

Test Pit at Pumping Wheel Pit, Cwm Elan Mine, Cwm Elan, Rhayader Scheduled Monument RD153



Report by: Trysor

For: Selwyn Elan Valley Trust

October 2018



Test Pit at Pumping Wheel Pit, Cwm Elan Mine, Cwm Elan, Rhayader Scheduled Monument RD153

By

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Trysor

Trysor Project No. 2018/618

For: Selwyn Jones and Elan Valley Trust

October 2018

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Cover photograph: View of the wheel pit looking north

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Cwm Elan Mine, Cwm Elan, Rhayader
Scheduled Monument RD153**

RHIF YR ADRODDIAD - REPORT NUMBER: Trysor 2018/618

DYDDIAD 27^{ain} Hydref 2018

DATE

27th October 2018

Paratowyd yr adroddiad hwn gan bartneriad Trysor. Mae wedi ei gael yn gywir ac yn derbyn ein sêl bendith.

This report was prepared by the Trysor partners. It has been checked and received our approval.

JENNY HALL MCIFA

Jenny Hall

PAUL SAMBROOK MCIFA

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Croesawn unrhyw sylwadau ar gynnwys neu strwythur yr adroddiad hwn.

We welcome any comments on the content or structure of this report.

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Trysor is a Registered Organisation with the Chartered Institute for Archaeologists and both partners are Members of the Chartered Institute for Archaeologists, www.archaeologists.net .

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1. Summary

1.1 In September 2018, Trysor undertook a small evaluation and photo recording at the large wheel pit at SN8996265133, part of Cwm Elan Mine, Scheduled Monument RD153 in the Elan Valley.

1.2 A single test pit was excavated at the external southeast corner of the wheel pit. The purpose of the test pit was to investigate the nature of the foundations of the wheel pit down to the upper surface of the topmost significant archaeological deposit in order to inform a conservation strategy.

1.3 The southeastern corner of the wheel pit was seen to be built directly onto the bedrock with no slippage occurring and therefore the slight drop in the arch in the southern wall of the wheel pit was not due to movement in this corner. Four contexts were recorded which have been interpreted as relating to the construction, use and disuse of the water wheel.

1.4 The photo recording was of a metal axle or shaft lying on the ground in a stone cell to the west of the wheel pit. It is possible this was an axle for a winding drum located to the west side of the main wheel.

2. Copyright

2.1 Trysor holds the copyright of this report and of the paper and digital archive. Further paper copies may be made of this report without gaining permission to reproduce but it must be noted that Figure 1 include other copyright material and should not be copied.

3. Introduction

3.1 Selwyn Jones commissioned Trysor heritage consultants to provide a Written Scheme of Investigation for archaeological works required as part of Scheduled Monument Consent for RD153, Cwm Elan Mine, see Figure 1.

3.2 This part of an ongoing project to consolidate parts of Cwm Elan Mine, Scheduled Monument RD153.

3.3 The Elan Valley Trust and Cadw were investigating the need for structural support for the pumping wheel pit at SN8996265133. The southern end shows some signs of collapse, in particular in the arch through which water exited the wheel pit. Before a decision was taken about consolidation/underpinning work was taken it was necessary to investigate the nature of the footings.

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3.4 Cwm Elan Mine lies at SN8996265133 at around 300 metres above sea level on the southeast facing slopes on the southwestern side of the Nant Methan. The slopes are relatively steep and the discrete complex occupies less than 5 hectares.

3.5 The site lies on interbedded mudstone of the Cwmere Formation laid down approximately 428 to 444 million years ago in the Silurian Period. The local environment at that time was deep seas and the rocks came from occasional slurries from shallow water sediments which were then re-deposited as graded beds.

3.6 The wheel pit lies towards the western side of the complex on a steep southeast facing slope. It has a stone built cell attached to its western side.

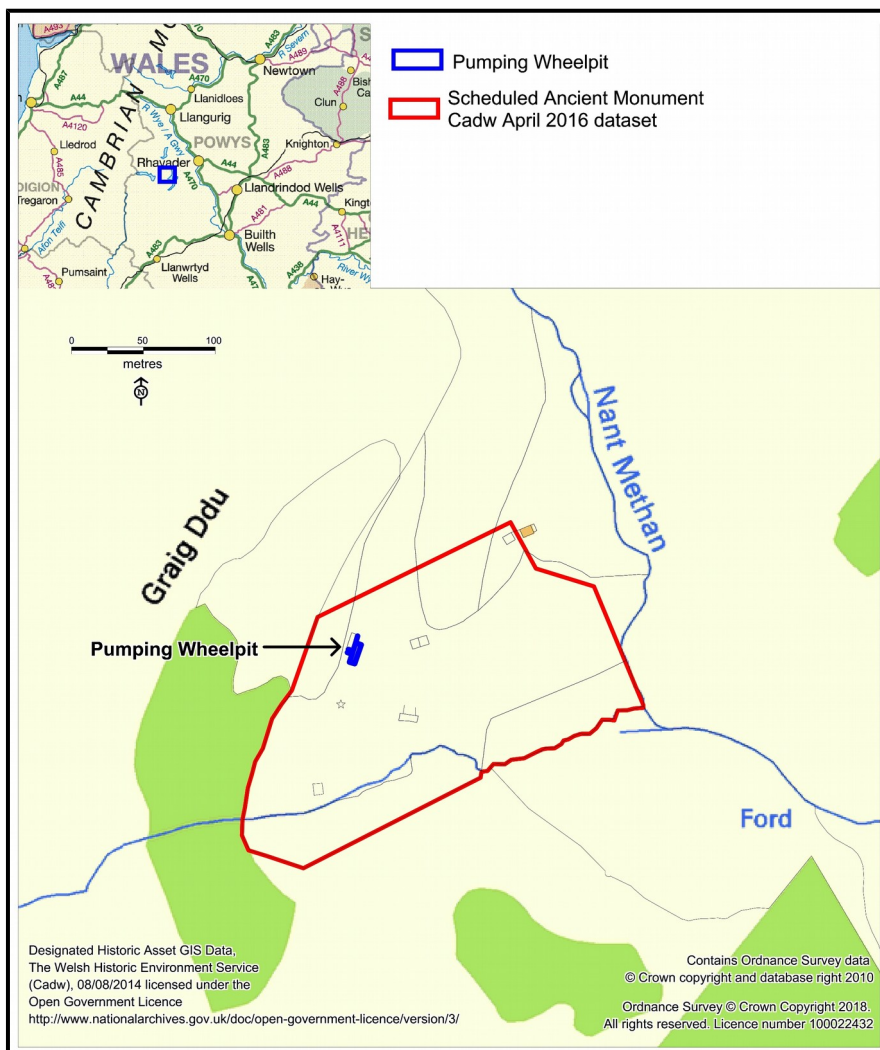


Figure 1: Location of the wheel pit within the scheduled area of RD153.

