

Wemyss Lead & Zinc Mine, Pontrhydygroes, Ceredigion.

Archaeological Watching Brief



By

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May 2022

HRS Wales Report No: 253

ARCHAEOLOGICAL WATCHING BRIEF

Wemyss Lead & Zinc Mine, Pontrhydygroes, Ceredigion,

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Prepared for:

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On behalf of: The Coal Authority

Date: May 2022

HRSW Report No: 253



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Non Technical Summary

The following report presents the results of an Archaeological Watching Brief during groundworks for the installation of a new/upgraded flow gauging structure at the adit discharge point at the Frongoch / Wemyss Lead Mine Adit Discharge point, Pont-rhyd-y-groes, Ceredigion (centered on OS grid reference SN 7190 7428).

The key objective of the archaeological presence on the site was to ensure the examination and recording of the nature and character of the mining deposits in the area of the mine discharge point and to ensure that if any historic mining features or finds are exposed then they are investigated and recorded.

In summary, the archaeological watching brief during ground works for the installation of the new/upgraded flow gauging structure at the adit discharge point at the Frongoch / Wemyss Lead Mine, Pont-rhyd-y-groes, managed to assess the area of the ground work, and in so doing recorded the position of a series of vertically laid former iron tramway rails protruding from the ground at the base to the spoil tipping on the east side of the discharge point. It also noted the position of three kerb stones along the eastern edge of the stream at the base of the spoil tip. Whether these kerb stones are historic or not is speculative, but they may well have been laid down at the time of the existing flow gauge structure. The assessment of the site also noted that the stone wall channel that dives beneath the public road is very likely an historic wall that has been dismantled and rebuilt on a number of occasions over the years and the proposed groundwork, other than the finds and features discussed, did not expose any further dateable finds and features at the site. All geology at the site consisted of a sandy gravel and grit overlying a natural sedimentary shale.

1 Introduction

- 1.1 The following report presents the results of an Archaeological Watching Brief during groundworks for the installation of a new/upgraded flow gauging structure at the adit discharge point at the Frongoch / Wemyss Lead Mine Adit Discharge point, Pont-rhyd-y-groes, Ceredigion (centered on OS grid reference SN 7190 7428).
- 1.2 The specific objectives of this work were to:
 - Undertake an archaeological watching brief during all groundwork for the installation of a new/upgraded flow gauging structure at the adit discharge point to ensure any historic remains related to the lead mine are either not disturbed or else archaeologically recorded.

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 Miniére' 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 all of the 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 NRW 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.
- 1.16 In regard to the Frongoch Lead Mine, Natural Resource Wales (NRW) proposes to construct a new flow gauging structure at the Frongoch mine, Aberystwyth. This has been a major source of pollution (along with the Wemyss adit) into a natural watercourse, the Nant Cwmnewydion polluting it with Zinc. The flow gauging structure will allow for more accurate monitoring and infill data gaps through the implementation of a trapezoidal flume and associated logging equipment.

Scope of Works

- 1.17 In order to install the new mine-flow gauging structure, work involved:
 - 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;
 - Installation of a temporary above ground water piped diversion to the Frongoch Adit watercourse to convey the watercourse past the working area to allow the removal and replacement of the flow monitoring structure;
 - Sandbags and pipework will be used to create a temporary dam allowing the diversion of the watercourse to enable safe working conditions.
 - The existing flow monitoring structure will be removed from the site.
 - Localised excavation and re-profiling will take place to form a base for the gabion baskets and trapezoidal flume.
 - Installation of 5m long stilling basin (lined with a polyethylene membrane) upstream of the new structure;
 - Installation of gabion baskets, trapezoidal flume and concrete bag work weir;
 - Installation of monitoring instrumentation and telemetry;

- On completion of the installation works the temporary piped diversion will be removed and the watercourse will be reinstated on its original course.
- Removal of old infrastructure and de-mobilise from site.

Historical & Archaeological Background (see Figures 5 - 7)

- 1.18 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.
- 1.19 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.
- 1.20 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.

Geology

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

2 Aims & Objectives

2.1 The key objective of the archaeological presence on the site is to ensure the examination and recording of the nature and character of the mining deposits in the area of the mine discharge point and to ensure that if any historic mining features or finds are exposed then they are investigated and recorded.

