



Cwmystwyth Lead Mine, Pontarfynach, Ceredigion.

Archaeological Watching Brief



By

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ARCHAEOLOGICAL WATCHING BRIEF

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Contents

i) List of Illustrations and Photo plates

Non Technical Summary	Page i
Crynodeb Annhechnegol	Page ii
1. Introduction	Page 04
2. Aims & Objectives	Page 13
3. Methodology	Page 14
4. Cartographic Sources	Page 14
5. Results of Watching Brief	Page 16
6. Conclusions & Recommendations	Page 26
7. Acknowledgements	Page 27
8. Bibliography	Page 28

Appendix I: Figures

Appendix II: Photo plates

Appendix III: Archive Cover Sheet

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i) List of Illustrations

Figures

- Fig 01: Location map (OS 1:50,000 Landranger).
- Fig 02: Location map (OS 1:25,000 Explorer).
- Fig 03: Location Map - Enlarged view - OS Explorer
- Fig 04: OS Aerial Photo.
- Fig 05: Designation - Scheduled Area (SM).
- Fig 06: Designation - Special Protected Area (SPA).
- Fig 07: Detailed Site Plan.
- Fig 08: William Waller Map 1704.
- Fig 09: OS Surveyors Drawing c.1820.
- Fig 10: Llanfihangel y Creiddyn Tithe Map 1847.
- Fig 11: Gwnnws Parish Tithe Map 1847.
- Fig 12: Smyth Plans 1847.
- Fig 13. OS First Edition Map (1887).
- Fig 14. OS Second Edition Map. (1906).
- Fig 15. OS 1953 Edition Map
- Fig 16. Chronological Site Plan.
- Fig 17. David Bick Site Plan 1975.
- Fig 18. Tramway sleepers c.1820

Photo Plates

- Plates 01 -06: Panoramic view of Cwmystwyth in the Snow and Machine Dug trenches
- Plates 07 - 13: Machine Dug Trenches.
- Plates 14 - 18: Machine Dug Trenches.
- Plates 19 - 24: Machine Dug Trenches.
- Plates 25 - 30: Machine Dug Trenches.
- Plates 31 - 37: Machine Dug Trenches.
- Plates 38 - 44: Machine Dug Trenches.
- Plates 45 - 50: Machine Dug Trenches.
- Plates 51 - 57: Machine Dug Trenches.
- Plates 58 - 64: Machine Dug Trenches.
- Plates 65 - 71: Machine Dug and Hand Dug Trenches.
- Plates 72 - 79: Hand Dug Trenches.
- Plates 80 - 87: Hand Dug Trenches.
- Plates 88 - 95: Hand Dug Trenches.
- Plates 96 - 103: Hand Dug Trenches.
- Plates 104 - 111: Hand Dug Trenches.
- Plates 112 - 118: Hand Dug and Machine Dug Trenches.

Non Technical Summary

The following report presents the results of an Archaeological Watching Brief during ground investigation works undertaken by the geological contractors Soil Engineering, in the form of a series of machine dug and hand dug trenches at the Cwmystwyth Lead Mine, Pontarfynach, Ceredigion (centered on OS grid reference SN 8038 7465), in advance of and to inform the design measures to prevent contamination of the Afon Ystwyth by potentially harmful metals from the former Cwmystwyth mine. These future measures are likely to consist of the construction of lined channels, surface water and interceptor drains, flow transfer pipes and riverbank erosion protection.

The specific objective of this work was to undertake a watching brief during all groundwork for the cutting of a series of machine dug trenches and hand dug sampling trial pits. This work entailed archaeological supervision during all penetrative groundwork for the proposed trenches and sampling pits.

In summary, the archaeological watching brief during groundwork investigation works at the Cwmystwyth Lead Mine, managed to establish the character of the below ground deposits in the targeted areas, of both the machine and hand dug trenches. Although all of the machine dug trenches revealed the character of sub surface deposits in the targeted areas, with all of them having deposits related to historic mining at the site in the form of processed mine waste, only a small number of the trenches managed to expose finds and features of any significance. Two of these archaeologically productive trenches were positioned in such a way that the groundwork managed to confirm the positions of the buried Kingside Adit and the buried former course of the Nant y Gwaith stream. Of four other machine dug trenches, perhaps the most rewarding trench was the trench positioned to the southwest of the remains of the 19th Century Crusher House, where a cobbled surface with reused packing material from mine waste was found to exist buried beneath turf and shallow top soil. This cobbled surface is very likely 19th Century in date and almost certainly the remains of a dressing floor that served the processing at the Crusher House. Although only a small section of this cobbled surface was exposed and sadly damaged, it does suggest that this cobbled surface survives extensively in area surrounding the Crusher House. The other remaining rewarding machine dug trenches were those where the ground works exposed fragments of timber, all timbers associated with the historic working of the mine. Of these three trenches, the most significant timbers recovered were the remains of two former oak tramline sleepers, each with two cut slots in them placed at 1ft apart suggesting a narrow gauge rail c.1820 (pers. Comm. Ioan Lord). The other interesting timbers recovered were five short lengths of degraded timber planks, possibly from a former wood lined chute positioned alongside the Nant y Gwaith. Other than these finds and features no further datable finds or features became exposed during the machine dug trenches. All of the timber finds were passed onto the Cambrian Mines Trust for conservation.

Regards to the hand dug trenches, as with the machine dug trenches, these trial holes all appeared to have deposits related to historic mining at the site in the form of processed mine waste within them. However, all but one hand dug trench didn't expose any dateable finds or features. The one trial sampling hole that did expose a datable find was the recovery of a small fragment of 20th Century stone drainage pipe.

In terms of recommendations for the future, it is recommended that either a smaller machine is used for any future groundwork within the designated areas or else heavy duty matting is laid down for machine tracking along access routes, due to the sensitivity of the site. The machine used was a heavy plant machine and did leave some substantial tracking marks across the scheduled area particularly and especially when the machine twists to turn on its tracks and some of the historic mine spoil mounds consist of very fine mine waste material that shifts very easily. Although these track marks will weather away and mellow overtime, it is worth considering mitigation options to avoid this damage for any future ground works on the site where heavy plant is required.

Crynodeb Annhechnegol

Mae'r adroddiad a ganlyn yn cyflwyno canlyniadau Briff Gwyllo Archeolegol yn ystod gwaith archwilio tir a wnaed gan y contractwyr daearegol Soil Engineering, ar ffurf cyfres o ffosydd wedi'u cloddio â pheiriant a chloddio â llaw ym Mhwllglawdd Plwm Cwmystwyth, Pontarfynach, Ceredigion (yn canolbwyntio ar grid OS. cyfeirnod SN 8038 7465), cyn ac i lywio'r mesurau dylunio i atal halogi Afon Ystwyth gan fetelau a allai fod yn niweidiol o hen fwynglawdd Cwmystwyth. Mae'r mesurau hyn yn y dyfodol yn debygol o gynnwys adeiladu sianeli wedi'u leinio, draeniau dŵr wyneb a rhyng-gipio, pibellau trosglwyddo llif ac amddiffyn rhag erydiad glan yr afon.

Amcan penodol y gwaith hwn oedd cynnal briff gwyllo yn ystod yr holl waith sylfaen ar gyfer torri cyfres o ffosydd wedi'u cloddio â pheiriant a phyllau prawf samplu cloddio â llaw. Roedd y gwaith hwn yn cynnwys goruchwyliaeth archeolegol yn ystod yr holl waith sylfaen treiddiol ar gyfer y ffosydd a'r pyllau samplu arfaethedig.

I grynhoi, llwyddodd y briff gwyllo archeolegol yn ystod gwaith archwilio daear ym Mwynglawdd Plwm Cwmystwyth i sefydlu cymeriad y dyddodion o dan y ddaear yn yr ardaloedd targed, y ffosydd â pheiriant a'r ffosydd a gloddiwyd â llaw. Er bod pob un o'r ffosydd a gloddiwyd â pheiriant wedi datgelu cymeriad dyddodion o dan yr wyneb yn yr ardaloedd targed, gyda phob un ohonynt â dyddodion yn ymwneud â mwyngloddio hanesyddol ar y safle ar ffurf gwastraff mwyngloddio wedi'i brosesu, dim ond nifer fach o'r ffosydd a lwyddodd i ddatgelu darganfyddiadau a nodweddion o unrhyw bwys. Gosodwyd dwy o'r ffosydd gynhyrchol archeolegol hyn yn y fath fodd fel bod y gwaith sylfaen wedi llwyddo i gadarnhau lleoliad ceuffordd Kingside Adit a'r hen gwrs claddedig o Nant y Gwaith. O'r pedair ffos arall a gloddiwyd â pheiriant, efallai mai'r ffos fwyaf boddhaus oedd y ffos a leolwyd i'r de-orllewin o weddillion y Ty Malurwyr o'r 19eg Ganrif, lle canfuwyd bod wyneb coblog gyda deunydd pacio wedi'i aildddefnyddio o wastraff mwyngloddio wedi'i gladdu o dan dywarchen a phen bas. pridd. Mae'r arwyneb coblog hwn yn debygol iawn o'r 19eg Ganrif o ran ei ddyddiad ac mae bron yn sicr yn weddillion llawr gwisgo a oedd yn gwasanaethu'r prosesu yn y Crusher House. Er mai dim ond rhan fechan o'r wyneb coblog hwn a ddatgelwyd ac a ddifrodwyd yn anffodus, mae'n awgrymu bod yr arwyneb coblog hwn wedi goroesi'n helaeth yn yr ardal o amgylch y Malurwyr. Y ffosydd eraill gwerth chweil a gloddiwyd â pheiriant oedd y rhai lle datgelodd y gwaith daear ddarnau o bren, yr holl bren a oedd yn gysylltiedig â gwaith hanesyddol y mwynglawdd. O'r tair ffos hyn, y pren mwyaf arwyddocaol a adferwyd oedd olion dau hen dramlin derw, pob un â dwy slot wedi'u torri ynddynt 1 troedfedd oddi wrth ei gilydd sy'n awgrymu rheilen gul c.1820 (pers. Comm.

Ioan Lord). Y prennau diddorol eraill a ddarganfuwyd oedd pum darn byr o estyll pren diraddiedig, o bosibl o hen llithren wedi'i leinio â choed wedi'i lleoli ar hyd Nant y Gwaith. Heblaw am y darganfyddiadau a'r nodweddion hyn ni ddatgelwyd unrhyw ddarganfyddiadau neu nodweddion dataadwy pellach yn ystod y ffosydd a gloddiwyd â pheiriant. Trosglwyddwyd yr holl ddarganfyddiadau pren i Ymddiriedolaeth Mwyngloddiau Cambrian ar gyfer cadwraeth.

O ran y ffosydd a gloddiwyd â llaw, fel gyda'r ffosydd a gloddiwyd â pheiriant, roedd yn ymddangos bod gan y tyllau prawf hyn oll ddyddodion yn ymwneud â mwyngloddio hanesyddol ar y safle ar ffurf gwastraff mwyngloddio wedi'i brosesu ynddynt. Fodd bynnag, ni ddatgelodd pob un ond un ffos a gloddiwyd â llaw unrhyw ddarganfyddiadau na nodweddion y gellir eu dyddio. Yr un twll samplu arbrofol a ddatgelodd ddarganfyddiad y gellir ei ddata oedd adfer darn bach o bibell ddraenio carreg yr 20fed Ganrif.

O ran argymhellion ar gyfer y dyfodol, argymhellir naill ai bod peiriant llai yn cael ei ddefnyddio ar gyfer unrhyw waith tir yn y dyfodol o fewn yr ardaloedd dynodedig neu fel arall gosod matiau trwm ar gyfer tracio peiriannau ar hyd llwybrau mynediad, oherwydd sensitifrwydd y safle. Roedd y peiriant a ddefnyddiwyd yn beiriant peiriannau trwm a gadawodd rai marciau olrhain sylweddol ar draws yr ardal gofrestredig yn enwedig ac yn enwedig pan fydd y peiriant yn troi i droi ei draciau ymlaen ac mae rhai o'r twmpathau gwastraff mwyngloddio hanesyddol yn cynnwys deunydd gwastraff mwyngloddio mân iawn sy'n symud yn hawdd iawn. . Er y bydd yr olion trac hyn yn hindreulio i ffwrdd ac yn ysgafnhau goramser, mae'n werth ystyried opsiynau lliniaru i osgoi'r difrod hwn ar gyfer unrhyw waith tir yn y dyfodol ar y safle lle mae angen offer trwm.

1 Introduction

1.1 The following report presents the results of an Archaeological Watching Brief during ground investigation works undertaken by the geological contractors Soil Engineering, in the form of a series of machine dug and hand dug trenches at the Cwmystwyth Lead Mine, Pontarfynach, Ceredigion (centered on OS grid reference SN 8038 7465), in advance of and to inform the design measures to prevent contamination of the Afon Ystwyth by potentially harmful metals from the former Cwmystwyth mine. These future measures are likely to consist of the construction of lined channels, surface water and interceptor drains, flow transfer pipes and riverbank erosion protection.

1.2 The specific objectives of this work were to:

- Undertake a watching brief during all groundwork for the cutting of fifteen (15)* machine dug trenches and twelve (12) hand dug sampling trial pits. This work entailed archaeological supervision during all penetrative groundwork for the proposed trenches and sampling pits.

**. Originally there had been eighteen (18) machine dug trenches planned, but trenches TP23, TP6 and TP29 were dropped due to either access issues or else deemed unnecessary.*

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

Appendix I: Figures;

Appendix II: Photographs

Appendix III: Archive Cover Sheet

Site Location & Description (see Figures 1 - 4)

1.4 The designated Cwmystwyth Metal Mine (NPRN: 115 / PRN: 5461 / SM: CD145) is located approximately 22Km southeast of Aberystwyth and 6km northeast of the village of Pont-rhyd-y-groes. The extensive mine covers around 250ha on the steep northern slopes of the Ystwyth Valley, with some minor workings on the southern slopes. Cwmystwyth exploited three mineral lodes over the course of its operation, namely Comet, Kingside and Mitchell. The northern slopes are cut by four watercourses, the Nant y Gwaith, the Nant y Graig, the Nant y Watcyn and the Nant yr Onen. Work at the Cwmystwyth Mines can be dated back as far as the Bronze Age (c.2300 BC - c.800 BC), and continued intermittently over many centuries until all activity finally ceased in around 1939 and was later abandoned in 1950. The visible features within the scheduled area include numerous shaft and adit entrances, areas of opencast working, vast waste dumps, water-management and transport systems, extraction and dressing processes with their power systems, as well as remains of office and residential buildings, garden plots and even an early 20th-century tennis court. The mines consist of four distinct areas which were sometimes worked as separate undertakings and sometimes combined. Working from west to east these are Pugh's Mine, the Kingside Mine, Penguelan Mine, and Copa Hill, which can be subdivided into the prehistoric opencast on the Comet Lode together with the tips to the west of it, and the remainder.

- 1.5 Cwmystwyth Mine lies within the Registered Historic Landscape of Uplands Ceredigion, the *Elenydd* Special Area of Conservation (SAC) & Site of Special Scientific Interest (SSSI), and the *Elenydd-Mallaen* Special Protection Area (SPA). Much of the site itself has been designated as a Scheduled Monument (SM: CD145), with 14ha also designated as a Site of Special Scientific Interest (SSSI) (*Mwyngloddfa Cwmystwyth*).
- 1.6 Cwmystwyth is a hydrologically complex site, with mining activity having had a significant impact on the natural regime. The River Ystwyth receives all surface and sub-surface drainage from the mine, causing it to fail European Water Framework Directive (WFD) standards for zinc, lead and cadmium. The subsurface workings are drained via Pugh's, Gill's Lower and Kingside adits. Pugh's Adit is the largest point source of metals from the site, whilst Gill's Lower and Kingside are collapsed and emerge as small upwellings. There are also numerous other minor upwellings of contaminated groundwater. A number of streams draining the plateau high above Cwmystwyth flow down through the site, eroding and mobilising heavy metals from the extensive waste tips. These include the Nant y Gwaith, Nant y Graig, Nant Watcyn and Nant yr Onnen. These watercourses are often lost to ground as they pass through the site, making flow monitoring and determination of metal loads challenging. Mine drainage is also influenced by the large Ystwyth Fault which runs in an east-northeast to west-southwest trend, bisecting the River Ystwyth. It is thought that contaminated groundwater from the sub-surface workings discharges directly into the river through the fault zone.
- 1.7 In 2013 the Cambrian Mines Trust obtained ownership of Cwmystwyth Mine from the Crown Estate with the aim of securing the preservation, restoration and improvement of the site for public benefit. Today from the public highway, the surface workings of the Cwmystwyth Mine are dominated by extensive spoil heaps, several ruinous structures, including the remains of the former dressing mill floor, compressor house foundations, mine offices and crusher house and more, and lengths of leat, shafts, levels and adits. Since the Cambrian Mines Trust obtained the mine, significant structures have been protected by fencing.

