagnostic features nearby.

132 Structure SH44809073

*Site grade* E *Category* Unknown *Site status*

**Description**

A roofless structure is marked here on the 1900 25" ordnance survey. Its site is now considerably overgrown with heather. Traces of the first course only of a stone wall are evident on tile south side.

**Threat**

Vegetation; collapse.

**Management**

A ground plan and contour survey of this feature would establish its relationship with other undiagnostic features nearby.

133 Feature SH44749079

*Site grade* E *Category* Unknown *Site status*

**Description**

A depression, heavily overgrown, in built-up ground, possibly connected with (121) and (122).

**Threat**

Vegetation.

**Management**

Ground plan and contour survey of this feature to establish its relationship with other undiagnostic features nearby.

134 Shaft SH44589070

*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped.

**Threat**

NA.

**Management**

Level 1 recording.

135 Shaft SH44609067

*Site grade* E *Category* Extraction *Site status*

**Description**

Possible site only.

**Threat**

NA.

**Management**

Level 1 recording.

136 shaft SH44699071

<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>	Site only, capped.				
<b>Threat</b>	NA.				
<b>Management</b>	Level 1 recording.				
<b>137</b>	Road				SH44739068
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>	Connects the western part of the Mona Mine workings with shaft 17 (136).				
<b>Threat</b>	Scrambling.				
<b>Management</b>	Level 1 recording.				
<b>138</b>	Shaft				SH44739068
<b>Site grade</b>	A	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>	Sunk through bed-rock, there are traces of a stone-built collar, and a substantial stone retaining wall to the south-cast overlooking, the roadway. It is filled with stone rubble to within 4m of the lip. It is associated with the horse-whim circle (139), and they together form the best example of features once common on Mynydd Parys.				
<b>Threat</b>	This feature is stable.				
<b>Management</b>	As the relationship of this shaft to the horse-gin circle which formerly served it (139) is clear, the feature could be incorporated into a replica construction to form part of a guided walk.				
<b>139</b>	Horse-gin circle				SH44739069
<b>Site grade</b>	A	<b>Category</b>	Power	<b>Site status</b>	
<b>Description</b>	Associated with the shaft ( 13 8); together they form the best examples of a type of feature once common on Mynydd Parys. Even so, nothing remains of the whimsy, itself, and there is no trace even of pivot stone.				
<b>Threat</b>	This feature is stable.				
<b>Management</b>	As the clearest surviving example of a horse-circle, this location is suitable for the re-erection of a replica horse-gin.				
<b>140</b>	Structure				SH44769071
<b>Site grade</b>	E	<b>Category</b>	Unknown	<b>Site status</b>	
<b>Description</b>	The ruins of a Substantial stone-built structure, very seriously dilapidated and overgrown. It appears to have gone through several phases of use, including an off-ice, which survives as a roofless structure in the western part of the building, and the 1900 25" ordnance survey map shows a cluster of small buildings around an enclosed area. This structure, or set of structures, may, be associated with the pillars (131) that line up with one of the perimeter walls, q.v.: these are suggested as being, supports for a flat-rod system, in which case it is possible that this structure may have been an engine house of some description.				
<b>Threat</b>	Vegetation				
<b>Management</b>	Clearance of vegetation: extended (ground plan and counter survey to include this feature to establish its relationship with other undiagnostic features nearby.				
<b>141</b>	Shaft				SH44629060
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>	Site only, capped. It was in this vicinity, that the discovery of 2 March 1768 took place.				
<b>Threat</b>	N.A.				

**Management**

Level 1 recording.

142 Shaft SH44629058  
*Site grade* C *Category* Extraction *Site status*

**Description**

A possible shaft, visible only as a slight depression - apparently capped, but not numbered.

**Threat**

Collapse.

**Management**

Level 1 recording.

143 Precipitation system SH44609057  
*Site grade* C *Category* Extraction *Site status*

**Description**

A shallow depression in between tips may have been a copper precipitation pit; it shows no evidence of having been constructed.

**Threat**

Erosion.

**Management**

Level 1 recording.

144 Precipitation system SH44599062  
*Site grade* C *Category* Extraction *Site status*

**Description**

Traces of three copper ponds are visible; some water remains in the most southerly. It appears to have been fed from (239).

**Threat**

Erosion.

**Management**

Level 1 recording.

145 Shaft SH44679066  
*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped.

**Threat**

NA.

**Management**

Level 1 recording.

146 Shaft SH44699066  
*Site grade* C *Category* Extraction *Site status*

**Description**

Blocked 2m below the collar by fallen stone.

**Threat**

NA.

**Management**

Level 1 recording.

147 Cobbing floor SH44699064  
*Site grade* C *Category* Processing, *Site status*

**Description**

A possible cobbing floor is exposed in collapse at this point.

**Threat**

Collapse.

**Management**

Level 1 recording.

<b>148</b>	Kiln					SH44869076
<i>Site grade</i>	E	<i>Category</i>	Processing	<i>Site status</i>		
<b>Description</b>	A possible site only; a depression was observed at this point between two piles of waste, 1 m deep, 13m long, 2m across.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 2 recording.					
<b>149</b>	Extraction area					SH44869073
<i>Site grade</i>	B	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	An open pit, approximately 10m deep, part flooded, which exposes bedrock on the north and east sides.					
<b>Threat</b>	This feature is stable.					
<b>Management</b>	Level 2 recording.					
<b>150</b>	Road					SH44949070
<i>Site grade</i>	B	<i>Category</i>	Transport	<i>Site status</i>		
<b>Description</b>	An engineered cart road.					
<b>Threat</b>	Continued use by motor vehicles.					
<b>Management</b>	Level 1 recording.					
<b>151</b>	Retaining wall					SH44929064
<i>Site grade</i>	B	<i>Category</i>	Structural	<i>Site status</i>		
<b>Description</b>	A stone retaining wall, 2m high supporting (150).					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 1 recording.					
<b>152</b>	Structure					SH44879075
<i>Site grade</i>	E	<i>Category</i>	Unknown	<i>Site status</i>		
<b>Description</b>	A structure is marked here on the 1900 25" ordnance survey, of which no trace now remains.					
<b>Threat</b>	N A.					
<b>Management</b>	Level 1 recording.					
<b>153</b>	Dwelling					SH45109075
<i>Site grade</i>	D	<i>Category</i>	Domestic	<i>Site status</i>		
<b>Description</b>	The house "Henwaith". extensively modernised and in occupation. The name (Anglice: "Old Workings") is associated with early mineral extraction and may suggest pre-Modern work in the vicinity. Old workings are shown here in 1764.					
<b>Threat</b>	NA.					
<b>Management</b>	Level 2 recording.					
<b>154</b>	Road					SH44869078
<i>Site grade</i>	C	<i>Category</i>	Transport	<i>Site status</i>		
<b>Description</b>						



A cart track to Henwaith (153).

**Threat**

Continued use as road.

**Management**

Level 1 recording

155 Dwelling SH449-590S2

*Site grade* D *Category* Domestic *Site status*

**Description**

Tai Fry, extensively modernised dwellings.

**Threat**

NA.

**Management**

Level 2 recording.

156 Road SH44869079

*Site grade* C *Category* Transport *Site status*

**Description**

A cart track to Tai Fry (155).

**Threat**

Continued use as a road.

**Management**

Level 1 recording

157 Shaft SH44799071

*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped.

**Threat**

NA.

**Management**

Level 1 recording.

158 Shaft SH44799069

*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped. It is possible that this is the Cerrig y Bleiddiau shaft; it lines up with the Pearl engine house and a possible flatrod system is shown in a photograph, published in 1897 in Owen Griffith's history of the mines, extending towards the shaft. It is possible therefore that this was a pump-shaft rather than an uphaulage shaft. It is possible that water pumped from here fed both (159) and (161)

**Threat**

Bulldozing

**Management**

Ground plan and contour survey to establish its relationship to other features in the immediate area.

159 Water-course SH44799069

*Site grade* C *Category* Power *Site status*

**Description**

This feature is visible only as a shallow depression, but it may be connected with the water-course that flows through a substantial rock cutting to the south ( 161 ). and may be connected with the row of pillars to its north (131), assuming these to be for a launder rather than for flatrods or with the supply to the engine pool (130).

**Threat**

Erosion.

**Management**

Ground plan and contour survey to establish its relationship to other features in the immediate area.

160 Shaft SH44789068

*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped. not otherwise identified,

**Threat**

NA.

**Management**

Level 1 recording.

161 Water-course SH44799065

*Site grade* C *Category* Power *Site status*

**Description**

A water-course which may be connected with (159) but is probably independent of it, which passes through a cutting through bedrock, 4m deep. It appears to feed a precipitation pit (162).

**Threat**

Bulldozing

**Management**

Level 2 recording.

162 Precipitation system SH44799064

*Site grade* C *Category* Extraction *Site status*

**Description**

A copper precipitation pit, visible only as a flat area of ground but marked as a rectangular pit on the 1900 25" ordnance survey.

**Threat**

NA.

**Management**

Level 2 recording.

163 Water-course SH44609058

*Site grade* C *Category* Extraction *Site status*

**Description**

The site of a water-course, apparently leading from ( 143) and (144) to 162). and passing under roads at two points.

**Threat**

Erosion, fly-tipping.

**Management**

Level 1 recording

164 Precipitation system SHI43848994

*Site grade* C *Category* Extraction *Site status*

**Description**

Four small copper precipitation pits which still hold water, and two ochre pits; the argia are made up of heaped precipitate held between stone walls.

**Threat**

Erosion.

**Management**

Level 2 recording.

165 Road SH43818977

*Site grade* C *Category* Transport *Site status*

**Description**

A roadway from Ty'n Nant to the Parys and Mona mine yards. The lower part, on the slopes of Cerrig y Gigfran, is very overgrown.

**Threat**

Resumption of mining\_(planning consent May 1986)

**Management**

Level 1 recording.

166 Water-course SH43858997

*Site grade* C *Category* Extraction *Site status*

**Description**

A shallow depression across the tips which may be a water-course; it appears to lead from (167) and to feed (164).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

167 Shaft SH43878999

*Site grade* C *Category* Extraction *Site status*

**Description**

A shallow depression in the tips. marked by a growth of heather. may indicate a shaft. The possible water-channel leading from it (166) would suggest that this had been a pump shaft or that water was raised in a kibble.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

168 Precipitation system SH43829002C

*Site grade* B *Category* Extraction *Site status*

**Description**

Two large ochre pits. It is noteworthy that these features apparently feed the water-course (169) which eventually leads, by a prominent route, to 'ingian yr opencast mawr' suggesting that the water had become sufficiently fresh to function as feed water for the boiler.

**Threat**

This feature appears to be stable.

**Management**

Level 3 recording.

169 Water-course SH43839006

*Site grade* A *Category* Power *Site status* SAM

**Description**

A prominent water-course. leading from west to east from (168). marked by a strong growth of heather, in places a stone-lined channel, elsewhere carried on an stone embankment. 1.5m high, 2m wide, which leads along the south edge of the Great Opencast to reach 'ingian yr opencast mawr' (213). It descends the south side of the Great Opencast in a stone channel: Warrington Smythe's painting, shows a launder leading from it across the ridge of felsite against which 'ingian yr open cast mawr' is built, to reach the boiler-house. There is now no trace of this, but there does appear to be a channel along the floor of the Opencast to the engine house.

**Threat**

Resumption of mining, (planning consent May 1986)

**Management**

Level 3 recording.

170 Bridge SH43889012

*Site grade* B *Category* Transport *Site status*

**Description**

A small stone bridge which carries roadway (165) over water-course (169): the surface is laid with finely cobbled waste, and the stone blocks which form the sides have partly collapsed.

**Threat**

Resumption of mining (planning consent May 1986): collapse.

**Management**

Level 2 recording.

171 Shaft SH43859012

*Site grade* C *Category* Extraction *Site status*

**Description**

A possible shaft-site, visible as a depression 4m in diameter, 3m deep, blocked with stone.

**Threat**

Resumption of mining (planning consent May, 1986)

**Management**

Level 1 recording.

172	Water-course				SH4376900 1
	<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>
<b>Description</b>					
A channel much overgrown which appears to have fed ( 168).					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
Level 1 recording.					
173	Dwelling				SH43608998
	<i>Site grade</i>	C	<i>Category</i>	Domestic	<i>Site status</i>
<b>Description</b>					
Bryn Parys, a farmhouse in occupation.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 2 recording.					
174	Dwelling				SH43598990
	<i>Site grade</i>	C	<i>Category</i>	Domestic	<i>Site status</i>
<b>Description</b>					
Pen y Mynydd, a two-storey dwelling. Intact and roofed but not apparently in occupation.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 2 recording.					
175	Dwelling				SH43578989
	<i>Site grade</i>	D	<i>Category</i>	Domestic	<i>Site status</i>
<b>Description</b>					
A dwelling adjacent to Pen y Mynydd farmhouse. largely demolished: one wall remains standing.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 1 recording.					
176	Dwelling				SH437189S8
	<i>Site grade</i>	D	<i>Category</i>	Domestic	<i>Site status</i>
<b>Description</b>					
Penrhyn, a two-storey dwelling in occupation, much modernised.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 2 recording.					
177	Smithy				SH43668973
	<i>Site grade</i>	D	<i>Category</i>	Ancillary	<i>Site status</i>
<b>Description</b>					
Marked on the 1900 25" ordnance survey, map as Efail Bach (Anglice: the little smithy); no trace now remains.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 1 recording.					
178	Dwelling				SH43808981
	<i>Site grade</i>	D	<i>Category</i>	Domestic	<i>Site status</i>

**Description**

A dwelling Pen Terfyn, is marked here on the 1900 25" ordnance survey map. No visible trace remains and the area is very, heavily overgrown.

**Threat**

Vegetation.

Management

Level 1 recording.

179 Shaft SH43909003

*Site grade* D *Category* Extraction *Site status*

**Description**

A possible shaft. 2m by 3m across sunk through bedrock. blocked 1 m below the collar.

**Threat**

NA.

**Management**

Level 1 recording.

180 Shaft SH43779023

*Site grade* C *Category* Extraction *Site status*

**Description**

A possible shaft-site visible as a depression 3m+ deep. 7m in diameter, filled with stone.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

181 Mill SH43699024

*Site grade* B *Category* Processing *Site status*

**Description**

A modern corrugated iron bow-roof shed for milling trials: constructed on the site of one arm of the adjacent precipitation pit system (182).

**Threat**

NA.

**Management**

NA.

182 Precipitation system SH43709012

*Site grade* B *Category* Extraction *Site status*

**Description**

A precipitation system. possibly, for ochre rather than copper, enclosed between stone walls. The stone argia which separates the two northern pits of the system is a substantial feature.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording.

183 Shaft SH43669015

*Site grade* E *Category* Extraction *Site status*

**Description**

The site is recorded on the 1900 25" ordnance survey map but is not now visible.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

184 Shaft SH43559015

*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

**185** Shaft SH43559022

*Site grade* E *Category* Extraction *Site status*

**Description**

The site is marked on the 25" ordnance survey, of 1900 but is not visible.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

**186** Precipitation system SH43259003

*Site grade* D *Category* Extraction *Site status*

**Description**

A series of copper and ochre precipitation pits. partly surviving, partly, destroyed by modern operations. Some of the pits still hold water but the argia are grass-grown and decayed.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording.

**187** Dwelling SH43439013

*Site grade* C *Category* Domestic *Site status*

**Description**

Pen v Mynydd farmhouse and outbuildings, in occupation and use.

**Threat**

NA.

**Management**

Level 2 recording

**188** Precipitation system SH43318984C

*Site grade* D *Category* Extraction *Site status*

**Description**

Formerly a small series of copper and ochre precipitation pits. these are now visible only as a marshy depression: a modern service drain has been constructed through the site.

**Threat**

NA.

**Management**

Level 1 recording.

**189** Shaft SH43338987

*Site grade* D *Category* Extraction *Site status*

**Description**

Site only; the shaft is marked on the 1900 25" ordnance survey but is not now visible.

**Threat**

NA.

**Management**

Level 1 recording.

**190** Shaft SH43408980

*Site grade* D *Category* Extraction *Site status*

**Description**

A shaft-site, visible only as an overgrown depression.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

**191** Extraction area SH44069026  
*Site grade* A *Category* Extraction *Site status* SAM/Lichenological SSSI/Geological SSSI

**Description**

The Great Opencast, an extensive open working which effectively reached its present extent between the discovery of 1768 and the very early years of the nineteenth century. It dominates the site as a whole, and its variety of colours from the rock it exposes and the tips around its edge make it a visually spectacular feature, which has been used as the set for an early episode of “Dr Who and the Daleks”, and more recently “Mortal Kombat (sic) 2”. There is some flooding at its western extremity, and there has been some collapse of the walls along the northern side, which are not as sheer as they are shown to be in old paintings.