The aims of the watching brief, as defined by the CIfA (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 11th May- 20th May 2022.
- 3.2 All work was carried out by a suitably qualified archaeologist with relevant level membership of the Chartered Institute for Archaeologists (CI*f*A) and followed the CI*f*A Standard and Guidance for an archaeological watching brief (CI*f*A 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 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 intermittently over a period nine (9) days from 11th May– 20th May 2022.
- 4.2 All contexts encountered are shown in brackets ().
- 4.3 Initial groundwork entailed the turf and top soil strip from the area of the field immediately west of the discharge point alongside the public road, in order to create a working platform area for the mechanical excavator, so that it can reach the stream bed for the removal of material to form the upgraded flow gauge structure. Groundwork for this stripping work revealed an orange/yellow sandy gravel deposit (102) directly below the turf (100) and top soil (101). Once the turf and top soil was

cleared from this area the excavator began to dig down further to create a working platform. This work revealed that directly below the orange sandy gravel deposit was a natural grey shale (103). No finds, features or significant archaeological deposits were exposed during this preparatory groundwork

- 4.4 Prior to groundwork beginning in the area of the existing flow gauge the area was waked over and assessed. This revealed that the eastern edge of the upgraded flow gauge structure was going to disturb the base of an historic spoil tip as well and remove a series of apparent loose kerb stones that run alongside the eastern edge of the base of the tip (see Photo 25). The assessment also noted a series of three vertically laid former iron tramway rails protruding into the spoil tip and water level running east to west close to the kerb stones (see Photo 26), Further assessment of the site also noted that the stone built wall that forms the channel that takes water beneath the public road is very probably historic and associated with the Wemyss mine. However, closer inspection of this wall revealed that it had seemingly been rebuilt and remortared in areas on a number of occasions over the years. Discussions this the site manager and the representative from the Coal Authority agreed that the preservation of these historic features is important and any compromise to them in relation to the scope of works is kept to a minimum.
- 4.5 Following the completion of the preparatory groundwork and the assessment of the site, the proposed groundwork for the upgraded flow gauge structure commenced by removing part of the base of the spoil tip on the eastern side of the discharge point, approximately 1.5m wide c 3m in length, in order to place the proposed Gabion baskets. This groundwork completely exposed one of the vertically laid former iron tramway rails on the westernmost side, which had completely corroded along its central spine which caused it to snap in two. This rail remnant was put aside and placed along the base of the tip, still being kept on site. The groundwork for the Gabion baskets on the eastern side of the stream did not reveal any further finds, features or deposits of any archaeological significance.
- 4.6 The next phase of groundwork entailed the reduction of the stream bed to the required level, some 0.40m below the current level and the removal of earth on the western side of the stream to incorporate the western Gabion baskets. This groundwork also had to remove a small section of stone walling on the western side, a section some 0.50m in width. This section of walling appeared to have already been taken down previously, possibly as part of the construction of the existing flow gauge structure. This walling was to be rebuilt again following completion of the construction of the new flow gauge. The groundwork in this location did not reveal any further finds, features or deposits of any archaeological significance. Completion of ground work in this area concluded the archaeological watching brief.

5. Conclusion & Recommendations

5.1 The archaeological watching brief during ground works for the installation of the new/upgraded flow gauging structure at the adit discharge point at the Frongoch / Wemyss Lead Mine, Pont-rhyd-y-

groes, managed to assess the area of the ground work, and in so doing recorded the position of a series of vertically laid former iron tramway rails protruding from the ground at the base to the spoil tipping on the east side of the discharge point. It also noted the position of three kerb stones along the eastern edge of the stream at the base of the spoil tip. Whether these kerb stones are historic or not is speculative, but they may well have been laid down at the time of the existing flow gauge structure. The assessment of the site also noted that the stone wall channel that dives beneath the public road is very likely an historic wall that has been dismantled and rebuilt on a number of occasions over the years and the proposed groundwork, other than the finds and features discussed, did not expose any further dateable finds and features at the site. All geology at the site consisted of a sandy gravel and grit overlying a natural sedimentary shale.