4. Specification

4.1 Trysor prepared a specification for the evaluation and photographic recording, see Appendix A. The specification was approved by Will Davies, Regional Inspector of Ancient Monuments and Archaeology (North East Wales), Cadw.

5. Historical and Archaeological Overview

5.1 The remains of this relatively compact mid 19th century lead mine complex form one of the most complete examples of its type in Wales. Its unaltered layout and the level of preservation of its individual structures illustrate the entire extraction and processing sequence within a relatively small area of land.

5.2 Mining explorations were started here by the landowner, Thomas Grove of Cwm Elan, after lead ore was discovered in 1796 during the digging of a drainage ditch. There is evidence of these late 18th century and earlier 19th century workings in the form of earthworks, such as open cuts and building platforms.

5.3 The main phase of mining began in 1871 when the "Cwm Elan Mining Company" was formed, and this is the period to which most of the surviving structures belong (Jones et al, 2004). The "New Cwm Elan Mine" was formed in 1875 after a period of drought had caused the voluntary liquidation of the former company. This new phase came to an end in 1877, and the purchase of the land by the Birmingham Water at the end of the 19th century meant that no attempt was made to work the site again.

5.4 The largest of three wheel pits, (NPRN 261464, CPAT HER PRN 18469) at Cwm Elan mine stands at SN8996265133. It measures approximately 14 metres north to south by 4 metres (Levins, G, 1-201, Jones et al, 2004, pp 35 to 55, figures 20, 22 and 27).

5.5 Water was supplied by a leat from the Nant Methan to the northeast, and exited the wheel pit through an arch in the southern wall of the pit. The shaft lies to the 30 metres to the south-southwest.

6. Methodology

6.1 On Friday 11th September 2018, a single test pit was hand excavated along the southern wall at the external, southeast corner of the wheel pit, see figure 2. An adjoining second test pit along the eastern wall was not excavated as the relationship of the wall foundations with the bedrock and the condition of the wall was established in the first test pit.

6.2 The test pit was 0.50 metres wide and 1.7 metres long and was taken down to the first significant archaeological context, which was construction and in use layers on the western side of the trench and bedrock on the eastern side.

6.3 The metal axle to the west of the wheel pit was cleared of leaves and photographed.

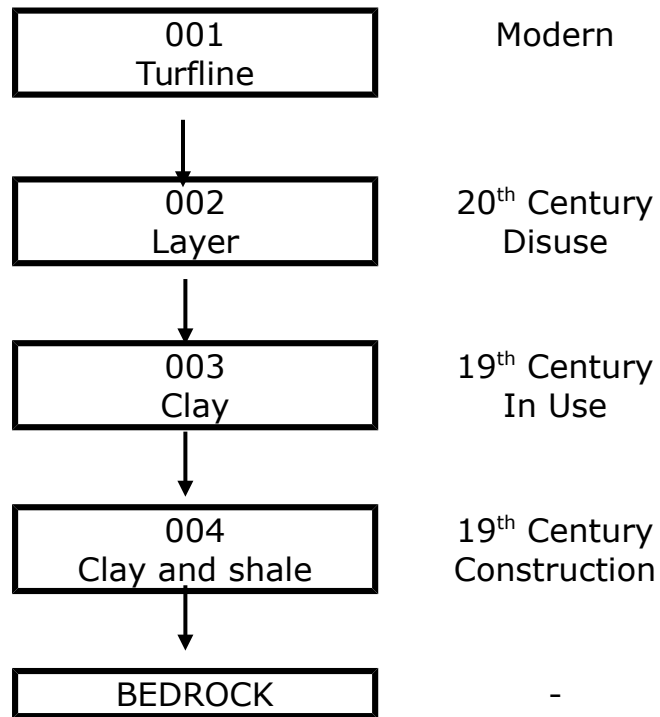
7. Site Stratigraphy

7.1 The test pits were hand excavated and recorded in accordance with the Institute for Archaeologists' *Standard and Guidance for an Archaeological Field Evaluation* (Institute for Archaeologists, 2014 updated version).

7.2 Context Catalogue

Context Number	Depth	Description	Interpretation
001	Up to 0.11 metres but deeper towards the wall of wheel pit	10YR 3/1 very dark grey, loose fibrous material, with many grass roots	Turfline
002	0.24 metres	Loose sandy layer with stones up to 0.3 metres long	Partial collapse of the top of the wheel pit
003	0.19 metres	10YR 5/2 greyish brown clay	Clay around wheel pit when waterwheel was in use?
004	At least 0.10 metres	10YR 6/2 light brownish grey clay with slate fragments	Construction phase