The use of opencast mining techniques is said to have come about as the consequence of the collapse of underground working (though it is possible that this was a deliberate feature of the extraction process) and is common to many other substantial copper workings, including Stora Koparber. in Sweden, Rio Tinto in Spain, Bingham Canyon in Utah and some of the workings in Australia and Papua New Guinea, but the Great Open Cast and the Hillside Opencast (252) have no parallels elsewhere in copper extraction in Wales nor in Britain as whole. Tin was obtained from substantial opencasts at Carclaze and Beam in Cornwall. It is clear from archival evidence that the horse-gins and windlasses were nearly all located on the north side of the open cast, where the dip of the veins made it possible to create a sheer drop.

This feature in its entirety constitutes a Scheduled Ancient Monument An 111 D. It contains four Geological SSIs, one of them the felsite outcrop, and one Lichenological SSSI.

**Threat**

Resumption of mining (planning consent May 1986), collapse of the exposures; tipping., use by film crews.

**Management**

Monitoring for collapse, dumping and vandalism.

**192** Shaft SH44129031  
*Site grade* A *Category* Extraction *Site status* SAM

**Description**

The shaft has collapsed; an abandoned car lies within it. This feature forms part of the Scheduled Area An 111 D.

**Threat**

Tipping

**Management**

Removal of abandoned car.

**193** Shaft SH44169028  
*Site grade* A *Category* Extraction *Site status* SAM

**Description**

A collapsed shaft; traces of projecting timber were noted on the west side, possibly for a staging. This feature falls within the Scheduled Area An 111 D.

**Threat**

Further collapse.

**Management**

Monitoring for collapse and dumping.

**194** Retaining wall SH44169025  
*Site grade* A *Category* Structural *Site status* SAM

**Description**

Built out of stones placed vertically, in the Cornish-fashion; carries (196). This feature falls within the Scheduled Area An 111 D.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Monitoring for collapse.

**195** Shaft SH44179030  
*Site grade* A *Category* Extraction *Site status* SAM

**Description**

A depression 2m deep is visible at this point. This feature falls within the Scheduled area An 111 D.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

196 Road SH44099034

*Site grade* A *Category* Transport *Site status* SAM

**Description**

A roadway from the southern rim of the Great Open cast to a working face on the north side, crossing the ridge near the boundary; part intact and part degraded. This feature falls within the Scheduled area An 111 D.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

197 Adit SH44169033

*Site grade* A *Category*3, Transport *Site status* SAM

**Description**

The trace of a blocked adit is visible at this point. This feature falls within the Scheduled area An 111 D.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

198 Bridge SH44169032

*Site grade* A *Category* Transport *Site status* S AM

**Description**

The stone abutments only survive; it appears to have carried a tramway or barrow-way from (197). This feature falls within the Scheduled area An 111 D.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

199 Shaft SH44209034

*Site grade* A *Category* Extraction *Site status* SAM

**Description**

A blocked shaft; old car-parts and other detritus has been dumped on the blockage. Ginging is visible to the north. There is a breast wall on the south side. This feature falls within the Scheduled area An 111 D.

**Threat**

Resumption of mining (planning consent May 1986); tipping.

**Management**

Removal of scrap; level 1 recording.

200 Shaft SH44229035

*Site grade* A *Category* Extraction *Site status* SAM

**Description**

Blocked and collapsed; the depression which marks its site is 6m in diameter and 2m deep. This feature falls within the Scheduled area An 111 D.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

201 Extraction area SH44249032

*Site grade* A *Category* Extraction *Site status* SAM



**Description**

A stope emerges to the open here; shot-holes are evident in the rock exposed. This feature falls within the Scheduled area An 111 D.

**Threat**

Collapse.

**Management**

Level 1 recording.

202 Smithy SH44259029

*Site grade* C *Category* Ancillary *Site status*

**Description**

A ruined and dilapidated building, though enough survives to identify it with the smithy of which a photograph appears in Owen Griffith's book. The site measures 17m by 7m in plan, and the stone walls survive up to 2m high, though they are mostly collapsed above the second course. The building is orientated north-west to south-east, with one large unit on the north-west side, a smaller to the south-east. There is a trace of a hearth in each gable, and cinders and fragments of Arfon roofing slates lie to the south west of the building. This was the scene of the mines' prayer-meetings.

**Threat**

Collapse; proximity to path.

**Management**

Level 2 recording.

203 Shaft SH44279027

*Site grade* E *Category* Extraction *Site status*

**Description**

A circular area of collapse, 5m in diameter, in a tip-run may mark the site of a shaft.

**Threat**

Further erosion of tip.

**Management**

Level 1 recording.

204 Incline SH44239028

*Site grade* A *Category* Transport *Site status*

**Description**

The course of the incline is much degraded, but is confirmed by maps and by Warrington Smythe's painting of the Great Open Cast in the 1850s. Its may be marked by a depression on the level ground on the lip of the pit, and by the finger-tip (usually associated with railed transport) extending south-eastwards from it. See also (205). Where its course is apparent it does not fall within the Scheduled area An 111 D.

**Threat**

Collapse of formation.

**Management**

This feature falls partly within an area designated as a Scheduled Ancient Monument.

205 Incline winding house SH44239027

*Site grade* C *Category* Transport *Site status*

**Description**

Heavily dilapidated retaining walls standing up to 3m high, built of burnt oxidised stone, may mark the site of an winding-engine house to raise wagons on (204).

**Threat**

Collapse.

**Management**

Level 2 recording.

206 Structure SH44229027

*Site grade* E *Category* Unknown *Site status*

**Description**

Possible structure. very dilapidated.

**Threat**

Further collapse.

**Management**

Level 1 recording.

**207** Structure SH44049016  
*Site grade* E *Category*. Unknown *Site status*  
**Description**  
A brick floor is exposed in the south-facing tip walls, with tailings above.  
**Threat**  
Collapse.  
**Management**  
Level 1 recording.

**208** Structure SH43969026  
*Site grade* A *Category* Unknown *Site status* SAM  
**Description**  
A brick floor is exposed at this point, on the lip of the Great Opencast, at a location too dangerous for detailed examination.  
**Threat**  
Resumption of mining (planning consent May 1986)  
**Management**  
NA.

**209** Structure SH43999014  
*Site grade* E *Category* Unknown *Site status*  
**Description**  
The foundations of a stone building are evident here.  
**Threat**  
Resumption of mining (planning consent May 1986)  
**Management**  
Level 1 recording

**210** Water-course SH43929013  
*Site grade* C *Category* Extraction *Site status*  
**Description**  
The trace of a sluice whereby water could be turned from (169) to (211) survives here.  
**Threat**  
Resumption of mining (planning consent May 1986)  
**Management**  
Level 1 recording.

**211** Water-course SH44089021  
*Site grade* B *Category* Extraction *Site status* SAM/Geological SSSI  
**Description**  
An extensive water-course and precipitation system, extending from the south-western extremity of the Great Opencast around its southern periphery before being channelled through a rock cut to reach a further precipitation system on the floor of the Opencast at (224). It is possible that this system had its origins in the precipitation systems on the north side of the Great Opencast (215) and (219), and that the intervening lengths have collapsed, though its present starting, point is near the presumed site of the water-whimsey shaft or “twll drwg” (212).  
**Threat**  
Resumption of mining (planning consent May 1986)  
**Management**  
Levelled survey to establish its relationship with (215), (219) and (224).

**212** Shaft SH44029018  
*Site grade* E *Category* Extraction *Site status*  
**Description**  
The South Engine or Water-whimsey shaft is marked near this point on nineteenth-century maps of the Parys mine. No visible trace of it was observed nor of the “twll drwg” (Anglice: the bad pit) which (if it is not synonymous with the South Engine shaft) was a level connecting with it. It may have fed precipitation system (211) or (222). It may have hauled water in buckets, hence its name, though the name South Engine shaft, suggesting that there might have been a pump in it at one stage,

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

**213** Engine house SH44089027  
*Site grade* A *Category* Power *Site status* SAM/Lichenological SSSI/Geological SSS

**Description**

The engine-house which contained ingian yr open cast mawr. It is roofless and extremely dilapidated but clearly included a substantial boiler-house built against, and to the north-east of, a spur of felsite at the foot of the Opencast, in which the recessed base of a chimney is clearly visible. The engine base appears to have been situated on the south-east side of the boiler house and to have supported a horizontal engine which worked a pump in (2127) and also a pair of sheerlegs over the shaft, since these appear in Warrington Smyth's painting. There are traces of machine drilling in the felsite. This feature falls within the Scheduled area An 111 D.

The felsite spur contains traces of machine drilling.

**Threat**

Resumption of mining, (planning consent May 1986); collapse.

**Management**

Level 5 recording.

**214** Structure SH44079038  
*Site grade* D *Category* Magazine *Site status*

**Description**

A circular feature, 6m in diameter, which survives only as the first course of stones. This feature is identified as a magazine on the 1889 25". It is alarmingly near the kilns.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

**215** Precipitation system SH44019035C  
*Site grade* B *Category* Extraction *Site status*

**Description**

An copper precipitation system of six pools on the north side of the Great Opencast, fed by a channel leading from near (214) on the east, though this is unlikely to have fed the two top lakes, which may have had a different source of supply, not now evident. The argia are formed out of waste material apart from some stone retaining walls at the south western end of the largest pool, where the waters appear to be channelled through an under-round level to the lowest pool.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording and levelling.

**216** Structure SH44009031  
*Site grade* E *Category* Unknown *Site status* SAM/Geolo2ical SSSI

**Description**

A stone retaining wall on the northern lip of the Great Opencast, built out of oxidised stone, surviving up to 4m high, which has suffered considerable collapse at its eastern end, where a projecting buttress has become very unstable. At its west end, traces of cinders are visible in the grass.

Whilst there is archival evidence for this area having been used as a base for horse-whimseys from the late eighteenth to the mid-nineteenth century, the traces of cinders and the substantial walling leave open the possibility that this was the site of the unsuccessful Boulton and Watt engine installed in the 1790s to uphaul from the Great Opencast. It is also possible that these date from the latter period of working at Parys when portable engines were used.

**Threat**

Resumption of mining. (planning consent May 1986); collapse; proximity to roadway.

**Management**

Level 3 recording.

217	Structure				SH43939028
<i>Site grade</i>	C	<i>Category</i>	Ancillary	<i>Site status</i>	
<b>Description</b>					
The former Parys mine yard, now extremely dilapidated and very densely overgrown with heather. Map evidence makes it clear that the yard was a rectangular enclosure whose longer axis ran south-west to north-east; the central building of the range alongside the south-east facing longitudinal wall survives up to 2m from ground level, but otherwise little obvious trace of former arrangements survives here.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986); collapse; vegetation.					
<b>Management</b>					
Level 3 recording.					
218	Structure				SH43959025
<i>Site grade</i>	E	<i>Category</i>	Unknown	<i>Site status</i>	
<b>Description</b>					
Site of a building, marked on the 25" ordnance survey of 1900 as roofless, now only visible as a depression in the ground.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
Level 1 recording.					
219	Water-course				SH43949025
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	
<b>Description</b>					
A length of isolated water-course which may at one time have united precipitation system (215) with precipitation system (211).					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
Level 3 recording and levelling					
220	Structure				SH43899025
<i>Site grade</i>	D	<i>Category</i>	Unknown	<i>Site status</i>	
<b>Description</b>					
A building marked here on the 1900 25" ordnance survey has been destroyed by the widening of the road.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986); proximity to road.					
<b>Management</b>					
Level 1 recording					
221	Feature				SH43959024
<i>Site grade</i>	A	<i>Category</i>	Unknown	<i>Site status</i>	
<b>Description</b>					
A jutting timber in tile north-western slopes of the Great Opencast may have been part of an uphaulage system. This feature falls within the Scheduled area An 111 D.					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
NA.					
222	Precipitation system				SH44039016
<i>Site grade</i>	B	<i>Category</i>	Extraction	<i>Site status</i>	
<b>Description</b>					
A precipitation system on the south side of the Great Opencast, now dry but apparent as a flat area; possibly at one time fed by the water whimsey shaft/twll drwg (212).					
<b>Threat</b>					
Resumption of mining (planning consent May 1986)					
<b>Management</b>					
Level 2 recording,					

<b>223</b>	Bridge					SH44049015
<i>Site grade</i>	B	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The trace of a bridge to carry a water-course (23 5) draining (222) over the lower precipitation system (211 ). Only the stone abutments survive.					
<b>Threat</b>	Resumption of mining (planning consent May 1986); collapse.					
<b>Management</b>	Level 1 recording.					
<b>224</b>	Precipitation system					SH44109027
<i>Site grade</i>	A	<i>Category</i>	Extraction	<i>Site status</i>	SAM/Lichenological SSSI	
<b>Description</b>	A set of seven small copper precipitation pits at the foot of the Great Opencast, fed from (22 1 ), adjacent to shaft (227).					
<b>Threat</b>	Resumption of mining (planning consent May 1986)					
<b>Management</b>	Level 3 recording.					
<b>225</b>	Structure					SH44119025
<i>Site grade</i>	A	<i>Category</i>	Unknown	<i>Site status</i>	SAM/Lichenological SSSI	
<b>Description</b>	An embankment, 2m wide and >5m high, part built of rubble, part enclosed within stone walls, which runs from the Great Opencast engine (213) and the precipitation pits nearby (224). which appears to enter the adit (226); its form suggests a tramway, but there are no traces of sleeper depressions.					
<b>Threat</b>	Resumption of mining (planning consent May 1986)					
<b>Management</b>	Level 3 recording.					
<b>226</b>	Adit					SH44129022
<i>Site grade</i>	A	<i>Category</i>	Extraction	<i>Site status</i>	SAM	
<b>Description</b>	A substantial adit cut into the bedrock on the south face of the Great Opencast but now entirely blocked by fallen stones. It was at least 2m wide and 3m+ high.					
<b>Threat</b>	Resumption of mining (planning consent May 1986)					
<b>Management</b>	Level 2 recording.					
<b>227</b>	Shaft					SH44099027
<i>Site grade</i>	A	<i>Category</i>	Extraction	<i>Site status</i>	SAM/Lichenological SSSI	
<b>Description</b>	A collapsed shaft: the depression is 12m in diameter and is blocked by stone 3m, below the present ground surface. There are traces of a stone shaft-collar.					
<b>Threat</b>	Resumption of mining (planning consent May 1986)					
<b>Management</b>	Level 2 recording.					
<b>228</b>	Shaft					SH44109030
<i>Site grade</i>	A	<i>Category</i>	Extraction	<i>Site status</i>	SAM/Lichenological SSSI	
<b>Description</b>	Possible site only - a shallow (> 1 m ) depression.					
<b>Threat</b>	Resumption of mining (planning consent May 1986)					
<b>Management</b>	Level 1 recording.					

<b>229</b>	Water-course						SH44029023
<i>Site grade</i>	A	<i>Category</i>	Extraction	<i>Site status</i>	SAM		
<b>Description</b>	A water-course, now visible as two high (3m+) stone retaining walls.						
<b>Threat</b>	Resumption of mining (planning consent May 1986)						
<b>Management</b>	Level 2 recording.						
<b>230</b>	Wall						SH44039024
<i>Site grade</i>	A	<i>Category</i>	Structural	<i>Site status</i>	SAM		
<b>Description</b>	A small wall on an outcrop at the foot of the Great Opencast.						
<b>Threat</b>	Resumption of mining (planning consent May 1986)						
<b>Management</b>	Level 1 recording.						
<b>231</b>	Road						SH44139018
<i>Site grade</i>	A	<i>Category</i>	Transport	<i>Site status</i>	SAM/Lichenological SSSI		
<b>Description</b>	A cart-road to the foot of the Great Opencast, which at one point is carried on a substantial stone embankment 3m+ wide and 2m high.						
<b>Threat</b>	Resumption of mining (planning consent May 1986)						
<b>Management</b>	Level 2 recording.						
<b>232</b>	Adit						SH43979025
<i>Site grade</i>	A	<i>Category</i>	Extraction	<i>Site status</i>	SAM		
<b>Description</b>	A substantial adit mouth. now blocked, flanked by stone retaining walls 2m apart.						
<b>Threat</b>	Resumption of mining (planning consent May 1986)						
<b>Management</b>	Level 2 recording.						
<b>233</b>	Steps						SH44009026
<i>Site grade</i>	A	<i>Category</i>	Transport	<i>Site status</i>	SAM		
<b>Description</b>	Steps from the foot of the Great Opencast to a working level on the north face.						
<b>Threat</b>	Resumption of mining (planning consent May 1986); collapse.						
<b>Management</b>	Level 2 recording.						
<b>234</b>	Retaining, wall						SH44029029
<i>Site grade</i>	A	<i>Category</i>	Structural	<i>Site status</i>	SAM		
<b>Description</b>	A stone retaining wall; there is evidence of fine tailing down slope, suggesting that this area formed an extraction and processing point.						
<b>Threat</b>	Resumption of mining (planning consent May 1986); collapse.						
<b>Management</b>	Level 3 recording.						