6 Acknowledgements

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

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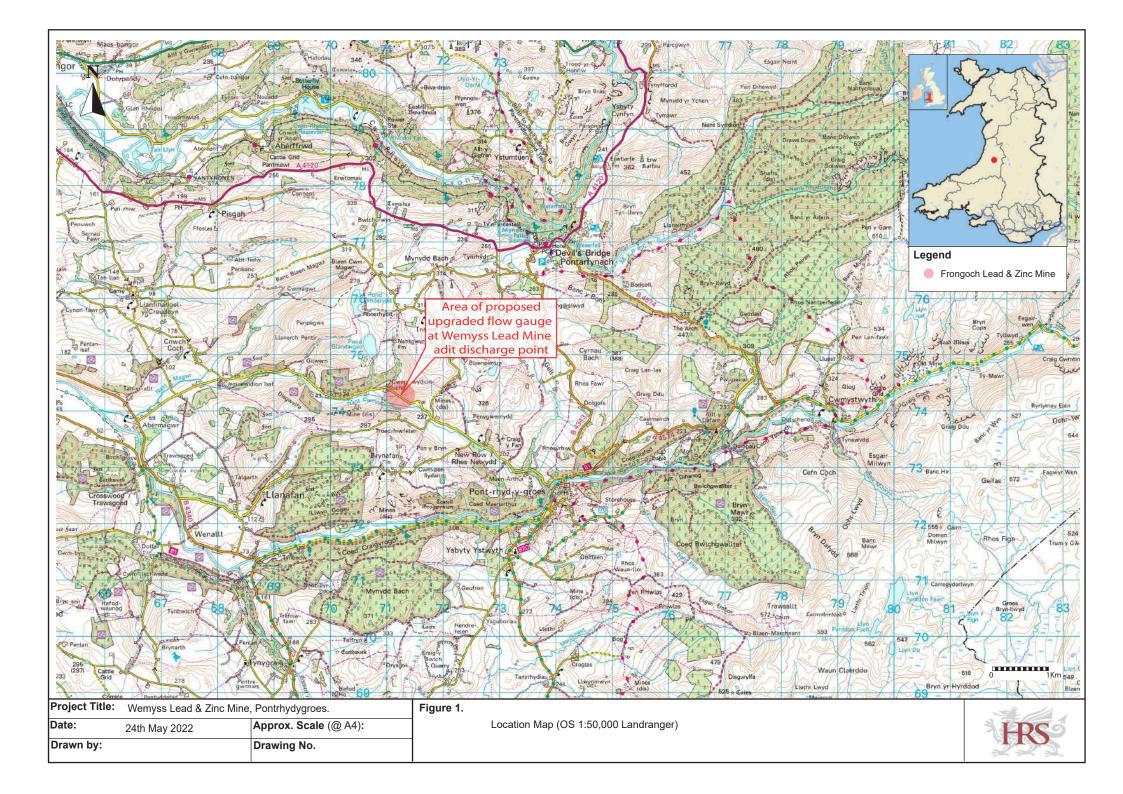
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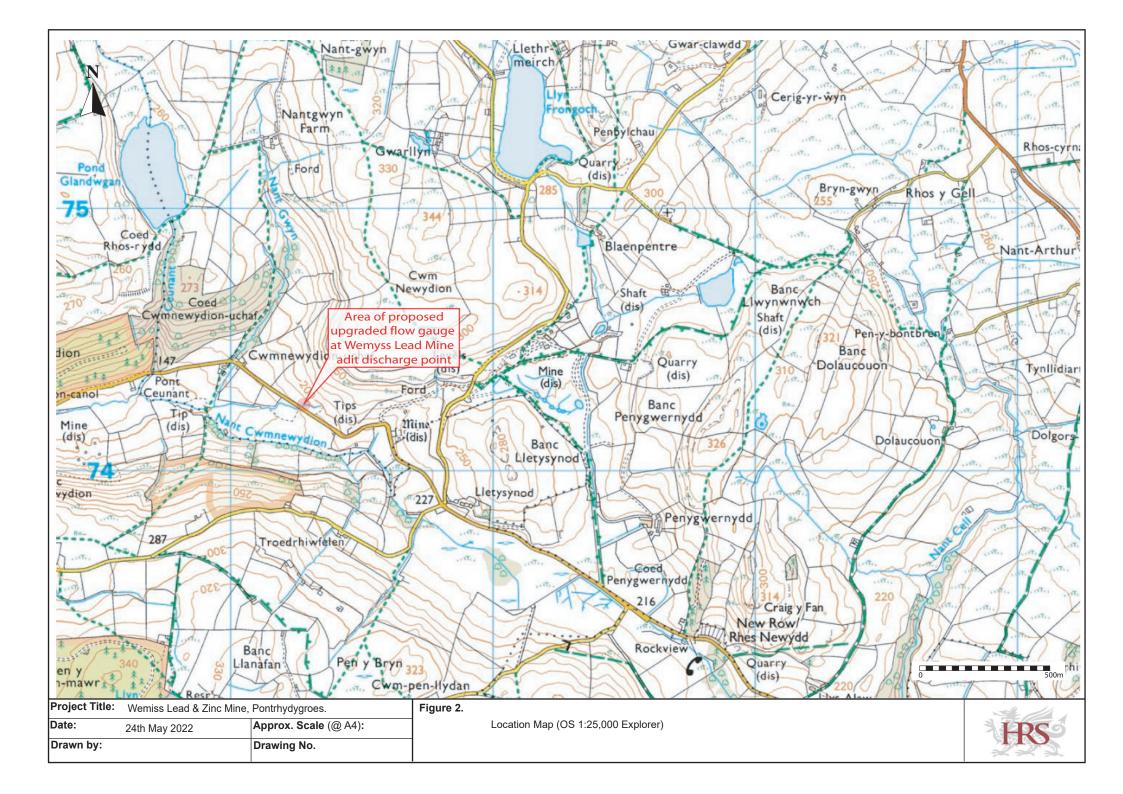
Soils of England and Wales 1983. Sheet 2: Wales, 1:25000

