



Frongoch Lead & Zinc Mine, Pontrhydygroes, Ceredigion.

Archaeological Watching Brief



By

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Nov 2022

HRS Wales
Report No: 259

DAT Event No. 129648

ARCHAEOLOGICAL WATCHING BRIEF

Frongoch Lead & Zinc Mine, Pontrhydygroes, Ceredigion,

By
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Prepared for:

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On behalf of:

The Coal Authority

Date: November 2022

DAT Event No: 129648

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Non Technical Summary

The following report presents the results of an Archaeological Watching Brief during ground work for the installation of two monitoring flow chambers at the Frongoch Lead & Zinc Mine, Pontrhydygroes, Ceredigion (centered on OS grid reference SN 72303 74239), as part of the continuing program of water treatment works.

The specific objective of this work was to locate the position of the 19th Century stone culvert already exposed in 2013 in order to install two monitoring flow chambers directly over the culvert channel.

In summary, an initial culvert discovery trench managed to expose the position of a former 19th Century drainage channel or leat filled with peat intermixed with mudstone grit and clays. The position of this apparent ditch in relation to the OS first edition map of 1887, suggests that this channel marks the north-eastern edge of the former reservoir and an apparent channel that once ran alongside the reservoir. This channel is clearly shown on the OS first edition map. The second trench managed to expose the voussoirs arched stone culvert at SN 72303 74239 and exposed the exact same part of the culvert as that exposed during the 2013 watching brief during remediation works and the creation of the settling pond. What was interesting was the fact that the water in the exposed channel did not appear to be flowing although there was some considerable water in the channel being directed below the surface drain via a modern twin wall plastic pipe running to the northeast. Following the predicted route of the culvert channel to the northeast, Trench 2, although having exposed the channel and water, did not expose a stone lined culvert. This would suggest that the stone culvert once terminated at around this point. However, given the amount of water in the trench, water is moving to the NE, and is probably following an early cut ditch or leat, as is suggested on the OS first edition map of 1887. However, landscaping in 2013 in the area to the NE appears to have covered over this ditch, which is causing some blockage in the water flow. Ideally this water channel needs to be reopened so that the polluted water can flow so that it can be captured and redirected toward a further settling pond.

Crynodeb Annhechnegol

Mae'r adroddiad a ganlyn yn cyflwyno canlyniadau Briff Gwylio Archeolegol yn ystod gwaith tir ar gyfer gosod dwy siambr llif monitro yng Ngwaith Plwm a Sinc Frongoch, Pontrhydygroes, Ceredigion (yn canolbwyntio ar gyfeirnod grid OS SN 72303 74239), fel rhan o'r rhaglen barhaus. o weithfeydd trin dŵr.

Amcan penodol y gwaith hwn oedd lleoli lleoliad y cwlfer carreg o'r 19eg Ganrif a oedd eisoes wedi'i amlygu yn 2013 er mwyn gosod dwy siambr llif monitro yn uniongyrchol dros sianel y cwlfer.

I grynhoi, llwyddodd ffos ddarganfod cwlfer gychwynnol i ddatgelu lleoliad hen sianel ddraenio neu ddyfrffos o'r 19eg ganrif wedi'i llenwi â mawn wedi'i chymysgu â graean carreg laid a chlai. Mae lleoliad y ffos ymddangosiadol hon mewn perthynas ag argraffiad cyntaf map yr OS dyddiedig 1887, yn awgrymu bod y sianel hon yn nodi ymyl ogledd-ddwyreiniol yr hen gronfa ddŵr a sianel ymddangosiadol a arferai redeg wrth ymyl y gronfa ddŵr. Dangosir y sianel hon yn glir ar fap argraffiad cyntaf yr OS. Llwyddodd yr ail ffos i ddatgelu ceuffos carreg fwaog y coffrau yn SN 72303 74239 a datguddio'r un rhan yn union o'r cwlfer ag a

ddatgelwyd yn ystod briff gwylio 2013 yn ystod gwaith adfer a chreu'r pwll ymsefydlu. Yr hyn oedd yn ddiddorol oedd y ffaith nad oedd y dŵr yn y sianel agored i'w weld yn llifo er bod rhywfaint o ddŵr sylweddol yn y sianel yn cael ei gyfeirio o dan y draen wyneb trwy bibell blastig deufur modern yn rhedeg i'r gogledd-ddwyrain. Yn dilyn llwybr rhagfynegedig sianel y cwlfer i'r gogledd-ddwyrain, ni ddatgelodd Ffos 2, er ei bod wedi datguddio'r sianel a'r dŵr, geuffos wedi'i leinio â cherrig. Mae hyn yn awgrymu bod y cwlfer carreg unwaith wedi dod i ben tua'r pwynt hwn. Fodd bynnag, o ystyried faint o ddŵr sydd yn y ffos, mae dŵr yn symud i'r gogledd-ddwyrain, ac mae'n debyg ei fod yn dilyn ffos neu ddyfrffos wedi'i thorri'n gynnar, fel yr awgrymir ar fap argraffiad cyntaf yr OS dyddiedig 1887. Fodd bynnag, tirweddu yn 2013 yn yr ardal i mae'n ymddangos bod y gogledd-ddwyrain wedi gorchuddio'r ffos hon, sy'n achosi rhywfaint o rwystr yn llif y dŵr. Yn ddelfrydol mae angen ailagor y sianel ddŵr hon fel y gall y dŵr llygredig lifo fel y gellir ei ddal a'i ailgyfeirio tuag at bwll setlo pellach.

1 Introduction

- 1.1 The following report presents the results of an Archaeological Watching Brief during ground work for the installation of two monitoring flow chambers at the Frongoch Lead & Zinc Mine, Pontrhydygroes, Ceredigion (centered on OS grid reference SN 72303 74239), as part of the continuing program of water treatment works.
- 1.2 The specific objectives of this work were to:
- Locate the position of the 19th Century stone culvert already exposed in 2013 in order to install two monitoring flow chambers directly over the culvert channel.
- 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 Frongoch Lead & Zinc Mine is near the village of Pont-rhyd-y-groes, Ceredigion, and covers approximately 11 hectares. The mine produced lead and zinc ore from the late 1700s until the early 1900s, when it fell into disuse. From 1924 to 1930 the vast waste dumps were reworked to reclaim zinc and lead that had once been deemed uneconomical to recover. The mine is connected to nearby Wemyss Mine which worked the same mineral vein (The Frongoch Lode). The site is privately owned and has in recent years been used as a saw mill and is presently used for the storage of car parts.
- 1.5 The abandoned Wemyss Mine is located at the head of the Cwmnewydion valley, a tributary of the River Magwr, which joins the River Ystwyth at Abermagwr. The mine worked the Frongoch mineral lode alongside Frongoch and Graig Goch mines. Wemyss became an integral part of the larger Frongoch Mine and cannot be considered in isolation from its more illustrious neighbour. In the 1840s both mines came under the same ownership and the Wemyss drainage adit was extended to also serve the Frongoch workings, becoming the Frongoch Adit we know today.
- 1.6 The mines continued to be operated together with varying success throughout the latter half of the 19th century until they were acquired by the Belgian company '*Société Anonyme Minière*' in 1898. The Belgians invested heavily in modernising and electrifying the mining operations, which included constructing a state-of-the-art hydro-electric power station at Pont Ceunant and a large ore dressing mill at Wemyss. However, the venture was short-lived and by 1904 the company were in liquidation and the entire mine's machinery and effects were sold at auction.
- 1.7 Today, the Wemyss site is dominated by the ruins of the dressing mill and its large spoil tips which are bordered to the south by the Cwmnewydion Stream and to the west by the smaller Mill Race Stream. There are also the remains of the wheel pit for a 56-foot waterwheel, which was fed by a leat from Frongoch.