<b>235</b>	Water-course					SH44049016
<i>Site grade</i>	B	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A water-course which formerly crossed bridge (223) and connected precipitation system (222) to the Dyffryn Coch precipitation systems; there has been some household dumping here.					
<b>Threat</b>	Resumption of mining (planning consent May 1986)					
<b>Management</b>	Level 1 recording.					
<b>236</b>	Shaft					SH44629057
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	Blocked; possibly part of the collar is exposed on the south (down slope) side; it is possible that there is stoping leading to the open workings at (237). This believed to have been one of the shafts operated by a central steam winder.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 1 recording.					
<b>237</b>	Extraction area					SH44649056
<i>Site grade</i>	B	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	Either stoping or open workings.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 1 recording.					
<b>238</b>	Precipitation system					SH44539062
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A single copper precipitation pit, now visible only as a low curved stone wall. This appears to have been fed from (240), and in turn to have fed into (239).					
<b>Threat</b>	Erosion.					
<b>Management</b>	Level 1 recording.					
<b>239</b>	Precipitation system					SH44549064
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A copper precipitation pit, fed from (238) and apparently feeding into (144).					
<b>Threat</b>	Erosion.					
<b>Management</b>	Level 1 recording.					
<b>240</b>	Water-course					SH44539062
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A shallow channel from the Carreg y Doll shaft (241) to precipitation system (238).					
<b>Threat</b>	Erosion.					
<b>Management</b>	Level 1 recording.					
<b>241</b>	Shaft					SH44429051

*Site grade* B *Category* Extraction *Site status*

**Description**

One of the two shafts known as Carreg y Doll. It has been capped (no. 27), but there is a substantial area of collapse to a depth of 2m, exposing stonework and timbering. The presence of a water-channel from the shaft (240) suggests that it was used to raise water (see [242]).

**Threat**

Collapse.

**Management**

Level 3 recording.

242 Structure SH44429052

*Site grade* B *Category* Power *Site status*

**Description**

Traces of buildings, foundations only, covered with heather. These were presumably the engine house for operating Carreg y Doll shaft (241) and their associated features, in which case they probably date to 1846. It was here that Captain Tiddy sheltered from the strike in 1860 only to find the engine shaking itself to pieces over him.

**Threat**

Vegetation.

**Management**

Level 3 recording.

243 Bridge SH44409050

*Site grade* C *Category* Transport *Site status*

**Description**

The stone abutments only survive, 2m high, of a bridge that carried a tip run from Lemin's, Charlotte and Cairn's shafts over a path. The form of the bridge suggests the use of railed transport at this point.

**Threat**

Collapse.

**Management**

Level 1 recording.

244 Structure SH44329044

*Site grade* E *Category* Unknown *Site status*

**Description**

A dilapidated stone structure, rectangular in plan, of which only three or four courses survive, which may enclose a stope or shaft. The ground is covered in heather at this point. Set in the ground by the east-facing wall is a cast-iron cylinder 0.7m diameter.

**Threat**

Vegetation.

**Management**

Level 1 recording.

245 Shaft SH44329043

*Site grade* C *Category* Extraction *Site status*

**Description**

Possible site --visible only as a shallow depression.

**Threat**

NA.

**Management**

Level 1 recording.

246 Extraction point SH44339045

*Site grade* A *Category* Extraction *Site status*

**Description**

An open cutting, possibly a stope, orientated south-west to north-east, approximately 9m deep, too dangerous for close exploration, but in which there are no traces of shot holes. Whilst this is therefore presumably earlier than the late eighteenth century, it is reported that no trace of hammer-stones have been found here either, nor of charcoal for fire setting

**Threat**

Collapse.



## Management

Exploration by, suitably equipped and qualified personnel with a view to establishing dating evidence exists.

247 Extraction point SH44339044

*Site grade* A *Category* Extraction *Site status*

### Description

An open cutting, possibly a stope, orientated south-west to north-east, approximately 9m deep, too dangerous for close exploration, but in which there are no traces of shot holes. Whilst this is therefore presumably earlier than the late eighteenth century, it is reported that no trace of hammer-stones have been found here either, nor of charcoal for fire-setting.

### Threat

Collapse.

### Management

Exploration by suitably equipped and qualified personnel with a view to establishing dating evidence exists.

248 Extraction point SH44339043

*Site grade* A *Category* Extraction *Site status*

### Description

An open cutting, possibly a stope, orientated south-west to north-east. approximately 9m deep, too dangerous for close exploration, but in which there are no traces of shot holes. Whilst this is therefore presumably earlier than the late eighteenth century, it is reported that no trace of hammer-stones have been found here either, nor of charcoal for fire-setting.

### Threat

Collapse.

### Management

Exploration by suitably equipped and qualified personnel with a view to establishing dating evidence exists.

249 Shaft SH44329043

*Site grade* A *Category* Extraction *Site status*

### Description

A shaft, possibly open, near the lip of the Hillside Opencast, too dangerous for close inspection.

### Threat

Collapse.

### Management

Exploration by suitably equipped and qualified personnel with a view to establishing dating evidence exists.

250 Shaft SH44289042

*Site grade* C *Category* Extraction *Site status*

### Description

Site only, capped. no. 35.

### Threat

NA.

### Management

Level 1 recording.

251 Precipitation system SH44279038

*Site grade* A *Category* Extraction *Site status* Lichenological SSSI

### Description

Possibly part of a copper precipitation pit, which has otherwise been quarried away by the Hillside Opencast. However. no such system is marked on surviving maps. This feature falls within the Scheduled area An 111 D.

### Threat

NA.

### Management

Level 1 recording.

252 Extraction area SH44359038

*Site grade* A *Category* Extraction *Site status* SAM/Lichenological SSSI

### Description

The Hillside Opencast, a major open working, not as large in area as the Great Opencast but possibly deeper. This feature appears to have come into being after 1788, when this area is shown riddled with shafts. but had achieved a substantial size by 18 15-18

19. The Hillside opencast includes a spectacular feature, an open cavern or “heavy hanging” known as Gwaith Robin Ellis at SH44329037.

The Hillside Opencast falls within the Scheduled area An 111 D.

**Threat**

Collapse.

**Management**

Monitoring for collapse.

253 Shaft SH44299033

*Site grade* A *Category* Extraction *Site status* SAM/Lichenological SSSI

**Description**

Site only, capped; this feature is believed to lead to Gwaith Robin Ellis within (252) and falls within the Scheduled area An111D

**Threat**

NA.

**Management**

Level 1 recording.

254 Shaft SH44289027

*Site grade* C *Category* Extraction *Site status*

**Description**

A possible site only. A substantial depression is apparent in the fork of finger tip-runs.

**Threat**

Collapse.

**Management**

Level 1 recording.

255 Structure SH44439037?

*Site grade* E *Category* Unknown *Site status*

**Description**

Two dilapidated half-round buildings in a UU plan, built against the slope of a tip to the north. The walls survive up to 2m high; the more westerly is laid with vertically-placed stones, the easterly with horizontal. The 25” ordnance survey of 1900 marks a single small circular-plan building here built against what appears to be a tip retaining wall, a feature which cannot easily be reconciled with what survives on site. Rogers 1996 suggests that they were powder magazines.

**Threat**

Collapse.

**Management**

Level 2 recording.

256 Shaft SH44459033

*Site grade* C *Category* Extraction *Site status*

**Description**

Possible site only; a depression is visible in made-up ground approximately 4m deep, 10m in diameter.

**Threat**

NA.

**Management**

Level 1 recording.

257 Retaining wall SH44439031

*Site grade* C *Category* Structural *Site status*

**Description**

A long retaining wall, orientated south-west to north-east, on the south-east side of which are the foundations of a building (258).

**Threat**

Collapse.

**Management**

Level 2 recording.

258 Incline winding house SH44439031

*Site grade* C      *Category* Transport      *Site status*

**Description**

A building constructed on the made-up ground of tipping waste, and which now survives only as a sunken feature below the present ground level. It may possibly be the site of the winding engine that uphauled wagons on the incline from the Hillside Opencast, of which no other trace was observed to remain, but which is indicated by archival evidence.

**Threat**

Collapse.

**Management**

Level 2 recording.

259      Structure      SH44389026

*Site grade* E      *Category* Unknown      *Site status*

**Description**

A low embankment of stone, 1 m high and 2m, wide, runs across an area of tipping. It is possible that this represents part of the precipitation system indicated on the map of 1788 as extending from north of the Mona Mine yard at SH44259022 to the Hillside, and which otherwise appears to be almost entirely buried apart from the lowest pits, noted as (290). See also (453).

**Threat**

Collapse.

**Management**

Level 2 recording.

260      Shaft      SH44439041

*Site grade* C      *Category* Extraction      *Site status* Lichenological SSSI

**Description**

Site only, capped.

**Threat**

NA.

**Management**

Level 1 recording.

261      Shaft      SH44479046

*Site grade* C      *Category* Extraction      *Site status* Lichenological SSSI

**Description**

Visible as a substantial depression, 11 m in diameter and 5m deep, the condition of which has deteriorated markedly over the last few years.

**Threat**

Collapse.

**Management**

Level 1 recording.

262      Retaining wall      SH44489046

*Site grade* D      *Category* Structural      *Site status*

**Description**

A low dilapidated stone retaining wall.

**Threat**

Further dilapidation.

**Management**

Level 1 recording,

263      Structure      SH44579052

*Site grade* E      *Category* Processing      *Site status* Lichenological SSSI

**Description**

A stone-built structure, in plan 16.5m by 9m, orientated north-east to south-west, roofless and much dilapidated, built on the bedrock of the southern slope of Carreg, y Doll. The walls stand up to 4.5m high. Doors are apparent in each longitudinal wall, and what may be a series of three chutes in the north-eastern gable. There is a raised inclined walkway across the structure, which continues as a ramp on the south-east side. At its northern corner is a small stone lined reservoir (vertically-laid stones, 5m square in plan) which feeds into the north-eastern part of the building through a pipe in the longitudinal wall (still in situ); the internal walls hereabouts appear to have spattered with a thick liquid substance which has dried and partly hardened.

This structure is associated with a water-course (264) and a feature (265) on its south side and with a flue that runs up to the summit of Carreg y Doll to the west (276), and is traditionally known as the Calciner. This interpretation appears to be supported by the flue. However, the presence of an adjacent water-holding pond and of a flume down slope, together with the suggestion of a spattered copper pulp on the northern part of the building and the chutes in the gable wall suggest that this building might have contained a set of stamps or a rotary crusher. It has also been described (Bick, 1988. 4.2.3 1) as the site of a horizontal steam engine for winding from several shafts and for boring wooden pipes.

**Threat**

Collapse; proximity to pathway.

**Management**

Level 5 recording.

**264** Water-course SH44569050  
*Site grade* E *Category* Unknown *Site status* Lichenological SSSI

**Description**

To the south of (263), a stone-lined water-channel, partly capped, possibly to take spent water from a wet-stamping or -crushing process in (263) to the precipitation system (288).

**Threat**

This feature appears stable.

**Management**

Level 3 recording.

**265** Feature SH44569051  
*Site grade* E *Category* Unknown *Site status* Lichenological SSSI

**Description**

A linear feature marked as a shallow depression to the south of the Calciner (263).

**Threat**

Erosion.

**Management**

Level 3 recording.

**266** Shaft SH44569055  
*Site grade* C *Category* Extraction *Site status* Lichenological SSSI

**Description**

Site only, capped.

**Threat**

NA.

**Management**

Level 1 recording.

**267** Water-course SH44609053  
*Site grade* E *Category* Unknown *Site status*

**Description**

Some timber ducting survives at this point embedded in the ground and part-buried.

**Threat**

Erosion.

**Management**

Level 1 recording.

**268** Shaft SH44619053  
*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, capped.

**Threat**

NA.

**Management**

Level 1 recording.

**269** Ramp SH44589051

<b>Site grade</b>	E	<b>Category</b>	Transport	<b>Site status</b>	Lichenological SSSI
<b>Description</b>					
A stone-built ramp, 1.5m wide, leading uphill into (263).					
<b>Threat</b>					
Collapse.					
<b>Management</b>					
Level 3 recording,					
<b>270</b>	Shaft				SH44609050
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>					
Visible only as a depression 2m deep, and 5m in diameter.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 1 recording					
<b>271</b>	Shaft				SH44579049
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>					
Visible only as a depression 2m deep, and 5m in diameter.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 1 recording,					
<b>272</b>	Feature				SH43879023
<b>Site grade</b>	E	<b>Category</b>	Unknown	<b>Site status</b>	
<b>Description</b>					
A semi-circular structure is shown here on the 19800 25" ordnance survey; it appears since to have been covered by tips.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 1 recording,					
<b>273</b>	Shaft				SH44649055
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>					
Marked on the 1900 25" ordnance survey but not longer apparent on the ground.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 1 recording,					
<b>274</b>	Shaft				SH44719055
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>					
Site only, capped.					
<b>Threat</b>					
NA.					
<b>Management</b>					
Level 1 recording.					
<b>275</b>	Shaft				SH44479053
<b>Site grade</b>	C	<b>Category</b>	Extraction	<b>Site status</b>	
<b>Description</b>					
Site only, capped.					
<b>Threat</b>					

NA.

**Management**

Level 1 recording.

276 Flue SH44579051

*Site grade* B *Category* Processing *Site status*

**Description**

A lengthy flue, visible in places only as a slight depression edged with stone, mainly quartz, elsewhere as a more marked growth of heather, leading from the Calciner (263) by a zig-zag course to the summit of Carreg y Doll. Capstones are visible in places on the upper section.

**Threat**

Erosion.

**Management**

Level 3 recording.

277 Precipitation system SH44859057C

*Site grade* B *Category* Extraction *Site status*

**Description**

A system of ochre precipitation pits at the lower end of the Hillside system, in which mine waste has been tipped over the western end and there is evidence of domestic waste tipping off the substantial embankment which carries the road across the eastern end.

**Threat**

Fly-tipping; proximity to road.

**Management**

Level 3 recording.

278 Water-course SH44809053

*Site grade* A *Category* Extraction *Site status*

**Description**

A by-pass system around (277), which emerges from underneath bedrock at (279) to feed (308).

**Threat**

Fly-tipping; proximity to road.

**Management**

Level 2 recording.

279 Water-course SH44809053

*Site grade* A *Category* Extraction *Site status*

**Description**

An opening in bedrock from which water feeds into (278); it may derive from (288).

**Threat**

NA.

**Management**

Level 2 recording.

280 Feature SH44859055

*Site grade* E *Category* Unknown *Site status*

**Description**

A stone-lined depression 2m by 2m in plan, 1 m deep.

**Threat**

Collapse.

**Management**

Level 1 recording,

281 Precipitation system SH44829051C

*Site grade* A *Category* Extraction *Site status*

**Description**

An ochre precipitation pit, bisected by a low wall of cobbing waste, feeding (282).

**Threat**

Erosion.

## Management

Level 2 recording.

282 Water-course SH44839052  
*Site grade* A *Category* Extraction *Site status*

### Description

A substantial stone argia, which may once have defined a water-course running from (281) into

### Threat

Fly'-tipping. proximity to road.

### Management

Level 1 recording.

283 Shaft SH44719055  
*Site grade* C *Category* Extraction *Site status*

### Description

Site only, capped.

### Threat

### Management

Level 1 recording.

284 Chimney SH44679051  
*Site grade* B *Category* Processing *Site status*

### Description

The stump of a chimney, which includes a stone square-plan (2m by 2m) base, 1.8m high, and a stone circular-plan chimney on top, standing to an additional height of 2m+. Firebricks and stone were noted in the surrounding tumble. The proximity of this feature to a precipitation system (288) suggests that it might have formed part of a reverberatory furnace for the copper or ochre precipitate, though (287) might also be a candidate for this function. It is also possible that it is connected with the long, flue which crosses the Hillside area from Dyffryn Coch (304).

### Threat

Collapse; proximity to pathway.

### Management

Level 3 recording.

285 Road SH44529043  
*Site grade* B *Category* Transport *Site status*

### Description

A roadway, an engineered feature, which would at one time have been able to take a cart but which has been disturbed by recent bulldozing

### Threat

Bulldozing

### Management

Level 1 recording.

286 Structure SH44589049  
*Site grade* E *Category* Unknown *Site status*

### Description

A stone-built banked recess consisting of a retaining wall 1.5m high, possibly the base of a chute from the shaft up slope (271).

### Threat

Collapse.

### Management

Level 1 recording.

287 Structure SH44569046  
*Site grade* E *Category* Unknown *Site status*

### Description

A single-unit stone-built building constructed into the slope of the hillside, orientated north-east to south-west. The walls survive up to caves height (4m). There are traces of chutes from the road on the up slope side (285) in the longitudinal wall. There are vents and windows in the gable walls, and firebrick was noted in the tumble in the south-western part of the building.