Cartographic Sources

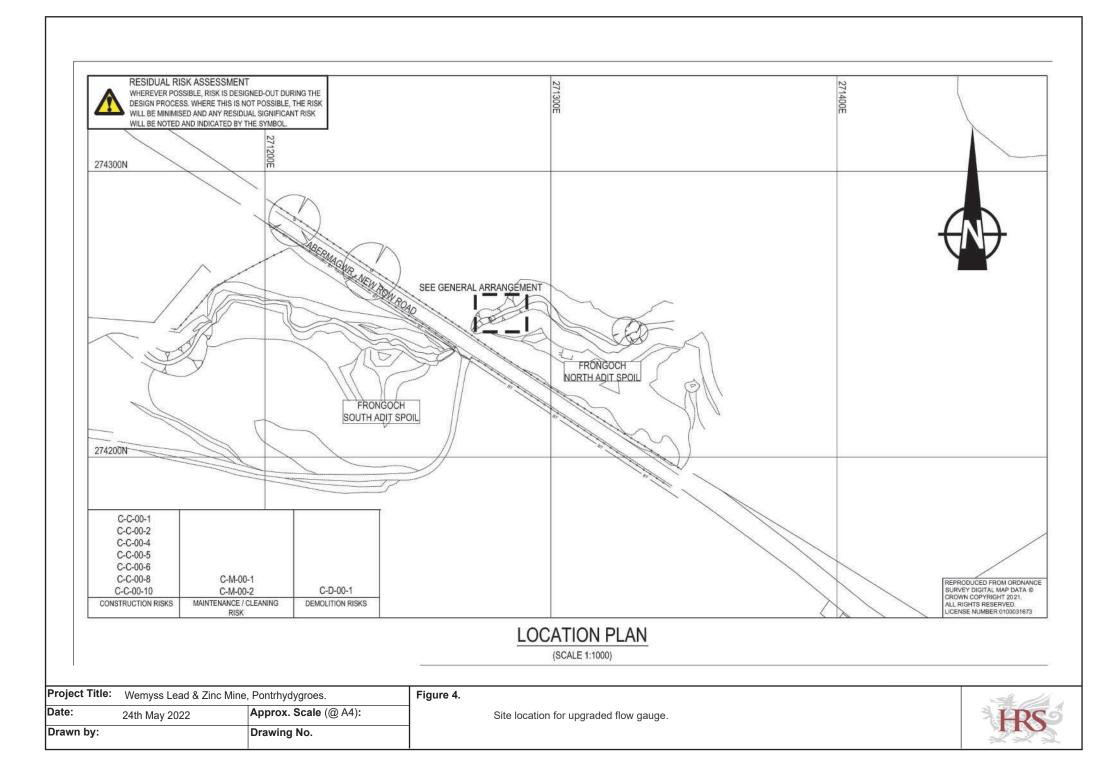
- Tithe Map for Llanfiangel Creuddyn Parish (1848)
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- Ordnance Survey 2nd Edition map of 1906 (1:10560);
- Ordnance 1953 (1:10560);