Background Information

- 1.8 The Coal Authority has been commissioned by Natural Resources Wales (NRW) to undertake engineering interventions for remediation of pollution caused by abandoned metal mining at and around Cwmystwyth Mine, Ceredigion. The *works* are required to inform the design of measures to prevent contamination of the Afon Ystwyth by potentially harmful metals from the former Cwmystwyth mine. The measures are likely to consist of the construction of lined channels, surface water and interceptor drains, flow transfer pipes and riverbank erosion protection.
- 1.9 The Site is located just to the east of Cwmystwyth, (approximate NGR SN802745, Postcode SY23 4AG) in Ceredigion, Mid Wales, 24 km to the southeast of Aberystwyth. The site has been extensively mined for metals since the Bronze Age with mining spoil present across the area. The area north of the road is indicated as Made Ground on the BGS 1:50 000 Series Solid Geology Map 1993, where shafts and adits are also shown. This geological map also shows that the surrounding area is underlain by Pysgotwr Grits formation – Turbidite sandstones and mudstones with high matrix turbidite sandstones,

locally pebbly. The Drift version shows Alluvium deposits in areas close to the main river. There are no available BGS borehole logs in close proximity.

Benefits of Remediation Works

1.10 Below are the benefits of the proposed remediation works.

- Over 20 tonnes of harmful metals could be prevented from entering the River Ystwyth and subsequently the Cardigan Bay Special Area of Conservation each year.
- The receiving and downstream water body will be more likely to achieve Good Ecological Status, although there are other mining pressures on these water bodies that will also need to be addressed.
- Reduced contaminated sediment load to the River Ystwyth.
- Potential to develop partnerships with important stakeholders, including the Cambrian Mines Trust.
- Potential to develop an educational resource at the site, demonstrating passive treatment technologies.

Development Proposals

1.11 Preliminary Set-up Works

1.12 Preliminary set-up works will consist of the setting up of:

- i) Setting up of a site compound and contractors welfare facilities area at the location shown in at the far east end of the site in an existing parking area;
- ii) Setting up the temporary proposed lay-down on the south side of the public road below the dressing floor;

Ground Investigation trenches

1.13 The Coal Authority is commissioned by Natural Resources Wales (NRW) to undertake engineering interventions for remediation of pollution caused by abandoned metal mining at and around Cwmystwyth Mine, Ceredigion. The works are required to inform the design of measures to prevent contamination of the Afon Ystwyth by potentially harmful metals from the former Cwmystwyth mine. The measures are likely to consist of the construction of lined channels, surface water and interceptor drains, flow transfer pipes and riverbank erosion protection.

1.14 The site is located just to the east of Cwmystwyth, (approximate NGR SN802745, Postcode SY23 4AG) in Ceredigion, Mid Wales, 24 km to the southeast of Aberystwyth. The site has been extensively mined for metals since the Bronze Age with mining spoil present across the area. The area north of the road is indicated as Made Ground on the BGS 1:50 000 Series Solid Geology Map 1993, where shafts and adits are also shown. This geological map also shows that the surrounding area is underlain by Pysgotwr Grits formation – Turbidite sandstones and mudstones with high matrix turbidite sandstones,

locally pebbly. The Drift version shows Alluvium deposits in areas close to the main river. There are no available BGS borehole logs in close proximity.

- 1.15 The *works* comprise a geotechnical / geo-environmental investigations at the various locations in the area of Cwmystwyth historic mine. This will involve a combination of machine and hand dug trial pits and taking of surface samples. The *works* will aim to:
- Provide information on ground conditions in order to design the interventions such as channels and drains.
 - Provide additional information on the locations and composition of spoil heaps on site with the aim of potential future relocation/stabilisation.
 - Establish locations of adits for the design of future capture structures.
- 1.16 Approximate works locations and the provisional access routes are shown in Figure 7. Provisional co-ordinates of the locations of each GI trench are also shown in Figure 7. However, the locations are to be micro-sited during *works* and agreed with the Project Manager and the archaeologist.
- 1.17 Given that the site is of national historic and archaeological significance areas of the site have the following designations; SSSI, SAC and Scheduled Ancient Monument. The site is surrounded by land designated as SPA, but works will not be taking place in this area.. As such the works must be undertaken so as not to impact on features of scientific, ecological and heritage importance.
- 1.18 Originally there to be eighteen (18) mechanically excavated trenches (TPs) to be excavated, but this number was later reduced to fifteen (15). Each of these trenches were to be excavated to depths of approximately 2-3m where possible (refer to Figure 7), with bulk and disturbed samples for materials testing and characterization respectively. These trenches were originally to measure approximately 1
- 1.19 As well as the machine dug trenches, eight (8) small hand dug trial pits (TPs) were also excavated to depths of at least 1m or rockhead, with bulk and disturbed samples for materials testing and characterization respectively. These trenches were no larger than 0.40m in diameter.
- 1.20 As well as the above trial pits, four (4) hand dug samples pits (HS's) were also undertaken at the surface for environmental testing..
- 1.21 Bulk and disturbed samples were taken from the trial pits for appropriate classification geotechnical (including psd and shearbox testing) and geo-environmental testing.
- 1.22 Trial trenches and hand dug pits were reinstated in 300mm compacted layers with a final layer reinstated as per the original ground surface, having been set aside at commencement. Site areas accessed by the contractor, including welfare/lay-down area, investigation locations and access routes were cleared of all materials, equipment and plant on completion and cleaned to the satisfaction of the employer.

- 1.23 All machine access routes to trial pit locations will follow the main access tracks and agreed crossing points as shown in Figure 7.

Historical & Archaeological Background (see Figures 5 - 7)

- 1.24 In 2003 Simon Timberlake published the results of survey work and investigative works, with sampling and evaluation trenches, undertaken on Copa Hill, at Cwmystwyth between 1986-2002. The results of this work revealed that the earliest working on the site dates back to the Bronze Age, confirmed by the C14 dating, to 2205-1950 CalBC, of timbers found in excavations. The survey work also showed that Copa Hill is an area with a complex and rich mining landscape, which spans ten historic phases of mining and prospecting, overlain with a more recent agricultural landscape. Evidence of medieval and post- medieval elements and traces of a former prehistoric landscape are also still recognisable.
- 1.25 Roman working at the site has been claimed but never positively attested. Iron Age and Roman activity at the Cwmystwyth mines is potentially evident from finds of pounding stones and a saddle quern (PRN: 2071 / 2901) found at Copa Hill, thought to be Roman in date. The Early Mines Research Group undertook palaeo-environmental investigations of the blanket peat on Copa Hill between 1986 - 1999, which have suggested that there was also Roman mining for lead, probably undertaken in the 1st and 2nd Century AD. Although no definitive Roman workings have been found in the location of Copa Hill, a Roman lead bole (i.e. a lead smelting hearth) was uncovered at the foot of Copa Hill in 2002.
- 1.26 Historical sources for the mine, which are numerous, take the story back to the medieval period (roughly, in this case, the 13th to 15th centuries), when the mine came under the auspices of the Cistercian abbey at Strata Florida. Work in this period is however likely to have remained relatively small-scale, though as time went on, rights were increasingly sub-let to tenants. Around the time of the dissolution of the abbey in 1536, interest from private entrepreneurs increased and Leland's account of the mine at this time suggests that there was already a substantial enterprise with pollution from smelting affecting the woodland for some way around. Despite much of the site coming under the aegis of the Society of Mines Royal from the mid-16th century until 1693, disputes continued between lessees and potential lessees, which make it clear that work was underway during the 16th century on 'Craig y Mwyn', probably the area around the Nant y Gwaith, and in the 17th century in the area beside the Nant yr Onnen at the north end of Copa Hill. In 1698, the Company of the Mine Adventurers was formed, and under their supervision, and in particular that of William Waller, activity in the early 18th century was much more extensive across the scheduled area. This episode ended in a fraud scandal, and the extent of the Company's further involvement is not altogether clear. Other lessees took over, and activity in most parts of the complex continued during the century, with, in particular, the construction of a very impressive array of hushing reservoirs and gullies which would have been used for the removal of overburden using water pressure. By the end of the century the mines were being worked very successfully by Thomas Bonsall. This was however their high point, and though the 19th century saw technology of increasing complexity put to work in the mines by a variety of lessees, which included John Taylor and Sons, whose interests were widespread in Ceredigion, the most easily available deposits were by this time largely mined out, and deeper, more difficult and poorer ores were being

worked, with consequent greater expense and diminishing returns. The long history of earlier mining added to the problems, with un-surveyed earlier workings providing constant difficulties for the various enterprises when encountered unexpectedly, and even known workings necessitating extra expense when planning new developments. Bad weather and drought, which meant water-wheels could not work, added to the woes of the various enterprises, as did falling prices due to the development of more economical mineral sources overseas. Nonetheless, production continued with varying success for most of the century. In 1900 a substantial investment was made by yet another newly established company under Henry Gamman, including the construction of the large processing mill at the heart of the complex which remains a major feature today, albeit at ground level only, and of new housing for the workforce.

- 1.27 The mines themselves were developed considerably in the following years but were never altogether successful and by 1916 Gamman's means were exhausted and he faded from the scene. Very limited production limped on between the wars, largely involving the re-exploitation of older dumps, but in 1939-40 wartime bureaucracy put a stop even to this, and the mine never reopened.
- 1.28 Although the significant historic descriptions and plans by William Waller have offered invaluable information about the Cwmystwyth mine of the late 17th and early 18th century, it wasn't until the beginning of Industrial Archaeology that interest in lead mining in Wales began to emerge as a serious archaeological concern. One of the pioneers of this interest in lead mines of mid-Wales was of course the late David Bick who wrote a series of informed books in the mid 1970s, a series that are now seen as essential to any library on the history of lead mining. David Bick also wrote books on William Waller. David Bick was also the founder of the Welsh Mines Society in 1979, from which was born the Welsh Mines Preservation Trust in 1991, who have worked closely with Cadw and the Royal Commission (RCAHMMW) over the years to help preserve and record these forever decaying mines.
- 1.29 Archaeological work at the Cwmystwyth Mines has been very extensive over the years with key published works written by David Bick in the mid 1970s with his *Metal Mines of Mid Wales* series, Simon Hughes, with his invaluable *The Cwmystwyth Mines* (1981 and 1993) and Simon Timberlake with his survey and investigative works published in 2003 on the results of work undertaken at Copa Hill between 1986 - 2002 and subsequent other investigative works. Other survey work has also been undertaken by Robert Protheroe-Jones, Curator of Heavy Industry at the National Museum of Wales, in 1993 as part of a larger Ceredigion metal mines survey. As well as surface surveys over the decades, members of the Cambrian Mines Trust and the Welsh Mines Preservation Trust and others have surveyed and planned sub surface remains accessed through the profusion of adits and shafts across the site. This sub surface exploration work has revealed an extraordinary level of preservation from continuous mining at the site from the Bronze Age up to 1950 when the mine was finally abandoned.
- 1.30 Archives of information on the mine are held by the RCAHMMW including numerous photographs (both site shots and aerial photographs); site surveys carried out by RCAHMMW and Lampeter University in 1993; newspaper cuttings; and other archaeological reports prepared for the site. Other studies related to the site commissioned by the RCAHMMW include the Upland Initiative Cwm Ystwyth – Cwm Mwyro Archaeological Survey by Trysor.

- 1.31 The Dyfed Archaeological Trust Historic Environment Record (HER) also holds numerous photographs of the site and copies of the majority of reports written on the mines. The HER also holds copies of all of the individual records made for the site through the Metal Mines surveys by Robert Protheroe Jones.
- 1.32 Former projects on the archaeology and history of the area, including Cwmystwyth, include the work done for The Spirit of the Miners project through Ceredigion County Council and Countryside Council for Wales (now Natural Resources Wales).
- 1.33 As well as surveys and groundwork investigations, following the procurement of the mine by the Cambrian Mines Trust in 2013, Cadw and Ceredigion County Council (through Cynnal Y Cardi) provided funds for the development of a Management and Protection Plan for the site to develop ideas being put forward by the Cambrian Mines Trust in their 'A Way Ahead' document. This Plan was developed by DAT Archaeological Services in partnership with the Cambrian Mines Trust (DAT Report 2013/77). It included consultation and input from members of Cadw, Ceredigion County Council, Natural Resources Wales and Dyfed Archaeological Trust. Further consultation was also undertaken with ecological specialists and mining historians.
- 1.34 As a result of the NRW and the CA remediation programme, a recent feasibility study of the Cwmystwyth Lead Mine was also undertaken in early 2019 by Richard Scott Jones (HRSW Rpt 207), which concluded that given the extremely rich history and prehistoric origins of the Cwmystwyth Mines, there is a great opportunity as part of the remediation process to help further promote a sense of place and identity and as a result help to add and promote regional and local distinctiveness by utilising the remains of the mine as an educational, economic and social asset in conjunction with Cadw, Natural Resources Wales, Ceredigion County Council, the Welsh Mines Preservation Trust and the Cambrian Mines Trust. As well as helping to preserve and protect this exceptional site for the Nation, the continued promotion and education of the site should play a crucial role in any future conservation and management plan.

Geology

- 1.35 The geology of the site has been reviewed with reference to the British Geological Survey (BGS) 1:50,000 Sheet 179, "Rhayader", the British Mining Volume No.17 published by the Northern Mining Research Society (HUGHES 1981) and OT Jones's 1922 geological report. These indicate that the site is situated within turbiditic sandstones of the Llyn Teifi Member, at the base of the Cymystwyth Grits Group, more recently named the Upper Llandovery Series, of Silurian age. The mine is situated within a broad syncline within these strata, which has an axis trending approximately north-south.
- 1.36 The main geological feature in the vicinity of the mine is the Ystwyth Fault, which comprises a 30m wide brecciated (fractured) zone that runs sub-parallel with the Afon Ystwyth. Mining records indicate the faulted zone to be partially filled with glacial gravel and blue clay, which is the cause of stability problems in a number of the underground workings. Mine exploration information suggests that the upper 100 ft (30 m) contains permeable material (gravel), whilst below this the fault zone is comprised of fault breccia with a clay matrix.

- 1.37 Several smaller, sub parallel faults are present to the north and south of the Ystwyth Fault, which are not shown on the published BGS mapping. Local mining plans indicate two additional faults crossing perpendicular to the main fault, and intersecting the Ystwyth Fault at the confluence of the River Ystwyth and the Nant y Graig.
- 1.38 Lead (galena) and zinc (sphalerite) were the main ores extracted over the life of the mine. Both early (A1) and late (A2) phases of mineralization are well displayed at the site. A1 mineralization is represented by various quartz-sphalerite-galenachalcopyrite- dolomite breccias, whilst A2 mineralization is represented by a sphalerite-galena-quartz-calcite-pyrite assemblage. Three principal lodes were worked throughout the sites history; the southwards dipping Kingside and Comet Lodes, and the northwards dipping Mitchell's Lode.
- 1.39 Lead occurred in all the veins (as galena - lead sulphide), and this was the principal ore extracted, at least until 1884 when it was superseded by the production of zinc (or blende – zinc sulphide). Small amounts of copper ore (chalcopyrite) have been extracted at various times (particularly from the eastern end of the Comet Lode ('Belshazzar' or Copper Lode) on Copa Hill), although no production of this mineral has been recorded since 1800. Compared to the mines to the north of the Rheidol, the lead ore from Cwmystwyth appears to have been silver-poor, although some 33,509 ozs of silver metal were nevertheless recorded as having been obtained between 1848 and 1916 (this suggests an average content of 3.3 ozs silver per ton of lead ore). The total *recorded* output for lead since 1848 is only 32,913 tons, and for zinc ore 19,913 tons, thus it would appear that the mine was already exhausted by this time. However, the large area of shallow workings, including those on Copa Hill and the rich ore 'pipe' worked as an opencast on the Graig Fawr, at the junction of the Kingside and Comet Lodes, attests to the large volume of lead ore removed prior to the 19th century and the advent of deep mining (HUGHES 1981).