A branch cart-road from (285) serves the building through a doorway in the south-east-facing longitudinal wall, which is large enough to accommodate a cart. It is possible that this building housed a furnace to dry precipitate from (288).

**Threat**

Collapse.

**Management**

Level 4 recording.

**288** Precipitation system SH44609045C

*Site grade* A *Category* Extraction *Site status* SAM/Lichenological SSSI

**Description**

The Hillside precipitation pits, an extensive copper and ochre precipitation system, a Scheduled Ancient Monument. It occupies a natural gully in the eastern half of the mountain. The large ochre pit at the lower end of the system has been largely obscured by tailings, but the copper precipitation pits themselves survive largely intact. The argiau consist of low stone walls enclosing precipitate and other finer material. The system is fed from three points; a tunnel in (289), q.v., a row of pillars (291) and also from an adit emerging from underneath the road

**Threat**

Collapse.

**Management**

This feature has been Scheduled as an Ancient Monument.

**289** Water-course SH44619047

*Site grade* A *Category* Extraction *Site status* SAM/Lichenological SSSI

**Description**

The trace of a water-course apparently emerging from an adit, passing under the road (285) and feeding the precipitation system (288).

**Threat**

Erosion.

**Management**

Level 3 recording.

**290** Precipitation system SH44519040C

*Site grade* A *Category* Extraction *Site status* SAM/Lichenological SSSI

**Description**

The upper part of the Hillside precipitation system. It falls within the Scheduled area. This feature appears to be the only surviving part of the Mona mine's original precipitation pit system of 1788 or earlier, fragments of which may survive as (259), and which began at SH44259022 (see 453). It consists of two copper precipitation pit separated by a stone-faced dam, approximately 4m high, in which there has been some collapse on the upstream side. The lower pit is also bisected by a low wall, and the pits are connected by a by-pass water course along the northern side. The whole system is held back by a substantial stone dam, which stands up to a height of 4m, and is 4m wide at its surface. This feature is pierced by a channel, noted as a small square opening with a flat lintel on the upstream side and as a red-brick arch 1.5m in diameter on the downstream side. There are traces of a wooden sluice within.

**Threat**

Collapse.

**Management**

Consolidation.

**291** Water-course SH44439040

*Site grade* B *Category* Extraction *Site status*

**Description**

A row of dilapidated stone pillars built on the slope of a tip, standing to a maximum of 1 m high, and which probably carried water from shaft (260) to the precipitation system (288).

**Threat**

Collapse.

**Management**

Level 2 recording.

**292** Shaft SH44609033

*Site grade* C *Category* Extraction *Site status*

**Description**



A shaft surrounded by a low stone protective wall; the shaft itself appears to be blocked and is flooded to the collar. A small spoil tip is apparent down slope, suggesting that this feature is not very deep, and may be no more than a trial.

**Threat**

This feature appears stable.

**Management**

Level 1 recording.

293 Magazine SH44569034

*Site grade* C *Category* Ancillary *Site status*

**Description**

A stone-built circular-plan building, 7m in diameter (outside measurement), whose walls are 0.6m thick and stand to 2m high. There is one doorway in the building. Despite the weakness of the walls and the proximity of this structure to the kilns (294-304), it has all the structural characteristics of a powder magazine.

**Threat**

Proximity to roadway.

**Management**

Level 4 recording,

294 Kiln SH44609038

*Site grade* A *Category* Processing *Site status*

**Description**

A kiln site, alongside the road along the edge of the Hillside Opencast. Visible as a long oval depression surrounded by pinkish waste.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

295 Kiln SH44619036

*Site grade* A *Category* Processing *Site status*

**Description**

A kiln site, visible as a substantial oval depression surrounded by pinkish waste.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

296 Kiln SH44629038

*Site grade* A *Category* Processing *Site status*

**Description**

A kiln site, visible as a rounded depression, surrounded by pinkish waste.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

297 Kiln SH44729036

*Site grade* A *Category* Processing *Site status*

**Description**

A cluster of kiln sites along the northern side of a rock outcrop, visible as pink spoil. There is a trace of a possible flue or sulphur sublimation chamber (299) which also serves kiln (298) and which exhausts near the top of the outcrop.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

298 Kiln SH44769040

*Site grade* A *Category* Processing *Site status*

**Description**

A cluster of kiln sites down slope from (297); there are traces of a possible flue (299) leading from it to draw sulphur from kiln (297), which appears to have exhausted near the summit of the outcrop.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

299 Flue SH44759034

*Site grade* A *Category* Processing *Site status*

**Description**

There are faint traces of a flue or sulphur sublimation chamber uniting the various kiln sites at (297) and (298) and exhausting near the summit of the rock outcrop. This feature is for the most part only faintly visible as a linear feature in the heather.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

300 Kiln SH44529033

*Site grade* A *Category* Processing *Site status*

**Description**

A kiln site.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

301 Flue SH44529033

*Site grade* A *Category* Processing *Site status*

**Description**

A stone-built sulphur sublimation chamber orientated east-west, to the south of, and associated with, kiln (300).

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording. and contour survey.

302 Kiln SH44529035

*Site grade* A *Category* Processing *Site status*

**Description**

A kiln site, visible as a shallow depression, surrounded by pinkish waste.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

303 Flue SH44529035

*Site grade* A *Category* Processing *Site status*

**Description**

A stone-built sulphur sublimation chamber orientated east-west, to the south of. and associated with, kiln (302).

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

304 Flue- SH44509036

*Site grade* A *Category* Processing *Site status*

**Description**

A stone-built flue, apparently a sulphur sublimation chamber, with no associated kiln, but around which ironstone has been piled,

suggesting that it was used for sulphur extraction only and not for calcination.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

305 Kiln SH44559037

*Site grade* A *Category* Processing *Site status*

**Description**

A kiln site, visible as a shallow depression surrounded by pinkish waste.

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

306 Flue SH44569037

*Site grade* A *Category* Processing *Site status*

**Description**

A stone-built sulphur sublimation chamber, orientated north-east to south-west, and associated with kiln (305).

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

307 Kiln SH44569035

*Site grade* A *Category* Processing *Site status*

**Description**

A kiln site, visible as a shallow depression, up slope of (306).

**Threat**

Proximity to roadway; vegetation; collapse.

**Management**

Level 4 recording and contour survey.

308 Precipitation system SH44959060C

*Site grade* B *Category* Extraction *Site status*

**Description**

An extensive copper and ochre precipitation system, forming the lower part of the Hillside system. It is fed from a brick arch within (309). The copper floors are mostly dried out and covered with heather, though traces of brick flooring are intermittently visible. This system is shown on the map of 1815-1819.

**Threat**

Collapse; vegetation.

**Management**

Level 4 recording.

309 Embankment SH44919057

*Site grade* B *Category* Transport *Site status*

**Description**

A substantial stone-built embankment carrying a cart-road north to south across the Hillside precipitation systems; it stands 4m high, and a prominent arch on the north side feeds (306). Another arch on the southern side is much smaller, but feeds (308) by means of the by-pass system (278). It is an outstanding example of a late eighteenth-century/early nineteenth-century industrial road.

**Threat**

Tipping.

**Management**

Clearance of dumped household waste.

310 Precipitation system SH45039064

*Site grade* B *Category* Extraction *Site status*

**Description**

An extensive copper precipitation system fed from higher up the Hillside system. The most westerly pits were in existence by 1815-1819. The pits still carry water, and are divided by substantial stone argiau.

**Threat**

Vegetation.

**Management**

Level 4 recording.

311 Precipitation system SH45329064

*Site grade* B *Category* Extraction *Site status*

**Description**

A substantial ochre pool, bisected by a stone causeway. The pit walls to the north are constructed out of stones laid vertically in the in the Cornish fashion. There is a substantial stone-built dam on the south side.

**Threat**

Collapse.

**Management**

Level 2 recording.

312 Furnace SH45159063)

*Site grade* B *Category* Processing *Site status*

**Description**

A roofless and dilapidated building orientated north to south, heavily overgrown, with traces of burning on the internal walls on the south side. The building measures 27m. by 8m in plan. A flattened brick arch doorway in the east-facing longitudinal wall is large enough to accommodate a cart.

**Threat**

Collapse; vegetation.

**Management**

Level 3 recording.

313 Feature SH45179061

*Site grade* D *Category* Processing *Site status*

**Description**

A stone-floored area, heavily overgrown.

**Threat**

Vegetation.

**Management**

Level 1 recording.

314 Furnace SH45089058

*Site grade* D *Category* Processing *Site status*

**Description**

A structure which has now become very heavily overgrown and can scarcely be made out. It appears not to survive above the foundations. A photograph in Owen Griffith's history of the mine shows a pitched roof building at this point, with a chimney, suggesting that it was a reverberatory furnace for drying the precipitate.

**Threat**

Collapse; vegetation.

**Management**

Level 2 recording.

315 Structure SH44969056

*Site grade* E *Category* Unknown *Site status*

**Description**

Identified as caban haiam on the 1900 25" ordnance survey map.

**Threat**

Collapse; vegetation.

**Management**

Level 1 recording.

316 Adit SH43858985

**Site grade** C **Category** Extraction **Site status**  
**Description**  
 An adit from which water still flows into the Dyffryn Coch precipitation system, but which has been boarded up with timber.  
**Threat**  
 Resumption of mining (planning consent May 1986)  
**Management**  
 Level 2 recording.

317 Adit SH43868986

**Site grade** C **Category** Extraction **Site status**

**Description**  
 An adit from which water issues but which has been blocked or has collapsed.  
**Threat**  
 Resumption of mining (planning consent May 1986)  
**Management**  
 Level 2 recording.

318 Water-course SH43868983

**Site grade** B **Category** Extraction **Site status**

**Description**  
 A shallow watercourse which fades out to the east; it probably carried cupriferous water to the Dyffryn Coch systems.  
**Threat**  
 Resumption of mining (planning consent May 1986)  
**Management**  
 Level 2 recording and levelling.

319 Water-course SH43878984

**Site grade** B **Category** Extraction **Site status**

**Description**  
 A water-course, marked for the most part by a growth of heather in the turf, which may have connected the precipitation system at (164) with the Dyffryn Coch systems.  
**Threat**  
 Resumption of mining, (planning consent May 1986)  
**Management**  
 Level 2 recording and levelling.

320 Bridge SH44009000

**Site grade** D **Category** Transport **Site status**

**Description**  
 The abutments only survive of a small bridge which seems intended for a barrow-run rather than a cart-road or a tramway.  
**Threat**  
 Resumption of mining (planning consent May 1986)  
**Management**  
 Level 1 recording.

321 Feature SH44029001

**Site grade** E **Category** Unknown **Site status**

**Description**  
 An area of brick scatter here may be the result of dumping.  
**Threat**  
 Resumption of mining (planning consent May 1986)  
**Management**  
 Level 1 recording.

322 Structure SH44249015C

**Site grade** B **Category** Ancillary **Site status** Lichenological SSSI

**Description**

The Mona Mine yard (Iard Mona Mine); described as new on the map of 1788 and its basic arrangements appear to have under-one little alteration since.

It is an open yard on an east-west axis, constructed on bedrock, and would presumably originally have stood of more of an eminence than now, before tipping altered the ground levels. There is a trace of a cart-entrance on the north longitudinal wall, and buildings have been constructed all around the yard wall, both internally and externally. These are variously single-storey and two-storey buildings, roofless and dilapidated. The walls stand up to a maximum of 4m high. There are traces of possible gardens along the west wall, suggesting that these might have been offices, and a possible smithy is indicated by the traces of a hearth among the ruins on the east side of the building. A curious feature is the stone-lined cellar, 4m by 9m in plan, 1.5m deep, alongside the south longitudinal wall.

**Threat**

Collapse; proximity to pathway; resumption of mining (planning consent May 1986) - the boundaries of the consent touch the north-west corner of the yard and run along the southern perimeter wall.

**Management**

Level 4 recording. It is desirable that the tip immediately to the north be examined for traces of mercury, as this may indicate the position of the assay office.

323 Precipitation system SH44149016

*Site grade* B *Category* Extraction *Site status*

**Description**

The trace of a copper precipitation pond is visible here among the tips; there is no evidence of man-made features, and its relationship to the water-course (235) is uncertain.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording.

324 Precipitation system SH44159000C

*Site grade* B *Category* Extraction *Site status*

**Description**

A copper precipitation system on the southern slopes of the mountain, fed by (235) and feeding into the Dyffryn Coch systems. Pits are marked here on the 1815 map of Parys mine, and they may also be the ones marked in 1788 on the Mona mine map as "Hughes and Co's Iron Pits". The retaining wall (326) is a prominent feature.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording.

325 Shaft SH44169005

*Site grade* C *Category* Extraction *Site status*

**Description**

Site only, collapsed.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

326 Retaining wall SH44108998

*Site grade* D *Category* Structural *Site status*

**Description**

A stone-built retaining wall across (324).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

327 Structure SH44218997

*Site grade* E *Category* Unknown *Site status*

**Description**

A substantial structure, still roofed, is marked here on the 1900 25" ordnance survey, at a location which corresponds to a building marked in 1788.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

328 Structure SH44228998

*Site grade* E *Category* Unknown *Site status*

**Description**

A building is shown here on the 25" ordnance survey of 1900, still roofed; its position corresponds with a building possibly a cottage, shown on the 1788 map.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

329 Structure SH44238999

*Site grade* E *Category* Unknown *Site status*

**Description**

A tiny un-roofed building or other structure is marked here on the 25" ordnance survey of 1900 in a location which corresponds to the position of a building, possibly a cottage, on the 1788 map. There is no trace now visible, It may have been Cadi Rondol's house, of which a photograph appears in Owen Griffith's history of the mines.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

330 Retaining wall SH44399007

*Site grade* C *Category* Structural *Site status*

**Description**

A stone retaining wall, 3m high, alongside the Dyffryn Coch road.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording,

331 Retaining wall SH44489010

*Site grade* C *Category* Structural *Site status*

**Description**

A short length of retaining wall, 1.5m high.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

332 Adit SH44519014

*Site grade* C *Category* Extraction *Site status*

**Description**

An adit which has blocked by a concrete plug at the mouth, but from which water still issues, supplying precipitation system (330).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

333 Extraction point SH44509016

*Site grade* E *Category* Extraction *Site status*

**Description**

An open quarry face in which there is no evidence of the use of explosives. This feature is therefore likely to be early Modem or pre-Modem.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Geo-archaeological dating of exposure of rock-face.

334 Dwelling SH43788971

*Site grade* C *Category* Domestic *Site status*

**Description**

A dwelling, in re-use as dog kennels.

**Threat**

NA.

**Management**

Level 2 recording..

335 Precipitation system SH43858978C

*Site grade* B *Category* Extraction *Site status*

**Description**

A copper precipitation pit, in existence by 1815-1818, of unusual construction in that the argiau run the length of the

**Threat****Management**

Level 3 recording.

336 Precipitation system SH44088987C

*Site grade* B *Category* Extraction *Site status*

**Description**

An ochre precipitation system, apparently fed from (323). It is held back by a stone dam pierced by a brick arch. This feature is marked on the map of 1815-1819.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Clearance of dumped waste.

337 Adit SH44118993

*Site grade* B *Category* Extraction *Site status*

**Description**

An adit from which water supplies precipitation pit system (338). A brick built-structure over the adit mouth may have contained a sluice mechanism.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

338 Precipitation system SH44188990C

*Site grade* B *Category* Extraction *Site status*

**Description**

A set of copper precipitation pits, in existence by 1815, possibly as early as 1788, when "Hughes and Co's Iron Pits" are marked on or near this site. There has been some recent dumping on this site.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

This area has been surveyed by Electronic Data Measuring.

339 Adit SH44268997

*Site grade* B *Category* Extraction *Site status*

**Description**



An archway from which cupriferous water still flows, feeding water-course (341) and precipitation system (340). This feature appears to have been in existence by 1788.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

**340** Precipitation system SH443108996

*Site grade* B *Category* Extraction *Site status*

**Description**

A copper and ochre precipitation system. The copper pits appear to have been in existence by 1788, and the ochre pit is marked in 1815-1819.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

This area has been surveyed by Electronic Data Measuring.

**341** Water-course SH44268997

*Site grade* B *Category* Extraction *Site status*

**Description**

A lengthy water-course apparently fed by adit (339). It follows the contour of the valley around the eastern spur of Mynydd Parys past Tal y Dyffryn, eventually flowing into Llyn Llaethdy (391), to the north of Mynydd Parys. Though it passes the lower part of the Hillside ochre pits (310) it is not necessarily connected to them. Its initial stages are shown on the map of 1788, and its full length is marked on the map of 1815-1819.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 3 recording, to include levelling.

**342** Precipitation system SH44459002

*Site grade* B *Category* Extraction *Site status*

**Description**

A copper precipitation system, marked on the map of 1815-1819, apparently fed from both the upper pits within the Dyffryn Coch system and from an adit to the north (320).