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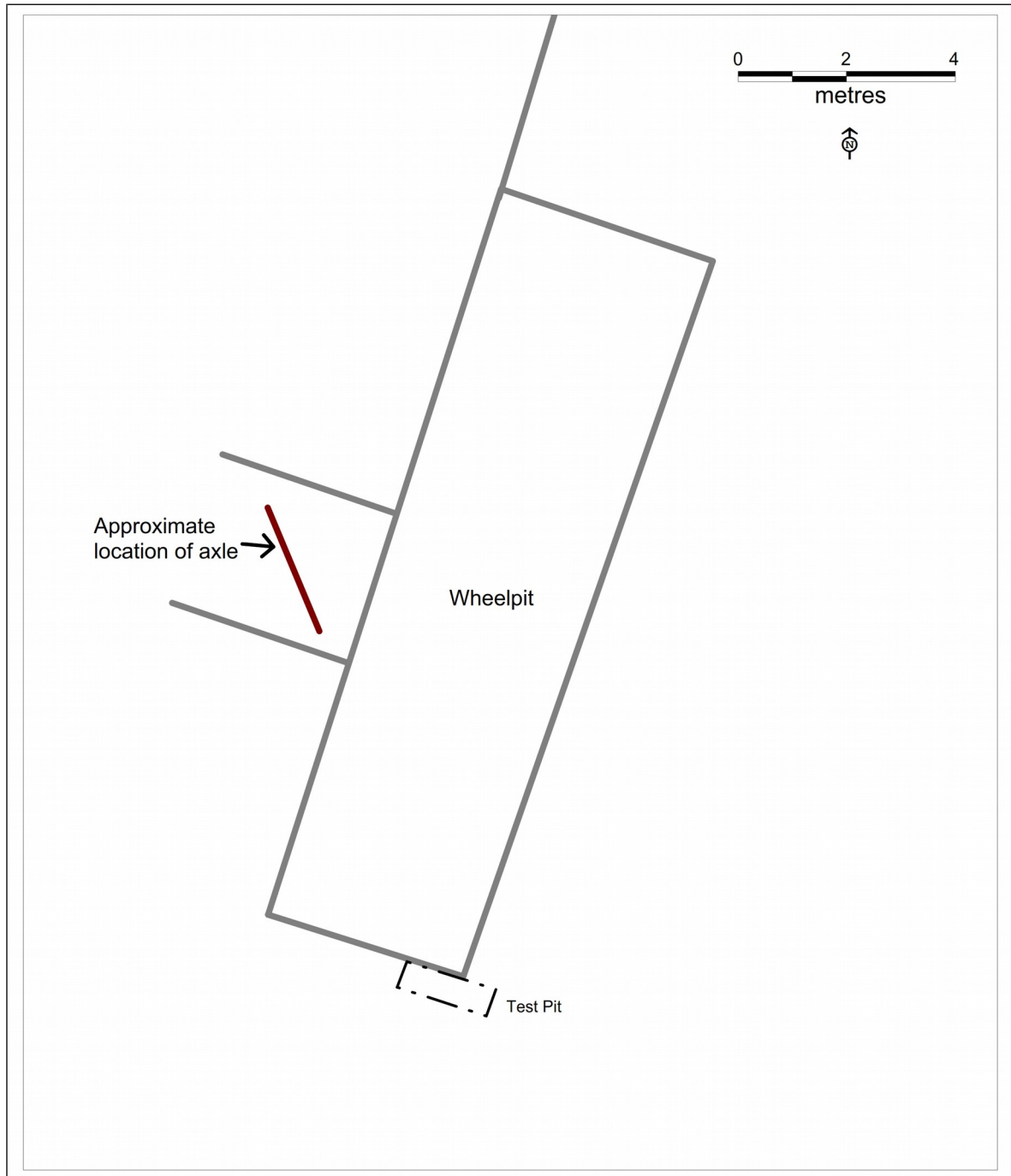


Figure 2: Location of the test pit at the southwest corner of the wheel pit. Note that a full measured survey of the water wheel structure was not undertaken, so the wheel pit and adjoining cell are diagrammatic only.

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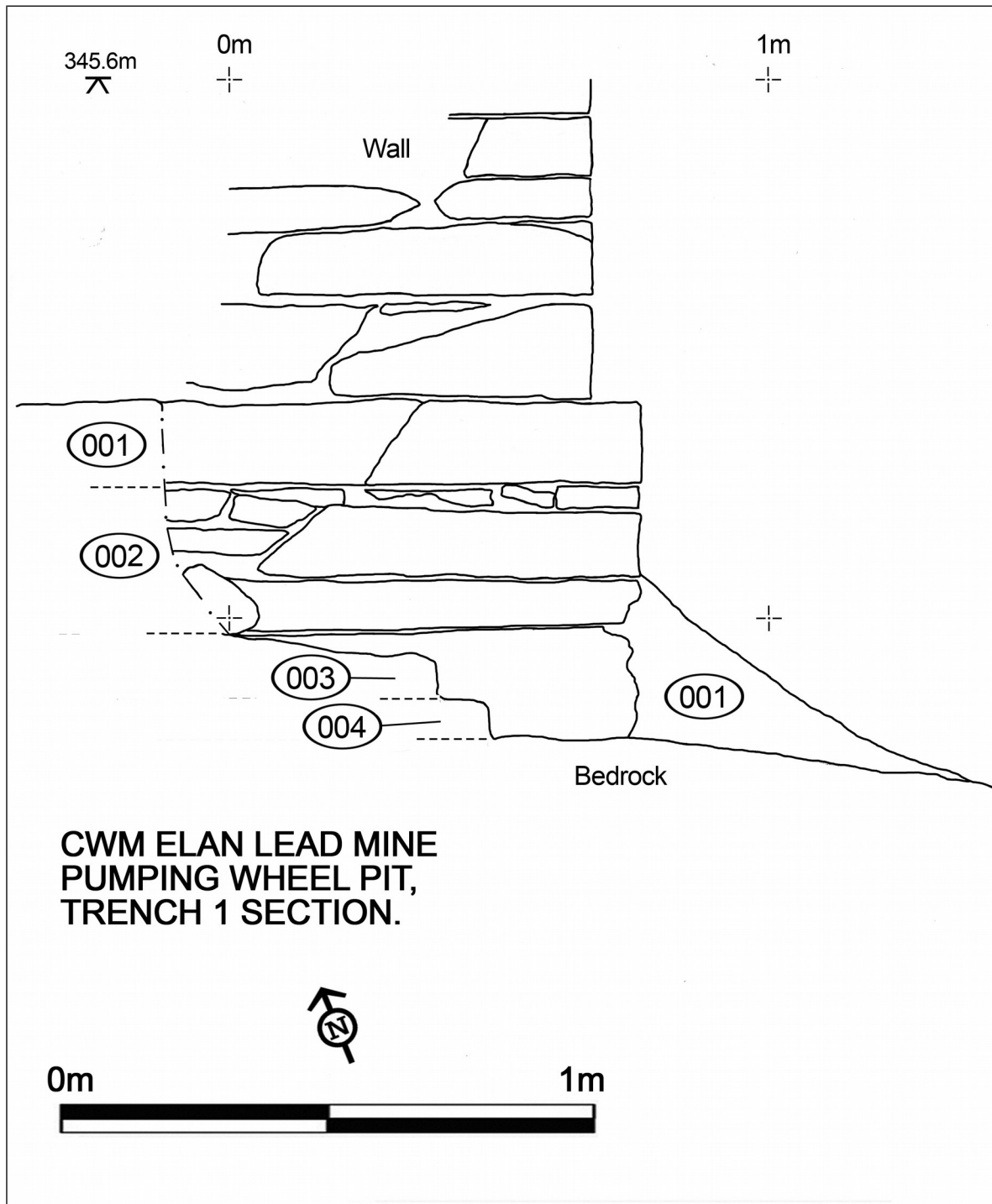