Scheduled Monument Consent (SM CD145)

- 1.40 Section 2(2) of the Ancient Monuments and Archaeological Areas Act 1979 states that Scheduled Monument Consent must be obtained for the following:
- any works resulting in the *demolition* or *destruction* of or any damage to a scheduled monument;
 - any works for the purpose of *removing* or *repairing* a scheduled monument or any part of it or making any *alteration* or *addition* thereto;
 - any *flooding* or *tipping* operations on land in, on or under which there is a scheduled monument.
- 1.41 Natural Resources Wales submitted an application for SMC to Cadw on 5th August 2022. SMC was granted by Cadw for the proposed works on the 4th December 2022 with the following conditions:

- 4(a) The applicant shall provide Cadw with reasonable advance notice of commencement of works on site and shall afford access at all reasonable times to any Cadw official or archaeologist nominated by Cadw to monitor progress of the works;
- 4(b) The approved works shall be carried out strictly in accordance with the application form, plans and documents as listed below. No variations are permitted unless they have been authorised in advance, in writing by Cadw;

Number	Document / plan	Reference Number (if applicable)	Date submitted to Cadw
1	SMC application form signed by Peter Stanley and dated 03/08/2022		05/08/2022
2	EV00476-GI-01-TI Ground Investigation drawing		05/08/2022
3	NRW Cwmystwyth Mine Ground Investigation Works 2022 Environment Action Plan v. 1.2 28/07/2022		05/08/2022
4	Tabulated Trial Pit Heritage Information		05/08/2022
5	Cwmystwyth Lead Mine, Cwmystwyth, HRS Wales Report No: 207 March 2019. Cultural Heritage & Archaeological Feasibility Study.		28/07/2022
6	Ground Investigation drawing Revision	EV00476-GI-01-TI C2	21/10/2022
7	Images showing micro sited locations of works marked on ground		21/10/2022
8	Machine Excavated Pits Method Statement	TA8482_MS01_Trial-pit_2022-09-26	08/11/2022
9	Written Scheme of Investigation for an archaeological watching brief during ground investigation works at the Cwmystwyth Lead Mine, Pontarfynach, Ceredigion.		08/11/2022
10	Updated Environmental Action Plan Version 1.4 dated 07/11/2022		

- 4(c) The works shall be carried out strictly in accordance with a 'Method Statement', revised to include final SMC conditions, to be submitted in advance and formally approved in writing by Cadw before work commences. The 'Method Statement' shall be adhered to throughout the project and any variations shall be approved by Cadw prior to works commencing;

4(d) The method Statement shall provide for:

	INFORMATION REQUIRED	Date when information required
1	Ground investigation works and reinstatement – revised Machine Excavated Pits. Method Statement to demonstrate requirements for agreement with Cadw over location of works and necessity for archaeological watching briefs.	Before work commences.

- 4(e) No works, including site clearance, shall commence until Cadw has been informed in writing of the name of an appropriately qualified archaeologist operating to ClfA published standards and guidance, who is to be present to undertake a watching brief for any works or operation occurring within the scheduled area. No work shall commence until Cadw has confirmed in writing that the proposed archaeologist and their written scheme of investigation for an archaeological watching brief are acceptable;
- 4(f) A digital copy of the draft watching brief report shall be submitted to Cadw for approval within 8 weeks of the archaeological fieldwork being completed.
- 4(g) A digital copy of the approved watching brief report shall be submitted to the regional Historic Environment Record and National Monuments Record of Wales to be incorporated into these public records, and the applicant shall inform Cadw when this has been completed;
- 4(h) Cadw shall be invited to attend a site meeting within the first 5 working days of commencement of the project to review the programme, submitted method statement and arrangements that have been established for archaeological mitigation/building recording;
- 4(i) That upon completion of the project the applicant shall produce a completion report including an annotated photographic record detailing the site before, during and after works took place and including a final plan of areas worked upon. The draft should be sent to Cadw in digital format for approval within 25 working days of the works being completed; and
- 4(j) Any historic or archaeological features not previously identified, which are revealed when carrying out the works, shall be retained in situ and reported to Cadw within two working days. Works shall be halted in the area/part of the site affected until provision has been made for retention and/or recording of the feature by a suitably qualified archaeologist in accordance with details submitted to and approved in writing in advance by Cadw.

2 Aims & Objectives

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

- Allow a rapid investigation and recording of any archaeological features that are uncovered during the proposed groundwork.
- Provide the opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief are not sufficient to support the treatment to a satisfactory or proper standard.

3 Methodology

Watching Brief

- 3.1 Originally the intention had been to undertake the ground works in Late December 2022, however due to snow and ice this work was cancelled and postponed until 2023 (see Photo plate 1).
- 3.2 The archaeological watching brief was eventually undertaken by HRS Wales staff using current best practice over three days in January (16th – 18th January 2023), again postponed by snow and ice, but restarted over two days in February (7th and 8th February 2023).
- 3.2 All work was carried out by a suitably qualified archaeologist with relevant level membership of the Chartered Institute for Archaeologists (CIfA) and followed the CIfA Standard and Guidance for an archaeological watching brief (CIfA 2014).
- 3.3 All proposed groundwork was undertaken under close and constant archaeological supervision. All groundwork for the larger trenches was undertaken using a mechanical digger with a toothless grading bucket. All hand dug sampling pits were dug using a posting shovel and spade.
- 3.4 All archaeological deposits or features when encountered were investigated and recorded. All finds recovered during the watching brief were to be bagged and a grid coordinate was taken using a handheld GPS device in order to locate the findspot with the OS national grid.
- 3.5 Any recording required was to be carried out using HRS Wales recording systems (pro-forma context sheets etc), using a continuous number sequence for all contexts.
- 3.6 Where considered necessary plans and sections were drawn to a scale of 1:50, 1:20 and 1:10 as required and related to Ordnance Survey datum and published boundaries where appropriate.
- 3.7 All features identified were tied in to both the OS National Grid and all local site and ground plans.
- 3.8 Photographs were appropriated in digital format, using a 24 mega-pixel DSLR camera in RAW format, to be exported later to TIFF format for archive.

4 Cartographic Sources

William Waller's Map of 1704 (see Figure 17)

- 4.1 The valuable feature of the William Waller maps of the Cwmystwyth 'Great Lead Mine' are his depictions of the mine building in the late 17th century on Copa Hill, which clearly show the stamping mill, store houses and the smiths forge and the description of the main adit. The other illustration of the new Cwmystwyth mine shows the new adit and level probably the Nantrefach Level.

OS Surveyors Drawing (1820)

- 4.2 This early preliminary survey undertaken by the Ordnance Survey shows the Cwmystwyth lead mines marked with a series of mining structures at the base of Graig Fawr. At the time of this map Joseph Jones was leasing the mine from William Powell. The previous lessee had been Thomas Bonsall.

Llanfihangel y Creuddyn Parish and Gwnnws Tithe Maps (1847)

- 4.3 The Ystwyth River marks the boundary between the two parishes of Llanfihangel y Creuddyn and Gwnnws, with Llanfihangel y Creuddyn being on the north side and Gwnnws to the south. Both these tithe maps are dated 1847 which is relatively late when compared to other tithe maps in the old county of Cardiganshire.
- 4.4 The Llanfihangel y Creuddyn map clearly marks a series of structures below Graig Fawr, but fails to actually denote the fact on the map that these structures are mine related and they are only marked as No.66. Examination of the tithe map however reveals that these buildings along with Tynddol and Nantryonen were tenanted by James Raw but owned by the Earl of Lisburne of the Vaughan family whose family seat traditionally was Trawsgoed in Cardiganshire. However, at this time the mine was probably still leased to Abel Gower and one Gregory Walters with John Taylor and sons soon to become lessees in 1848.
- 4.5 The land to the west of the mine, the red line area (WEST), shows that much of this area was pasture land with the Pentre Mill to the far west end. Interestingly the tithe map clearly shows an area of tipped waste (No, 73) below Penparc (No.71) where a level was sunk on the other side of the main track. The field in which this tip is located was known as Cae Ucha Tanyffordd.
- 4.6 The Gwnnws parish tithe of 1847 shows the area of the South Cwmystwyth Mines, marked as No. 998 and 999. This land was owned and tenanted by Thomas Jenkins. The cottage and garden was called Henparc and the surrounding land is described as pastureland. No mine workings are shown on the tithe map at this time.

OS First Edition Map (1887)

- 4.7 By the time of the OS First Edition Map of 1887 the Cwmystwyth Mines were in the hands of John Taylor and Sons and at this time the mine output had been suffering immensely following a bad winter and severe droughts. This map series clearly shows the division between the Pugh's mine workings and the Kingside workings with an extensive leat system already in place between the two mines. Also shown is the remains of the former South Cwmystwyth Mine at Hen Parc. The western red line area clearly shows a series of mining levels at the base of Glog and the Pentre Mill complete with Mill Race,

OS Second Edition Map (1906)

- 4.8 The OS Second Edition Map of 1906 shows a dramatic change in the mine complex at the Cwmystwyth mine. At this time Henry Gamman had already been the lessee since 1900 and had already erected a new dressing mill on the site of the former Taylor and Sons who had already also installed a tramway

system and a new leat system. The power sources were now primarily hydraulic with turbines set alongside the Nant Watcyn. Gamman was also responsible for the creation of a tennis court built for his daughter Isabel, and staff welfare with the construction of Neville Place

- 4.9 To the west very little has changed from the earlier OS 1887 map in the area of Pentre, apart from the addition of a number of other now disused mining level above Penparc, suggesting that the Pentre mine was abandoned at some time between these years 1887 - 1906.

OS 1953 Edition Map

- 4.10 By 1953 the mine at Cwmystwyth had already been abandoned since 1950, but the mine had already come to a virtual standstill by the start of WW2. As such this map series shows very little change from the earlier 1906 map and essentially shows the mine almost at the point of abandonment.

5 Results of Watching Brief

- 5.1 Originally the intention had been to undertake the ground works in late December 2022, however due to snow and ice this work was postponed until 2023 (see Photo plate 1).
- 5.2 The archaeological watching brief was eventually undertaken by HRS Wales staff using current best practice over three snowy days in January (16th – 18th January 2023), again postponed later by snow and freezing temperatures reaching a shivering -8° C in the Cwmystwyth valley, The remaining trenches were excavated over two days in early February (7th and 8th February 2023, when the weather had improved.
- 5.3 In total fifteen (15) machine dug trenches and twelve (12) hand dug sampling trial pits were undertaken spread widely across the Cwmystwyth site, This included both trenches/pits north of the main access road within the scheduled area and trenches/pits south of the main access road but north of the river. In total nine (9) machine dug trenches were positioned within the scheduled area and six (6) without. Regards to the hand dug trenches/pits, four (4) were positioned within the scheduled area and the remaining eight (8) were positioned south of the main access road but within the SSSI. This work entailed archaeological supervision during all penetrative groundwork for the proposed trenches and sampling pits.
- 5.4 In order to gain access to the machine dug trench locations, approved access tracks were allocated and these are shown on Figure 7. These approved access routes were specified in order to avoid potential damage by machine tracks. Originally there had been eighteen (18) machine dug trenches planned, but trenches TP23, TP6 and TP29 were dropped due to either access issues or else not deemed unnecessary.
- 5.5 In the following section the results from the machine dug trial pits/trenches are discussed first followed by the results from the hand dug trial pits.
- 5.6 All number enclosed in () refer to contexts encountered.

A) Machine Dug trenches (see Figure 7)

5.7 1) *Trial pit No.1 (TP1)* (see Photo Plates 02-06)

5.8 This trial pit/trench was positioned within the scheduled area immediately east of the Dressing Mill floor and on the east side of the Nant y Gwaith stream. The trench was orientated E-W and measured approximately 3m x 1m and reached a depth of between 2.00m – 2.10m.

5.9 The first 0.05m of surface deposit consisted of a fine grit of mine waste (100). Below this deposit was stony deposit intermixed with a yellow/grey grit (101). Stones varied in size from 0.05m to 0.20m in size. All stones were irregular in shape and all were mining spoil. Within this stony deposit (101) was a thin lens of timber measuring approximately 0.03m in depth and 0.60m in width (102). In the process of excavation, the machine removed a small section of this timber lens, which produced five (5) pieces of timber planking varying in size from 0.30m to 0.60m in length (see Photo Plate 05). These timber planks and the small *lens* of timber (102) within (101) may be associated with the remains of a timber plank lined channel/chute that still survives just poking through mine spoil immediately to the south alongside the Nant y Gwaith stream.

5.10 Within the same stony deposit were pockets of larger irregular shaped stones, some 0.30m size, but all seeming to be the same mine spoil deposit. Other than the timber plank fragments no further finds were recovered from this trench. This trial pit reached a depth of between 2.00m – 2.10m, whereupon the excavation of the trench was halted.

5.11 2) *Trial pit No.2 (TP2)* (see Photo Plates 07-06)

5.12 This trial pit/trench was positioned within the scheduled area just north of the main access road and in line with the supposed route of the Nant y Gwaith stream, which disappears below ground at some point northwest but south of the position of the first trial trench (TP1). The trench was orientated E-W and measured approximately 2m x 1m and reached a depth of 2 meters.

5.13 The first 0.10m of deposit (100) consisted of loose stones of mining waste. Directly below this was an approximately 0.40m deep deposit of grey/brown grit (101). Directly below this was an apparent sediment layer of yellow/orange/grey grit and silt (102). This sediment deposit measured approximately 0.20m in depth. Directly below this was a dark band of stones with organic material within it (103). This deposit averaged approximately 0.10m in depth and appeared to be approximately 1.3m in length only and as such was suggestive of the position of a former water channel since collapsed, likely the former route of the Nant y Gwaith prior to the water disappearing below ground to the north. Below this deposit was a stone and grit layer of shale and slate, with irregular shaped stones averaging approximately 0.10 – 0.20m in size (104). Either side of (103) were the *possible* remains of a dry walled leat structure that had since collapsed, but due to the character of the surrounding stone filled deposits this is not conclusive, however, considering that there does appear to be a section of confined finer grit material with sediment and a thin organic band of sediment, the likelihood of a former walled channel at this

point does seem very likely. Excavation of this trench was halted at 2 meters. No dateable finds were recovered from this trench.

5.14 3) *Trial pit No.3 (TP3) (see Photo Plates 11-13)*

5.15 Trial trench No.3 was positioned outside of the scheduled area and on the south side of the main access road and just south of the Nant y Gwaith stream, but north of the Afon Ystwyth. The trench was orientated N-S and measured approximately 2m x 1m and reached a depth of only approximately 1.25m.

5.16 The first 0.10m of deposit consisted of small stones approximately 0.10m in size (100). Directly below this was a granular grit with small stones averaging approximately 0.20m in depth (101). Directly below this was a dark oxidised grit with irregular sized stones and river boulders with occasional fragments of corroded iron (Fe) and one fragment of 1950s linoleum (102). Below this deposit was a deposit of natural river stones (103). The excavation of this trench was halted at 1.25m due to water ingress at 0.20m which made further excavation and sampling impossible.

5.17 4) *Trial pit No.5 (TP5) (see Photo Plates 14-18)*

5.18 Trial trench No.5 was positioned within the scheduled area at the far eastern end of the mine complex alongside the Nant y Graig stream by the main access road. The trench was orientated E-W and measured approximately 2m x 1m and reached a depth of only approximately 1.90m.