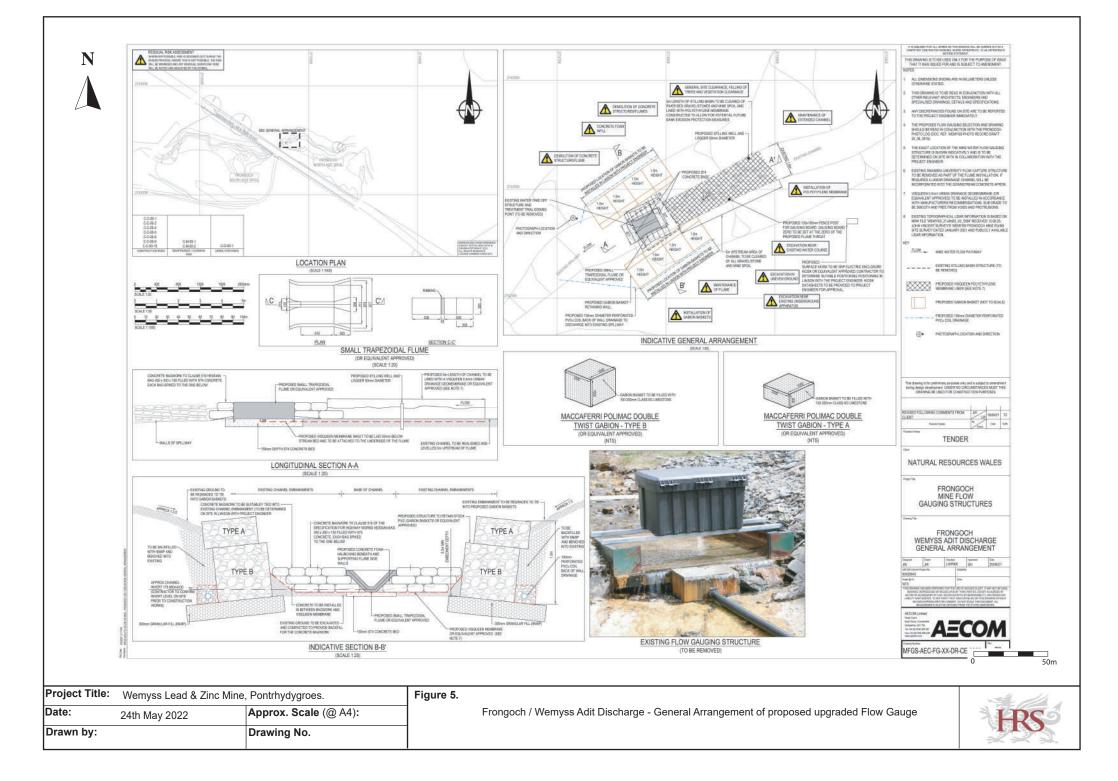
APPENDIX I: Figures

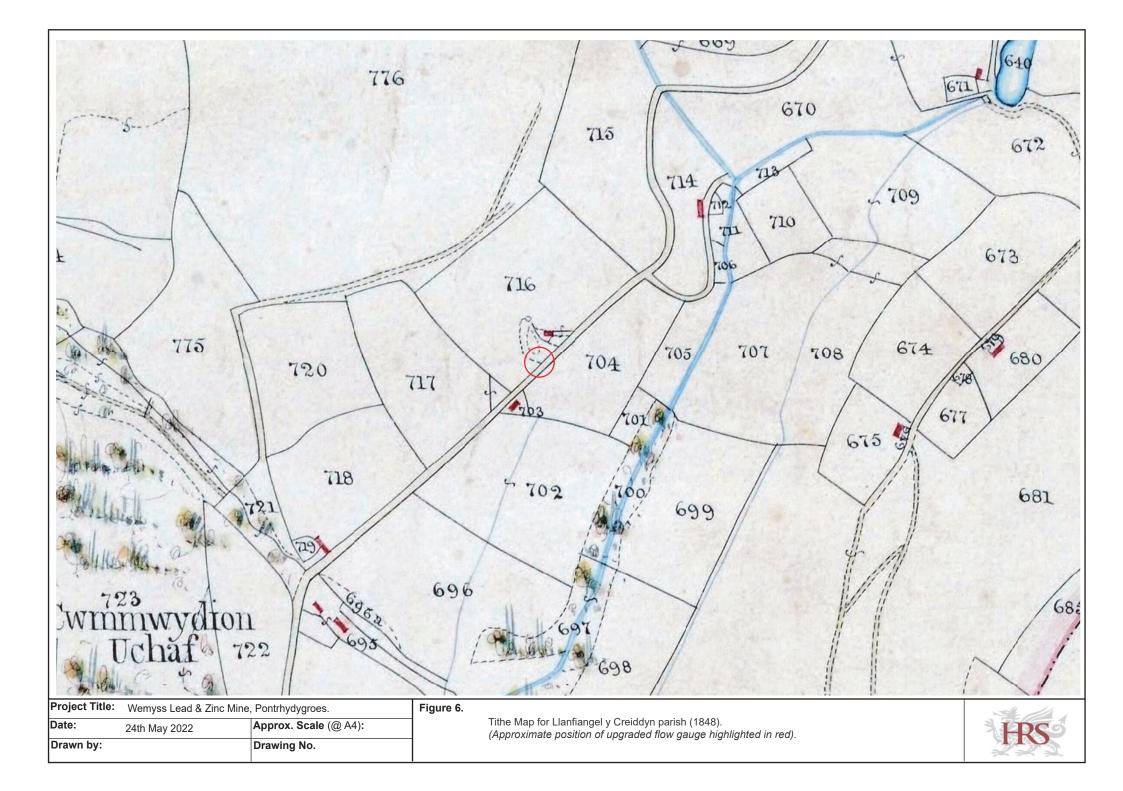












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 Wemyss Lead & Zinc Mine, Pontrhydygroes.