Figure 3: Section showing the wheel pit wall, its plinth courses and the excavated section, drawn at 1:10

8. Description

8.1 The turf layer (001) was generally 0.11 metres deep but became thicker towards the wall of the wheel pit. Below it was a layer (002) of loose sandy material with many large stones, up to 0.3 metres long. This was interpreted as relating to disuse of the wheel pit with stones falling off the top of the wall. Below this was a clay layer (003) which was interpreted as clay plugging around the base of the wheel pit when it was in use. At the base of (003) water began bubbling into the trench. Layer (004) below (003) was a mixed clay and slate layer which was interpreted as relating to the construction phase of the wheel pit.

8.2 The metal axle lies on the floor within a cell to the west of the main wheel pit. The axle was 2.43 metres long and at the ends was 0.135 metres in diameter. The central section was 1.47 metres long but the ends of the axle do not mirror each other. The northwestern end narrowed for 0.285 metres, narrowed for a further 0.08 metres and then widened again for a further 0.045 metres at the very end. The southeastern end narrows for 0.285 metres and then widens again for the remaining 0.26 metres. It is thought to be an axle for a winding drum on top of the walls of the cell.

9. Photographs

9.1 Colour digital photographs were taken of hand excavation of the posthole using a 16M pixel camera. The following table describes the content of each photograph included in the project archive and their locations are provided in the following map, see Figure 4 and 5. The photographs are included in Appendix B at the end of the report. The number sequence is not consecutive and 108, 109, 112, 117, 119, 120 and 128 are not included.

Photo Number	Description	Date Taken	Direction
CEM2018_101	A general view of the ruined wheel pit at the Cwm Elan mine.	11/09/2019	Looking west-northwest.
CEM2018_102	A view of the ruined wheel pit undergoing conservation.	11/09/2019	Looking northwest.
CEM2018_103	A closer view of the location of test pit before excavation. It was situated at the southern end of the wheel pit.	11/09/2019	Looking east-southeast.
CEM2018_104	A view along the eastern side of the wheel pit from the location of test pit.	11/09/2019	Looking north-northeast.
CEM2018_105	A view of the eastern side of the wheel pit towards the location of test pit.	11/09/2019	Looking south-southwest.
CEM2018_106	A view of the eastern side of the wheel pit, showing the plinth at the base of the structure.	11/09/2019	Looking northwest.
CEM2018_107	A view of test pit after the removal of the turf covering (001). The rubble (002) associated with the gradual dereliction of the wheel pit is revealed.	11/09/2019	Looking north-northeast
CEM2018_110	Another view of test pit after the removal of the turf covering (001). The arched outlet at the base of the wheel pit is visible to the left.	11/09/2019	Looking north-northeast

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Photo Number	Description	Date Taken	Direction
CEM2018_111	A view of test pit showing more collapse rubble (002) exposed.	11/09/2019	Looking north-northeast.
CEM2018_113	A view of test pit as the collapse rubble layer (002) is being removed. It was underlain by a clay layer (003) interpreted as material deposited when the water wheel was in use.	11/09/2019	Looking north-northeast.
CEM2018_114	A view of the gravel and clay layer (004) at the base of test pit. This lower layer is thought to have been lain down during the construction of the wheel pit and overlies bedrock. The stone seen right of centre is the base stone of the wheel pit at the southeast corner of the structure. It sits on the bedrock, and appears to indicate that the site was quarried to create a level platform before the wheel pit was constructed.	11/09/2019	Looking northwest.
CEM2018_116	A view of test pit showing the full stratigraphy from the turf (001), through (002), (003) and (004) down to the bedrock. Groundwater began flowing strongly from beneath the wheel pit at this depth.	11/09/2019	Looking west-northwest.
CEM2018_118	Another view of test pit.	11/09/2019	Looking north-northeast.
CEM2018_121	A view of the probable spindle of the pumping wheel, now laying to the	11/09/2019	Looking east.

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Photo Number	Description	Date Taken	Direction
	rear of the wheel pit.		
CEM2018_122	A more detailed view of the wheel axle.	11/09/2019	Looking northeast.
CEM2018_123	A more detailed view of the wheel spindle.	11/09/2019	Looking northeast.
CEM2018_124	A view of the wheel pit.	11/09/2019	Looking north-northeast.
CEM2018_125	A view of the wheel pit.	11/09/2019	Looking north-northeast.
CEM2018_126	A view inside the wheel pit during consolidation work.	11/09/2019	Looking south-southwest.
CEM2018_127	A view of the wheel pit.	11/09/2019	Looking north.
CEM2018_129	A view inside the wheel pit after consolidation work had been completed.	11/09/2019	Looking south-southwest.