- 1.8 Both the Frongoch and Wemyss Mines are a major source of metals pollution, causing a chemical and ecological impact on downstream watercourses. The mines are the primary cause of the Frongoch Stream, Nant Cell, Nant Cwmnewydion and River Magwr failing to achieve the environmental quality standards for zinc, lead and cadmium required by the European Water Framework Directive (WFD). They are also a major source of zinc to the River Ystwyth, contributing to its failure of WFD standards. Fish population surveys carried out on the Nant Cwmnewydion showed the stream to be virtually fishless downstream of the Frongoch Adit to its confluence with the Magwr. The Nant Cell was also shown to be devoid of fish above its confluence with the River Ystwyth.

Background Information

- 1.9 Abandoned metal mines are the principal cause of failure to achieve Water Framework Directive (WFD) standards in Wales and drainage from underground workings, together with leaching and erosion of waste dumps are the major sources causing zinc, lead and cadmium failures.
- 1.10 In March 2011 Natural Resources Wales (NRW) diverted the Frongoch Stream to prevent it flowing into the mine and thus reduce the amount of contaminated water discharging from the Frongoch Adit into the Nant Cwmnewydion. This work was funded by the Welsh Government's Contaminated Land Capital Fund. The flow from the adit reduced by approximately 80% and metal loads by approximately 50% after the stream diversion, making future treatment of this discharge more feasible. This work also increased dilution of metals in the Frongoch Stream and Nant Cell, causing zinc concentrations to reduce by over 70%.
- 1.11 In January 2013 NRW started work on a project to further reduce pollution from the mine. The project was partly funded by the European Regional Development Fund, provided through the Welsh Government, and was delivered with technical support from the Coal Authority. The aim was to prevent rain and surface water from coming into contact with the contaminated mine waste, thus reducing the amount of metals being mobilised and entering the Frongoch Stream.
- 1.12 The first phase of the project, completed in 2013, involved the construction of a channel around the mine, directing surface water to a lined pond. This reduced the amount of water flowing through the mine waste and controlled the amount of water leaving the site, reducing the risk of flooding downstream.
- 1.13 In the second and final phase, the waste dumps were re-shaped and capped with clay and soils to prevent water ingress and to encourage re-vegetation. We also built channels to carry the clean surface water into a series of ponds, creating a wetland habitat. The works were designed to be sympathetic to the extensive archaeological remains present at the mine, to preserve its heritage value for future generations. Dyfed Archaeological Trust carried out investigations at the site and recorded the features discovered during excavation of the mine waste.

- 1.14 The project was completed in June 2015 and we are currently monitoring its effectiveness. Early results have been encouraging with further reduction in metal concentrations, despite the wettest winter on record in Wales.
- 1.15 In order to design a suitable treatment system NRW are seeking a methodology to compile a longer term metal mines remediation programme across Wales as a whole. The programme will identify potential annual progression of sites towards remediation over the next fifteen years, incorporating checks at critical decision points to ensure only sites which are technically feasible and pass cost benefit assessments progress.

Development Proposals

- 1.16 In order to install the new mine-flow gauging chambers, work will involve:
- Production of WSI in advance of the works for approval by DAT and watching brief by heritage consultant (employed by the Contractor).
 - Mobilisation and establishment;
 - Carry out pre-start ecology/heritage briefings to mark out 'no go' areas
 - Localised vegetation clearance;
 - Excavate holes to insert pre-fabricated concrete chambers to which the flow chambers will be inserted;
 - Excavate for the insertion of a rocker pipe between the two chambers;
 - Re-excavate existing culvert discharge channel so as to realign it with new flow chambers
 - Reinststate ground around chambers following construction

Historical Background (see *Figures 5 - 7*)

- 1.17 Frongoch Lead Mine is an extensive and important lead mine complex, first recorded in 1759 and last noted as a potential going concern in 1903. It was supplied with water for power and processing purposes from at least five reservoirs in the late nineteenth century: Pond Rhos-rhydd (SN 7045 7595), 2.3km to the north west of the mine, with Pond Glan-dwgan (SN 7070 7515) adjacent to its south; Llyn Frongoch (NPRN 32235; SN 7215 7535), 1km north of the mine, with the subsidiary Blaen Pentre Pool (SN 7235 7487) adjacent to its south; and Ty'n-y-bwlch Pool (SN 7285 7470), some 800m to the north east of the mine.
- 1.18 In 1899 a Belgian firm, the *Societe Anonyme Metallurgique*, of Liege, took over Frongoch Mine and set about installing new electrically-driven plant. Power was supplied by a Pelton wheel and steam engine in a power house (NPRN 407230) adjacent to the road about 1.6km to the west. A five level dressing mill (NPRN 33870) was built on the (by then) closed Wemyss Mine (NPRN 33907) and this was served by a 700m-long tramway from Frongoch.

- 1.19 The Wemyss mine was a lead and zinc mine which operated in conjunction with Frongoch Mine (NPRN 302), working the Frongoch lode intermittently from 1861 to 1899, together with West Frongoch. In 1899 a dressing mill (NPRN 33870) was built on the site to process ore from Frongoch Mine. A fine wheelpit and remains of the dressing mill survive.

Archaeological Background

- 1.20 As part of the Water Framework Directive (WFD) and the 2013 phases of work to further reduce pollution from the mine, the Dyfed Archaeological Trust Field Unit undertook a series of evaluations and watching briefs at the Frongoch Lead Mine prior to and during excavation of the mine waste and spoil, whilst they were being reshaped and capped with clay soils to prevent water ingress and to encourage re-vegetation (see DAT Rpt 2013: Frongoch Remediation Phase 2 and DAT Rpt 2013/46: Frongoch Phase 1 Archaeological Watching Brief)
- 1.21 Of particular relevance to the objective and results of this report is the DAT Rpt 2013: Frongoch Phase 1 Archaeological Watching Brief, which describes the discovery of the objective of the ground work for this report, namely the re-discovery of the 19th Century stone culvert and channel positioned in former Area 4 at SN 72292 74234 . In July 2013, this stone culvert was exposed during ground work for the creation of the settling pond immediately north of the proposed monitoring flow chambers. The text below is taken from this report and offers a detailed description of the stone culvert.

“Near the base of the tailings a dry stone arched culvert (4000) was revealed which continued across the footprint of the settling pond on a northwest/southeast alignment heading towards the former mine buildings. The culvert lay at a depth of 4.0m below undisturbed ground level. It was constructed from seemingly dry-stone local shale slabs (*See reproduced photos in Figure 13 in this report*). A layer of silt which in places measured 0.75m in depth was present at the base of the culvert. The depth of the bottom of the culvert was ascertained through pushing a road pin through the sediment indicating it was 1.5m in height from the base of the structure to the top of the arch. The culvert measured 1.0m wide and had walls which were at most 0.30m thick. Water appeared to be running freely through the culvert even though significant rain fall had not occurred for several days prior to its discovery. A hand drawn plan of the culvert was not possible, but the area was surveyed by Natural Resources Wales (*See reproduced Plan 9 in Figure 14 in this report*).

An attempt was made to use a small remote controlled vehicle with camera to obtain further information about the culvert and where it led from, but due to the depth of silt the vehicle could not make any progress. In order to prevent further damage to the culvert as it still seemed to have water flowing through it, the breach was repaired and the settling pond moved slightly to the northeast” (Shobbrook, Murphy and Poucher p26, 2013) .

Geology

- 1.22 The geology of the area falls within the Undifferentiated Llandovery Rocks consisting of Mudstone, Siltstone and Sandstone.