5.19 The uppermost deposit of this trench consisted of loose stones intermixed with grit. The largest stones were approximately 0.10m in size. This deposit was approximately 0.10m in depth (100). Directly below this deposit was a deposit of irregular stones ranging from 0.10m to 0.30m in size (101). This deposit was approximately 1.30m in depth to the base of the trench. Water started to come into the trench at 1.30m, likely from the stream to the west. The excavation of this trench was halted at 1.90 meters. No dateable finds were recovered from this trench.

5.20 5) *Trial pit No.7 (TP7) (see Photo Plates 19-23)*

5.21 Trial trench No.7 was positioned outside of the scheduled area and south of the main access road, alongside the point where the Nant y Graig watercourse meets the Afon Ystwyth. The trench was orientated NW-SE and measured approximately 2m x 1m and reached a depth of only approximately 1.95m.

5.22 The trench consisted of only one deposit (100) containing anhular and irregular sized stones approximately 0.10m to 0.40m in size. This trench was excavated to a depth of 1.95m only due to water ingress at 0.50m. No dateable finds were recovered from this trench.

5.23 6) *Trial pit No.10 (TP10) (see Photo Plates 114-118)*

5.24 Trial trench No.10 was positioned within the scheduled area on the immediate north side of the main access road within an area of mining spoil. The trench was orientated E-W and measured approximately 3m x 1m and reached a depth of only approximately 2.6m.

5.25 The initial deposit within this trench was approximately 0.20m and consisted of a granular grit (100). Directly below this was a fine silt deposit that was 0.30m in depth (101). Directly below this was a deposit of irregular shaped stones varying in size from 0.15m – 0.20m in size (102). Directly below this deposit was a fine grey sand, likely a former buddle slime (103). This deposit was approximately 0.40 – 0.50m in depth. Directly below this was a deposit of irregular stones varying in size from between 0.10m – 0.20m (104). This deposit continued to the base of the trench at 2.60m in depth wherein water ingress halted excavation.

5.26 From within the last deposit a small fragment of oak timber was recovered measuring 0.75m in length and 0.05m in width. This timber was not diagnostic and did not have any holes or slots cut into it. This timber fragment was not retained and was returned to the trench for reinstatement. No further finds were recovered from this trench.

5.27 7) *Trial pit No.11 (TP11) (see Photo Plates 24-30)*

5.28 Trial trench No.11 was positioned immediately SW of the remains of the Crusher House on the south side of the main access road and close to Pugh's Adit.. The trench was orientated E-W and measured approximately 3m x 1m and reached a depth of only approximately 1.60m.

5.29 Prior to the excavation of the trench, due to ecological requests to preserve surface vegetation, an area of 2m x 2m was cleared of turf which was set aside for later reinstatement, and the resulting spoil from the trench was to be placed on this now cleared area.

5.30 Once the uppermost turf and sub soil consisting of silt and grit with apparent river pebbles was removed (100) a deposit of orange grit became exposed (102). It soon became apparent that this orange grit was in fact reused mine waste being utilised as packing material for a cobble surface (101), the river pebbles in the uppermost top deposit intermixed with the turf and top soil in fact being a cobbled surface, interpreted as the remains of a former dressing floor alongside the Crusher House. A quick trowelling at the far west end of the trench revealed that some of these cobbles were still surviving in situ and as such the excavation of the trench proceeded further east to avoid further damage to this cobbled surface. The depth of the packing material (102) measured approximately 0.20m in depth. Directly below this orange grit layer was what appeared to be a redeposited material of shale and river pebbles intermixed with irregular shaped stones (103). This trench was excavated to a depth of 1.60m only. Other than the cobbled surface which is probably early-mid 19th Century in date, No other dateable finds were recovered from this trench.

- 5.31 8) *Trial pit No.12 (TP12) (see Photo Plates 31-35)*
- 5.32 Trial trench No.11 was positioned within the scheduled area and on the north side of the main access road and directly below an area of historic mine spoil to the northeast of the Crusher House remains. The trench was orientated SE-NW and measured approximately 2.4m x 1.4m and reached a depth approximately 2.40m in depth.
- 5.33 The surface of the trench position was stone covered with angular stones averaging between 0.05m – 0.10m in size to a depth of approximately 0.20m. Once the upper stone deposit (100) was removed another stony deposit became exposed that consisted of larger angular stones of irregular shape varying from 0.10m – 0.30m in size (101), all former mining waste. This stony deposit was approximately 1m in depth. Directly below this stony deposit was an orange fine sandy sediment with bands of grey interpreted as a working mine waste material. Excavation of the trench was halted at 2.40m. No dateable finds were recovered from this trench.
- 5.34 9) *Trial pit No.13 (TP13) (see Photo Plates 36-44)*
- 5.35 Trial trench No.13 was positioned outside the scheduled area and on the southern side of the main access road and directly opposite the stone lined tunnel below the road that is Gill's Lower Adit. The trench was orientated NE-SW and measured approximately 3m x 2m oval and reached a depth approximately 1.50m in depth.
- 5.36 The first 0.20m of this trench consisted of a grey grit (100). Directly below this was a deposit of irregular shaped stones varying in size from 0.10m – 0.20m (102). The greater number of these stones were covered in what appeared to be an iron oxide (FeO^2). Within this deposit two former oak timber tramline sleepers were recovered. Both these sleepers measured approximately 0.60m in length and 0.15m in depth. Cut into both sides of each of the timbers were narrow slots, which presumably would have once held iron tram rails. The distance between these two slots is 0.30m (1ft), suggesting a narrow rail and indicative of an early 19th Century date, c. 1820 (*pers. Comm.* Ioan Lord). Both these timbers were retained and both have been passed onto Ioan Lord of the Cambrian Mines Trust for conservation (see illustration of timber in Figure 18).
- 5.37 Directly below this layer of large stones was a shale grit which continued to the base of the trench, a depth of 1.5m. No further finds or features were exposed in this trench.
- 5.38 10) *Trial pit No.14 (TP14) (see Photo Plates 45 – 47)*
- 5.39 Trial Trench 14 was positioned within the scheduled area at the far west end of the Cwmystwyth Mine, south of the road and directly east of the Crusher House. The trench was orientated NE-SW and measured approximately 3m x 1m oval and reached a depth approximately 1.90m in depth.
- 5.40 Initially the first 0.10m of shale and loose stone was removed and set aside (100). Directly below this was a fine sediment deposit (101) that averaged approximately 0.10m in depth. Directly below this was

a layer of angular stones, all redeposited mine waste (102). This deposit was approximately 0.50m in depth. Directly below this was a layer of natural river cobbles of various sizes, which continued to the base of the trench at 1.90m. Water ingress occurred at 0.30 – 0.40m below the surface. No finds or features became exposed within this trench.

5.41 *11) Trial pit No.15 (TP15) (see Photo Plates 48-52)*

5.42 Trial Trench 15 was positioned within the scheduled area on the north side of the main access road and within a hollow that once formed the Kingside Adit. The trench was orientated E-W across the supposed Kingside Adit and measured approximately 3m x 1m and reached a depth approximately 1.70m in depth.

5.43 Initially the first 0.10m of deposit was removed and set aside to be reinstated later. This consisted of loose shale (mine waste). Below this was a continuation of the same loose shale intermixed with angular stones of varying size, between 0.05 – 0.20m (100). Central to the trench was an apparent fill (101) of a former channel, the route of the former adit. This fill consisted of fine sediment intermixed with angular stones. This fill within this channel measured approximately 0.60m in width. At the point where the fill appeared to end on each side, there appeared to be the remains of a narrow dry-stone walling (102), partially collapsed within the fill, suggesting that the sides of the adit channel are still present but they have partly collapsed into the channel itself and thus form part of the fill itself. Recovered from the excavation were two possible wall capping stones that may once have capped the two side walls, suggesting that the Kingside Adit channel, at this point at least, would once have been open rather than covered over.

5.44 The excavation of this trench was halted at 1.70m due to water ingress. No further finds or features were exposed or recovered from within this trench.

5.45 *12) Trial pit No.18 (TP18) (see Photo Plates 53-56)*

5.46 Trial Trench 18 was positioned outside the scheduled area on the southern side of the main access road and within an area of mine spoil. The trench was orientated N-S across and measured approximately 2.5m x 1m oval and reached a depth approximately 1.80m in depth.

5.47 Initially a grey crust of mine waste was removed to a depth of 0.05m. This consisted of a granular grit intermixed with irregular stones. Directly below this was an orange mine spoil consisting of stones measuring between 0.10m and 0.30m (101). Directly below this was an almost identical deposit but yellow in colour (102). Both contexts (101 and 102) were interpreted as varying pockets of redeposited mine waste. Below (1020) was a further deposit of yellow/orange grit (103) which averaged approximately 0.30m in depth. Below this deposit was a further yellow grit (104), which continued to the base of the trench. The excavation of this trench was halted at 1.80m due to the sides of the trench falling in. No further finds or features were exposed or recovered from within this trench.

5.48 13) *Trial pit No.21 (TP21) (see Photo Plates 57-59)*

5.49 Trial Trench 21 was positioned within the scheduled area on the northern side of the main access road and positioned atop a mound of historic mine spoil southeast of the Dressing Mill floor. The trench was orientated E-W across and measured approximately 3m x 1m oval and reached a depth approximately 1.70 in depth.

5.50 The surface of this trench's location prior to groundwork was a granular processed grit (100). This grey processed grit reached a depth of approximately 0.90m – 1m in depth. Directly below this was a yellow/orange clayey grit intermixed with irregular shaped stones approximately 0.05m – 0.10m in size (101). It is possible that this deposit was purely a pocket deposit within (100). The depth of this trench reached approximately only 1.70m in depth due to the loose overlying grit falling back into the trench. No dateable finds or features were exposed or recovered from within this trench.

5.51 14) *Trial pit No.22 (TP22) (see Photo Plates 60-64)*

5.52 Trial Trench 22 was positioned just outside of the scheduled area and alongside the main access road on its southern side. The trench was orientated E-W across and measured approximately 3m x 1m and reached a maximum depth of approximately 2.2m

5.53 The first 0.20m of this trench consisted of irregular stones and soil intermixed with 20th Century waste material, including plastic (100). Directly below this was a deposit of irregular stones measuring between 0.20m to 0.30m in size (101). This deposit was approximately 0.50m in depth. Directly below this deposit was a deposit of processed fine orange and grey sand which continued to the based of the trench at 2.2m. No further dateable finds or features were exposed or recovered from within this trench.

5.54 15) *Trial pit No.28 (TP28) (see Photo Plates 65-68)*

5.55 Trial Trench 28 was positioned within the scheduled area at the far west end of the Cwmystwyth Mine, south of the road and directly southeast of the Crusher House. The trench was orientated E-W and measured approximately 3m x 1m oval and reached a depth of only approximately 1.10m.

5.56 Initially the first 0.10m of shale and loose stone was removed and set aside (100). Directly below this was a fine sediment deposit (101) that averaged approximately 0.10m in depth. Directly below this was a layer of angular stones, all re-deposited mine waste (102). This deposit was approximately 0.50m in depth. Directly below this was a layer of natural river cobbles of various sizes, which continued to the base of the trench at 1.100m. Water ingress occurred at 0.30 – 0.40m below the surface. No finds or features became exposed within this trench.

B) Hand Dug trenches (see Figure 7)

5.57 1) Trial pit No.16 (TP16) (see Photo Plates 87-90)

5.58 The hand dug trench TP16 was positioned outside of the scheduled area on the south side of the main access road, approximately 15m east of Gill's Lower Adit. The trench measured approximately 0.30m in diameter and reached a depth of only approximately 0.60m.

5.59 The first 0.05m surface deposit of this trial pit consisted of a fine silty grey sediment with angular stone inclusions varying in size from between 0.01m – 0.05m in size (100). Directly below this deposit was a stony deposit with all stones being sharp and angular in form varying in size from 0.02m – 0.05m in size, the angular form suggesting that this deposit is redeposited mine waste (101). This trench was halted at 0.60m in depth due to the stony nature of the ground. No datable finds or features were recovered from this trench.

5.60 2) Trial pit No.17 (TP17) (see Photo Plates 91-94)

5.61 The hand dug trench TP17 was positioned outside of the scheduled area on the south side of the main access road, approximately 8m south of TP16. The trench measured approximately 0.30m in diameter and reached a depth of only approximately 0.60m.

5.62 The first 0.20m surface deposit of this trial pit consisted of a fine silty sandy/clay grey sediment with angular stone inclusions varying in size from between 0.01m – 0.05m in size (100). Directly below this deposit was a stony deposit with all stones being sharp and angular in form varying in size from 0.02m – 0.10m in size, the angular form suggesting that this deposit is re-deposited mine waste (101). This trench was halted at 0.60m in depth due to the stony nature of the ground. No datable finds or features were recovered from this trench.

5.63 3) Trial pit No. 19 (TP19) (see Photo Plates 95-98)

5.64 The hand dug trench TP19 was positioned outside of the scheduled area on the south side of the main access road, approximately 10m southeast of TP18. The trench measured approximately 0.30m in diameter and reached a depth of only approximately 0.65m.

5.65 The first 0.10m surface deposit of this trial pit consisted of a layer of angular stones varying in size from between 0.01m – 0.05m in size (100). Directly below this deposit was 0.20m deep finer buff coloured stony/gritty deposit with angular stone inclusions, with stones varying in size from 0.02m – 0.10m in size, the angular form suggesting that this deposit is re-deposited mine waste (101). Below this deposit was a grey clay/silt deposit intermixed with grit and angular stones varying in size from 0.01m – 0.03m (102). This trench was halted at 0.65m in depth due to the stony nature of the ground. No datable finds or features were recovered from this trench.

5.66 4) Trial pit No. 20 (TP20) (see Photo Plates 99-101)

5.67 The hand dug trench TP20 was positioned outside of the scheduled area on the south side of the main access road, approximately 4m from the Nant y Gwaith watercourse and atop a mound of fine mine waste silt material. The trench measured approximately 0.30m in diameter and reached a depth of only approximately 0.65m.

5.68 The first deposit of this trial pit consisted of a fine grey silt/sediment with occasional streaks of iron staining (100). This deposit was interpreted as possible buddle slime/sediment. This deposit reached to the base of the trench at 0.65m. No datable finds or features were recovered from this trench.

5.69 5) Trial pit No. 24 (TP24) (see Photo Plates 69-73)

5.70 The hand dug trench TP24 was positioned outside of the scheduled area on the south side of the main access road, approximately 20m from the buried Kingside Adit. The trench measured approximately 0.30m in diameter and reached a depth of only approximately 0.60m.

5.71 The first 0.50m deposit encountered in this trial pit was a dark grey/black gritty soil containing a mixture of both angular and irregular shaped stones and river worn stones varying in size from between 0.01m – 0.10m in size (100). Directly below this deposit was 0.10m deep grey silt and grit filled deposit containing angular and irregular shaped stones, with stones varying in size from 0.01m – 0.03m in size (101). This trench was halted at 0.65m. No datable finds or features were recovered from this trench.

5.72 6) Trial pit No. 25 (TP25) (see Photo Plates 74-78)

5.73 The hand dug trench TP25 was positioned outside of the scheduled area on the south side of the main access road and close to the Afon Yswyth, approximately 10m SE from TP24. The trench measured approximately 0.30m in diameter and reached a depth of only approximately 0.90m.

5.74 The first 0.30m deposit encountered in this trial pit was a grey/mid brown sandy soil/peat deposit intermixed with 60% stone inclusions varying in size from between 0.01m – 0.03m in size (100). Directly below this deposit was grey silty grit filled deposit containing angular and irregular shaped stones varying in size from 0.01m – 0.10m in size (101). Toward the base of this deposit river worn pebbles were beginning to become exposed suggesting the beginning of a new deposit (102). This trench was halted at 0.90m due to water ingress. No datable finds or features were recovered from this trench.

5.75 7) Trial pit No. 26 (TP26) (see Photo Plates 79-82)

5.76 The hand dug trench TP26 was positioned outside of the scheduled area on the south side of the main access road and close to the Afon Yswyth, approximately 4m SE from TP25. The trench measured approximately 0.30m in diameter and reached a depth of only approximately 0.70m.

5.77 The excavation of this trench encountered only one deposit all the way down to the base of the trench at 0.70m. This deposit (100) was a dark soil grit with shale stone varying in size from between 0.01m –

0.10m in size. This trench was halted at 0.70m due to the sides of the trench collapsing in. No datable finds or features were recovered from this trench.