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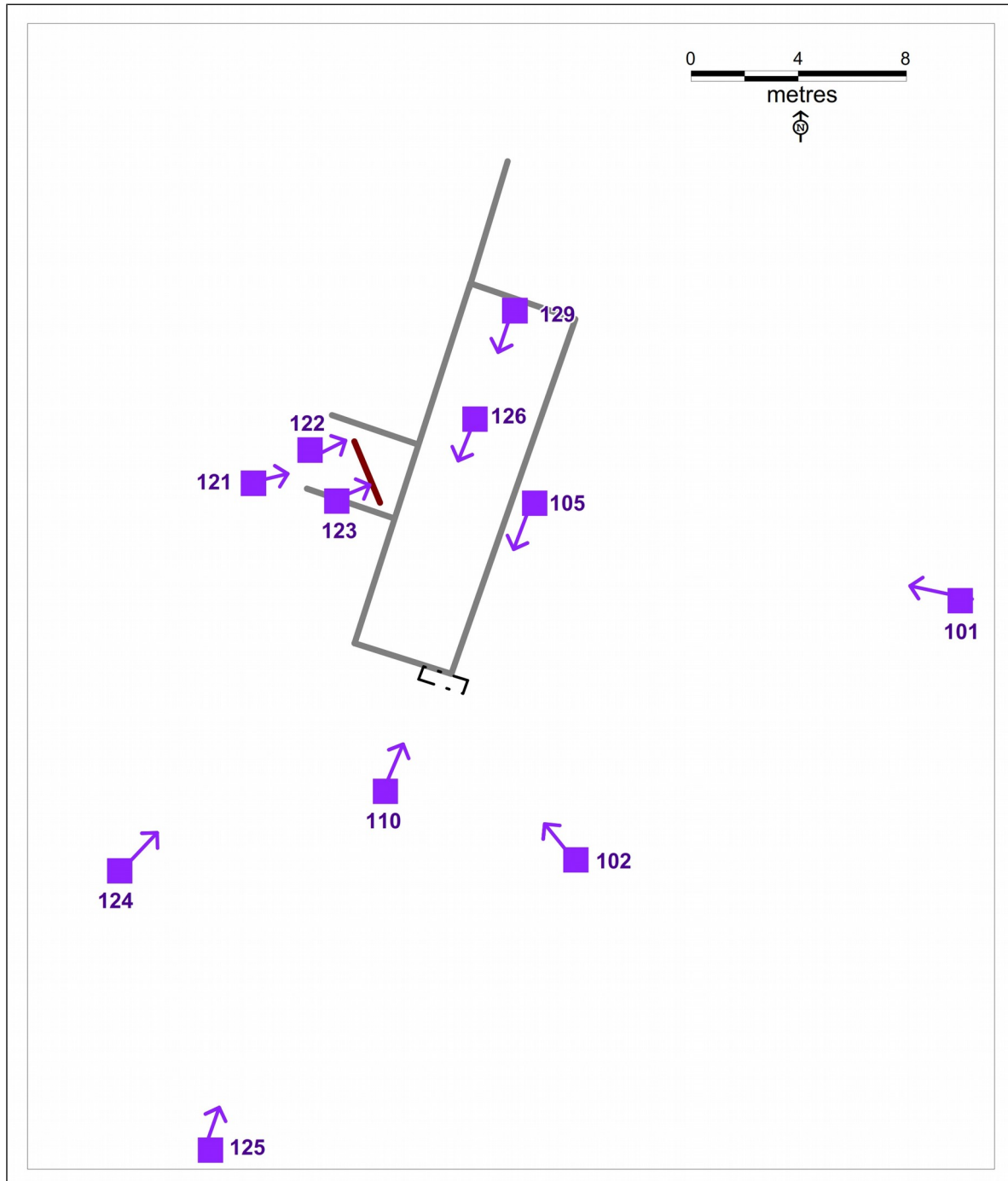


Figure 4: Location of overview photographs and of iron axle.

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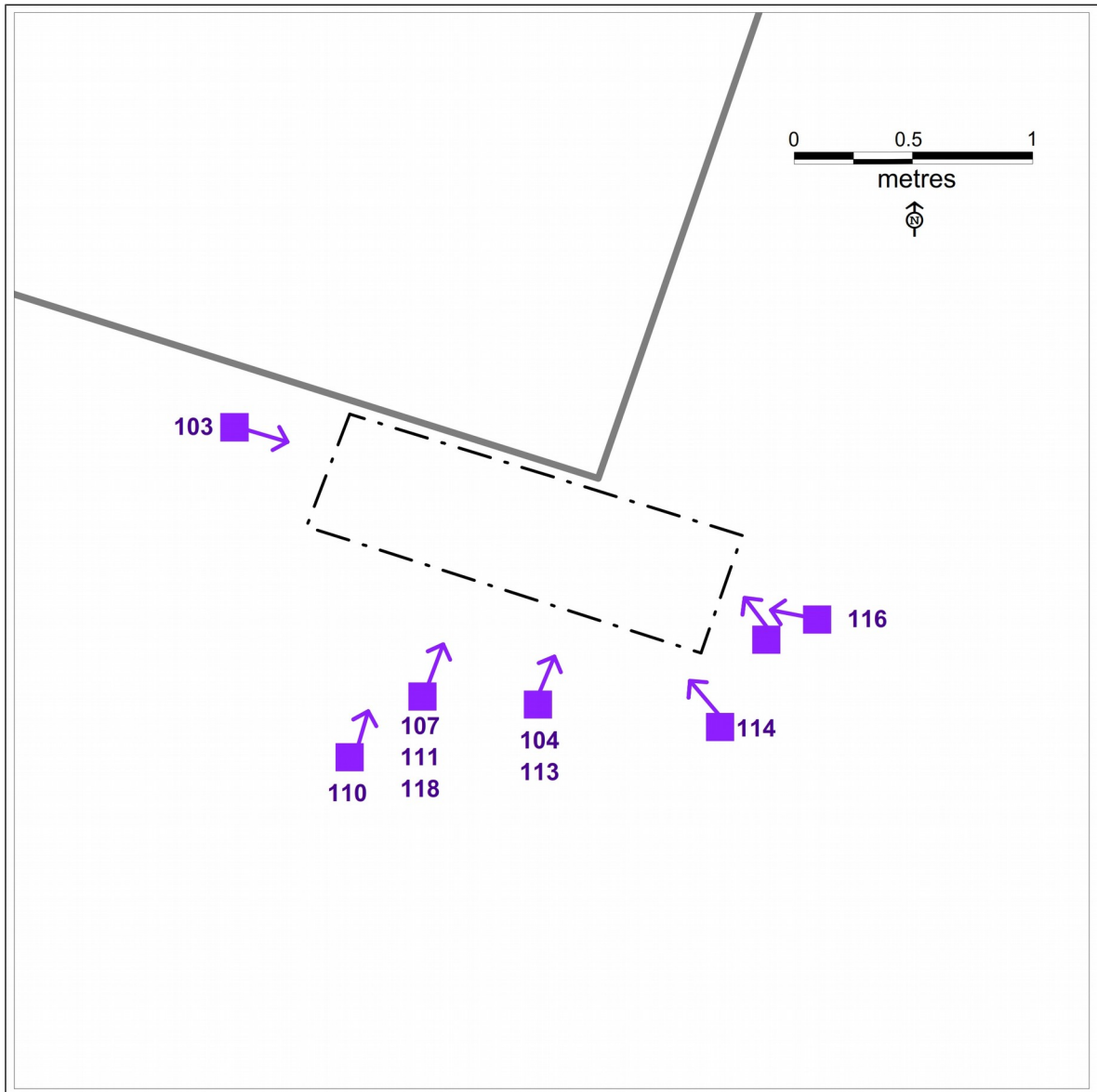