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 The archaeological watching brief was undertaken by HRS Wales staff using current best practice from 25th October 2022.
- 3.2 All work was carried out by a suitably qualified archaeologist with relevant level membership of the Chartered Institute for Archaeologists (ClfA) and followed the ClfA Standard and Guidance for an archaeological watching brief (ClfA 2014).
- 3.3 All proposed groundwork was undertaken under close and constant archaeological supervision. All machine dug groundwork undertaken by the contractor was done using a mechanical digger with a toothless grading bucket.
- 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 find-spot 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.

4 Results of Watching Brief (see Figure 4)

- 4.1 The archaeological watching brief was undertaken over a period of 1 day on 25th October 2022.
- 4.2 Groundwork entailed the excavation by machine of two holes to insert pre-fabricated concrete chambers to which the flow monitoring chambers will be inserted. The position of each flow chamber was to be inserted directly over the stone culvert and channel exposed in the 2013 watching brief. As such the re-discovery and re-exposure of the stone culvert was a necessary requirement. Unfortunately the grid reference given for the position of the stone culvert was not that accurate and as such it was necessary to excavate two large trenches (TR1 and TR2) for the first hole on the western side of the drain serving the settling pond in order to find the same culvert exposed in 2013, and another third trench (TR3) on the eastern side of the drain serving the settlement pond for the second flow chamber.
- 4.3 All numbers enclosed in () refer to contexts encountered.

Trench 1 (TR1)

- 4.3 Initially trench 1 was positioned around NGR: SN 72302 74231 and measured approximately 2.5m(L) x 2.5m(W) x 1.5m(D) but no stone culvert became exposed, with natural mudstone bedrock being exposed at an approximately 1.5m depth. As such Trench 1 was extended further northwards by a further approximately 4m. Unfortunately the trench was unable to extend further than 4m northwards as there was a modern water drainage pipe running alongside the trench on the north side that was installed in the 2013 phase of groundwork that drains into the settling pond to the north. In the end Trench 1 measured approximately 6.25m in length x 2.5m in width and reached a depth of approximately 1.8m. The following details the stratigraphy of this trench.
- 4.4 Once the turf (100) had been removed, a top soil of mid brown earth intermixed with small stones and mudstone grit became exposed (101). Directly below this earth deposit was a modern white *cloth* sheet laid down in the 2013 phase of groundwork. This cloth sheet ran the whole length of the trench. Directly below this sheeting was a deposit of re-deposited mudstone intermixed with mudstone grit (102). This deposit measured approximately 0.60m in depth at the northern end and only 0.50m at the southern end. Directly below this re-deposited material was a natural mudstone bedrock (105), which had been cut (103) through by a shallow channel or leat filled with peat (104) intermixed with mudstone grit a clays, suggestive of a former leat or drainage ditch (*see Figure 12 – Southeast facing section drawing*). Once the natural bedrock was exposed across the entirety of Trench1 with no stone culvert forthcoming, excavation of this trench was stopped.

Trench 2 (TR2)

- 4.5 Given that the stone culvert was not re-discovered in the first trench, a second trench was excavated on the north side of the modern drainage pipe feeding the settling pond, thus creating a bridge between Trench 1 and Trench 2. In extent, this trench measured approximately 3m(L) x 3m(W) x 3m(D). With the turf (200), a mid brown earth intermixed with mudstone grit (201) became exposed identical to that exposed in Trench 1. This soil deposit reached a depth of approximately

0.40m. Directly below this was the same modern *terram* sheeting exposed in Trench 1. Directly below this sheeting was a 1.5m deep deposit of layers of re-deposited mudstone grit and mine tailings/spoil (202). Directly below this re-deposited material was a black woven *terram* sheeting, which was found to be lying directly over the 19th Century stone culvert (203) that had already been exposed and breached in 2013. The culvert channel was still filled with clear water, but a modern plastic twin walled drainage pipe had been placed into the channel that was supposedly taking water below the drain bed leading to the settling pond. However, it soon became apparent that the water that was in the channel was not moving eastward through the pipe, suggesting that the culvert channel was either not continuing further eastward or else the channel was blocked. Only a photographic record was made of the culvert from the trench edge as the sides of the trench were too loose to enable safe and close inspection and recording. The NGR position of the stone culvert was SN 72303 74239 and the elevation height of the culvert from its voussoirs was recorded as 236.8m AOD.

Trench 3 (TR3)

- 4.6 With the stone culvert now exposed and pin-pointed in Trench 2, excavation of the other hole for the second flow monitoring chamber on the east side of the drain serving the settling pond, was now excavated at the projected position of the culvert. This trench measured approximately 3m(L) x 3m(W) x 3m(D). This trench was excavated at NGR; SN 72322 74227.
- 4.7 Once the upper deposit (300) of re-deposited mudstone grit was removed, which averaged a depth of approximately 0.60m, a modern sheeting became exposed. This sheeting extended across the whole of the trench. Once the sheet was cut through an approximately 2.4m deep deposit of fine mudstone grit and mine spoil/ tailings became exposed. Within this mining spoil was recovered the remains of a timber tramway sleeper and two wrought iron (Fe) pins (see photos 18 and 19). This fine grit deposit continued down until water was reached at a depth of approximately 3m, the approximate same depth as the water in Trench 2. However, no stone culvert or channel became exposed in this trench, only water which must be filling a cut channel or leat, but not stone lined. With the excavated trench now water-logged and the main objective accomplished, excavation of this trench was halted at this point.

5. Conclusion & Recommendations

- 5.1 An initial 'culvert discovery trench' (TR1), managed to expose the position of a former 19th Century drainage channel or leat filled with peat intermixed with mudstone grit and clays. Geo-plotting the position of this apparent ditch in relation to the OS first edition map of 1887, suggests that this channel marks the NE edge of the former reservoir and apparent channel that once ran alongside the reservoir. This channel is clearly shown on the OS first edition map. The second trench (TR2) managed to expose the voussoirs arched stone culvert at SN 72303 74239 and exposed the exact same part of the culvert as that exposed during the 2013 watching brief during remediation works and the creation of the settling pond. What was interesting was the fact that the water in the

exposed channel did not appear to be flowing although there was some considerable water in the channel being directed below the surface drain via a 400mm modern twin wall polypropylene pipe running to the NE. Following the predicted route of the culvert channel to the NE, Trench 2, although having exposed the channel and water, did not expose a stone lined culvert. This would suggest that the stone culvert once terminated at around this point. However, given the amount of water in the trench, water is moving to the NE, and is probably following an early cut ditch or leat, as is suggested on the OS first edition map of 1887. However, landscaping in 2013 in the area to the NE appears to have covered over this ditch, which is causing some blockage in the water flow. Ideally this water channel needs to be reopened so that the polluted water can flow so that it can be captured and redirected toward a further settling pond.

6 Acknowledgements

Thanks to; All at the Coal Authority and Midwest Plant for their time and patience and understanding during the groundwork.