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

This area has been surveyed using Electronic Data Measuring.

**343** Structure SH44429005

*Site grade* C *Category* Unknown *Site status*

**Description**

A heavily dilapidated structure; it is shown as roofed on the 1900 25" ordnance survey.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 2 recording.

**344** Vitriol works SH44588995

*Site grade* B *Category* Processing *Site status*

**Description**

The site of "y gwaith fudrol" (Anglice: the vitriol works). The stone-lined pits are now heavily overgrown, but a number of sterile waste-heaps are visible.

**Threat**

Resumption of mining (planning consent May 1986) and subsequent extension.

**Management**

This area has been surveyed by Electronic Data Measuring.

- 345 Structure SH44659015  
*Site grade* E *Category*, Unknown *Site status*  
**Description**  
The remains of three walls forming a structure of unknown purpose.  
**Threat**  
Resumption of mining (planning consent May 1986)  
**Management**  
Level 2 recording.
- 346 Engine house SH44939034  
*Site grade* D *Category* Power *Site status*  
**Description**  
The house of a suction gas engine to draw water from Dyffryn Coch through () and along () to sparge the tips. Now only visible as slight disturbance in the -round and cinders  
**Threat**  
Resumption of mining (planning, consent May 1986)  
**Management**  
Level 1 recording.
- 347 Water-course SH44969030  
*Site grade* D *Category* Power *Site status*  
**Description**  
A substantial concrete base, from which four holding-down bolts project, at the foot of (349), probably the site of a sluice or a pump to draw water from Dyffryn Coch, powered by (346).  
**Threat**  
Resumption of mining (planning consent May 1986)  
**Management**  
Level 2 recording.,
- 348 Feature SH44939034  
*Site grade* D *Category* Power *Site status*  
**Description**  
A linear feature connecting (346) to (347), possibly the site of a flatrod system to operate a pump in (347).  
**Threat**  
Resumption of mining (planning consent May 1986)  
**Management**  
Level 1 recording.
- 349 Water-course SH44859043  
*Site grade* B *Category* Power *Site status*  
**Description**  
A linear feature, some 350m long, which begins at (347) in Dyffryn Coch, and which follows an undulating course, partly through a rock cutting and partly in an embankment over an ochre pool. It may be connected with the chimney (284), but Cockshutt suggests that it is the course of a pipe which carried water pumped by the suction gas engine at (346) from Dyffryn Coch to sparge the tips to the north-west. Fragments of cast-iron piping were noted nearby.  
**Threat**  
Erosion; collapse.  
**Management**  
Level 4 recording.
- 350 Dwelling SH44939031  
*Site grade* D *Category* Domestic *Site status*  
**Description**  
The ruins of Fron Heulog, described by Cockshutt as the residence of the engine man responsible for (346). Now heavily overgrown, and extremely dilapidated. The traces of a garden in which cherry-trees grow are evident.  
**Threat**  
Collapse; resumption of mining (planning consent May 1986)  
**Management**  
Level 1 recording.

351 Dwelling SH45119046

*Site grade* D *Category* Domestic *Site status*

**Description**

The ruins of the dwelling Ty'n y Mynydd, roofless and extremely dilapidated. Enclosure walls survive.

**Threat**

Collapse.

**Management**

Level 2 recording.

352 Smelter SH44919053

*Site grade* A *Category* Processing *Site status*

**Description**

A brick-built smelter, surviving up to 2m high, visible as a wall exposed in a bank of earth and a contiguous building. There is the trace of a small reservoir in the building, possible for smelting, and immediately to the east is a pile of slag globules. This is the only smelter site so far discovered on Mynydd Parys.

**Threat**

Proximity to roadway; vegetation; collapse; vandalism; removal of slags.

**Management**

This feature is an priority for further excavation and measured survey.

353 Flue SH44929053

*Site grade* A *Category* Processing *Site status*

**Description**

Visible as two low parallel walls, approximately 50m long, and 0.6m apart, which carried gases from smelter (352) to the summit of a knoll to the south.

**Threat**

Vegetation.

**Management**

Clearance of vegetation.

354 Adit SH44919061

*Site grade* B *Category* Extraction *Site status*

**Description**

An adit cut through bedrock; the opening is 2m high, 1 m wide, and is closed by iron railings immediately within the adit mouth.

**Threat**

This feature appears stable.

**Management**

Level 2 recording.

355 Adit SH45089075

*Site grade* C *Category* Extraction *Site status*

**Description**

The possible site of an adit, now much overgrown.

**Threat**

Vegetation.

**Management**

Level 1 recording.

356 Hammerstone find-spot SH45059072

*Site grade* A *Category* Extraction *Site status*

**Description**

An area in which a number of possible hammer-stones have been noted by Owen J. Owen (local farmer) and in which flints and possible slag were also observed. This area is near the dwelling Henwaith, and was described in both 1764 and in 1880 as the site of early workings.

**Threat**

Proximity to road and dwellings.

**Management**

Analysis of slags.

357 Extraction point SH45049074

*Site grade* A *Category* Extraction *Site status*

**Description**

A possible early open working, visible as a shallow rock-face, in which no shot-holes are visible.

**Threat**

Proximity to road and dwellings.

**Management**

Geo-archaeological dating of exposure of rock-face.

358 Shaft SH44909079

*Site grade* D *Category*, Extraction *Site status*

**Description**

A shaft is marked at this point on the 1889 25" ordnance survey, which appears to have been infilled since.

**Threat**

NA.

**Management**

Level 1 recording.

359 Shaft SH45049074

*Site grade* D *Category* Extraction *Site status*

**Description**

A shaft is marked and identified as such on the 1889 25" ordnance survey, which appears to have been infilled since.

**Threat**

NA.

**Management**

Level 1 recording.

360 Precipitation system SH45219046

*Site grade* B *Category* Extraction *Site status*

**Description**

A small pit, now largely dry and much overgrown with gorse. There is a substantial buttressed dam on the east side, from which two separate water-courses (361) and (362) flow.

**Threat**

Vegetation.

**Management**

Level 3 recording of the dam.

361 Water-course SH45239048

*Site grade* B *Category* Extraction *Site status*

**Description**

A water-course which appears to have run from (361) to (311).

**Threat**

Collapse.

**Management**

Level 1 recording and levelling.

362 Water-course SH45239047

*Site grade* B *Category* Extraction *Site status*

**Description**

A water-course which runs partly on a made-up embankment and partly in a rock cutting, from (360) eastwards, then turns south and west into Dyffryn Coch, where its course peters out.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording and levelling.

<b>363</b>	Extraction point				SH43228985
<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>	
<b>Description</b>	A shallow open working.				
<b>Threat</b>	Collapse.				
<b>Management</b>	Level 1 recording.				
<b>364</b>	Shaft				SH43208987
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	
<b>Description</b>	Site only, capped.				
<b>Threat</b>	NA.				
<b>Management</b>	Level 1 recording.				
<b>365</b>	Shaft				SH43138999
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	
<b>Description</b>	Site only, capped.				
<b>Threat</b>	Resumption of mining (planning consent May 1986)				
<b>Management</b>	Level 1 recording.				
<b>366</b>	Shaft				SH43099010
<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>	
<b>Description</b>	Evident only as a substantial pile of spoil. Marked as "Old Shaft (Copper)" on the 1900 25" ordnance survey map.				
<b>Threat</b>	Resumption of mining (planning consent May 1986)				
<b>Management</b>	Level 1 recording.				
<b>367</b>	Engine house				SH43109011
<i>Site grade</i>	D	<i>Category</i>	Power	<i>Site status</i>	
<b>Description</b>	Site only. Marked as such on the 1900 25" ordnance survey, but the only evidence is scattered stonework.				
<b>Threat</b>	Collapse; resumption of mining (planning consent May 1986)				
<b>Management</b>	Level 1 recording.				
<b>368</b>	Water-course				SH43089012
<i>Site grade</i>	D	<i>Category</i>	Power	<i>Site status</i>	
<b>Description</b>	A rectangular-plan pool, 14.5m by 9m is apparent here. It is marked on the 1889 25" ordnance survey, and presumably connected with the engine-house (367). It is probably the engine-pool to catch rainwater mentioned in the Mining Journal for 1882.				
<b>Threat</b>	Farming; resumption of mining (planning consent May 1986)				
<b>Management</b>	Level 1 recording.				
<b>369</b>	Shaft				SH43169015
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>	

**Description**

Site only, capped.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

370 Shaft SH43269023

*Site grade* E *Category* Extraction *Site status*

**Description**

Not observed; possibly obscured by heather.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording

371 Shaft SH43239028

*Site grade* B *Category* Extraction *Site status*

**Description**

The collar of the shaft has been concreted and an iron door placed over the shaft-head. This is held down by a bar bolted into the concrete. However, the shaft is open and could be made accessible.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

The shaft should be kept open to allow future access to the Morfa Du workings.

372 Road SH43099009

*Site grade* C *Category* Transport *Site status*

**Description**

An engineered cart-road.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

373 Dwelling SH43369032

*Site grade* D *Category* Domestic *Site status*

**Description**

A dwelling, partly intact, but most of the slates have been removed and the roof timbers are beginning to deteriorate.

**Threat**

Collapse; resumption of mining (planning consent May 1986)

**Management**

Level 2 recording,

374 Shaft SH43569043

*Site grade* C *Category* Extraction *Site status*

**Description**

A shallow, flooded open working, which led to the Western shaft.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording,

375 Extraction point SH43609053

*Site grade* C *Category* Extraction *Site status*

**Description**

An open quarry, part infilled with domestic and other rubbish.

**Threat**

Tipping; resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

376 Dwelling, SH43549035

*Site grade* D *Category* Domestic *Site status*

**Description**

The ruins of Bryn Glas, roofless and heavily dilapidated.

**Threat**

Collapse; resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

377 Extraction point SH43499031

*Site grade* C *Category* Extraction *Site status*

**Description**

An open quarry.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording'

378 Magazine SH43429042

*Site grade* D *Category* Ancillary *Site status*

**Description**

The site of the Morfa Du powder magazine, marked as such on the 1889 25" ordnance survey.

**Threat**

Resumption of mining (planning consent May 1986)

**Management**

Level 1 recording.

379 Shaft SH43019018

*Site grade* C *Category* Extraction *Site status*

**Description**

Possibly the site of the lower Morfa Du adit.

**Threat**

Collapse.

**Management**

Level 2 recording,

380 Shaft SH431929095

*Site grade* C *Category* Extraction *Site status*

**Description**

A ventilation shaft on the joint level.

**Threat**

Collapse.

**Management**

Level 2 recording.

381 Shaft SH43899104

*Site grade* C *Category* Extraction *Site status*

**Description**

A ventilation shaft on the joint level.

**Threat**

Collapse.

**Management**

Level 2 recording,

<b>382</b>	Shaft					SH43869109
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A ventilation shaft on the joint level.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 2 recording.					
<b>383</b>	Shaft					SH43849114
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A ventilation shaft on the joint level.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 2 recording.					
<b>384</b>	Shaft					SH43829118
<i>Site grade</i>	C	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	A ventilation shaft on the joint level.					
<b>Threat</b>	Collapse.					
<b>Management</b>	Level 2 recording.					
<b>385</b>	Adit					SH43819123
<i>Site grade</i>	B	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The point at which the joint level emerges from underground and joins with the Afon Goch; in existence by 1815.					
<b>Threat</b>	Collapse; this feature is believed to contain a dam some distance from the entry.					
<b>Management</b>	Level 2 recording; the condition of the dam within the level should be monitored.					
<b>386</b>	Precipitation system					SH43909170C
<i>Site grade</i>	B	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The Dyffryn Adda precipitation system, consisting of a system of copper and ochre precipitation pits, at the point where the joint level (385) emerges from under-round and joins both with the Afon Goch and the stream (392) which drains Llyn Llaethdy (392). The copper pits are of a different design to those elsewhere on the site, being brick-built with timber shuttering. Some of the pits still contain precipitate. These are shown on the map of 1815-1819, and remained in use until 1958. The ochre pits are now largely grassed over.					
<b>Threat</b>	Vandalism, vegetation.					
<b>Management</b>	Level 4 recording; this feature also lends itself to reconstruction as a working exhibit. Its value is enhanced by its proximity to the furnace (387).					
<b>387</b>	Furnace					SH43829137
<i>Site grade</i>	A	<i>Category</i>	Processing	<i>Site status</i>		
<b>Description</b>	A stone-built furnace house, now roofed with corrugated iron but once slated, possibly used to dry precipitate from the Dyffryn Adda precipitation pits. The brick-built furnace survives, but has suffered considerable recent damage. Integral with the building on its south-east side is a smaller unit, possibly for a weighbridge.					
The furnace house, or a building on its site, appears to be shown on the map of 1815-1819.						



**Threat**

Vandalism; collapse.

**Management**

Level 5 recording; consolidation; the value of this feature is enhanced by its proximity to (386), and would lend itself to incorporation in a visitor trail.

**388** Dwelling SH43809137

*Site grade* C *Category* Domestic *Site status*

**Description**

A dilapidated dwelling, integral with (387).

**Threat**

Vandalism; collapse; vegetation.

**Management**

Consolidation.

**389** Yard SH43859140

*Site grade* C *Category* Ancillary *Site status*

**Description**

An open area latterly used to store core samples in wooden sheds. These are now largely destroyed, and core samples have been scattered over the site. A fragment of pump-rod, believed to be from Cairn's shaft, survives on site.

**Threat**

Vandalism.

**Management**

Level 31 recording.

**390** Road SH43879136

*Site grade* C *Category* Transport *Site status*

**Description**

A road from the Dyffryn Adda precipitation system and furnace to the Amlwch-Llanerchymedd road.

**Threat**

This feature is stable.

**Management**

Level 1 recording.

**391** Precipitation system SH44209150C

*Site grade* B *Category* Extraction *Site status*

**Description**

An ochre pit, known as Llyn Llaethdy.

**Threat**

Vegetation.

**Management**

Level 2 recording.

**392** Water-course SH44159154

*Site grade* B *Category* Extraction *Site status*

**Description**

A stone-lined stream which connects Llyn Llaethdy (391) with the Dyffryn Adda precipitation system (386).

**Threat**

Vegetation.

**Management**

Level 2 recording.

**393** Hammerstone find-spot SH44099053C

*Site grade* A *Category* Extraction *Site status*

**Description**

An area in which Simon Timberlake records the discovery of hammer-stones.

**Threat**

Proximity to footpath.

## Management

It is desirable that this area be further examined for evidence of pre-Modern mining.,

394 Hammerstone find-spot SH43879062

*Site grade* A *Category* Extraction *Site status*

### Description

An area in which Simon Timberlake records the discovery of hammer-stones.

### Threat

Proximity to footpath.

### Management

It is desirable that this area be further examined for evidence of pre-Modern mining.

396 Flue SH43859030

*Site grade* B *Category* Processing *Site status*

### Description

The possible upper end of a flue was noted at this point.

### Threat

Resumption of mining (planning consent May 1986)

### Management

Level 3 recording.

397 Flue SH43779034

*Site grade* B *Category* Processing *Site status*

### Description

The trace of a flue, visible only as a line of heather in the slope of a tip, was noted at this point. It appears to be connected with (398).

### Threat

Resumption of mining (planning consent May 1986)

### Management

Level 3 recording.

398 Chimney SH43769033

*Site grade* B *Category* Processing *Site status*

### Description

The lower part of a dilapidated stone chimney.

### Threat

Resumption of mining (planning consent May 1986)

### Management

Level 3 recording.

399 Feature SH433739032

*Site grade* E *Category* Processing *Site status*

### Description

A feature which may be connected with the calcining or smelting of ore, visible as a stone embankment up the side of a tip and two stone-built pillars on the tip surface.

### Threat

Resumption of mining, (planning consent May 1986)

### Management

Level 3 recording.

400 Bridge SH44629014

*Site grade* B *Category* Transport *Site status*

### Description

A bridge over water-course (34 1).

### Threat

Collapse.

### Management

Recommendations: level 2 recording.

401 Precipitation system SH44789013

*Site grade* B *Category* Extraction *Site status*

**Description**

An extensive ochre pit. A substantial stone dam, over which a road passes, holds back the water on the east.

**Threat**

Vegetation.

**Management**

Level 3 recording.

402 Precipitation system SH44859024

*Site grade* B *Category* Extraction *Site status*

**Description**

A large, irregularly shaped pit constructed to the north of (401) It is held back by a large wall on its down slope side.

**Threat**

Vegetation.

**Management**

Recommendations: level 3 recording

403 Precipitation system SH44799022

*Site grade* B *Category* Extraction *Site status*

**Description**

A large rectangular-plan pit adjacent to (402) and immediately up slope of (401)

**Threat**

Vegetation.