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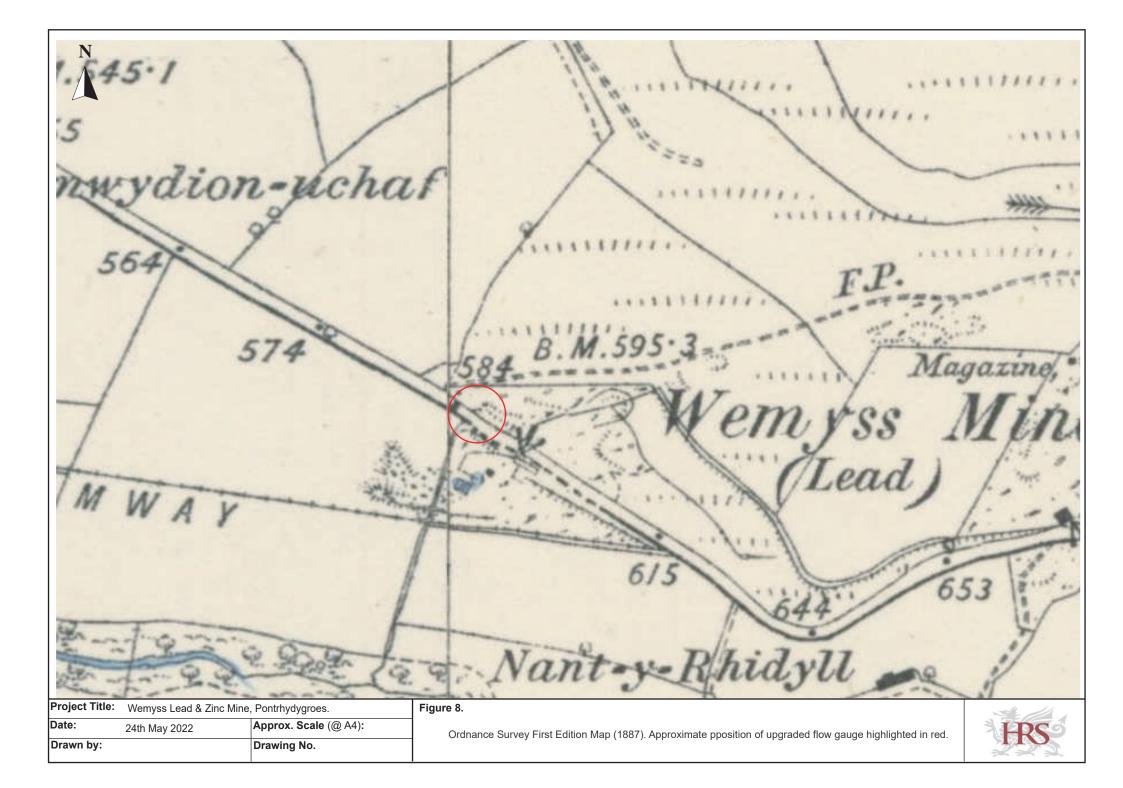
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