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Other References

- British Geological Survey 1979, Ten Mile Map 3rd edition (solid) 1:625000)
- Soils of England and Wales 1983. Sheet 2: Wales, 1:25000

Cartographic Sources

- *Tithe Map for Llanfiangel Creuddyn Parish (1848)*
- *Ordnance Survey 1st Edition map of 1887 (1:10560);*
- *Ordnance Survey 2nd Edition map of 1907 (1:10560);*
- *Ordnance 1953 (1:10560);*

APPENDIX I:

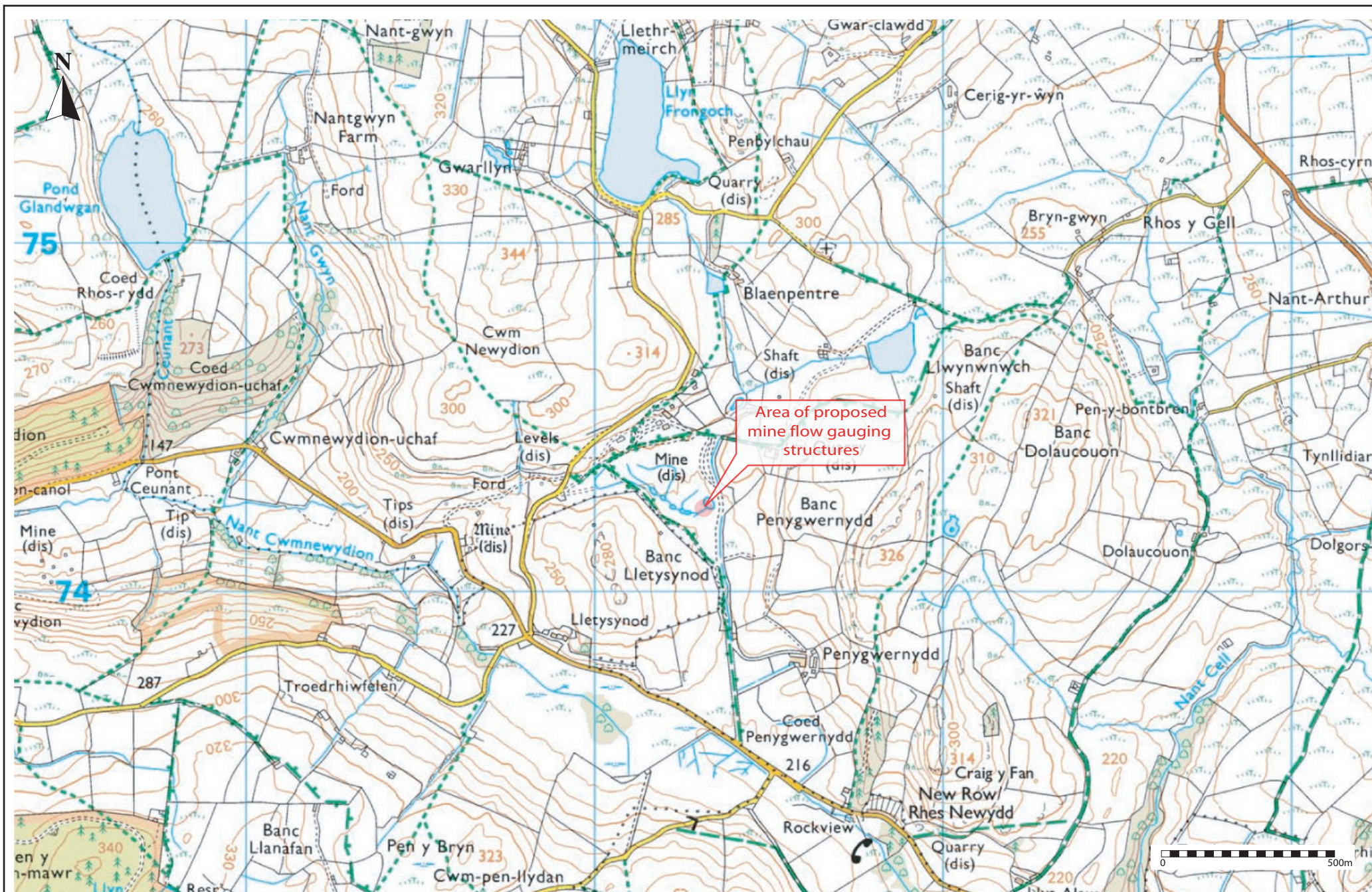
Figures



Project Title: Frongoch Lead & Zinc Mine, Ponrhydygroes.	
Date: 7th November 2022	Approx. Scale (@ A4):
Drawn by:	Drawing No.

Figure 1.
Location Map (OS 1:50,000 Landranger)





Project Title: Fromgoch Lead & Zinc Mine, Pontrhydygroes.

Date: 7th November 2022

Drawn by:

Approx. Scale (@ A4):

Drawing No.

Figure 2.

Location Map (OS 1:25,000 Explorer)





Project Title: Frongoch Lead & Zinc Mine, Pontrhydygroes.

Date: 7th November 2022

Approx. Scale (@ A4):

Drawn by:

Drawing No.

Figure 3.

Aerial Photo (Google 2006)





Project Title: Frongoch Lead & Zinc Mine, Pontrhydygroes.

Date: 7th November 2022

Approx. Scale (@ A4):

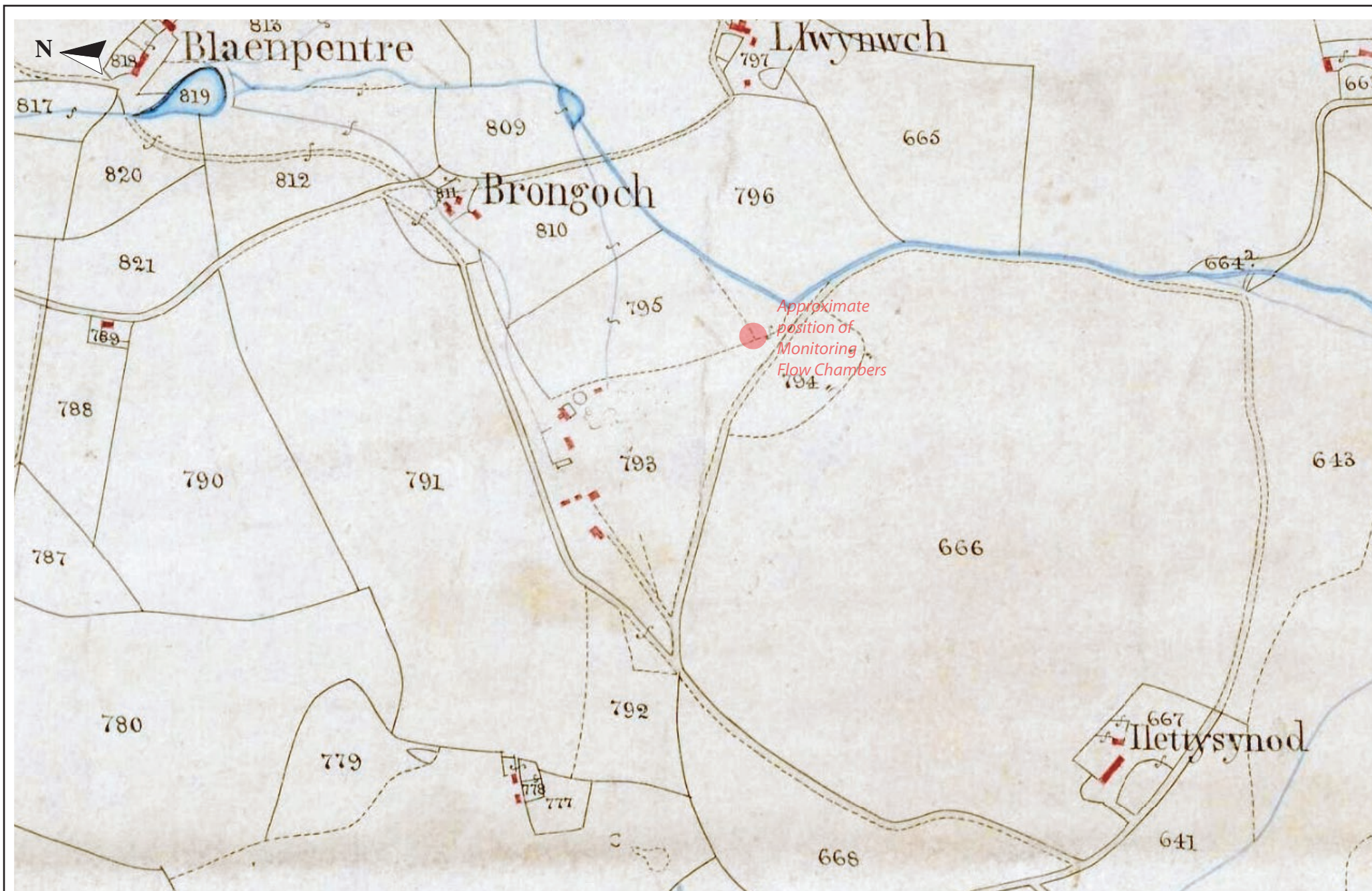
Drawn by:

Drawing No.