5.78 *8) Trial Pit No, 27 (TP27) (see Photo Plates 83-86)*

5.79 The hand dug trench TP27 was positioned outside of the scheduled area on the south side of the main access road and close to the Afon Yswyth, approximately 4m NE from TP26. The trench measured approximately 0.30m in diameter and reached a depth of approximately 1m.

5.80 The first 0.20m deposit encountered in this trial pit was an orange clay deposit intermixed with 60% stone inclusions varying in size from between 0.01m – 0.03m in size (100). Directly below this deposit was grey silty grit filled deposit containing angular and irregular shaped stones varying in size from 0.01m – 0.04m in size (101). This trench was halted at 1m. Regards to datable finds, a small fragment of modern stone drainage pipe was found within the upper clay (100) deposit. Other than this modern find no further datable finds or features were recovered from this trench.

C) Hand Dug Bulk Sample Pits (see Figure 7)

5.81 *1) Hand Dug Bulk Sample Pit HS4 (see Photo Plates 102-104)*

5.82 The hand dug bulk sample trench HS4 was positioned within the scheduled area on the north side of the main access road and alongside the Nant y Graig watercourse toward the base of a large mound of mine waste. The trench measured approximately 0.30m in diameter and reached a depth of approximately 0.50m.

5.83 Only one deposit was encountered from this trench, a stony gritty deposit (100). No datable finds or features were recovered from this trench.

5.84 *2) Hand Dug Bulk Sample Pit HS8 (see Photo Plates 105-108)*

5.85 The hand dug bulk sample trench HS8 was positioned within the scheduled area on the north side of the main access road and alongside the Nant y Watcyn watercourse toward the base of a large mound of mine waste. This trench measured approximately 0.30m in diameter and reached a depth of approximately 0.50m.

5.86 Only one deposit was encountered from this trench, an orange/brown silty sandy deposit (100) No datable finds or features were recovered from this trench.

5.87 *3) Hand Dug Bulk Sample Pit HS9 (see Photo Plates 109-111)*

5.88 The hand dug bulk sample trench HS9 was positioned outside of the scheduled area on the north side of the main access road and on the east bank of the Nant y Watcyn watercourse on a bank between the edge of the road and the stream. This trench measured approximately 0.30m in diameter and reached a depth of approximately 0.50m.

- 5.89 Only one deposit was encountered from this trench, a loose shale deposit consisting of angular and irregular stones (100). No datable finds or features were recovered from this trench.
- 5.90 *4) Hand Dug Bulk Sample Pit HS30 (see Photo Plates 112-113)*
- 5.91 The hand dug bulk sample trench HS30 was positioned within the scheduled area on the north side of the main access road and approximately 6m south of HS8 on the east bank of the Nant y Watcyn watercourse. This trench measured approximately 0.30m in diameter and reached a depth of approximately 0.50m.
- 5.92 Only one deposit was encountered from this trench, a dark grey fine grit shale deposit with occasional angular and irregular stone inclusions (100). No datable finds or features were recovered from this trench.

6. Conclusion & Recommendations

- 6.1 The archaeological watching brief during groundwork investigation works at the Cwmystwyth Lead Mine, managed to establish the character of the below ground deposits in the targeted areas, of both the machine and hand dug trenches. Although all fifteen (15) machine dug trenches revealed the character of sub surface deposits in the targeted areas, with all of them having deposits related to historic mining at the site in the form of processed mine waste, only six of the trenches managed to expose finds and features of any significance. Two of these archaeologically productive trenches (TP2 and TP15) were positioned in such a way that the groundwork managed to confirm the positions of the buried Kingside Adit and the buried former course of the Nant y Gwaith stream. Of the other four machine dug trenches (TP1, TP10, TP11 and TP13), perhaps the most rewarding trench was TP11, positioned to the southwest of the remains of the 19th Century Crusher House, where a cobbled surface with reused packing material from mine waste was found to exist buried beneath turf and shallow top soil. This cobbled surface is very likely 19th Century in date and almost certainly the remains of a dressing floor that served the processing at the Crusher House. Although only a small section of this cobbled surface was exposed and sadly damaged, it does suggest that this cobbled surface survives extensively in area surrounding the Crusher House. The other three (3) rewarding machine dug trenches (TP1, TP10 and TP13) were those where the ground works exposed fragments of timber, all timbers associated with the historic working of the mine. Of these three trenches, the most significant timbers recovered were from TP13, where the remains of two former oak tramline sleepers were recovered, each with two cut slots in them placed at 1ft apart suggesting a narrow gauge rail c.1820 (*pers. Comm.* Ioan Lord). The other interesting timbers recovered were from TP1 just east of the dressing mill floor. Here, five approximately 30cm – 50cm lengths of degraded timber planks were recovered, possibly from a former wood lined chute positioned alongside the Nant y Gwaith. Other than these finds and features no further datable finds or features became exposed during the machine dug trenches. All of the timber finds were passed onto the Cambrian Mines Trust for conservation.

- 6.2 Regards to the twelve (12) hand dug trenches, as with the machine dug trenches, these trial holes all appeared to have deposits related to historic mining at the site in the form of processed mine waste within them. However, all but one hand dug trench didn't expose any dateable finds or features. The one trial sampling hole that did expose a dateable find was TP27 where a small fragment of 20th Century stone drainage pipe was recovered but not retained.
- 6.3 In terms of recommendations for the future, it is recommended that either a smaller machine is used for any future groundwork within the designated areas or else heavy duty matting is laid down for machine tracking along access routes, due to the sensitivity of the site. The machine used was a heavy plant machine and did leave some substantial tracking marks across the scheduled area particularly and especially when the machine twists to turn on its tracks and some of the historic mine spoil mounds consist of very fine mine waste material that *moves* very easily. Although these track marks will weather away and mellow overtime, it is worth considering mitigation options to avoid this damage for any future ground works on the site where heavy plant is required.

7 Acknowledgements

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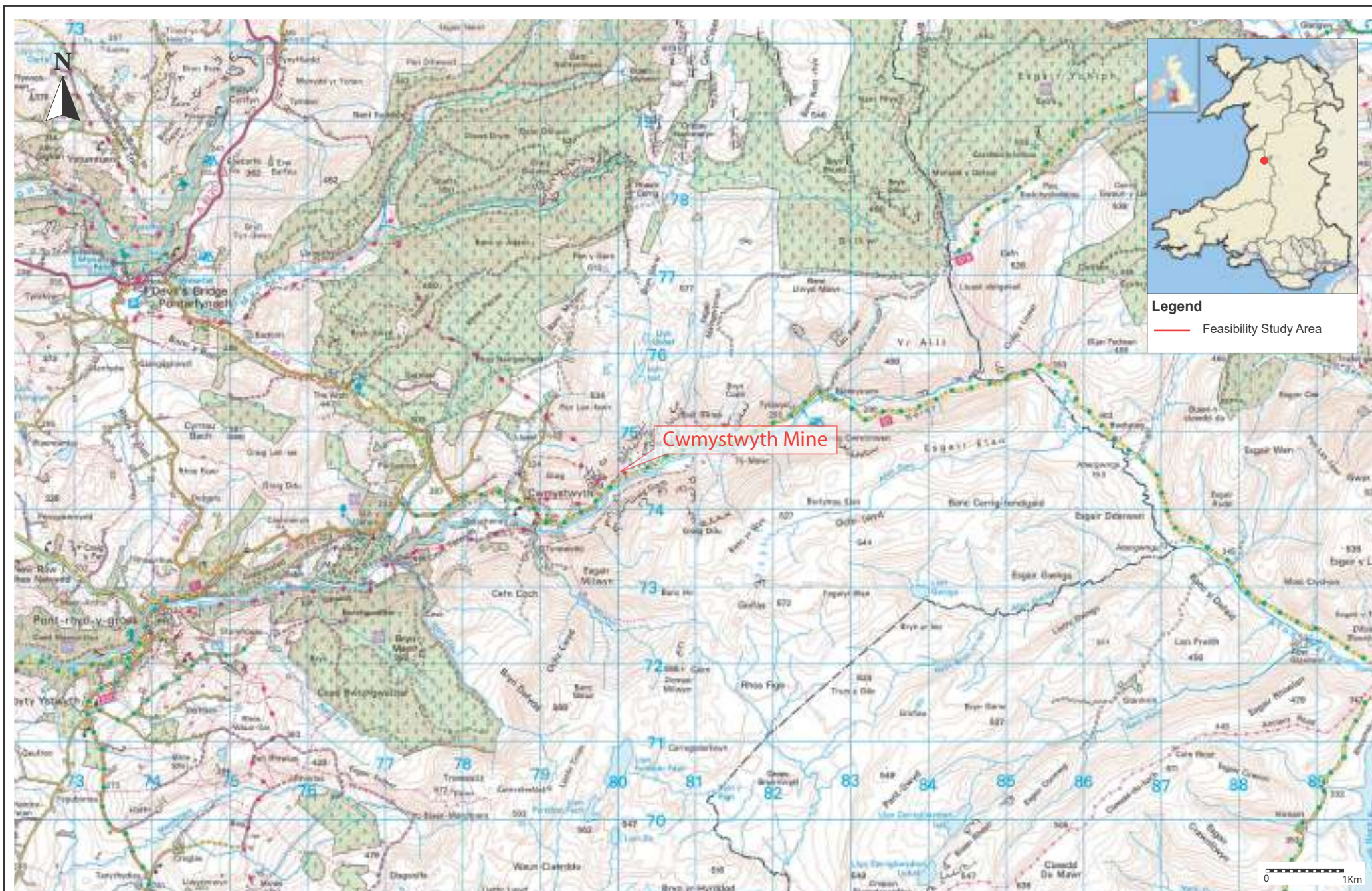
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Cartographic Sources

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- Llanfihangel-y-Creuddyn parish Tithe Map and apportionment details(1847)
- Gwnnws parish Tithe Map and apportionment details (1847)
- Ordnance Survey 1st Edition map of 1887 (1:10560);
- Ordnance Survey 2nd Edition map of 1906 (1:10560);
- Ordnance 1953 (1:10560);
- Ordnance Survey 2018 (Landranger)
- Ordnance Survey 2018 (Explorer)

APPENDIX I:

Figures



Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion

Date: February 2023

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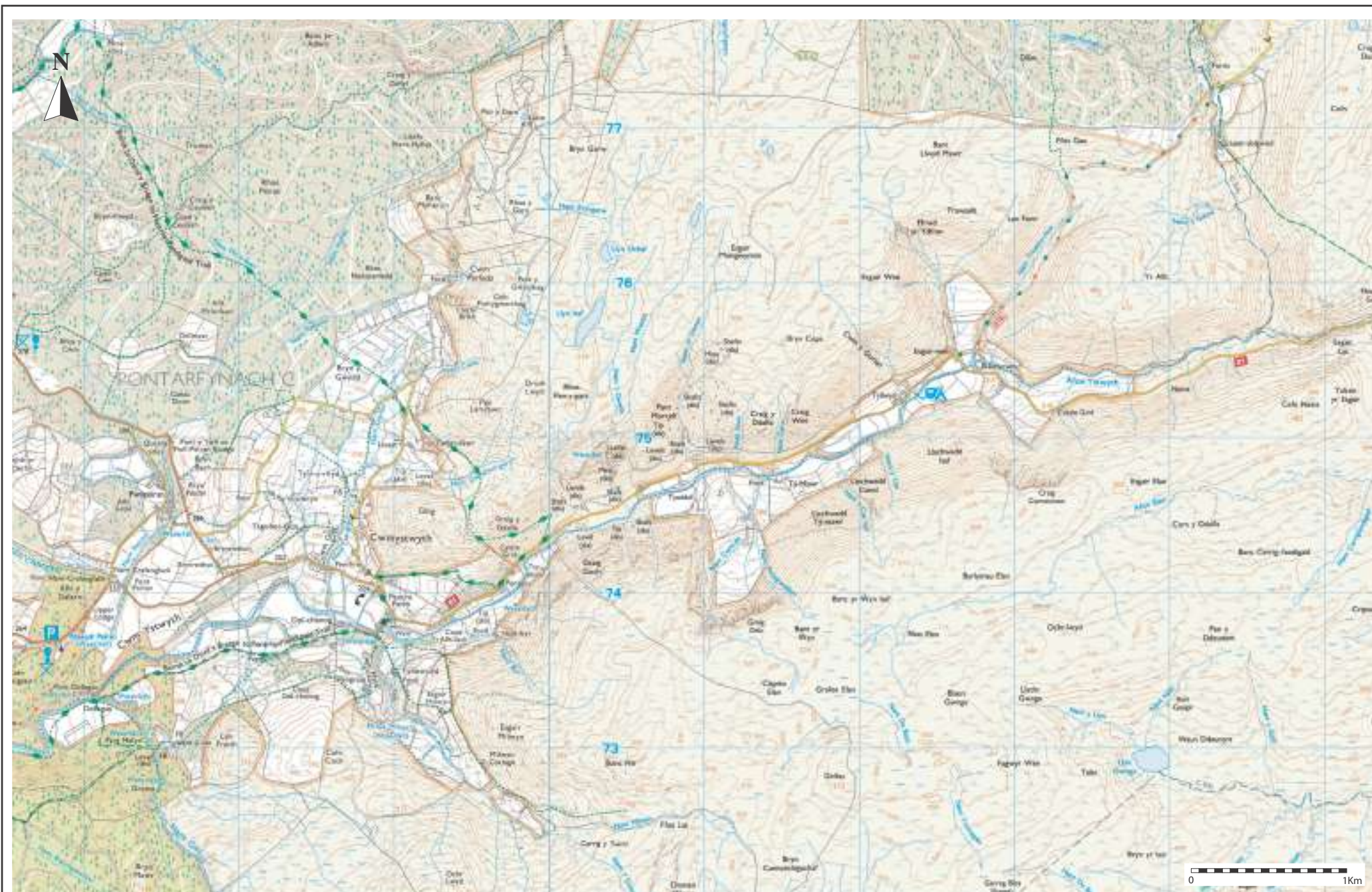
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Drawing No.

Figure 1.

Location Map (OS 1:50,000 Landranger)





Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion

Date: February 2023

Approx. Scale (@ A4):

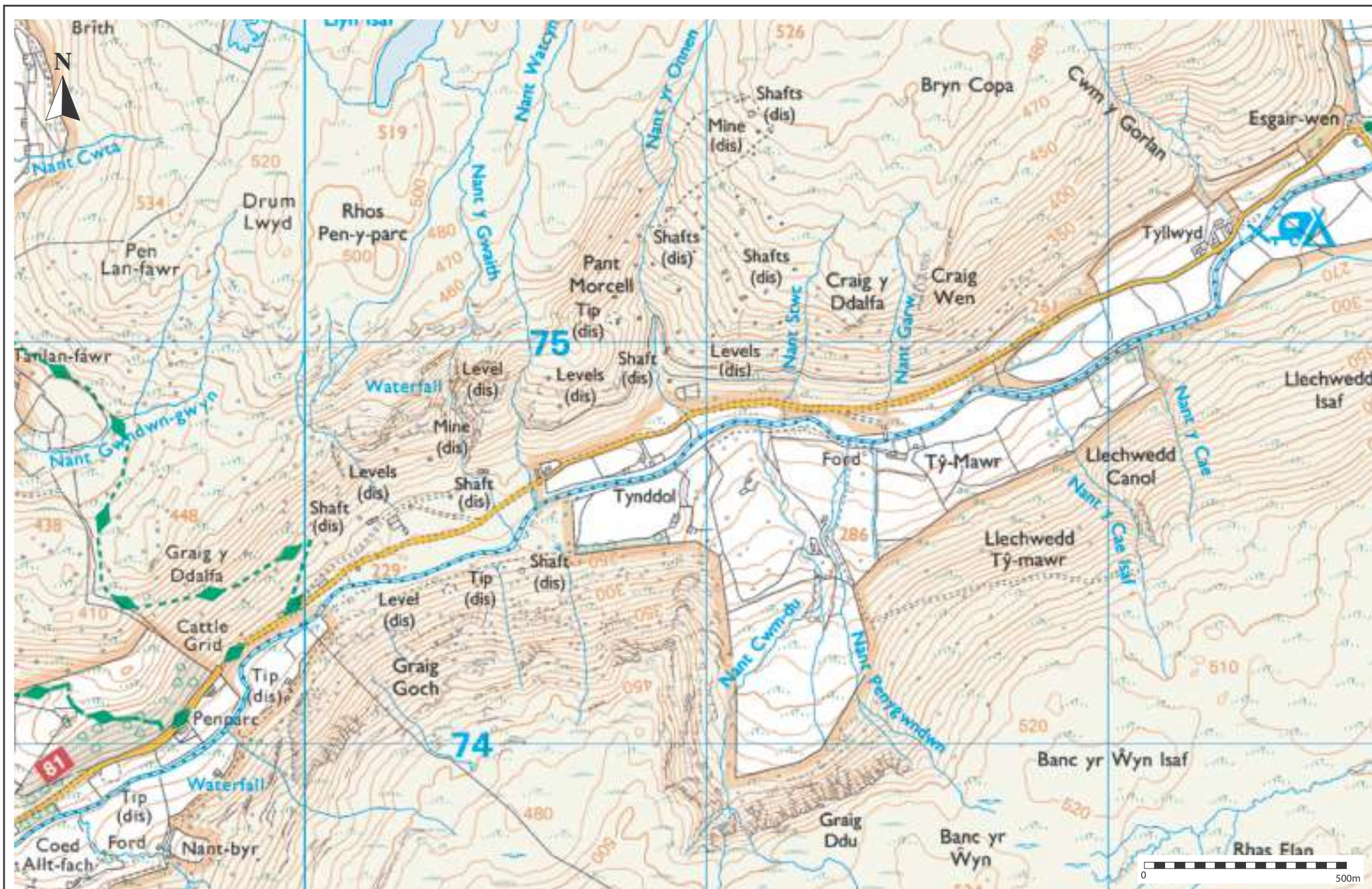
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Drawing No.