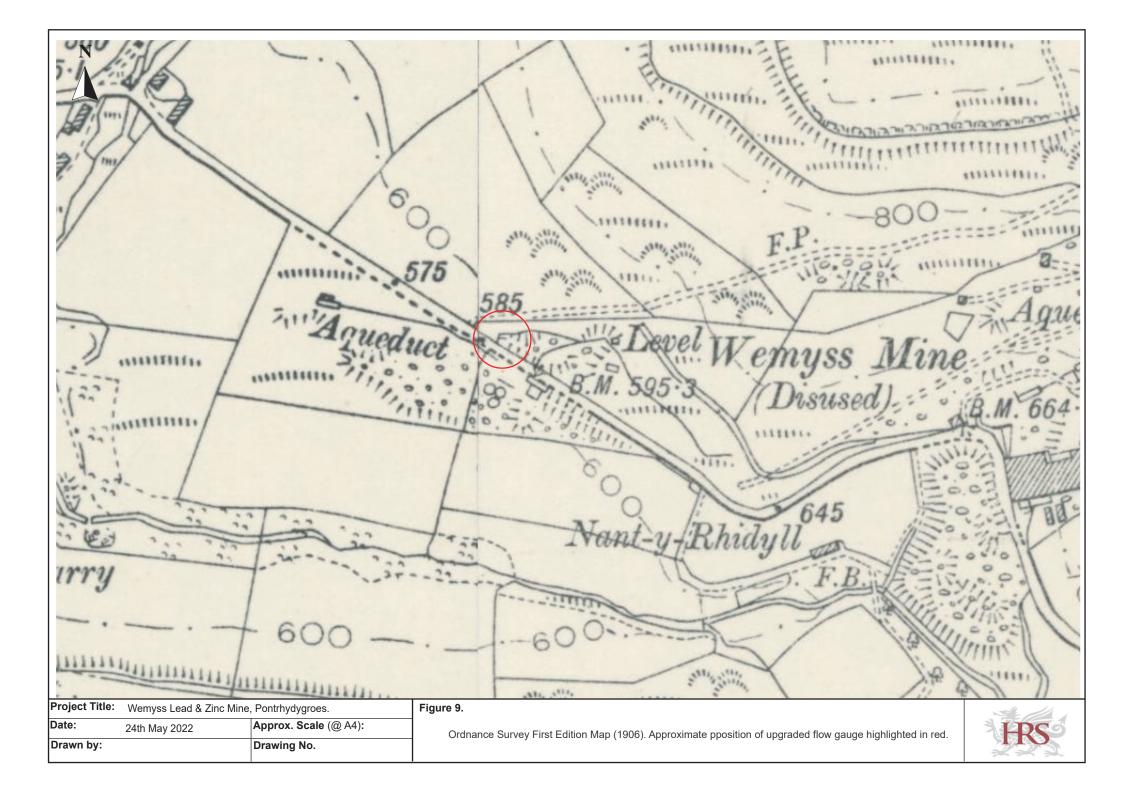
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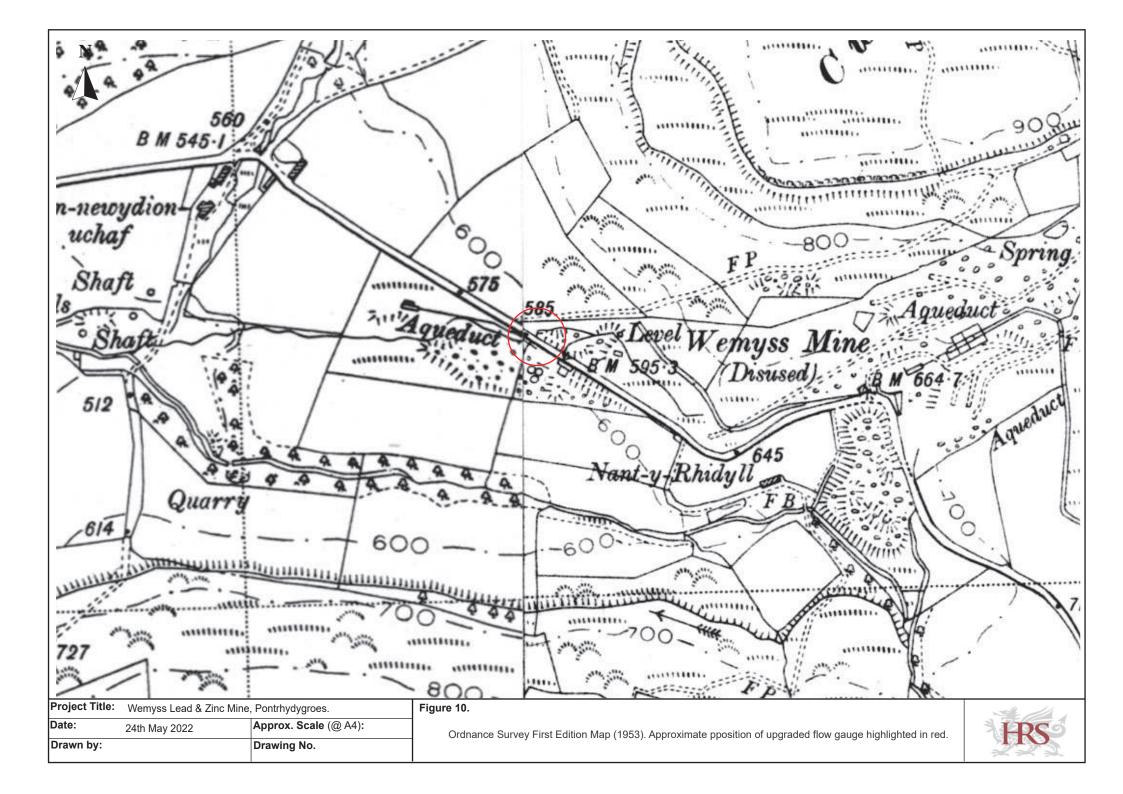
Figure 7.