Figure 5: Location of test pit photographs

10. Conclusion

10.1 No archaeologically significant contexts were removed. The evidence indicates that the wheel pit structure was built directly on a rock cut shelf. The southeastern corner was in good condition with no slippage.

10.2 The iron axle may have been for a winding drum mounted on the walls of the cell to the west of the wheelpit.

11. Archive

11.1 The archive and a paper copy of the report and photographs will be deposited with the National Monuments Record, Aberystwyth. Photographs are in TIFF format, following the standard required by the RCAHMW.

11.2 Further copies of the report have also been supplied to the client, and the Historic Environment Record at Clwyd Powys Archaeological Trust, Welshpool.

**APPENDIX A –Written Scheme of Investigation produced by
Trysor and agreed by Will Davies, Cadw, June 2018**

**WRITTEN SCHEME OF INVESTIGATION FOR THE PUMPING WHEELPIT AT
CWM ELAN MINE, ELAN VALLEY, RHAYADER
JUNE 2018**

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1. Introduction

1.1 Selwyn Jones has commissioned Trysor heritage consultants to provide a Written Scheme of Investigation for archaeological works required as part of Scheduled Monument Consent for RD153, Cwm Elan Mine.

1.2 This part of an ongoing project to consolidate parts of Cwm Elan Mine, Scheduled Monument RD153.

2. The proposed development

2.1 The Elan Valley Trust and Cadw are investigating the need for conservation work on the pumping wheelpit at SN8996265133. The southern end shows some signs of collapse but before any consolidation/pinning work is done it is necessary to investigate the nature of the footings.

3. Location of Development

3.1 Cwm Elan Mine lies at around 300 metres above sea level on the southeast facing slopes on the southwestern side of the Nant Methan. The slopes are relatively steep and the discrete complex occupies less than 5 hectares.

3.2 The site lies on interbedded mudstone of the Cwmere Formation laid down approximately 428 to 444 million years ago in the Silurian Period. The local environment at that time was deep seas and the rocks came from occasional slurries from shallow water sediments which were then re-deposited as graded beds.

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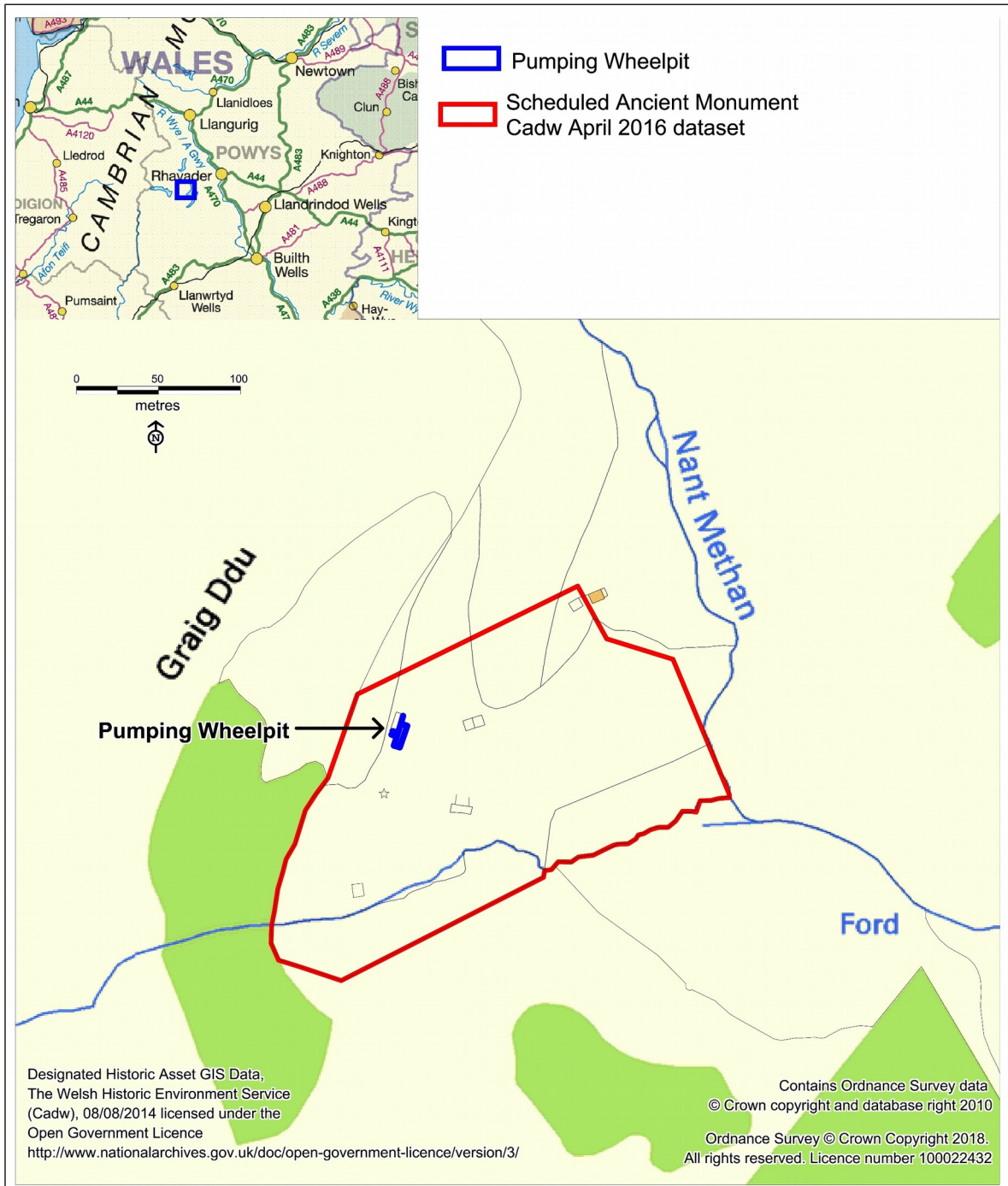