Figure 4.

OS Aerial Photo (2016)





Project Title: Frongoch Lead & Zinc Mine, Pontrhydygroes.

Date: 7th November 2022

Drawn by:

Approx. Scale (@ A4):

Drawing No.

Figure 7.

Tithe Map for Llanfiangel y Creuddyn parish (1848)



London: Printed and Published (By Authority) by Shaw & Sons, Stationers, 11, Abchurch Lane, London, E.C. 4.

LANDOWNERS.	OCCUPIERS.	Numbers referring to the Plan.	NAME AND DESCRIPTION OF LANDS AND PREMISES.	STATE OF CULTIVATION.	QUANTITIES IN STATUTE MEASURE.	Amount of Rent-Charge apportioned upon the several Lands, and to whom Payable.									REMARKS.
						PAYABLE TO			PAYABLE TO			PAYABLE TO			
						<i>vicar</i>	<i>parish</i>	<i>tithe</i>	<i>vicar</i>	<i>parish</i>	<i>tithe</i>	<i>vicar</i>	<i>parish</i>	<i>tithe</i>	
A.	R.	P.	£	s.	d.	£	s.	d.	£	s.	d.				
Lisburne the Earl of (continued).	Jones Thomas		<i>Frongoch</i>												
		791	<i>Bank frongoch</i>	<i>pasture</i>	27		57					7	0	A	
		792	"	"	2	2	35								
		793	<i>Cae Gwaithmawr</i> <i>and Buildings</i>	"	11		7						9		
		795	<i>Cae</i>	<i>Meadow</i>	4	3	20					6	2		
		809	" <i>with pool</i>	"	2	3	26					3	10		
		810	"	"	11		22					6			
		811	<i>Homesstead & Roads</i>		1	1	31					1	10		
		812	<i>Cae</i>	<i>Arable</i>	6	1	16					4	9	A	
					60	2	24					1	11		
			<i>Blaenpenkre</i>												
		813	<i>Field</i>	<i>Arable</i>	7	3	24					11	2	A	
		814	"	<i>Meadow</i>	13	2	20					11	9	A	
		815	"	<i>pasture</i>	11	1	8					7		A	
		816	"	"	36	1	23					15	6	A	
		817	"	"	1	1	35					1	4	A	
		818	<i>Homesstead</i>			3	28					1	7	A	
		819	<i>pool</i>			1	39								
		820	<i>Field</i>	<i>pasture</i>	2	2	35					1	4	A	
		823	"	<i>Arable</i>	11		30					3	6	A	
													R. 32930.		

N

Project Title: Frongoch Lead & Zinc Mine, Pontrhydygroes.

Date: 7th November 2022

Drawn by:

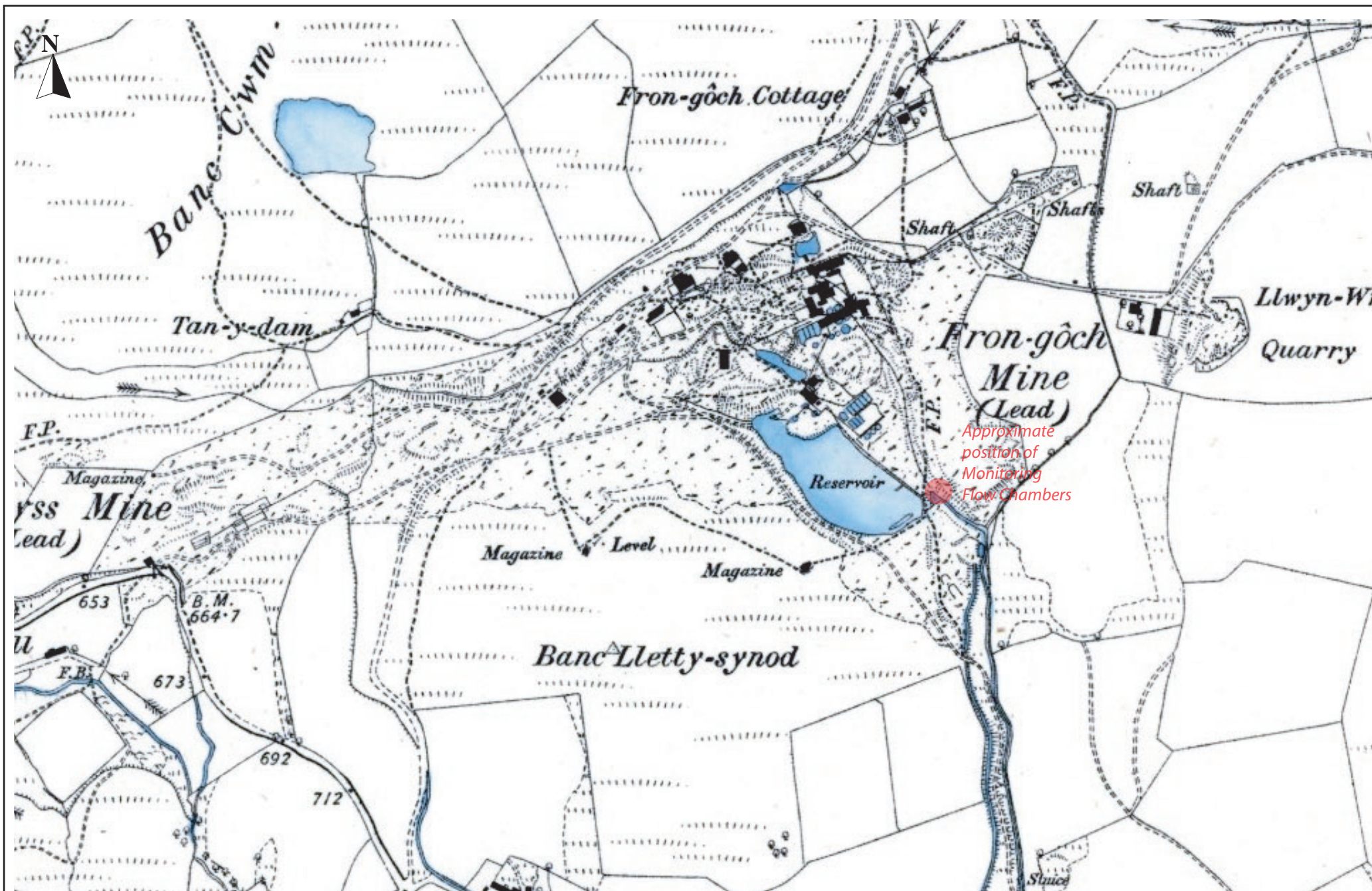
Approx. Scale (@ A4):

Drawing No.

Figure 8.