**Management**

Recommendations: level 3 recording

404 Precipitation system SH45209035C

*Site grade* B *Category* Extraction *Site status*

**Description**

An extensive ochre pit, the lower end of the Dyffryn Coch system, held back at its eastern end by a massive stone dam, 5m high. The dam has a sloping profile. The pit feeds into (311), the lowest part of the Hillside system, at its north-eastern corner.

**Threat**

This feature appears to be stable.

**Management**

Recommendations: level 3 recording,

405 Shaft SH43969060

*Site grade* A *Category* Extraction *Site status*

**Description**

A shaft is visible here when approached from under-round through the workings entered from (10). Hammer-stones and organic waste are evident at its foot.

**Threat**

This feature appears to be stable. It is only visible from underground.

**Management**

14C dating of organic waste; further geo-archaeological study.

406 Boundary marker SH44258995

*Site grade* C *Category* Commemorat *Site status*

**Description**

A limestone boundary maker, 0.3m square.

**Threat**

Resumption of mining (planning consent May 1986 and subsequent extension).

**Management**

Level 2 recording.

407 Boundary marker

SH44109087

*Site grade* C *Category* Commemorat *Site status*

**Description**

A limestone boundary marker, approximately 0.3m square.

**Threat**

NA.

**Management**

Level 2 recording.

408 Shaft

SH43389030

*Site grade* B *Category*, Extraction *Site status*

**Description**

The Morris shaft, sunk between 1988 and 1990. A modern steel headframe stands over the shaft, which is not currently in use.

**Threat**

NA.

**Management**

NA.

409 Engine house

SH43399028

*Site grade* B *Category* Power *Site status*

**Description**

A modern corrugated iron engine house for an electric winding motor which powers the Morris shaft (408).

**Threat**

NA.

**Management**

NA.

410 Shaft

SH44169041

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

411 Shaft

SH44109033

*Site grade* D *Category* Extraction *Site status* SAM

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

412 Shaft

SH43869022

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

413 Shaft

SH44879063

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

414 Shaft SH44749068

*Site grade* D *Category* Extraction *Site status***Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

415 Shaft SH44759068

*Site grade* D *Category* Extraction *Site status***Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

416 Shaft SH44499063

*Site grade* D *Category* Extraction *Site status***Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

417 Shaft SH44569053

*Site grade* D *Category* Extraction *Site status***Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

418 Shaft SH44409060

*Site grade* D *Category* Extraction *Site status***Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

419 Shaft SH44709056

*Site grade* D *Category* Extraction *Site status***Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

<b>420</b>	Shaft					SH44669053
<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.					
<b>Threat</b>	NA.					
<b>Management</b>	NA.					
<b>421</b>	Shaft					SH44749068
<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.					
<b>Threat</b>	NA.					
<b>Management</b>	NA.					
<b>422</b>	Shaft					SH45139050
<i>Site grade</i>	E	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.					
<b>Threat</b>	Proximity to road and dwellings.					
<b>Management</b>	Further study to establish the position of this potentially important feature.					
<b>423</b>	Shaft					SH44759068
<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.					
<b>Threat</b>	NA.					
<b>Management</b>	NA.					
<b>424</b>	Shaft					SH44819037
<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.					
<b>Threat</b>	NA.					
<b>Management</b>	NA.					
<b>425</b>	Shaft					SH44659062
<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>		
<b>Description</b>	The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.					
<b>Threat</b>	NA.					
<b>Management</b>	NA.					
<b>426</b>	Shaft					SH44569053
<i>Site grade</i>	D	<i>Category</i>	Extraction	<i>Site status</i>		

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

427 Shaft SH44669055

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

428 Shaft SH44009023

*Site grade* D *Category* Extraction *Site status* SAM

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

429 Shaft SH44019029

*Site grade* D *Category* Extraction *Site status* SAM

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

430 Shaft SH44889092

*Site grade* D *Category* Extraction *Site status* SA M

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

431 Shaft SH45139076

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

432 Shaft SH44369036

*Site grade* D *Category* Extraction *Site status* SA M

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

433 Shaft SH44399040

*Site grade* D *Category* Extraction *Site status* SAM**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

434 Shaft SH44269039

*Site grade* D *Category* Extraction *Site status* SAM**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

435 Kiln SH44059011

*Site grade* E *Category* Processing *Site status***Description**

The position of this feature has been identified from Map 2 (Appendix 2). It is not apparent as a surface feature, though pink spoil associated with kilns is evident.

**Threat**

NA.

**Management**

NA.

436 Shaft SH43669026

*Site grade* D *Category* Extraction *Site status***Description**

The position of this feature has been identified from Map 3 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

437 Shaft SH44079054

*Site grade* E *Category* Extraction *Site status***Description**

The position of this feature has been identified from Map 2 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

The location of this potentially important feature should be established in relation to accessible underground workings.

438 Kiln SH43949040

*Site grade* E *Category* Processing *Site status***Description**

The position of this feature has been identified from Map 2 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.



439 Feature SH44259039

*Site grade* E *Category* Unknown *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

440 Kiln SH44249022

*Site grade* E *Category* Processing *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

441 Kiln SH44259028

*Site grade* E *Category* Processing *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

442 Kiln SH44289030

*Site grade* E *Category* Processing *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

443 Kiln SH44269023

*Site grade* E *Category* Processing *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

444 Kiln SH44339027

*Site grade* E *Category* Processing *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

445 Kiln SH44369028

*Site grade* E *Category* Processing *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

446 Kiln SH44399031

*Site grade* E *Category* Processing *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

447 Dwelling SH44219019

*Site grade* E *Category* Domestic *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

448 Dwelling SH44269018

*Site grade* E *Category* Domestic *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

449 Shaft SH44189002

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

450 Shaft SH44209000

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

451 Shaft SH44228999

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

452 Feature SH44239021  
*Site grade* E *Category* Unknown *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

453 Furnace SH44259022  
*Site grade* E *Category* Processing *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature. Its location at the eastern extremity of the largely buried precipitation system (259 and 290) suggests that it was a furnace for drying precipitate.

**Threat**

NA.

**Management**

NA.

454 Feature SI-144139040  
*Site grade* E *Category* Unknown *Site status*

**Description**

The position of this feature has been identified from Map 1 (Appendix 2). It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

455 Shaft SH43269032  
*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this shaft has been identified from documents held by AMplc. it was not observed as a surface feature.

**Threat**

Resumption of mining (planning consent May 1986).

**Management**

456 Shaft SH43178982  
*Site grade* D *Category* Extraction *Site status*

**Description**

Possibly a drainage adit for the Morfa Du mine.

**Threat**

NA.

**Management**

NA.

457 Shaft SH43719019  
*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It was not observed as a surface feature.

**Threat**

NA.

**Management**

NA.

458 Shaft SH43929019

*Site grade* D *Category* Extraction *Site status* SA M

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

459 Shaft SH43879023

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

460 Shaft SH43949054

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

461 Shaft SH43989055

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

462 Shaft SH44269057

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

463 Shaft SH44359059

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

464 Shaft SH44439037

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from documents held by AMplc. It is not apparent as a surface feature.

**Threat**

NA.

**Management**

NA.

465 Adit SH42909032

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from Map 3 (Appendix 2). It is not apparent as a surface feature.

**Threat**

Collapse.

**Management**

Level 1 recording.

466 Adit SH42799020

*Site grade* D *Category* Extraction *Site status*

**Description**

The position of this feature has been identified from Map 3 (Appendix 2). It is not apparent as a surface feature.

**Threat**

Collapse.

**Management**

Level 1 recording.



**Mynydd Parys Copper Mine**  
**Archaeological Assessment (G1469)**

Appendix 2

MAPS

**Ymddiriedolaeth Archaeolegol Gwynedd**  
**Gwynedd Archaeological Trust**

Key to Mynydd Parys maps.

**Bangor 31602: Mynydd Parys 1815, original "Surveyed by Hugh Hughes Novr 1815"**

a = Mona Mine Brimstone yard  
b = rocks and lands not yet cultivated  
c = Parys Mine brimstone yard  
dd = horse whimseys  
ee = ground allotted for copper kilns  
ff = precipitation pits  
g = stone quarry  
i = an old Roman shaft  
l = smithy  
m = Parys Mine Store Yard etc  
nn = horse whimseys  
nn = hand whimseys  
p = pump for raising water to pits  
r = reservoir for Dyffryn Coch  
ss = waste heaps  
tt = waste heaps  
uu = air shafts on joint level  
vv = fresh springs  
w = stone quarry  
x = pond and trough for watering cattle  
yy = clay got for the use of the mines  
hh = Dyffryn Coch precipitation pits  
z = house and garden

**Bangor 31603 Mona Mine O Shafts open in the summer 1784 • Shafts found by information 1786**

A Boundary fall  
B Fall next Sir Nick's smithy  
C Champion's falls  
D Fall back of Mr Roose's house  
E Upper fall no 5  
F Fall back of assay office  
G Fall facing smithy door  
H Heap of rubbish  
I Opencast  
K Opencast  
L Deep level



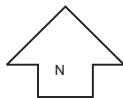
# Maps 1 and 2 Mona Mine, 1784 - 1786, Parys Mine 1815



Key to Map 2 (Bangor MS 31602)

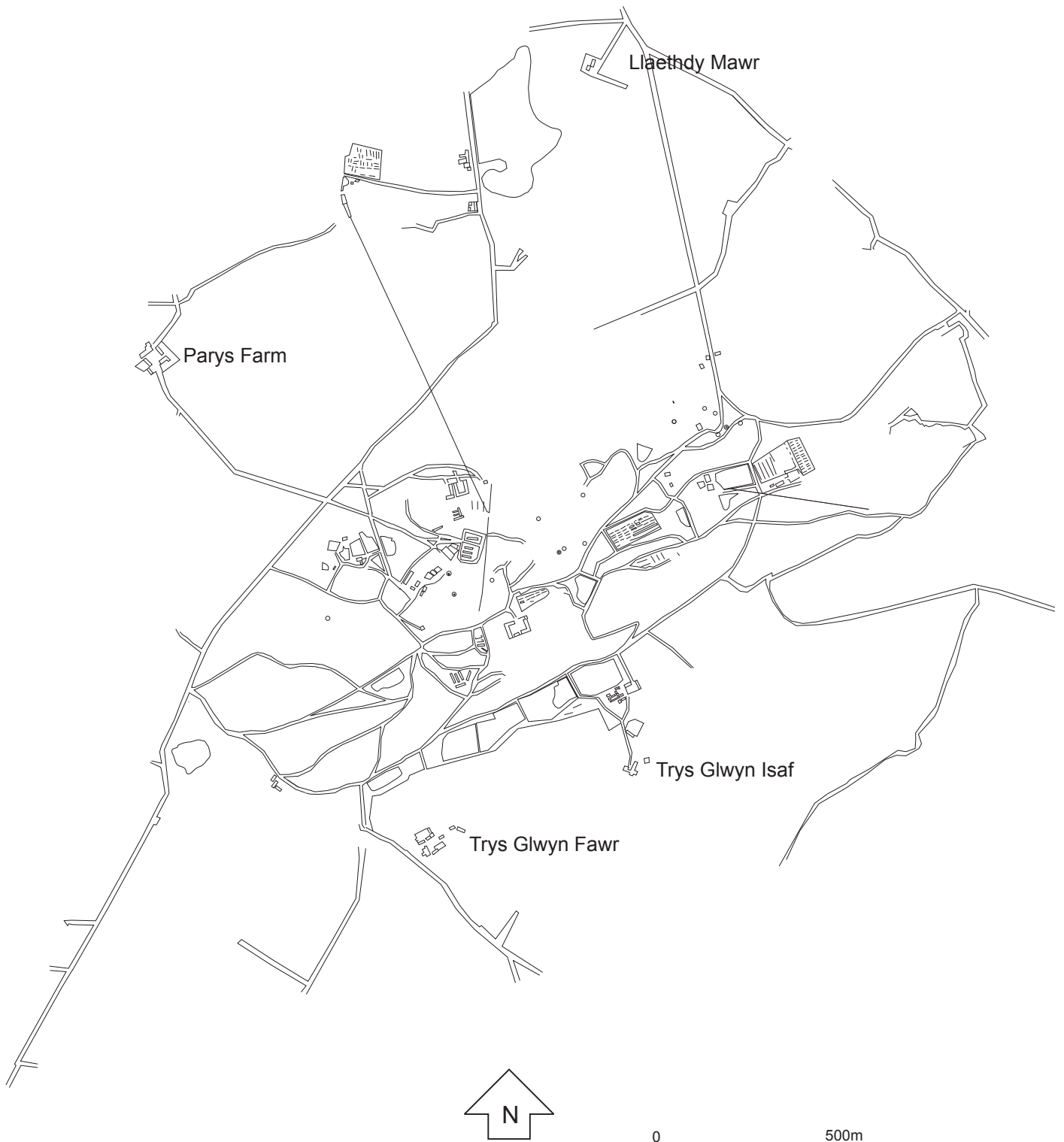
Features are identified on the original document thus:

- a. Mona Mine brimstone yard.
- b. Rocks and lands not yet cultivated
- c. Parys Mine brimstone yard.
- e. Ground allotted for copper kiohns.
- f. Precipitation puits.
- g. Stone quarry.
- i. An old Roman shaft.
- m. Parys Mine store yard
- p. Pump for raising water to the pits.
- r. Reservoir for Dyffryn Coch
- s. Waste heaps.
- y. Clay got for the use of the mines.
- z. House and garden

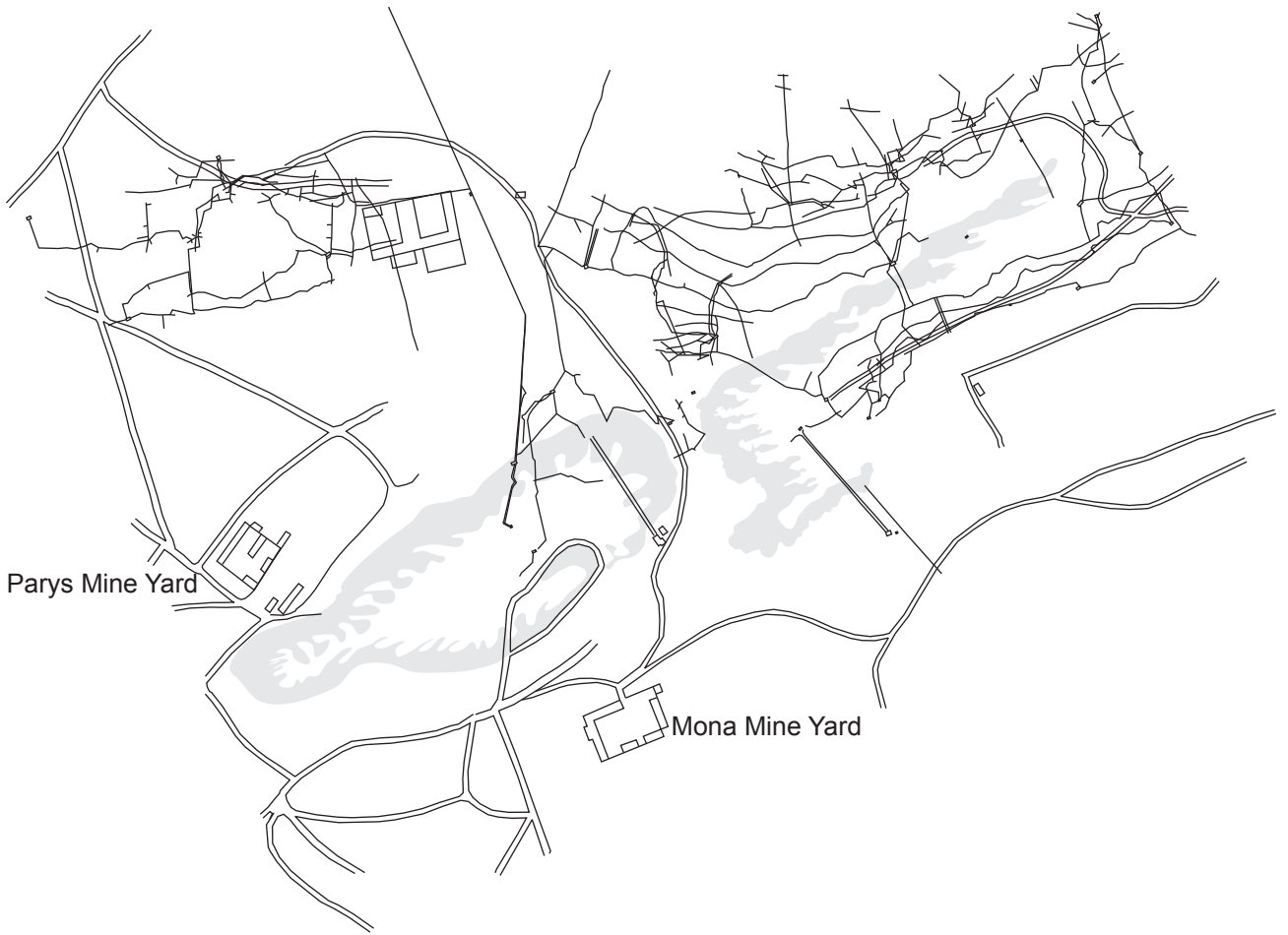


0  500m

Map 3 Mona and Parys Mines, c. 1815-1819



Map 4 Underground survey, 1889



0 500m

Map 5 Ordnance survey map, 1900



- Boundary of survey area
- ~~~~~ Boundary of Parys Mountain
- ~~~~~ Boundary of Great Opencast



0 500m

**Mynydd Parys Copper Mine**  
**Archaeological Assessment (G1469)**

Appendix 3

Survey and Assessment Excavation  
of the Mona Mine Smelter  
(Feature 352)

by

David Hopewell

**Ymddiriedolaeth Archaeolegol Gwynedd**  
**Gwynedd Archaeological Trust**

## **APPENDIX 3: ASSESSMENT AND SURVEY OF THE MONA MINE SMELTER (FEATURE 352)**

### **1. INTRODUCTION**

A survey and assessment excavation was carried out on an area on the western side of Mynydd Parys, including feature 352 and associated structures. This formed a part of an overall archaeological assessment of mineral extraction and processing on Mynydd Parys and environs, and was funded by the AIHT and Cadw.