Figure 2.

Location Map (OS 1:25,000 Explorer)





Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion

Date: February 2023

Drawn by:

Approx. Scale (@ A4):

Drawing No.

Figure 3.

Location Map - Enlarged view (OS 1:25,000 Explorer)





Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion.

Date: February 2023

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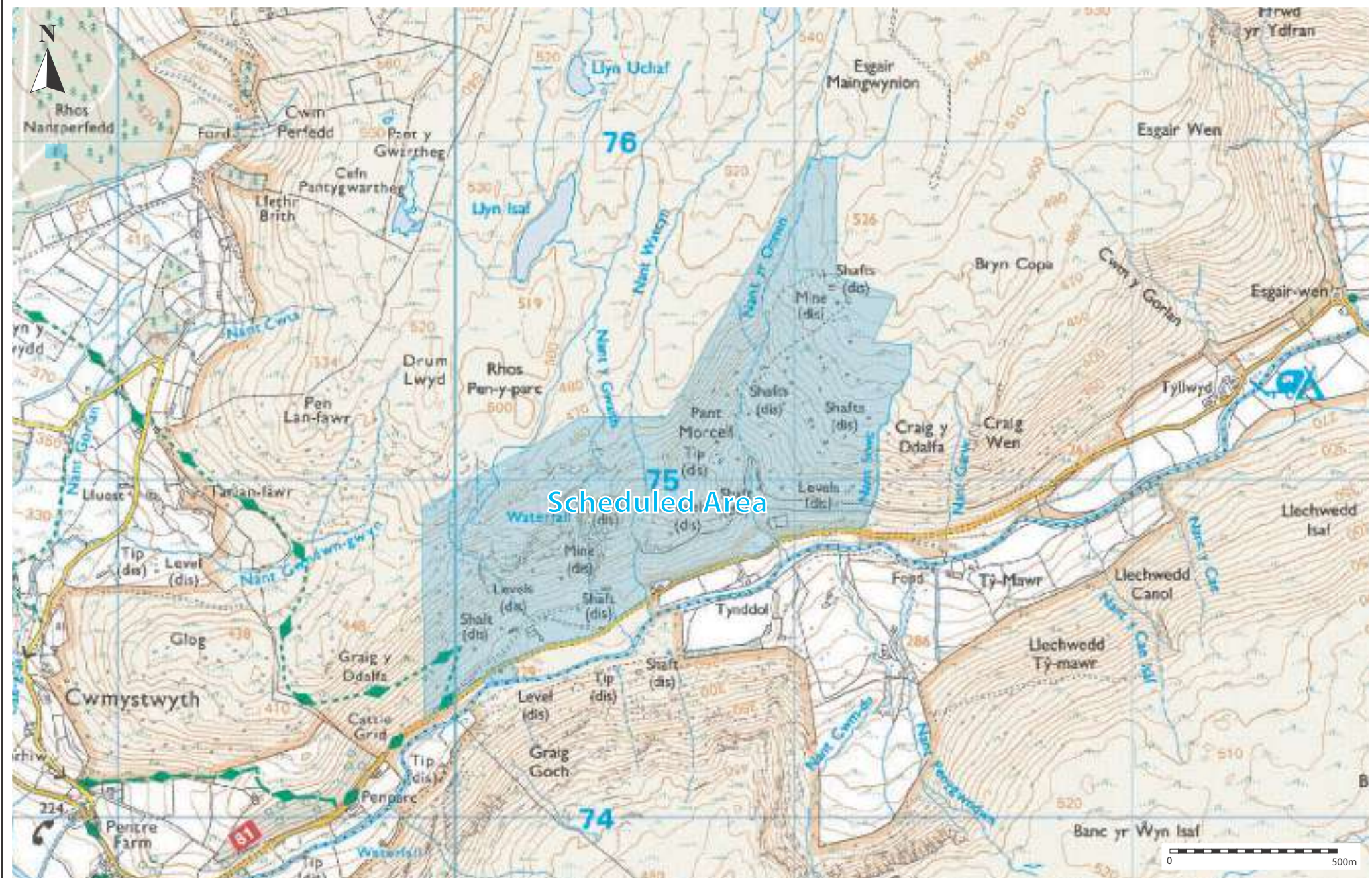
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Figure 4.

OS Aerial Photo (2022).





Project Title: Cwmystwyth Lead Mine, Ponytarfynach, Ceredigion

Date: February 2023

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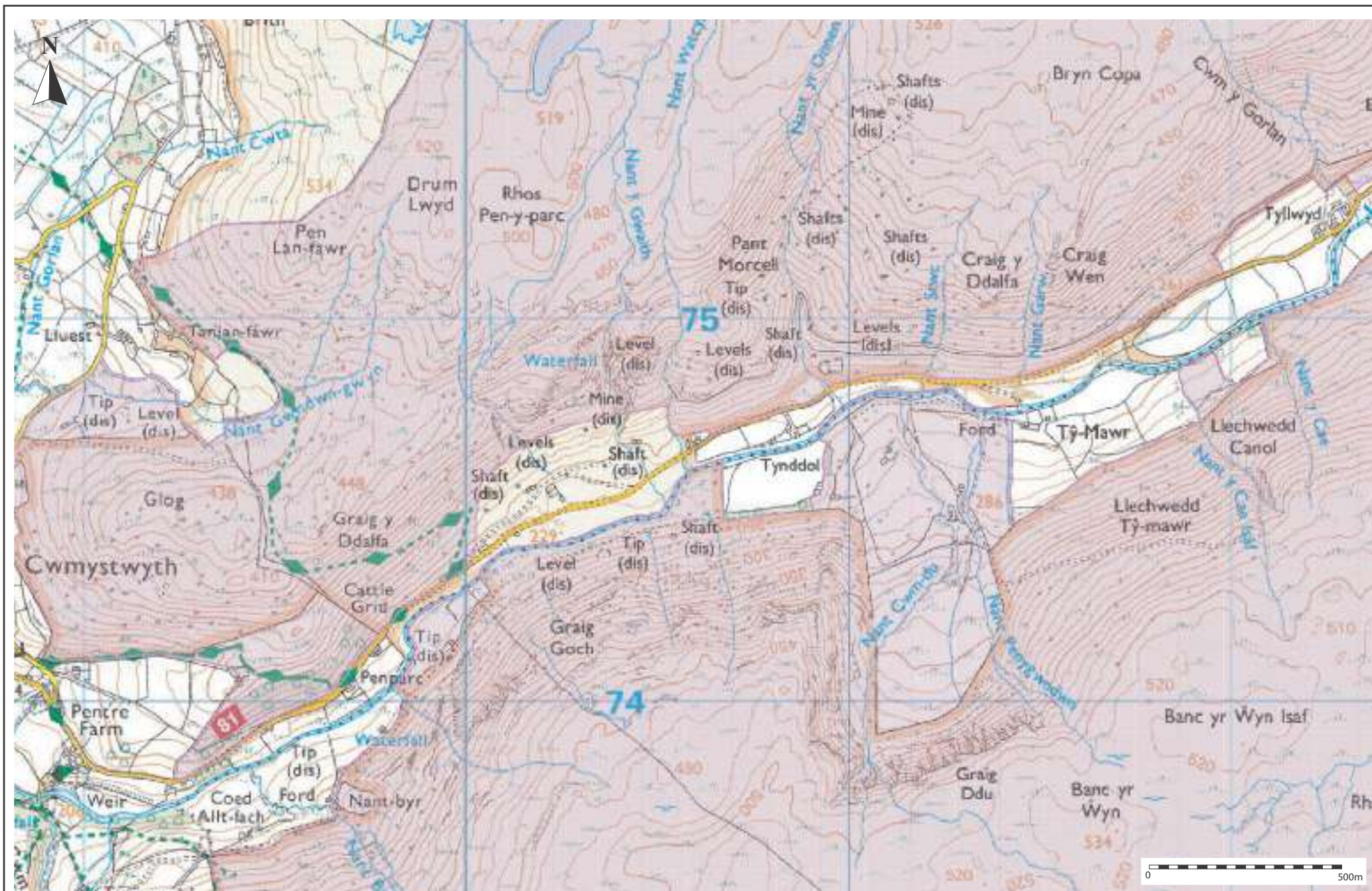
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Figure 5.

Cwmystwyth Lead Mine with limits of Scheduled Area shown





Project Title: Cwmystwyth Lead Mine, Ponytarfynach, Ceredigion

Date: February 2023

Approx. Scale (@ A4):

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Figure 6.

Cwmystwyth Lead Mine within limits of Special Protected Area (SPA)



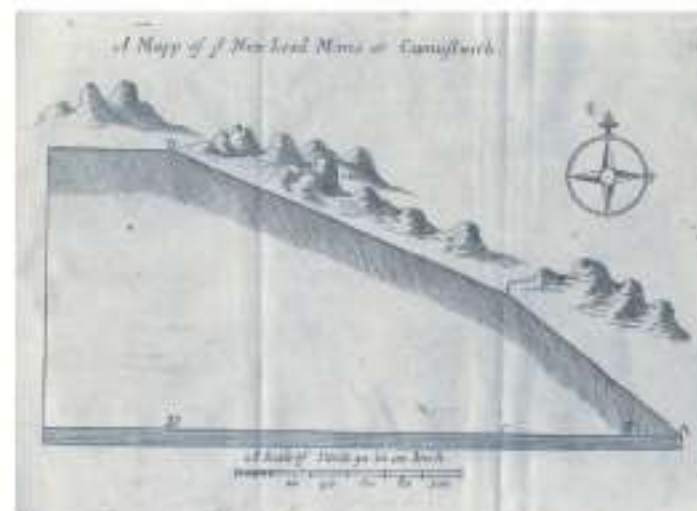
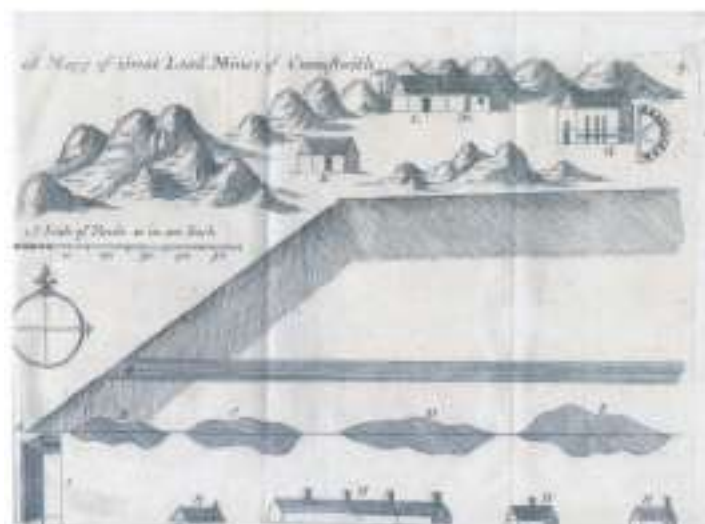


Figure 8.

William Waller's Plan and descriptive text of the Nerw Cwmystwyth Lead Mine in 1704.





Project Title: Cwmystwyth Lead Mine, Ponytarfynach, Ceredigion

Date: February 2023

Approx. Scale (@ A4):

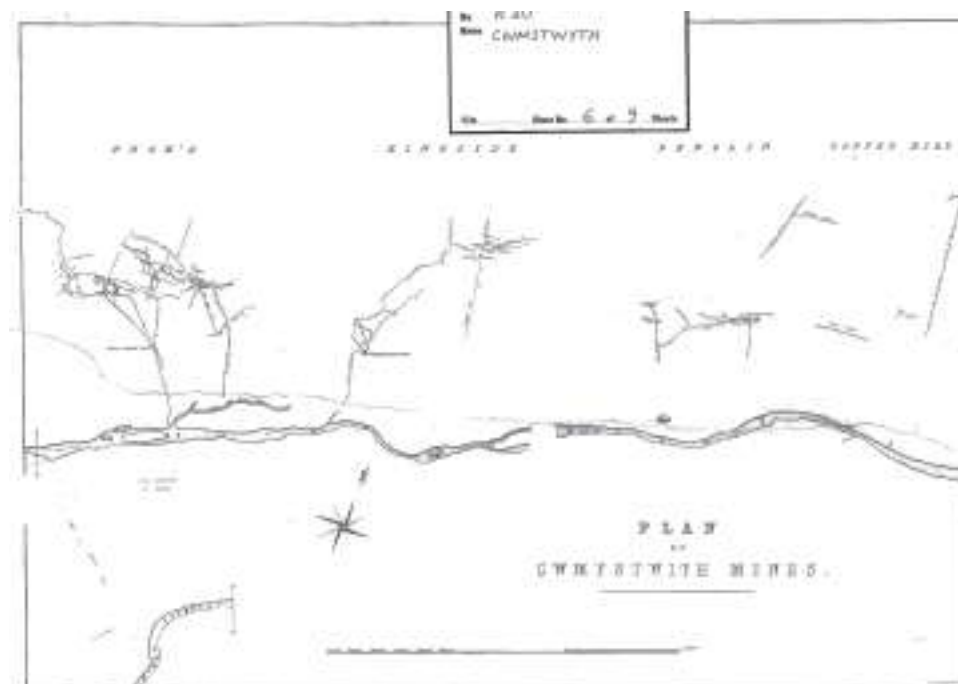
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Drawing No.

Figure 9.