Figure 1: The location of the pumping wheelpit

4. Objective of the Written Scheme of Investigation

4.1 The objective of this written scheme of investigation (WSI) is to specify the method to be used for the archaeological works.

4.2 The Chartered Institute for Archaeologists' Standard and Guidance for Archaeological Field Evaluation (Cifa, 2014b) was used to write this Written Scheme of Investigation.

5. Nature of the Archaeological Resource

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5.1 The remains of this relatively compact mid 19th century lead mine complex form one of the most complete examples of its type in Wales. Its unaltered layout and the level of preservation of its individual structures illustrate the entire extraction and processing sequence within a relatively small area of land.

5.2 Mining explorations were started here by the landowner, Thomas Grove of Cwm Elan, after lead ore was discovered in 1796 during the digging of a drainage ditch. There is evidence of these late 18th century and earlier 19th century workings in the form of earthworks, such as open cuts and building platforms.

5.3 The main phase of mining began in 1871 when the “Cwm Elan Mining Company” was formed, and this is the period to which most of the surviving structures belong (Jones et al, 2004). The “New Cwm Elan Mine” was formed in 1875 after a period of drought had caused the voluntary liquidation of the former company. This new phase came to an end in 1877, and the purchase of the land by the Birmingham Water at the end of the 19th century meant that no attempt was made to work the site again.

5.4 The largest of three wheelpits, (NPRN 261464, CPAT HER PRN 18469) at Cwm Elan mine stands at SN8996265133. It measures approximately 14 metres north to south by 4 metres (Levins, G, 1-201, Jones et al, 2004, pp 35 to 55, figures 20, 22 and 27.

6. Scope of Work

6.1 There are two elements to the work to be undertaken;

6.1.1 Hand excavation of two test pits around the external southeast corner of the wheelpit in order to investigate the nature of the foundations of the wheelpit. Both test pits will be excavated to the upper surface of the topmost significant archaeological deposit. If necessary the dimensions of the test pits will be altered to take account of conditions on site.

6.1.2 Beyond the west wall of the wheel pit is a metal axle or shaft. The surface rubble around this axle will be cleared in order to define its extent. The axle will be photographed with a simple plan to show the relationship of the axle to the adjoining structure. No excavation will take place.

7. Methodology

7.1 Two test pits, each 1 metre wide and 1.50 metres long, will be excavated externally at the southeast corner of the structure, on along the eastern wall and one along the south wall. Deposits will be removed by hand until the first archaeological context is exposed. Excavation will stop at this stage and contexts recorded. The test pits will be left open to allow inspection by Will Davies.

7.2 The rubble around the axle/shaft to the west of the structure will be removed sufficient to allow the axle/shaft to be photographed and recorded.

8. Recording – Excavation and Post Excavation

8.1 A written record of all activity will be kept as well as context records on pro-forma sheets for all archaeological contexts, based on the CEU recording manual. The notes and context sheets will form part of the project archive.

8.2 A plan of the location of the test pits and representative sections of the trenches will be drawn, at an appropriate scale. If any archaeological features are observed, they will be excavated and recorded, photographed, and planned at an appropriate scale. Plans will be drawn on permatrace to a scale of 1:10, 1:20 or 1:50, as appropriate.

All plans will be related to boundaries shown on 1:10000 Ordnance Survey mapping. Levels will be taken from a site datum which will be cross referenced to an Ordnance Survey datum.

8.3 Any artefacts will be dealt with in accordance with the guidance provided in the Chartered Institute for Archaeologists' *Standard and Guidance for the collection, documentation, conservation and research of archaeological materials (CIfA, 2014b)*. All artefacts will be retained, cleaned and stored. They will be catalogued by context, including dimensions, weight, number, and description as relevant. Significant artefacts will be drawn at an appropriate scale.

8.4 Deposits of environmental or technological significance will be sampled according to *A guide to the theory and practice of methods, from sampling and recovery to post-excavation* published in 2002 as one of the Centre for Archaeology Guidelines by English Heritage.

8.5 In the event of human burials being discovered the Ministry of Justice will be informed. The remains will initially be left *in situ*, and if removal is required, a Ministry of Justice licence will be applied for under the Burial Act 1857.

8.6 Colour digital photographs will be taken, as appropriate, using a 18M pixel camera. A written record will be made on site of the photographs taken. Appropriate photographic scales will be used. The photographs will be archived with a full catalogue showing location of photographs and direction taken. Photographs will be archived in TIF format.

9. Contingency arrangements if archaeological features are discovered

9.1 In the event that archaeological remains are encountered where appropriate investigation falls outside the scope of this specification, a meeting between Trysor, the client and Cadw will be convened in order to agree a course of action. The client will be responsible for paying for any further work necessary such as curatorial monitoring, finds conservation, finds specialist, radio-carbon dating etc.