The site had originally been recognised by the presence of a heap of large glassy crucible slags suggesting the presence of a smelter. Two concrete-lined water tanks, a brick revetment wall and a flue were visible to the west of the slagheap but the smelter itself could not be identified. No other smelting debris has been identified on Mynydd Parys so further evaluation was seen to be a priority. The 1900 edition 25" Ordnance Survey map (III 15 Anglesey) (fig. 1) shows part of the flue and a rectangular structure.

### **2. AIMS AND METHODOLOGY**

The aim of the excavation and survey was to find further evidence of smelting activity and carry out a general assessment of the extent and condition of the remains. There were however few easily identifiable structures on the site. The initial non-invasive investigation consisted of a detailed Total Station contour survey and a limited Magnetometer survey. Seven trial trenches were then excavated in order to investigate features identified in the surveys. Features and contexts within the excavated areas were recorded principally by total station survey with finer detail being added by hand. A complete photographic and written record was kept of all excavations as they progressed.

### **3. GENERAL TOPOGRAPHY AND RESULTS OF THE TOTAL STATION SURVEY**

The topographical survey encompassed a subrectangular area with dimensions of 138m. by 93m. Unmetalled roads passed just inside the northern and eastern boundaries. The central part of the survey area was reasonably flat, rising at the south to a rounded rocky knoll and falling steeply at the north to a further flat area. The majority of the industrial activity appeared to have occurred at the north of the site. Most of the site was easily accessible, being sparsely vegetated with heather and grass. Parts of the flue and the flat area to the north were however obscured by dense gorse and hawthorn. A number of features were identified. These are described below and are indicated on fig. 2.

#### **3.1. Dry-stone Flue (feature 353)**

The flue could be traced for a total of 120m., initially running from west to east along the break of slope at the north of the site before turning through 90° and following a gently curving path to the top of the rocky knoll at the southern end of the site. The flue could only be traced as a hollow in the ground for most of its length. Upstanding masonry had however survived on the slope at the south. Here the flue had an internal width of 0.5m and gave the impression of originally being covered by flat capstones.

#### **3.2. Slag Dump**

The site was first recognised by the presence of a dump of glassy crucible slags. The dump has dimensions of approximately 27m x 12m but much slag has been removed in recent years in order to fill in holes in a track to the north of the site. The slags are roughly conical in shape although some are flat bottomed and some are pointed. It has been suggested<sup>1</sup> that the variations in shape are due to the fact that iron crucibles had to be lined with foundry sand in order prevent them from being damaged by the molten slag. This was verified by the recovery of several fragments of crucible slag from elsewhere on the site with sand adhering to the outer surface.

#### **3.3. Slag Dump**

A further dump of crucible slags was identified on the northern side of the road at the north of the site. This was however very overgrown, making any estimate of quantities difficult.

#### **3.4. Concrete-lined tanks**

Two stone built tanks with internal dimensions of 6.0m. x 7.8m. x 3.5m. The upper part of the stonework appears to have been lost. The tanks are lined with concrete and have slightly bevelled corners.

#### **3.5. Stepped brick revetment wall**

An 8.5m. length of red brick wall could be seen to revet part of the slope between the upper and lower levels at the north of the site. The wall was strongly battered with each course of brick set slightly back from the previous, forming small steps. The western end of the wall was built against and bonded to the bedrock. The top of the wall had at one point been constructed in the form of a

carefully built arch the inside of which was also bonded to the rock.

### **3.6. Level unvegetated area**

This contained numerous fragments of vitrified furnace lining. The area immediately to the south-west of the tanks was covered in a yellowish and probably toxic deposit. A number of large pieces of broken brickwork could be seen here. The bricks were generally yellow in colour although some red bricks were present. The inside of the masonry pieces were fused and strongly vitrified and in some cases were covered in iron rich slag. Occasional drops of copper metal could also be seen adhering to the bricks. One large disk shaped piece of dense iron rich material could possibly be the remains of a furnace door.

### **3.7. Small linear hollow**

A shallow linear hollow about 0.3m across could be seen to run for 3.2m in a south westerly direction from the end of the tanks.

### **3.8. Linear hollow**

Several hollows (features 8, 9 and 10) could be seen at the top of the break of slope towards the north of the site. There was much broken stone and mortar in this area. Feature 8 ran to the edge of the slope and had dimensions of 10.3m x 1.2m.

### **3.9. Sub-circular hollow**

This shallow depression with dimensions of 3.1m was situated close to the edge of the break of slope.

### **3.10. Sub-circular hollow**

This 2.6m x 2.0m hollow was also close to the top of the slope.

### **3.11. Spread of crushed stone**

This was an approximately circular spread of crushed stone with a diameter of 5.3m, surrounded by broken pieces of glassy slag.

### **3.12. Six small heaps of stone**

These were made up of various types of stone.

### **3.13. Possible Flue**

A short length of possible flue could be seen, running in an approximately east-west direction along the top of the slope.

### **3.14. Rectangular structure**

An overgrown rectangular structure with internal dimensions of 3.3m x 2.8m could be seen at the southern end of the upper level area. The low walls were completely covered with a mat of grass and heather. There was a possible entrance in the south-western corner. This structure gave the impression of being earlier than the remains at the north of the site.

## **4. THE GEOPHYSICAL SURVEY**

Two areas of magnetometer survey were carried out. All areas were surveyed using an FM36 fluxgate gradiometer in 20m x 20m grids. A 1m traverse interval was used and readings were taken at 0.25m intervals along each traverse. The position of the grids is indicated on fig. 2.

The first area consisting of one complete grid and one half grid in the area at the top of the break of slope around features 8, 9, 10, 11 and 13. The responses were generally quiet with no indications of heavy burning. There was an undifferentiated area of increased noise along the top of the slope corresponding to the features already identified above (fig. 3).

The second area covered part of the area at the bottom of the slope and produced very different results to area 1. The readings were around one order of magnitude higher (SD area 1= 17.6 nT, SD area 2 = 245 nT) with large variations typical of ferrous or heavily burnt remains. A linear anomaly could be distinguished, producing a typical ferrous response of alternate high and low readings suggesting an iron pipe. The south-western part of the survey area produced a mass of very high readings. Such responses are typical of heavily burnt industrial features such as kilns and furnaces (fig. 4).

It was noted during the survey that the glassy slag did not produce a strong magnetic response. This was in contrast to the iron rich slags and vitrified brick etc. which produced readings in excess of 500nT. The very strong magnetic responses were produced

here because the furnace linings and slags such as fayalite contained a high proportion of iron all of which cooled at the same time. During the cooling process the iron particles and molecules aligned themselves to magnetic north thus producing a large magnetic dipole

## 5. RESULTS OF THE EXCAVATION

A total of seven trenches (fig. 5) was hand-dug in order to further assess some of the features identified above. The excavation was carried out in mid-February 1998 by two Gwynedd Archaeological Trust staff. Weather conditions were variable and excavation was hampered at times by gales and heavy rain.

### Trench A (fig. 6).

This trench with dimensions of 5m x 1m was dug in order to investigate the linear hollow (feature 7) at the end of the tanks and to assess the nature of the deposits on the level area to the south of this (feature 6). Between 10 and 20cm of topsoil containing mortar and other rubble was removed to reveal a bright yellow silty deposit (001) at the south of the trench. This petered out towards the north of the trench where a mid orange-brown clayey silt (002) containing a high percentage of stones could be seen. Feature 7 was cut through this and was a 40cm deep gully. A further linear feature, cutting the yellow deposit, was identified. This was found to contain an iron pipe with a diameter of approximately 4cm and a piece of wood. The linear anomaly in the geophysical survey was a result of this pipe.

### Trench B (fig. 7).

This irregular shaped trench with maximum dimensions of 6.5m x 2.4m was dug in order to investigate the flat area where the remains of furnace lining were found. The area around the western end of the trench also produced very high magnetometer responses. The majority of the trench was sealed by a mortar-rich demolition layer containing slag and furnace lining. A piece of a graphite composite tube of uncertain function was also recovered from this context. The most noticeable feature in this trench was the remains of a 1.3m square, mortared stone base. One corner had been broken away but the foundation trench was still visible. Just to the west of this was a solidified pool of iron-rich slag (possibly fayalite). This appeared to have two straight sides and there was a deposit of clean yellow foundry sand to the north of it. Elsewhere the trench was sealed by a shallow and variable yellowish brown clayey deposit (003). This was not excavated but a dark stoney layer could be seen beneath it in places. This contained a high proportion of cinders and broken glassy slag particularly on the south side of the square base. A possible slot could be seen running close to the south-east corner of the stone base. The iron pipe also passed through the eastern end of the trench.

### Trench C (fig. 8)

This rectangular trench (6m x 2m) with a narrow 4.5m long extension was dug in front of the brick revetment. There had been a build up of demolition debris against the revetment, so up to 1m of material had to be removed. The top of the revetment was cleared of rubble before the trench was excavated. This revealed the remains of another square (0.9m) mortared stone base. Photograph 7 shows the revetment after clearance.

The whole of the trench was sealed by demolition debris. This was removed, revealing the following features.

There was a paved area in front of the revetment. This consisted of stone slabs set in mortar. This had been broken away at the eastern side of the trench to reveal a stony subsoil which dropped away steeply to the east.

To the north of the paved area was a poorly defined east-west orientated linear feature. The eastern side of this consisted of flat capstones that appeared to have subsided into a drain or flue. One stone was lifted but the channel beneath was choked with mortar and other debris. No further action was taken here.

The northern end of the trench contained a concrete surface the southern edge of which was bounded by a length of decayed wood that could be the remains of shuttering. There was a rough area and three mounting holes close to the southern edge of the concrete suggesting that some kind of machinery had originally been mounted here. This also appeared to be in alignment with the stone base above the revetment. The eastern edge of the concrete was identified in the narrow extension trench.

A deposit of clay, slag and cinders (004) along with more demolition debris (005) was identified in the eastern end of the extension trench

### Trench D (fig. 9)

A small (1.6m x 0.6m) trench was dug across the possible flue (feature 13) at the top of the break of slope. The feature was completely full of cinders and other burning products but had only survived to a height of around 10 cm. The cinders etc. were removed revealing compact yellow clayey silt (006). A hard iron rich concretion was also identified on the southern side of the feature.



### **Trench E (fig. 9)**

Another trench with dimensions of 1.6m x 2.5m was dug at the southern end of the visible remains of the possible flue. This corresponded to the edge of the circular spread of crushed stone and slag (feature 11). No further remains of the flue could be found. A 10cm deep deposit of cinders and small pieces of slag was removed revealing compact yellow clayey silt (007). A piece of very well preserved wood was also found in the top of the yellow context.

### **Trench F (fig. 10)**

A small trench with dimensions of 1m x 1.7m was dug on the edge of one of the hollows (feature 10) above the break of slope. A small amount of demolition debris was removed, revealing part of a mortared stone and brick structure. The poorly- preserved remains of a wooden beam could also be seen within the stonework.

### **Trench G (fig. 11)**

A 2.8m x 1.7m trench was excavated across the linear hollow (feature 7) running towards the top of the brick revetment and the associated stone base. The demolition debris was removed revealing a shallow 0.8m. wide channel bounded on the western side by concrete. The concrete appeared to be foundations, possibly of a brick structure, which could be seen to turn and terminate towards the southern end of the trench. The eastern side of the channel was bounded by a context of fairly pure mortar. It could not however be determined if this was in situ or redeposited.

## **6. CONCLUSIONS**

The excavation strategy was not designed to produce a complete plan and interpretation of the site. The combined results of the topographic survey, magnetometer survey and the excavations do however give a good indication of the general layout and condition of the structures on the site.

No exact dating evidence was produced during the excavation. The extensive use of brick and concrete suggest a late nineteenth century date. The flue and a rectangular structure shown on the 1900 edition 25" O.S. map demonstrate that there were visible remains at this time. It should also be noted that the rectangular structure appears to extend on to both the upper and lower levels at the north end of the site.

The magnetometer data shows that the furnace remains are concentrated towards the western end of the lower level. The upper level produced no responses consistent with heavy in situ burning. The glassy slags contained little iron so were magnetically inert. This allows differentiation between the glassy slags and fayalite slags by magnetometer survey.

The numerous pieces of vitrified brick along with the solidified pool of slag demonstrate that there was a furnace on the site although its exact location is still unknown. The two dumps of crucible slag however are very small showing that this was unlikely to be a smelter producing commercial quantities of copper. This suggests that the smelter was either an experimental operation or was used to test or assay the ore.

The structures on the upper level appear to be aligned with at least some of the lower structures suggesting that a continuous process occurred here. The height differential could have been an aid in loading a top-fed furnace. The water tanks might have been used rapidly to cool and thus break up the crucible slags before they were re-smelted and further purified.

## **7. RECOMMENDATIONS FOR FURTHER WORK**

The limited area of trial excavation has yielded some information about the feature. More specific details such as the location of the furnace and the function of the various structures that have been located can only be resolved by the excavation of a larger area. The results of the geophysical survey suggest that the most likely location of the furnace is in front of the eastern end of the brick revetment. Analysis of the various slags and other debris would add to the understanding of the feature.

### **(Footnotes)**

<sup>1</sup> Personal communication, D. Chapman.