OS Surveyors Drawing of Cwmystwyth Lead Mine c.1820





Project Title: Cwmystwyth Lead Mine, Ponytarfynach, Ceredigion

Date: February 2023

Approx. Scale (@ A4):

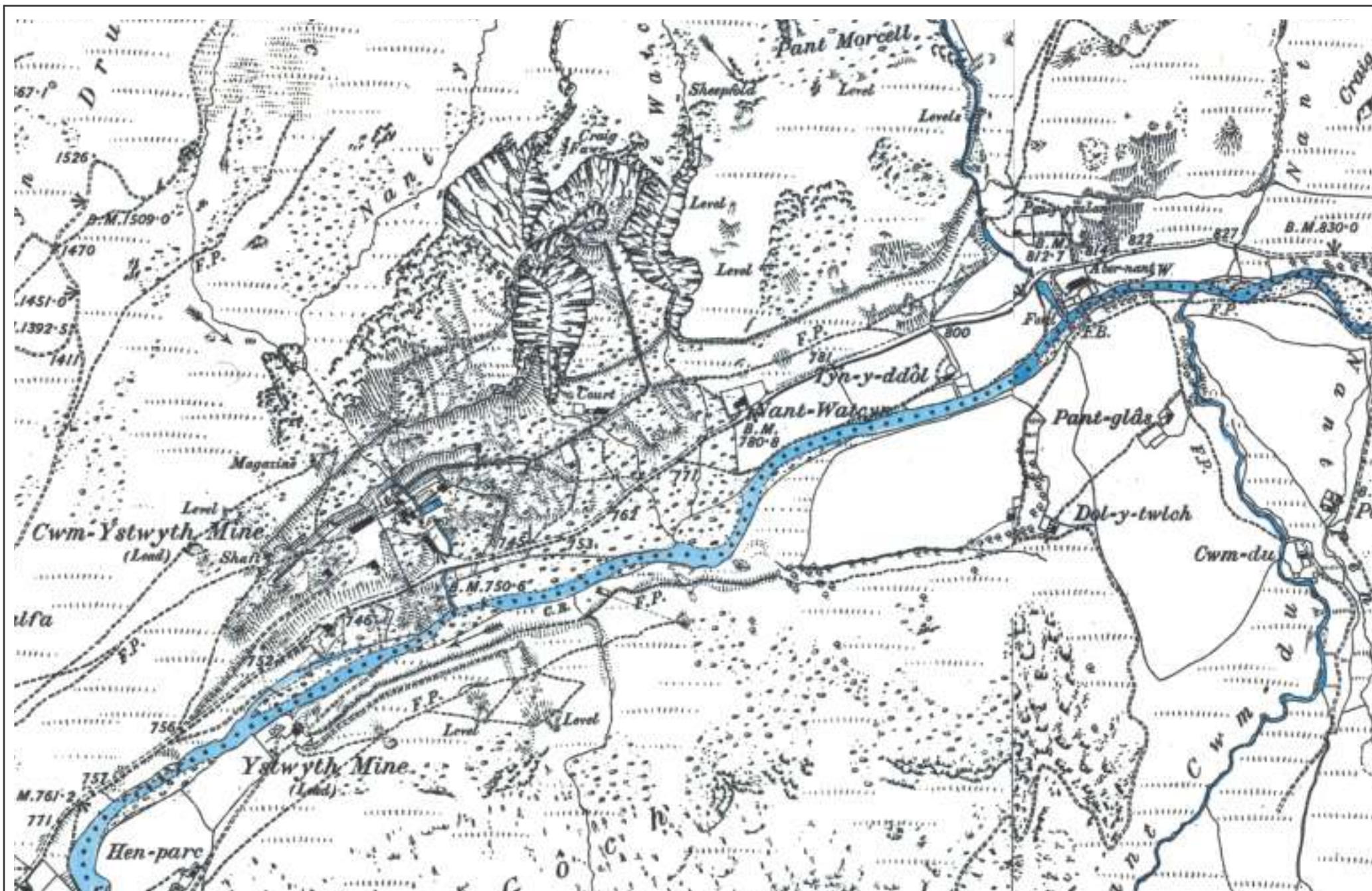
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Drawing No.

Figure 12.

W. Smyth Plans of Cwmystwyth Lead Mine (1847).





Project Title: Cwmystwyth Lead Mine, Ponytarfynach, Ceredigion

Date: February 2023

Drawn by:

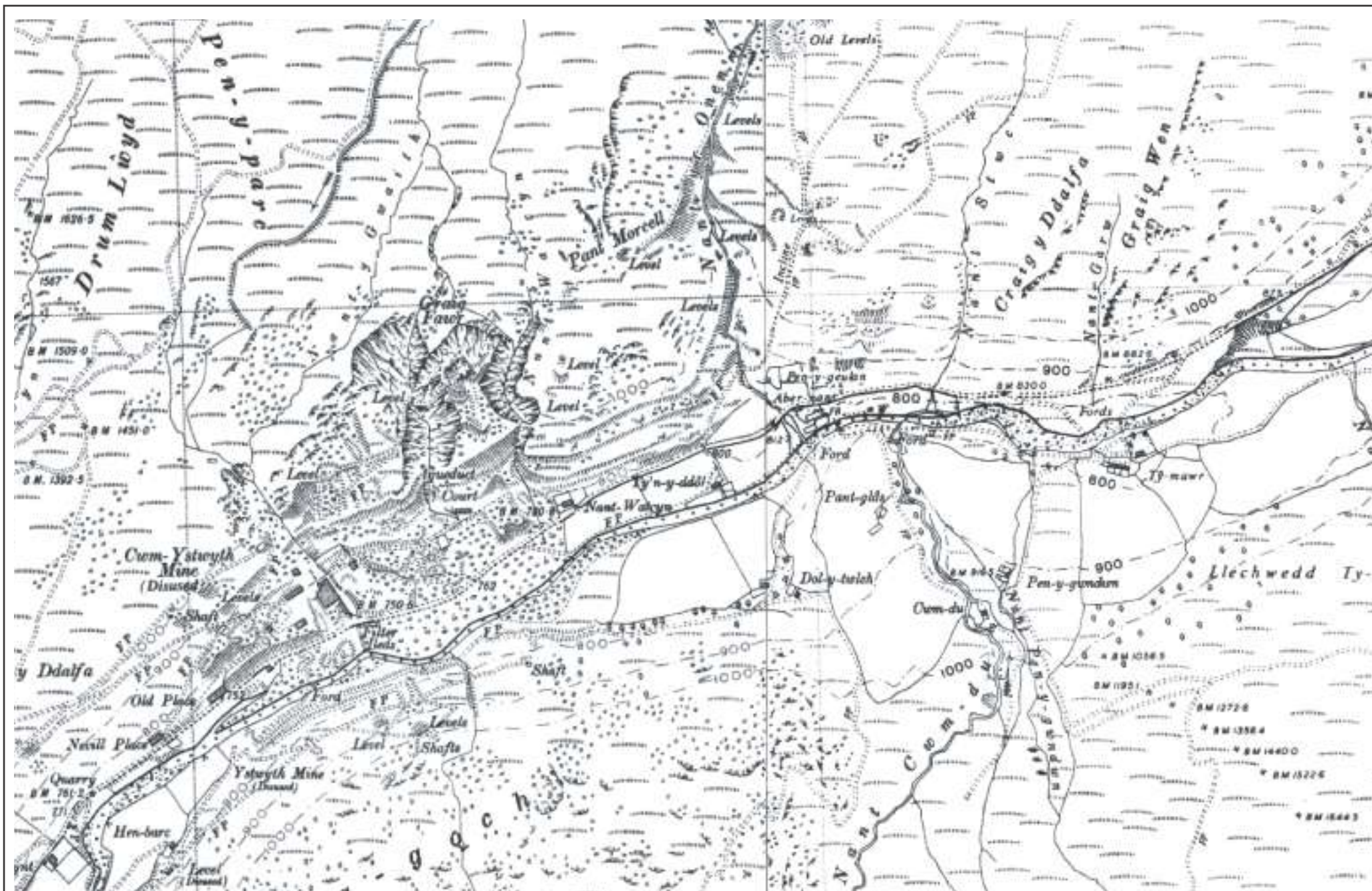
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Drawing No.

Figure 13.

OS First Edition Map (1887)





Project Title: Cwmystwyth Lead Mine, Ponytarfynach, Ceredigion

Date: February 2023

Drawn by:

Approx. Scale (@ A4):

Drawing No.

Figure 15.

OS 1953 Edition Map





Project Title: Cwmystwyth Lead Mine, Ponytarfynach, Ceredigion

Date: February 2023

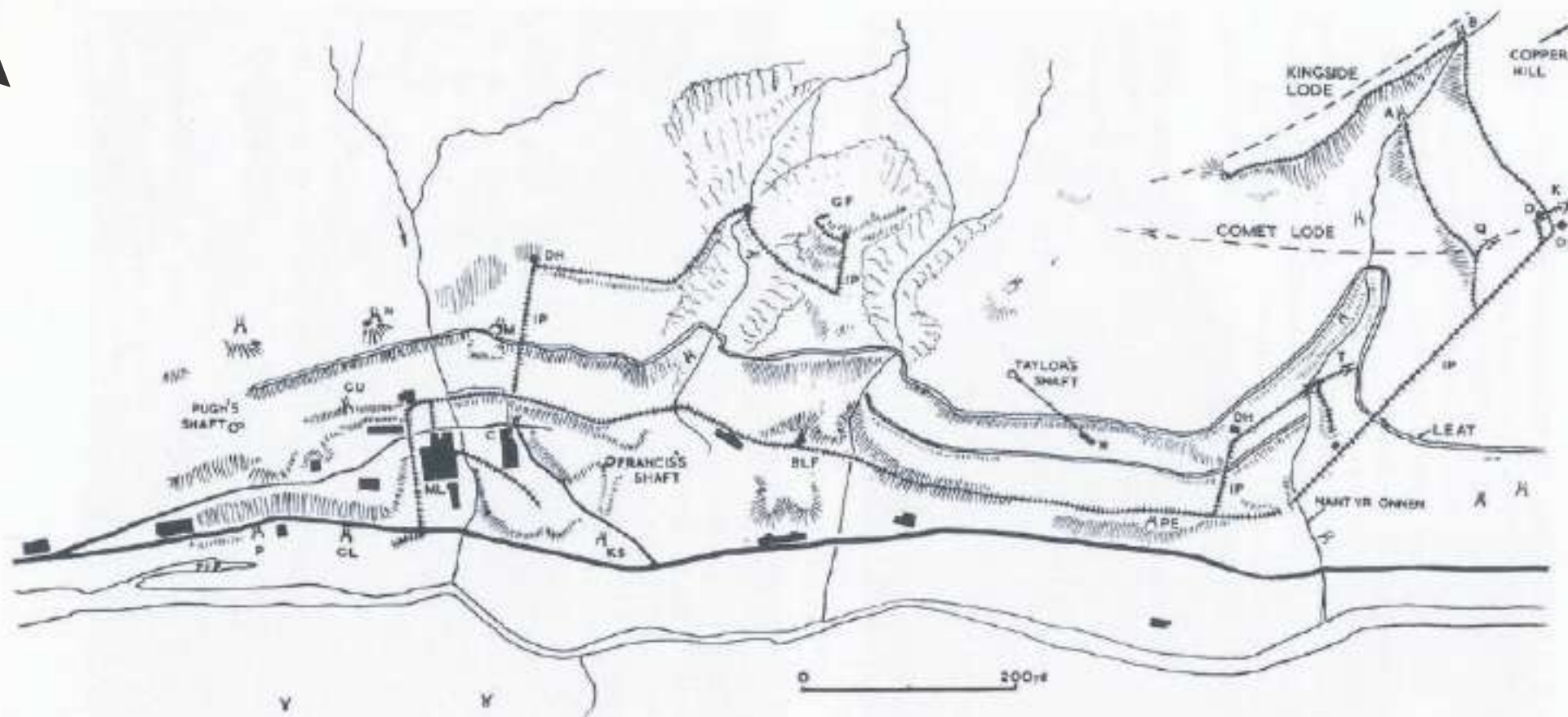
Approx. Scale (@ A4):

Drawn by:

Drawing No.

Figure 16.

Chronological Ground Plan showing Cwmystwyth Lead Mine Development from 1887-1906



A Alderson's Level*
B Bansall's Level*
C Crusher House
BLF Bansall's Level Fawr*
DH Drum House
GL Gill's Lower Level*
GU Gill's Upper Level*

GF Graig Fawr*—the most spectacular
opencut workings in mid-Wales
IP Inclined Plane
K King's Level
KS Kingside Adit*
M Mitchell's Level
ML Mill

N Nant Trefach Level*
O Ore Bins
P Pugh's Adit*
PE Pengetian Level*
Q Queen's Level
T Taylor's Level
W Waterwheel Pit

An asterisk denotes features present in 1846

Note: For a fine surface plan of the mine in 1846, see W. W. Smyth Mem. Geol. Survey

CWMYSTWYTH Some present-day remains

Project Title: Cwmystwyth Lead Mine, Ponystarfynach, Ceredigion

Date: February 2023

Approx. Scale (@ A4):

Drawn by:

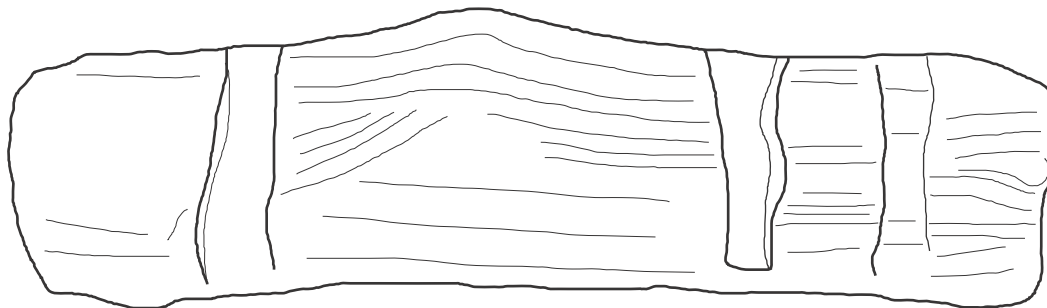
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Figure 17.

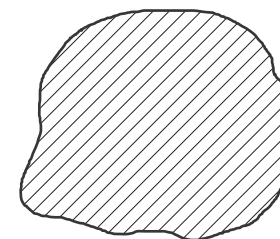
Plan of Cwmystwyth Lead mine by David Bick, from Metal Mines of Wales 1975.



Tramway sleeper 1



Tramway sleeper 2



Cross section of
tramway sleeper

Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion

Date: February 2023

Approx. Scale (@ A4):

Drawn by:

Drawing No.

Figure 18.

Oak tramway sleepers c. 1820 recovered from machine dug Trench 13.



APPENDIX II:

Photo plates



Plate 01. View of Cwmystwyth valley on 12th December 2022. Project was cancelled due to snow.



Plate 01. Machine Dug Trench 1 (TP1) prior to ground investigation works. Looking NE.



Plate 02. Machine Dug Trench 1 (TP1) prior to ground investigation works. Looking NE.



Plate 03. Machine Dug Trench 1 (TP1) following groundworks. Looking NE.



Plate 04. Machine Dug Trench 1 (TP1) following groundworks. Looking N.



Plate 05. Machine Dug Trench 1 (TP1) following groundworks. Timber fragments recovered from trench in upper deposit



Plate 06. Machine Dug Trench 1 (TP1) following groundworks. Looking E.


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 01 - 06	
Date Taken: 8th February 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 07. Position of Trench 2 (TP2) prior to ground investigation works. Looking NW.



Plate 08. Machine Dug Trench 2 (TP2). Working shot. Looking SW.



Plate 09. Machine Dug Trench 2 (TP2) following ground investigation works. Looking SW.



Plate 10. Machine Dug Trench 2 (TP2) following ground investigation works. Looking N.



Plate 11. Position of Trench 3 (TP3) prior to ground investigation works. Looking S.



Plate 12. Machine dug Trench 3 (TP3) during ground investigation works. Looking S.



Plate 13. Machine dug Trench 3 (TP3) following ground investigation works. Looking E..


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 07 - 13	
Date Taken: 17th Jan - 8th Feb 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 14. Position of Trench 5 (TP5) prior to ground investigation works. Looking N.



Plate 15. Machine dug Trench 5 (TP5) . Working shot during ground investigation works. Looking N.



Plate 16. Machine dug Trench 5 (TP5) . Working shot during ground investigation works. Looking N.



Plate 17. Machine dug Trench 5 (TP5) following ground investigation works. Looking W.



Plate 18. Machine dug Trench 5 (TP5) following ground investigation works. Looking SW.


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 14 - 18	
Date Taken: 8th Feb 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 19. Machine dug Trench 7 (TP7). Position of trench prior to ground investigation works. Looking NE.



Plate 20. Machine dug Trench 7 (TP7). Working shot during ground investigation works. Looking NW.



Plate 21. Machine dug Trench 7 (TP7). Working shot during ground investigation works. Looking N.



Plate 22. Machine dug Trench 7 (TP7). Trench following ground investigation works. Looking SE.