Tithe Map Apportionment details - Llanfiangel y Creuddyn parish (1848)





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Approx. Scale (@ A4):

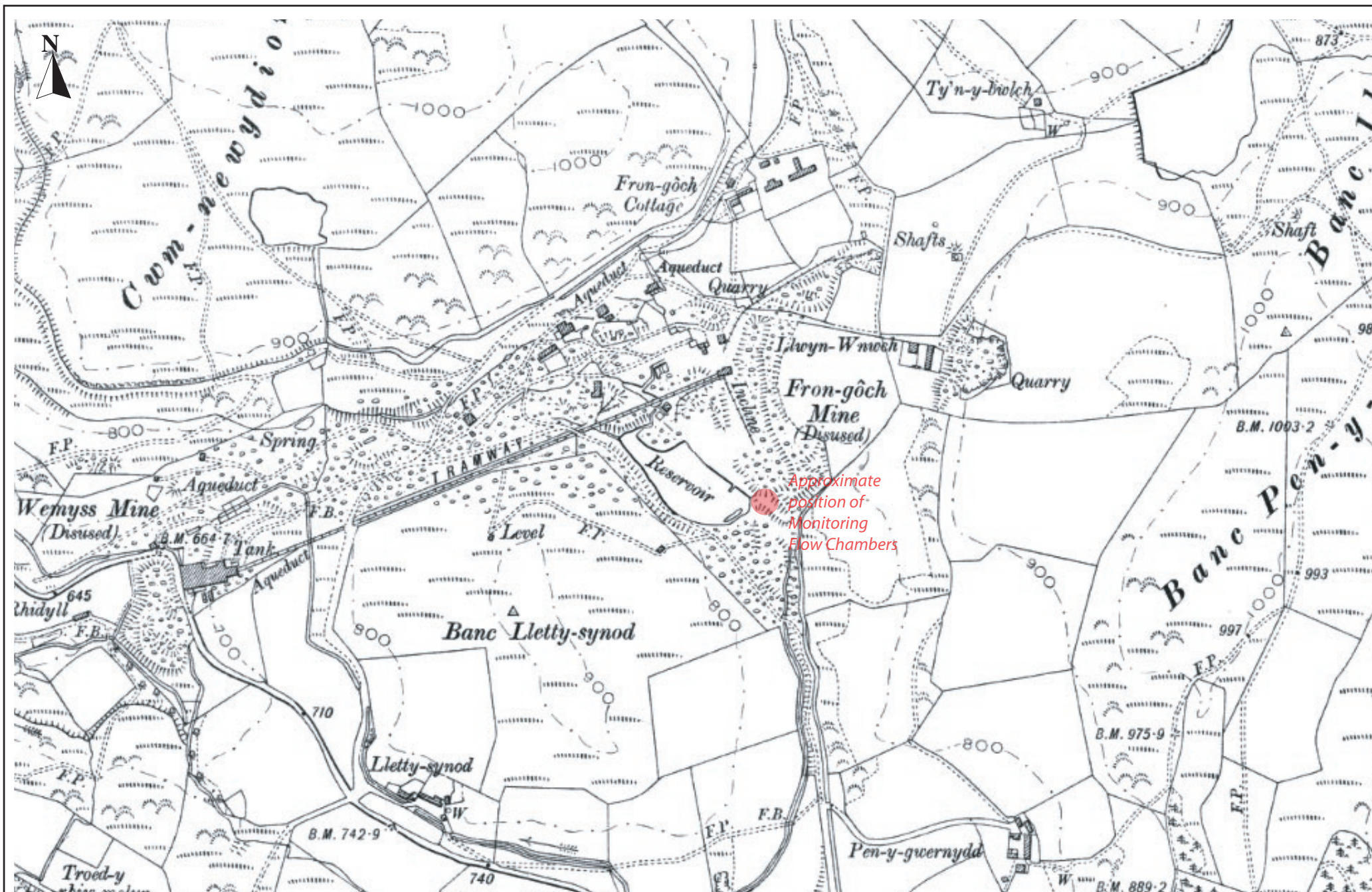
Drawn by:

Drawing No.

Figure 9.

Ordnance Survey First Edition Map (1887)





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Date: 7th November 2022

Drawn by:

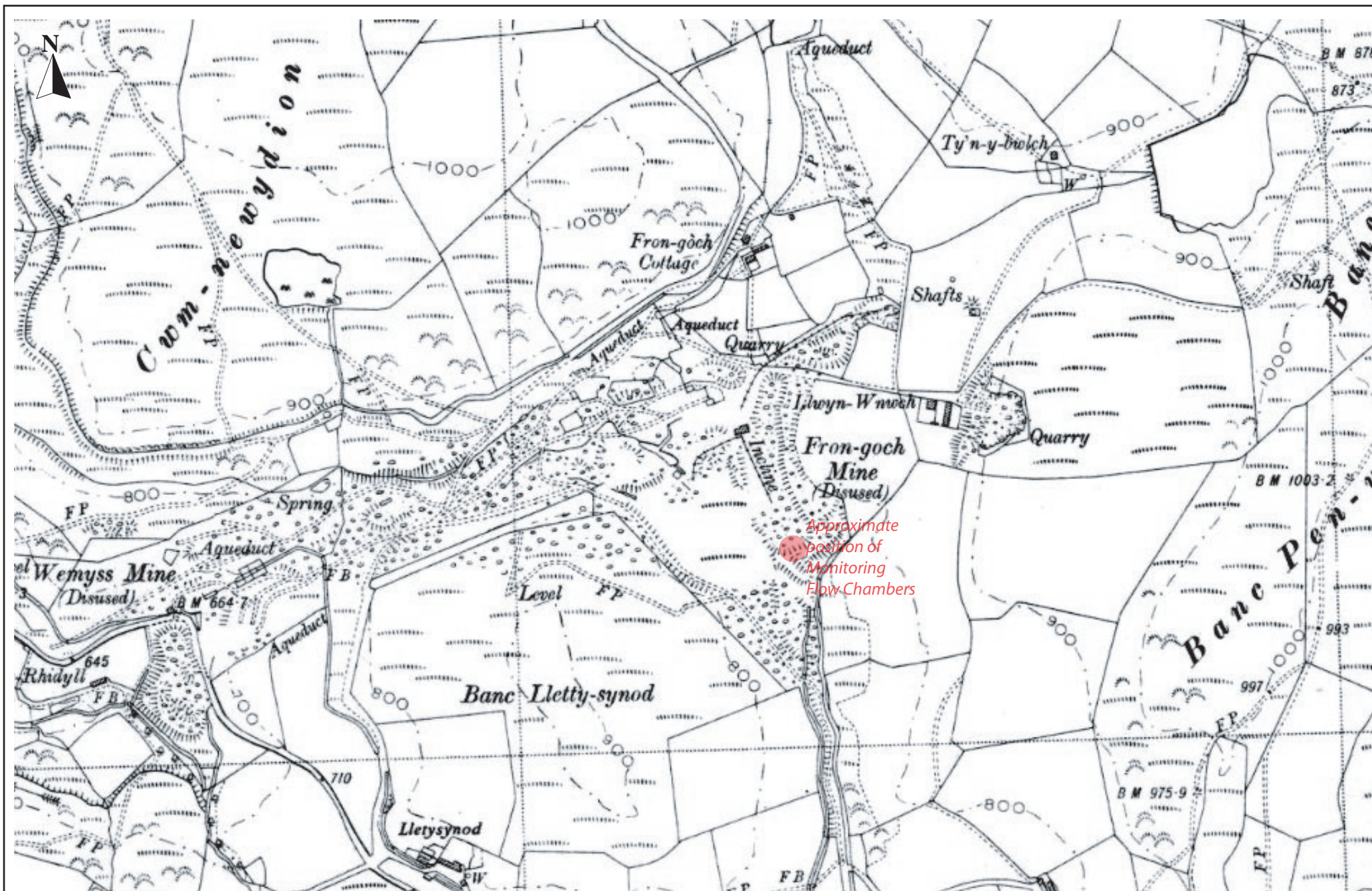
Approx. Scale (@ A4):

Drawing No.

Figure 10.

Ordnance Survey Second Edition Map (1907)





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Date: 7th November 2022

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Drawing No.

Figure 11.

Ordnance Survey 1953 Edition Map





Photo 18: View of stone culvert (4000) following breach of arched roof.



Photo 19: View southeast of arch in stone culvert (4000).