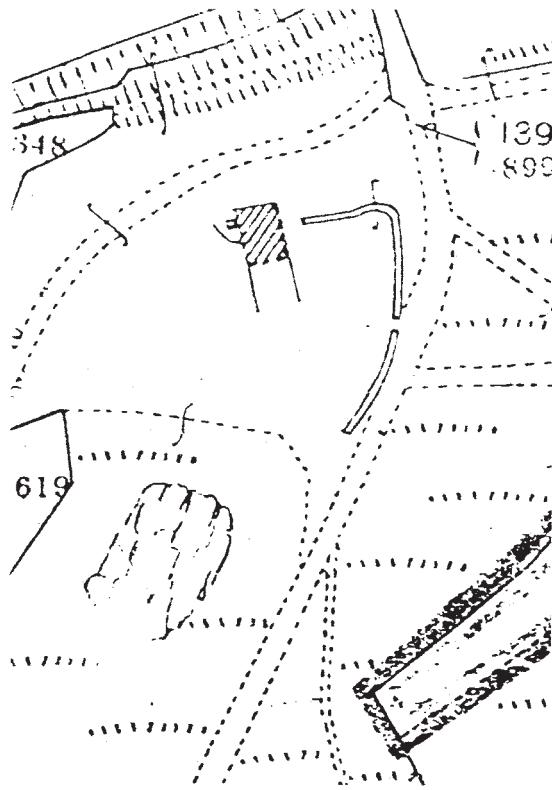


Fig 1

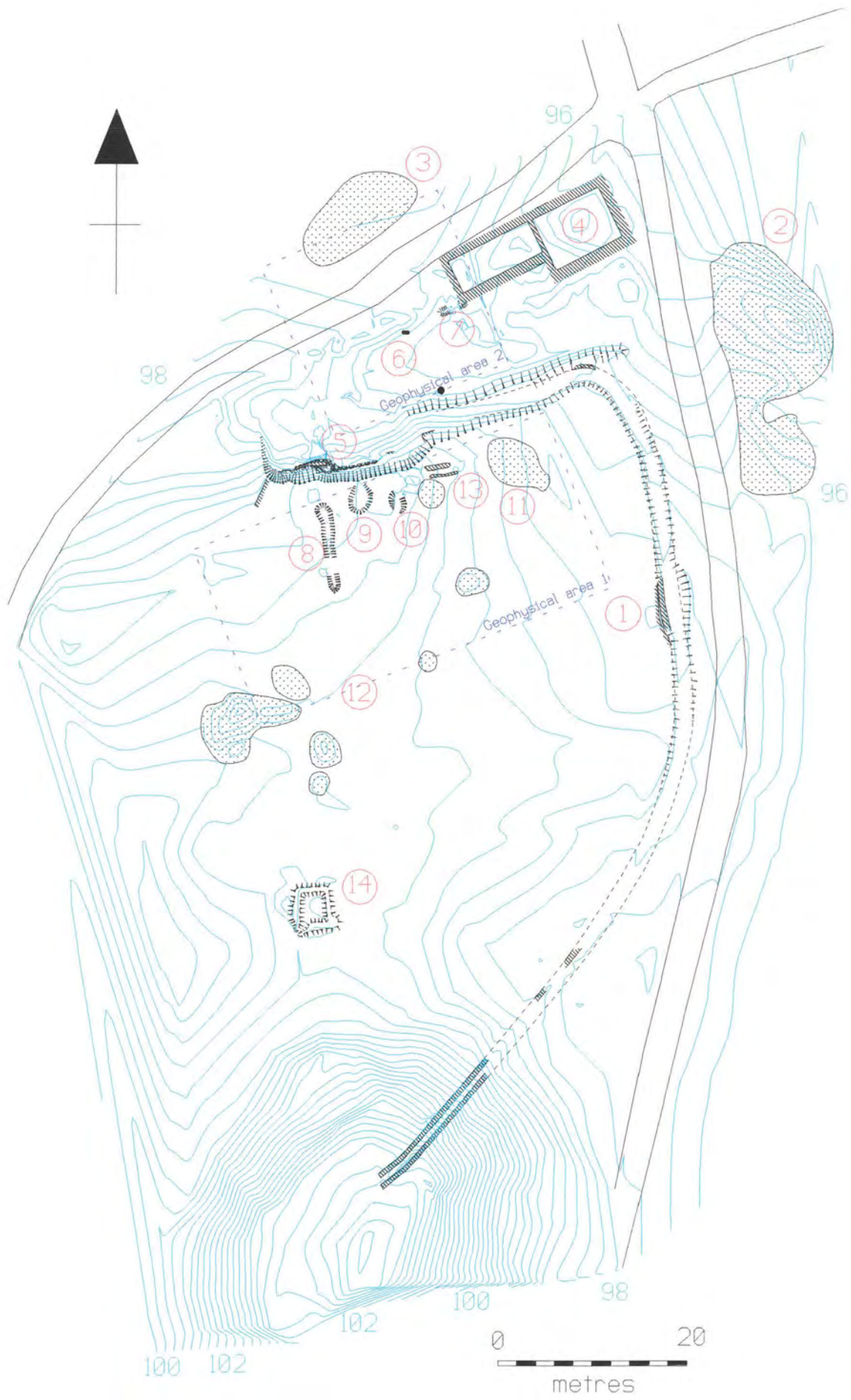


Fig. 2

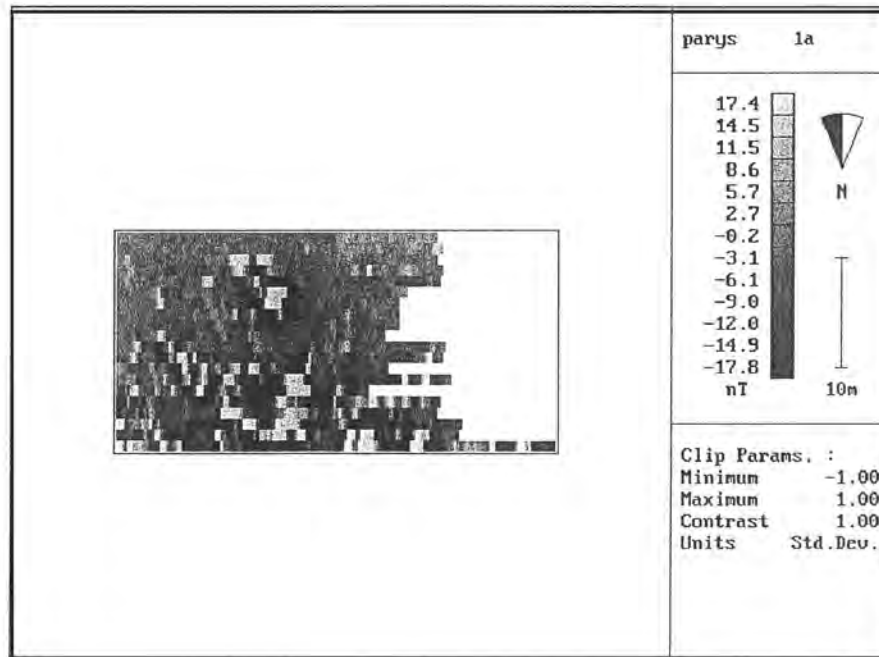


Fig. 3

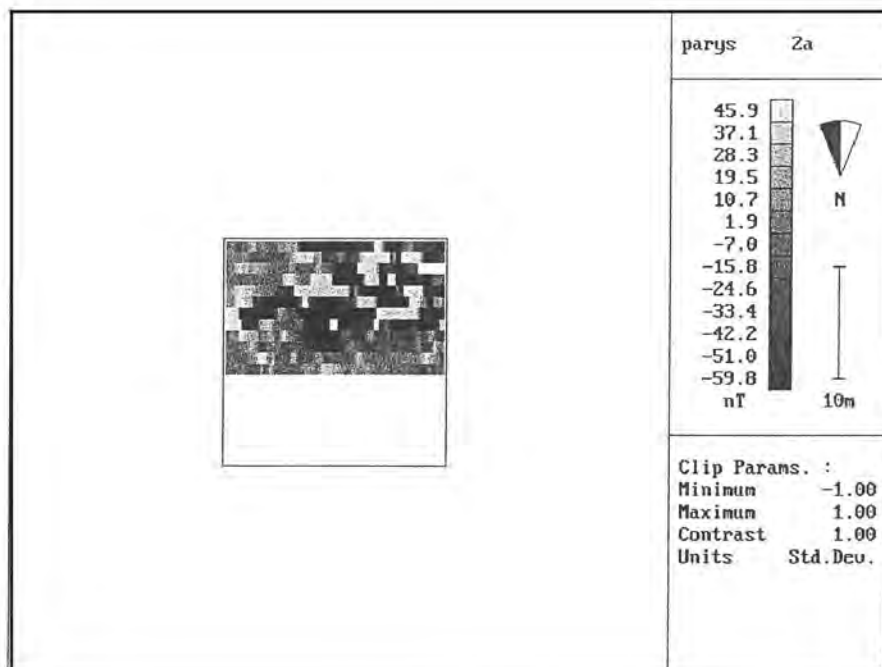


Fig. 4

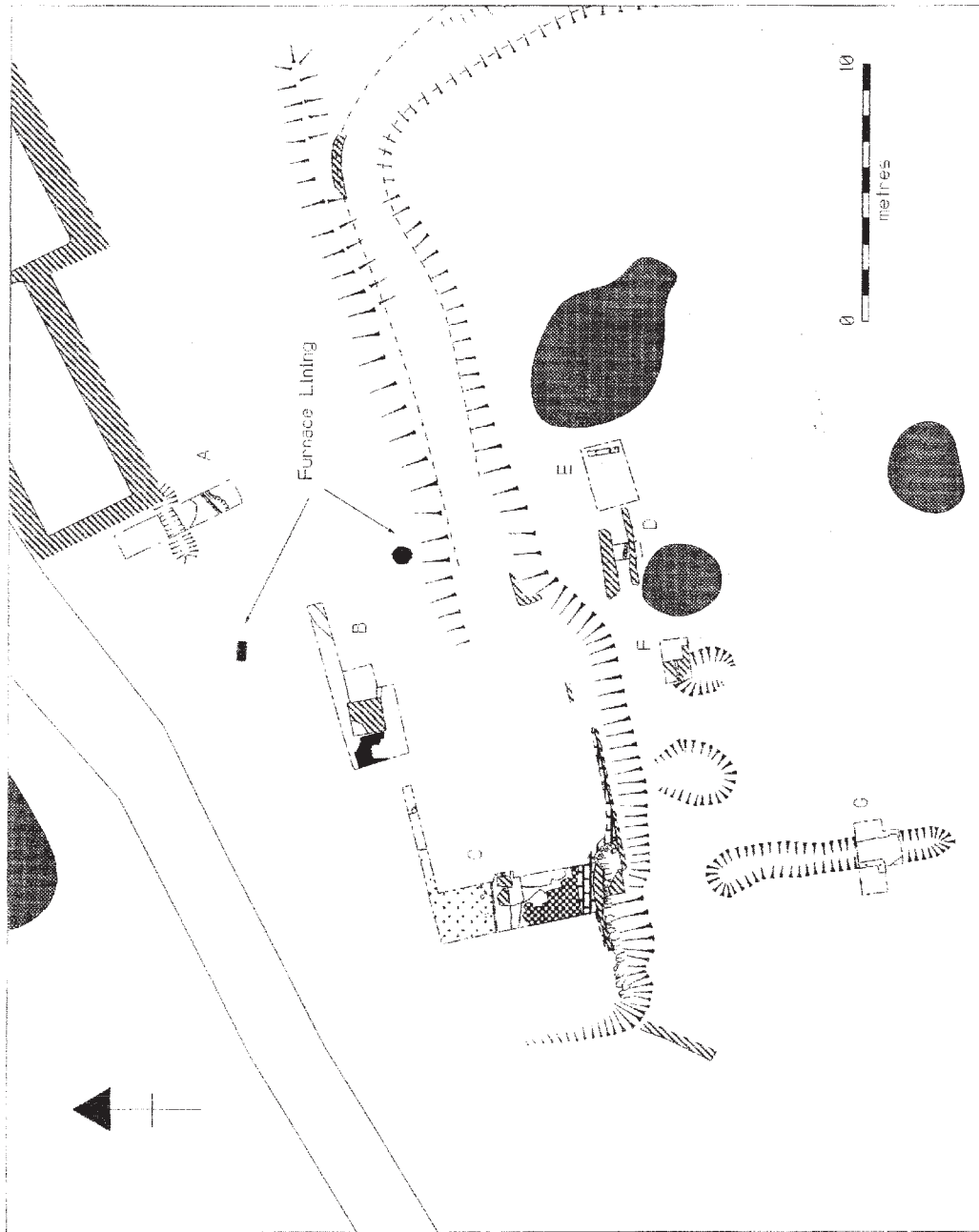


Fig. 5

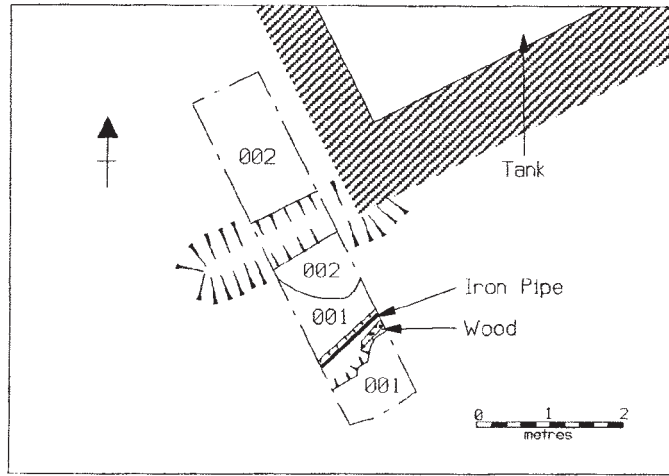


Fig. 6

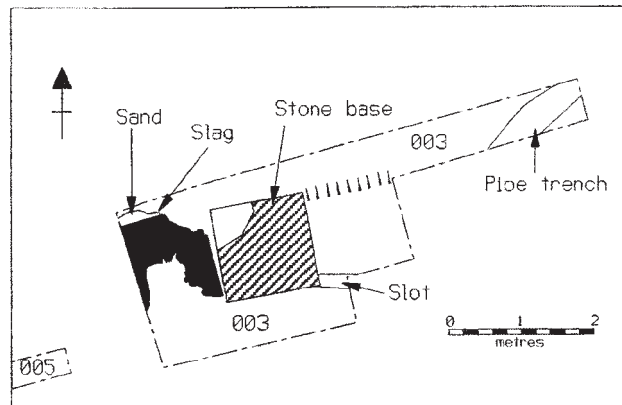


Fig. 7

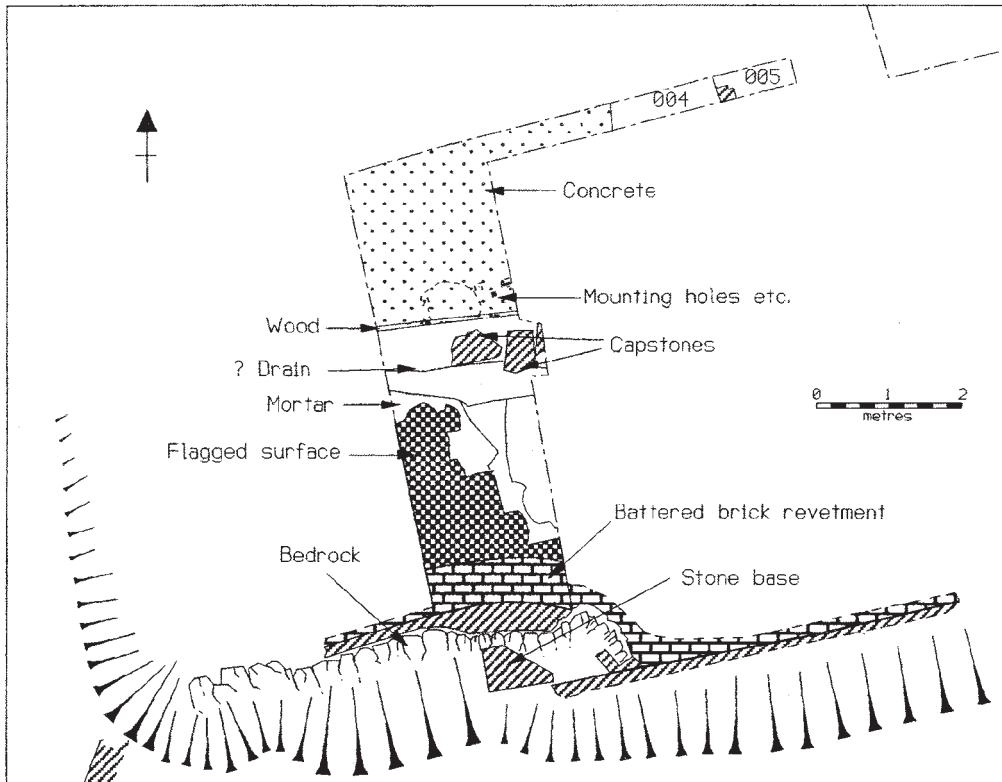


Fig. 8

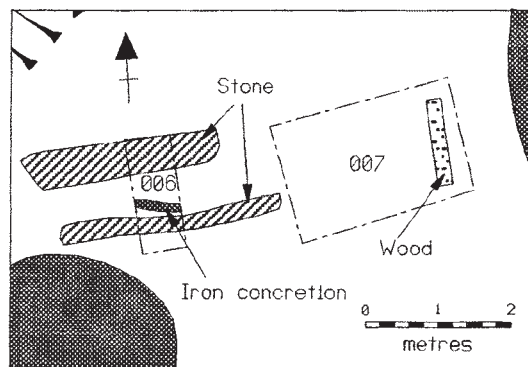


Fig. 9

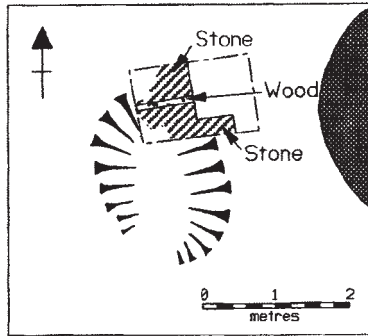


Fig. 10

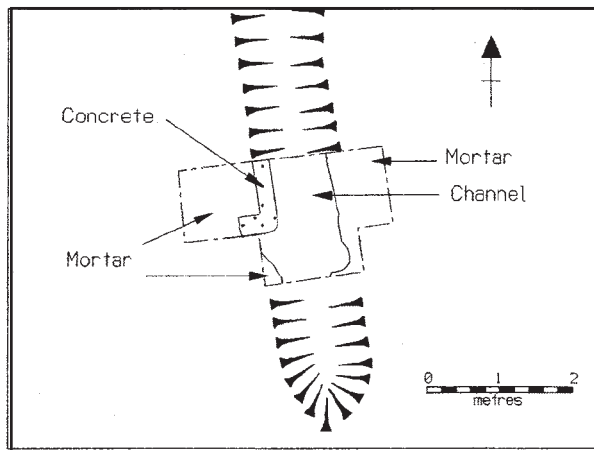


Fig. 11





7 The Mona Mine Smelter (feature 352): the revetment after clearance



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