Plate 23. Machine dug Trench 7 (TP7). Trench following ground investigation works. Looking E.



Plate 24 Machine dug Trench 11 (TP11). Position of TP11 alongside Crusher House prior to investigation works. Looking NE.


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 19 - 24	
Date Taken: 17th -8th January 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 25. Machine dug Trench 11 (TP11). Working shot during cutting of Trench 11. Looking E.



Plate 26. Machine dug Trench 11 (TP11). Cutting of trench paused following discovery of former 19th Century cobbled surface and sub base grit deposit. Looking E.



Plate 27. Machine dug Trench 11 (TP11). Cutting of trench paused following discovery of former 19th Century cobbled surface and sub base grit deposit. Looking E.



Plate 28. Machine dug Trench 11 (TP11). Trench 11 following excavation depth reached due to water ingress. Looking W.



Plate 29. Machine dug Trench 11 (TP11). Remnants of cobbled surface at W end of trench. Looking W.



Plate 30. Machine dug Trench 11 (TP11). Trench following ground investigation works. Note orange sub base of grit for cobbled surface packing. Looking SE.


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 25 - 30	
Date Taken: 17th January 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 31. Machine dug Trench 12 (TP12). Trench 12 location prior to groundworks. Looking N.



Plate 32. Machine dug Trench 12 (TP12). Working shot during cutting of Trench 12. Looking NW.



Plate 33. Machine dug Trench 12 (TP12). Groundworks completed for Trench 12 at c.2.40 meters. Looking N.



Plate 34. Machine dug Trench 12 (TP12). Groundworks completed for Trench 12 at c.2.40 meters. Looking NE.



Plate 35. Machine dug Trench 12 (TP12). Groundworks completed for Trench 12 at c.2.40 meters. Looking N.



Plate 36. Machine dug Trench 13 (TP13). Location of Trench 13 prior to groundworks. Looking SE.



Plate 37. Machine dug Trench 13 (TP13). Working shot during groundwork. Looking S.

Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion	
Date Taken: 16th & 17th January 2023	Approx. Scale (@ A4):
Appropriated by: RSJ	Drawing No.

Photo Plate No's.

31 - 37





Plate 38. Machine dug Trench 13 (TP13). Working shot during groundworks. Looking SE.



Plate 39. Machine dug Trench 13 (TP13). Remains of timber tramway sleepers c.1820 recovered from upper deposit.



Plate 40. Machine dug Trench 13 (TP13). Detail shot of one of the recovered timber tramway sleeper.



Plate 41. Machine dug Trench 13 (TP13). Remains of timber tramway sleepers c.1820 recovered from upper deposit.



Plate 42. Machine dug Trench 13 (TP13). Remains of timber tramway sleepers c.1820 recovered from upper deposit.



Plate 43. Machine dug Trench 13 (TP13). Groundwork completed. Looking N.



Plate 44. Machine dug Trench 13 (TP13). Recording board for Trench 13 on completion. Looking S.


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 38 - 44	
Date Taken: 16th January 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 45. Machine dug Trench 14 (TP14). Location of Trench 14 prior to groundworks. Looking S.



Plate 47. Machine dug Trench 14 (TP14). Groundworks completed following water ingress at only 0.40m below surface. Looking S.



Plate 49. Machine dug Trench 15 (TP15). Working shot during ground cutting. Looking E.



Plate 46. Machine dug Trench 14 (TP14). Groundworks completed following water ingress at only 0.40m below surface. Looking S.



Plate 48. Machine dug Trench 15 (TP15). Location of Trench 15 at Kingside Adit prior to groundworks. Looking NW.



Plate 50. Machine dug Trench 15 (TP15). Completed groundworks at c.1.70m in depth. Note remains of stone lined adit channel (highlighted). Looking N.


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 45 - 50	
Date Taken: 16th & 7th January 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 51. Machine dug Trench 15 (TP15). Trench 15 completed following groundwork. Looking S.



Plate 53. Machine dug Trench 18 (TP18). Location of Trench 18 alongside mine spoil. Looking E.



Plate 54. Machine dug Trench 18 (TP18). Working shot during cutting for Trench 18. Looking NE.



Plate 56. Machine dug Trench 18 (TP18). Completed groundworks at c.1.70m in depth. Looking N.



Plate 52. Machine dug Trench 15 (TP15). Likely cap stones from asit channel side wall. Recovered from uppermost deposit.



Plate 55. Machine dug Trench 18 (TP18). Location of Trench 15 at Kingside Adit prior to groundworks. Looking NW.



Plate 57. Machine dug Trench 21 (TP21). Location of Trench 21 atop mine spoil. Looking NE.


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 51 - 57	
Date Taken: 7th & 8th Feb 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 58. Machine dug Trench 21 (TP21). Trench 21 ground works completed at 1.60m due to trench sides collapsing. Looking NW.



Plate 59. Machine dug Trench 21 (TP21). Trench 21 ground works completed at 1.60m due to trench sides collapsing. Looking NE.



Plate 60. Machine dug Trench 22 (TP22). Location of Trench 22 alongside access road.. Looking NW.



Plate 61. Machine dug Trench 22 (TP22). Working shot during cutting for Trench 22. Looking SE.



Plate 62. Machine dug Trench 22 (TP22). Groundwork completed for Trench 22 at 2.2m. Looking N.



Plate 63. Machine dug Trench 22 (TP22). Groundwork completed for Trench 22 at 2.2m. Looking NW.



Plate 64. Machine dug Trench 22 (TP22). Groundwork completed for Trench 22 at 2.2m. Looking NE.

Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion	
Date Taken: 17th Jan & 8th Feb 2023	Approx. Scale (@ A4):
Appropriated by: RSJ	Drawing No.

Photo Plate No's.

58 - 64





Plate 65. Machine dug Trench 28 (TP28). Location of Trench 28 prior to groundworks. Looking NW.



Plate 66. Machine dug Trench 28 (TP28). Working shot during cutting of Trench 28. Looking NW.



Plate 67. Machine dug Trench 28 (TP28). Completed groundwork for Trench 28 following water ingress. Looking N.



Plate 68. Machine dug Trench 28 (TP28). Completed groundwork for Trench 28 following water ingress. Looking NW.



Plate 69. Hand dug Trench 24 (TP24). Position of hand dug trench 24. Looking NE.



Plate 70. Hand dug Trench 24 (TP24). Working shot during excavation. Looking SE.



Plate 71. Hand dug Trench 24 (TP24). Working shot during excavation. Material from trench. Looking NW.

Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion	
Date Taken: 17th & 18th Jan 2023	Approx. Scale (@ A4):
Appropriated by: RSJ	Drawing No.

Photo Plate No's.

65 - 71





Plate 72. Hand dug Trench 24 (TP24). Completed groundworks.



Plate 73. Hand dug Trench 24 (TP24). Completed groundworks.



Plate 74. Hand dug Trench 25 (TP25). Location of hand dug trench 25. Looking SE.



Plate 75. Hand dug Trench 25 (TP25). Working shot.



Plate 76. Hand dug Trench 25 (TP25). Material excavated from hand dug trench 25.



Plate 77. Hand dug Trench 25 (TP25). Completed ground work in hand dug trench 25.



Plate 78. Hand dug Trench 25 (TP25). Completed trench at 0.90m depth.



Plate 79. Hand dug Trench 26 (TP26). Working shot during excavation. Material from trench. L

Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion	
Date Taken: 17th & 18th Jan 2023	Approx. Scale (@ A4):
Appropriated by: RSJ	Drawing No.

Photo Plate No's.

72 - 79





Plate 80. Hand dug Trench 26 (TP26). Working shot during excavation. Material from trench.

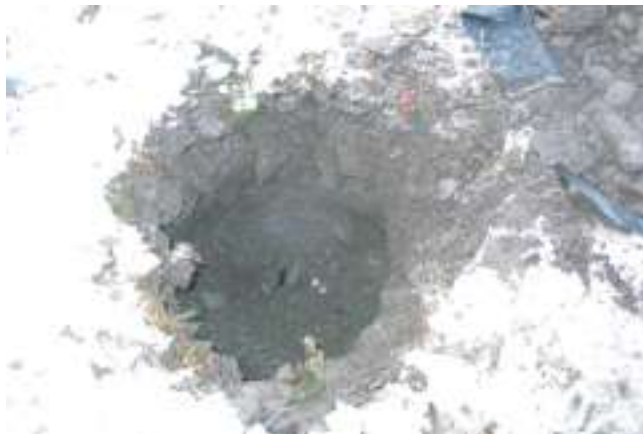


Plate 81. Hand dug Trench 26 (TP26). Completed trench at 0.70m depth.



Plate 82. Hand dug Trench 26 (TP26). Completed trench at 0.70m depth.



Plate 83. Hand dug Trench 27 (TP27). Working shot during excavation. Material from trench.



Plate 84. Hand dug Trench 27 (TP27). Working shot during excavation. Material from trench.



Plate 85. Hand dug Trench 27 (TP27). Completed trench at 1.00m depth.

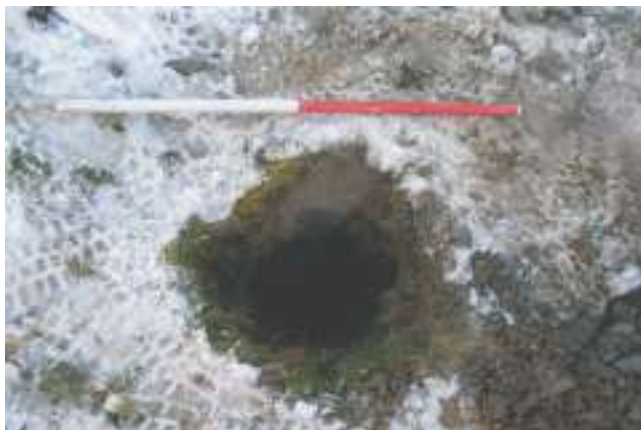


Plate 86. Hand dug Trench 27 (TP27). Completed trench at 1.00m depth.



Plate 87. Hand dug Trench 16 (TP16). Working shot during excavation.

Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's.	
Date Taken: 18th Jan 2023	Approx. Scale (@ A4):	80 - 87	
Appropriated by: RSJ	Drawing No.		





Plate 88. Hand dug Trench 16 (TP16). Working shot during excavation. Material from trench.

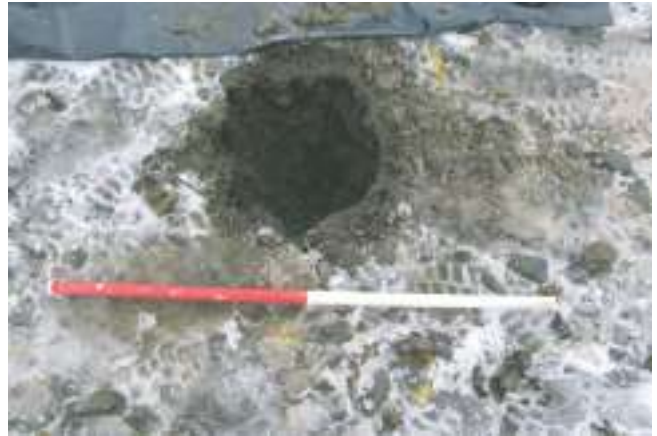


Plate 89. Hand dug Trench 16 (TP16). Completed trench at 0.60m depth.



Plate 90. Hand dug Trench 16 (TP16). Completed trench at 0.60m depth.



Plate 91. Hand dug Trench 17 (TP17). Working shot during excavation.



Plate 92. Hand dug Trench 17 (TP17). Material from trench.



Plate 93. Hand dug Trench 17 (TP17). Completed trench at 1.00m depth.



Plate 94. Hand dug Trench 17 (TP17). Completed trench at 1.00m depth.



Plate 95. Hand dug Trench 19 (TP19). Working shot during excavation.


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 88 - 95	
Date Taken: 18th Jan 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 96. Hand dug Trench 19 (TP19). Excavated material from Trench 19.

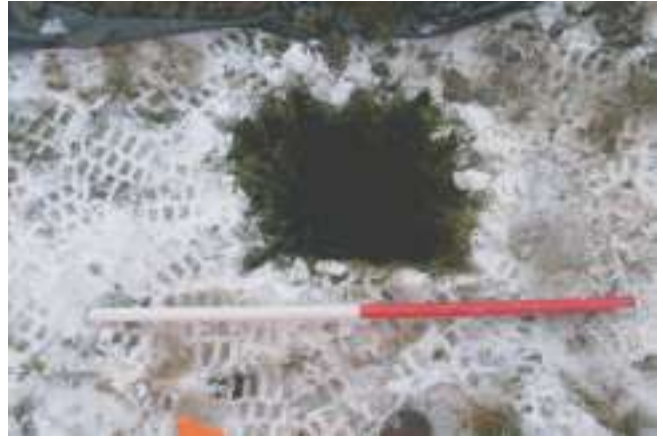


Plate 97. Hand dug Trench 19 (TP19). Completed trench at 0.65m depth.



Plate 98. Hand dug Trench 19 (TP19). Completed trench at 0.65m depth.



Plate 99. Hand dug Trench 20 (TP20). Position of trench prior to excavation.



Plate 100. Hand dug Trench 20 (TP20). Working shot during excavation.



Plate 101. Hand dug Trench 20 (TP20). Completed trench to 0.65m depth.



Plate 102. Hand dug Trench HS4 - Location of trench alongside stream.



Plate 103. Hand dug Trench HS4 - Working shot during excavation.

Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion	
Date Taken: 18th Jan & 7th Feb 2023	Approx. Scale (@ A4):
Appropriated by: RSJ	Drawing No.

Photo Plate No's.

96 - 103





Plate 104. Hand dug Trench HS4 - Completed sampling trench.



Plate 105. Hand dug Trench HS8 - Working shot during sampling at trench HS8.



Plate 106. Hand dug Trench HS8 - Working shot during sampling at trench HS8.



Plate 107. Hand dug Trench HS8 - Completed sampling.



Plate 108. Hand dug Trench HS8 - Completed sampling.



Plate 109. Hand dug Trench HS9 - Position of hand dug trench HS9 alongside road and Nant Watcyn.



Plate 110. Hand dug Trench HS9 - Working shot during sampling.



Plate 111. Hand dug Trench HS9 - Completed trench to 0.50m depth


Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 104 - 111	
Date Taken: 7th Feb 2023	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 112. Hand dug Trench HS30 - Working shot during sampling alongside Nant Watcyn.



Plate 113. Hand dug Trench HS30 - Completed sampling.



Plate 114. Machine Dug Trench (TP10) - Position of proposed Trench 10. Looking northwest.



Plate 115. Machine Dug Trench (TP10) - Working shot during cutting of Trench 10. Looking northwest.



Plate 116. Machine Dug Trench (TP10) - Completed ground work on Trench 10. Looking southeast.



Plate 117. Machine Dug Trench (TP10) - Completed ground work on Trench 10. Looking southeast.



Plate 118. Machine Dug Trench (TP10) - Degraded historic timber found in Trench 10.

Project Title: Cwmystwyth Lead Mine, Pontarfynach, Ceredigion		Photo Plate No's. 112 - 118	
Date Taken: 18th Jan & 7th Feb 2023	Approx. Scale (@ A4):		
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APPENDIX III:
Archive Cover Sheet

ARCHIVE COVER SHEET

Cwmystwyth Lead Mine, Pontarfynach, Ceredigion

ARCHIVE DESTINATION - RCAHMW

Site Name:	Cwmystwyth Lead Mine, Pontarfynach, Ceredigion
Site Code:	CLM/2023/WB
PRN:	5461
NPRN:	115
SAM No.	CD145
Other Ref No.	HRSW Rpt No. 261
NGR:	SN 8038 7465
Site Type:	Lead & Zinc Mine.
Project Type:	Archaeological Watching Brief
Project Manager:	Richard Scott Jones
Project Date(s):	January and February 2023
Categories Present:	None
Location of Original Archive:	HRSW
Location of Duplicate Archive:	RCAHMW
Number of Find Boxes:	N/A
Location of Finds:	Cambrian Mines Trust
Museum Ref:	N/A
Copyright:	HRS Wales
Restrictions to Access:	None



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