Photo 20: Linear view of stone culvert (4000). Looking northeast.



Photo 21: Looking northwest at arch in culvert (4000).

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Date: 7th November 2022	Approx. Scale (@ A4):
Drawn by: RSJ	Drawing No.

Figure 12.

Photos of stone culvert from 2013 archaeological watching brief during groundwork for the creation of settling pond (*from DAT Rpt 2013/46*)



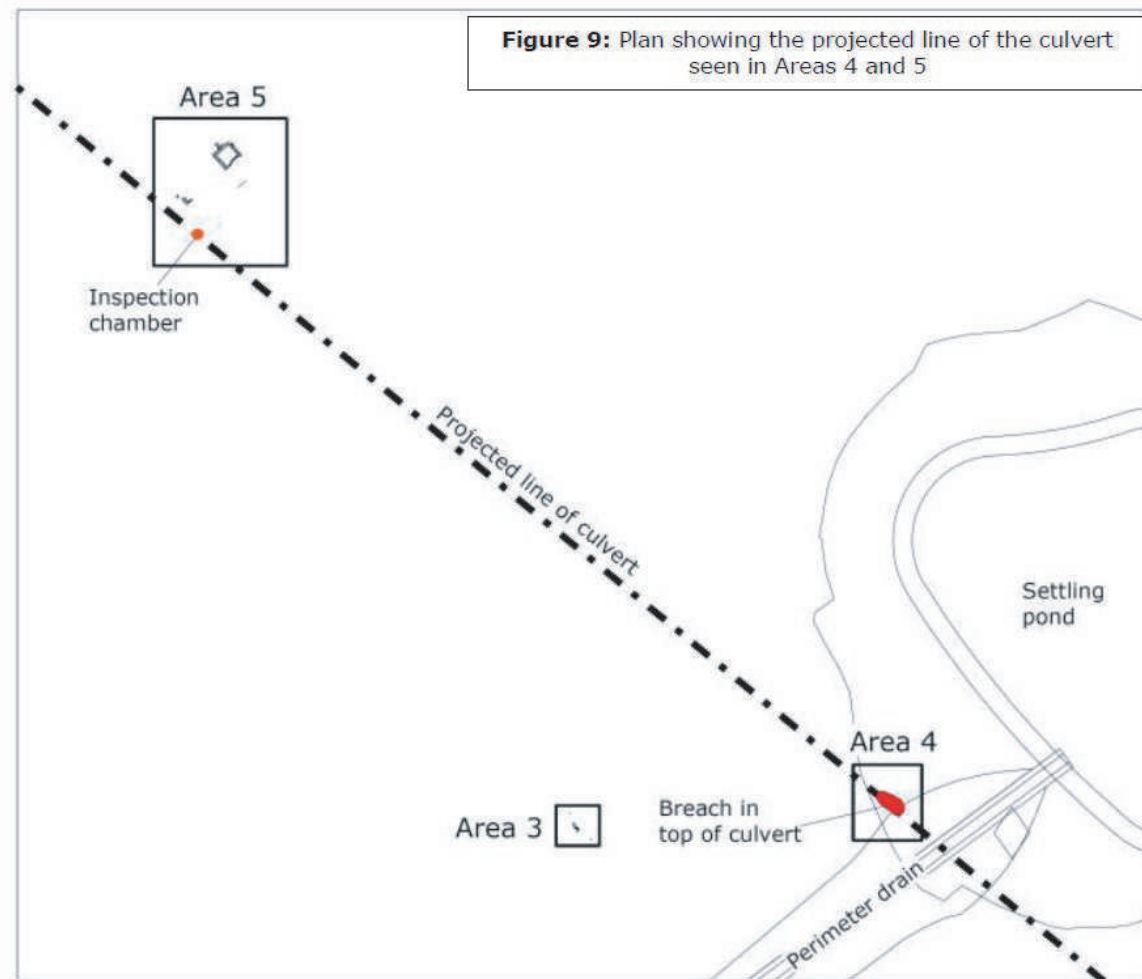


Figure 9: Plan showing the projected line of the culvert seen in Areas 4 and 5

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Approx. Scale (@ A4):

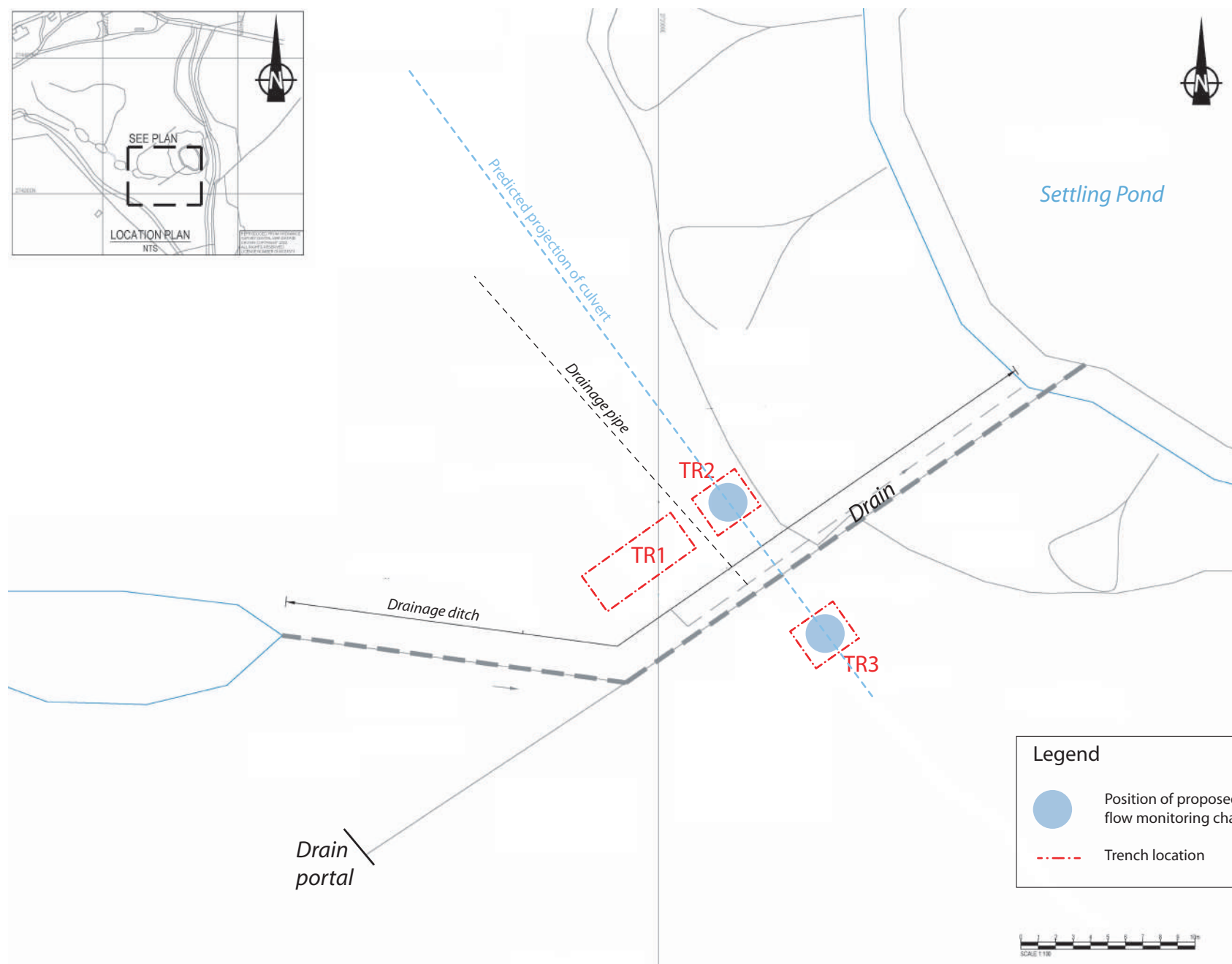
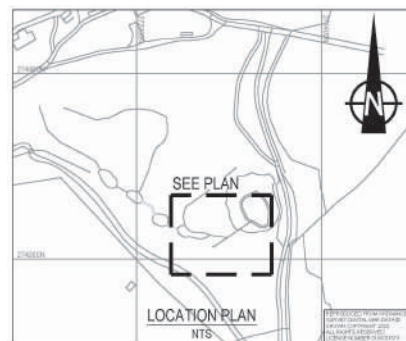
Drawn by:

Drawing No.