Tithe Map apportionment details for Llanfiangel y Creiddyn parish (1848) relating to No's. 704 and 716.









APPENDIX II: Photo plates



Plate 01. Compound area looking toward discharge point on other side of public road between mine spoil tips.Looking north.



Plate 02. View of existing water flow gauge at discharge point between mine spoil tips. Looking south.



Plate 03. View of existing water flow gauge at discharge point between mine spoil tips. Looking northward.



Plate 04. View of existing water flow gauge at discharge point between mine spoil tips. Looking southward.



Plate 05. View of existing water flow gauge at discharge point andbetween mine spoil tips. Looking northwesterly.

Project Title:	Wemyss Lead & Zinc Mine, Pontrhydygroes. Photo Plate No's.		& Zinc Mine, Pontrhydygroes. Photo Plate No's.		
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Plate 06. Working shot during turf and sub soil strpping in machine working area.Looking west.



Plate 07. Working shot during turf and sub soil strpping in machine working area.Looking northwards.



- 10

Plate 08. Working shot during turf and sub soil strpping in machine working area. Looking west.



Plate 09. Working shot during turf and sub soil strpping in machine working area.Looking southwest.



Plate 10. Working shot during removal of part of base of mine spoil tip alongside discahrge point in preparation for Gabion baskets. Looking southwards.

	Project Title: Wemyss Lead & Zinc	Photo Plate No's.		
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Plate 11. Working shot during removal of part of base of mine spoil tip alongside discahrge point in preparation for Gabion baskets. Looking southwards.



Plate 12. Working shot during removal of part of base of mine spoil tip alongside discahrge point in preparation for Gabion baskets. Looking northwards.



Plate 13. Working shot during removal of part of base of mine spoil tip alongside discahrge point in preparation for Gabion baskets. Looking southwards.



Plate 14. Area on east side of steam re\ady for new Gabion baskets. Looking northwards.



Plate 15. Area on east side of steam re\ady for new Gabion baskets. Looking northwest.

Project Title: Wemyss Lead & Zinc	Photo Plate No's.		
Date Taken: 12th & 16th May 2022	Approx. Scale (@ A4):		11 - 15
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Plate 16. Spliced panoramic view I.ooking west to north of parthy dismantled existing flow gauge and area prepared for new Gabion baskets. in preparation for Gabion baskets at base of spoil tip.



Plate 17. Working shot during clearance of stream bed and western bank in preparation for opposing Gabion baskets. Looking southwards.



Plate 18. Working shot during clearance of stream bed and western bank in preparation for opposing Gabion baskets. Looking northwards.





Looking westwards.



Plate 22. Groundwork complete in stream bed in preparation for concrete and new flume.

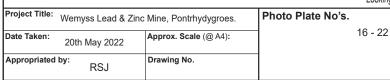




Plate 21. Groundwork complete on western bank for new Gabion baskets. Looking SW. Looking N.





Plate 23. Completed groundwork. Looking southwards.



Plate 24. Completed groundwork. Looking southwards.

Project Title: Wemyss Lead & Zin	c Mine, Pontrhydygroes.	Photo Plate No's.	5
Date Taken: 20th May 2022	Approx. Scale (@ A4):	23 - 24	HRS
Appropriated by: RSJ	Drawing No.		221



Plate 25. Apparent kerb stones at base of spoil tip alongside stream on east side in area of proposed upgraded flow gauge.



Plate 26. Remains of corroded former iron tramway rails sticking up out of ground in area of proposed new flow gauge at base of spoil tip on east side of stream. May have been used as a temorary fencing at some time across stream bed.

Project Title: Wemyss Lead & Zinc Mine, Pontrhydygroes.		Mine, Pontrhydygroes.	Photo Plate No's.	
Date Taken:	11th May 2022	Approx. Scale (@ A4):	25 - 26	HRS
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APPENDIX III: Archive Cover Sheet

ARCHIVE COVER SHEET

Wemyss Lead & Zinc Mine, Pontrhydygroes, Ceredigion

ARCHIVE DESTINATION - RCAHMW

Site Name:	Frongoch Lead & Zinc Mine, Pontrhydygroes, Ceredigion
Site Code:	WLM/2022/WB
PRN:	-
NPRN:	33907
SAM No.	
Other Ref No.	HRSW Rpt No. 253
NGR:	SN 7190 7428
Site Type:	Lead & Zinc Mine.
Project Type:	Archaeological Watching Brief
Project Manager:	Richard Scott Jones
Project Date(s):	11th May - 20th May 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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