Figure 13.

Reproduced plan of projected route of stone culvert following discovery during 2013 watching brief
(from DAT Rpt 2013/46)





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Date: 7th November 2022

Approx. Scale (@ A4):

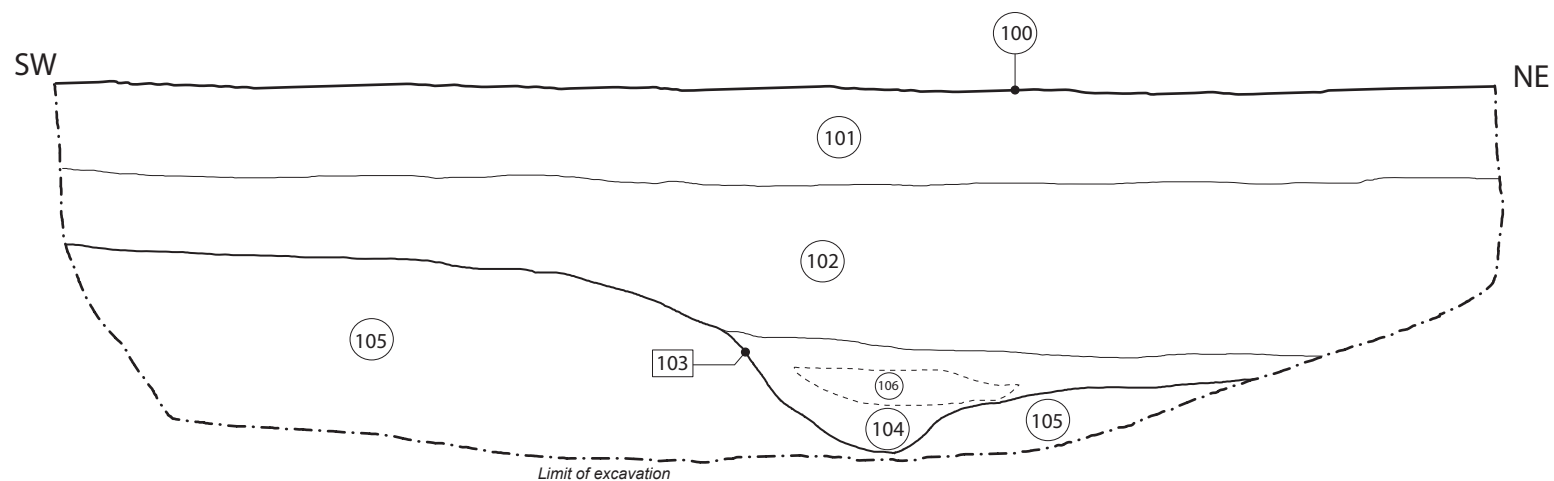
Drawn by:

Drawing No.

Figure 14.

Trench location plan in conjunction with location of proposed monitoring flow chambers.





Contexts

- 100. Turf
- 101. Top soil (Mid brown earth intermixed with small stones and mudstone grit.
- 102. Mudstone intermixed with mudstone grit (Relocated)
- 103. Cut for channel/leat (SN 72299 74237).
- 104. Deposit of peat intermixed with mudstone grit and clays filling channel/leat cut 103.
- 105. Natural mudstone bedrock
- 106. Lense of grey clay intermixed with mudstone grit.



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Date: 7th November 2022

Approx. Scale (@ A4):

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Figure 15.

Southeast Facing Section from Trench 1 showing apparent early leat/channel immediately SW (SN 72299 74237) of culvert.



APPENDIX II:

Photo plates



Plate 01. View of settling pond immediately adjacent to proposed monitoring flow chambers. Looking northeast.

Project Title: Frongoch Lead & Zinc Mine, Pontrhydygroes.

Date Taken: 25th October 2022

Appropriated by: RSJ

Approx. Scale (@ A4):

Drawing No.

Photo Plate No.

01





Plate 02. View of area of proposed monitoring flow chambers. Looking southwards.



Plate 03. View of area of proposed monitoring flow chambers. Looking northwards.



Plate 04. View of feeder channel from outflow feeding settling pond. Positioned between proposed monitoring flow chambers.



Plate 05. Working shot during excavation for culvert in trench 1. Looking southwest..



Plate 06. Working shot during excavation for culvert in trench 1. Looking southwest..



Plate 07. Working shot during excavation for culvert in trench 1. Looking southwest..



Plate 08. Working shot during excavation for culvert in trench 1. Looking south..

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Date Taken: 25th October 2022

Approx. Scale (@ A4):

Appropriated by: RSJ

Drawing No.

Photo Plate No's.

02 - 08





Plate 09. View of southeast facing section of initial Trench 1 when looking for culvert.

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Date Taken: 25th October 2022

Approx. Scale (@ A4):

Appropriated by: RSJ

Drawing No.

Photo Plate No.

09





Plate 10. Working shot during excavation of trench 2 in search for culvert. Looking northwards.



Plate 11. Working shot during excavation of trench 2 in search for culvert.



Plate 12. Working shot during excavation of trench 2 in search for culvert.



Plate 13. Working shot during excavation of trench 2 in search for culvert.


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Date Taken: 25th October 2022	Approx. Scale (@ A4):		
Appropriated by: RSJ	Drawing No.		



Plate 14. Southeast facing section of Trench 2 with 19th Century culvert entrance exposed. Looking westward.

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Date Taken: 25th October 2022

Appropriated by: RSJ

Approx. Scale (@ A4):

Drawing No.

Photo Plate No.

14





Plate 15. Working shot during excavation for culvert in Trench 3. Looking northeast.



Plate 16. Working shot during excavation for culvert in Trench 3. Looking northeast.



Plate 17. Working shot during excavation for culvert in Trench 3. Looking northeast.



Plate 18. Iron(Fe) pins found in Trench 2 spoil/tailings.



Plate 19. Remains of former timber tram rail sleeper recovered from Trench 3 within spoil/tailings.

Project Title: Frongoch Lead & Zinc Mine, Pontrhydygroes.

Date Taken: 25th October 2022

Approx. Scale (@ A4):

Appropriated by: RSJ

Drawing No.

Photo Plate No's.

15 - 19



APPENDIX III:
Archive Cover Sheet

ARCHIVE COVER SHEET

Frongoch Lead & Zinc Mine, Pontrhydygroes, Ceredigion

ARCHIVE DESTINATION - RCAHMW

Site Name:	Frongoch Lead & Zinc Mine, Pontrhydygroes, Ceredigion
Site Code:	FLM/2022/WB
PRN:	-
NPRN:	33907
SAM No.	
Other Ref No.	HRSW Rpt No. 259
NGR:	SN 72303 74239
Site Type:	Lead & Zinc Mine.
Project Type:	Archaeological Watching Brief
Project Manager:	Richard Scott Jones
Project Date(s):	25th October 2022
Categories Present:	None
Location of Original Archive:	HRSW
Location of Duplicate Archive:	RCAHMW
Number of Find Boxes:	N/A
Location of Finds:	N/A
Museum Ref:	N/A
Copyright:	HRS Wales
Restrictions to Access:	None



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