10. Reporting

10.1 Following the completion of the on-site work, a report on the archaeological work will be prepared according to the requirements of section 3.4 of the Chartered Institute for Archaeologists' *Standard and Guidance for Archaeological Field Evaluation (CIfA, 2014a)*

10.2 The report will address the aims and purposes of the evaluation and be fully representative of the information gained including negative evidence. It will contain at a minimum:

- A non-technical summary of the archaeological works
- Introductory statement
- Aims and purposes of the archaeological works
- Methodology
- Results including documentary research, structural data and associated finds and/or environmental data recovered, details will be included in appendices as appropriate
- Interpretation
- Discussion/Conclusion
- Index to Archive and location of archive
- Illustrations, including a location plan
- Bibliography

10.3 Copies of the report will be provided to the client, to Cadw, to the National Monuments Record and the Powys Historic Environment Record.

11. Health & Safety

11.1 Trydor will undertake a risk assessment in advance of the fieldwork in accordance with their health and safety policy.

12. Dissemination

12.1 A summary of the work undertaken and its findings will be submitted to *Archaeology Wales*, if appropriate.

13. Archive

13.1 The paper and digital archive will be deposited with the National Monuments Record and Historic Environment Record, including a copy of the final report in accordance with the CIfA's *Standard and Guidance for the creation, compilation, transfer and deposition of archaeological archives* (CIfA, 2014c). This archive will include all written, drawn and photographic records relating directly to the investigations undertaken. Digital archives will follow the standard required by the RCAHMW (RCAHMW, 2015).

13.2 After recording and reporting, any artefacts will be deposited in a suitable location, after consultation with the landowner and Cadw.

14. Resources to be used

14.1 Jenny Hall, BSC, MCIfA and Paul Sambrook, BA, PGCE, MCIfA of Trydor will undertake the fieldwork outlined and reporting and archiving. During the fieldwork they will be equipped with standard field equipment, including digital cameras, GPS and first aid kit. Trydor have access to the computer hardware and software required to deliver the completed final report and archive to a professional standard.

15. Qualification of personnel

15.1 Trysor is a Registered Organisation with the Chartered Institute for Archaeologists and both partners are Members of the Chartered Institute for Archaeologists, www.archaeologists.net

15.2 Jenny Hall (BSc Joint Hons., Geology and Archaeology, MCIfA) had 12 years excavation experience, which included undertaking area and trench excavation, watching briefs and post excavation work. She worked on the extensive Stanwick Roman villa project in Northamptonshire for several seasons and undertook a year of postexcavation work with the project. In 1993 she became the Sites and Monuments Record Manager for a Dyfed Archaeological Trust for 10 years. She has been a partner in Trysor since 2004 undertaking a variety of work that includes upland field survey, desk-based appraisals and assessments, watching briefs and evaluations as well heritage interpretation and community-based projects.

15.3 Paul Sambrook (BA Joint Hons., Archaeology and Welsh, MCIfA, PGCE) has extensive experience as a fieldworker in Wales. He was involved with Cadw's pan-Wales Deserted Rural Settlements Project for 7 years. He also undertook Tir Gofal field survey work and watching briefs. He has been a partner in Trysor since 2004 undertaking a variety of work including upland field survey, desk-based appraisals/assessments, watching briefs and evaluations as well as community-based, non-intrusive projects and community heritage interpretation.

15.4 Dee Williams (BA Archaeology and Classical Studies) graduated from the University of Wales, Lampeter. After University she pursued a career in field archaeology. Her first supervisory post was with Wessex Archaeology (Manpower Service Commission 1984-5) as the Finds Officer on a large multi-period urban excavation in Dorchester. From 1986 to 1994 she was employed as the Finds Officer with the Dyfed Archaeological Trust. From 1994 to the present she has worked as an administrator in the Department of Archaeology at Lampeter but continues her research interests in finds with specialisms in ceramics and glass.

15.5 Martin Locock (BA, MCIfA) – Martin has undertaken many bone reports for Glamorgan Gwent Archaeological Trust and others. He has also undertaken studies of bricks and mortar.

15.6 Dr Ian Brooks (PhD, BA, MCIfA, FSA) - Flint assemblages of any size from a single artefact to many thousands of artefacts can be analysed. Recent projects have varied from a few artefacts recovered during the excavation of a late medieval house in North Wales to over 16,000 Mesolithic artefacts from Bath. In addition to standard typological studies Ian Brooks has developed specialist techniques to investigate the original source of the flint and the deliberate heat treatment of flint by the use of micropalaeontology.

15.7 Wendy Carruthers (BSc, MSc) has worked as a freelance archaeobotanist for over 30 years, mainly analysing plant macrofossils from sites in southern and central England and Wales. After graduating in Manchester she worked as a field botanist for a year, followed by a couple of years on archaeological excavations as a digger and planner. I then took the Masters course in Plant Taxonomy at Reading, and started working as a freelance

archaeobotanist after I graduated. In the early 1990s she was the English Heritage Archaeobotanist at the Ancient Monuments Laboratory for four years. Over the years she has analysed charred, waterlogged, mineralised, silicified and desiccated plant remains. She is particularly interested in preservation by mineralisation.

16. Insurance & Professional indemnity

16.1 Trydor has Public Liability and Professional Indemnity Insurance.

17. Project identification

17.1 The project has been designated Trydor Project No. 2018/618. Identifying site code will be CEM2018.

18. Monitoring

18.1 Will Davies, Regional Inspector of Ancient Monuments and Archaeology (North East Wales), Cadw will be informed as to when work will start on site.

19. Sources

Cadw. 2018, *RD153: RD153: Cwm Elan Lead Mine - Archaeological recording, email dated 24/05/2018*

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June 2018

APPENDIX B



Plate 1: CEM2018_101. A general view of the ruined wheel pit at the Cwm Elan mine. Looking west-northwest.



Plate 2: CEM2018_102. A view of the ruined wheel pit undergoing conservation. Looking northwest.



Plate 3: CEM2018_103. A closer view of the location of test pit before excavation. It was situated at the southern end of the wheel pit. Looking east-southeast.



Plate 4: CEM2018_104. A view along the eastern side of the wheel pit from the location of test pit. Looking north-northeast.



Plate 5: CEM2018_105. A view of the eastern side of the wheel pit towards the location of test pit. Looking south-southwest.

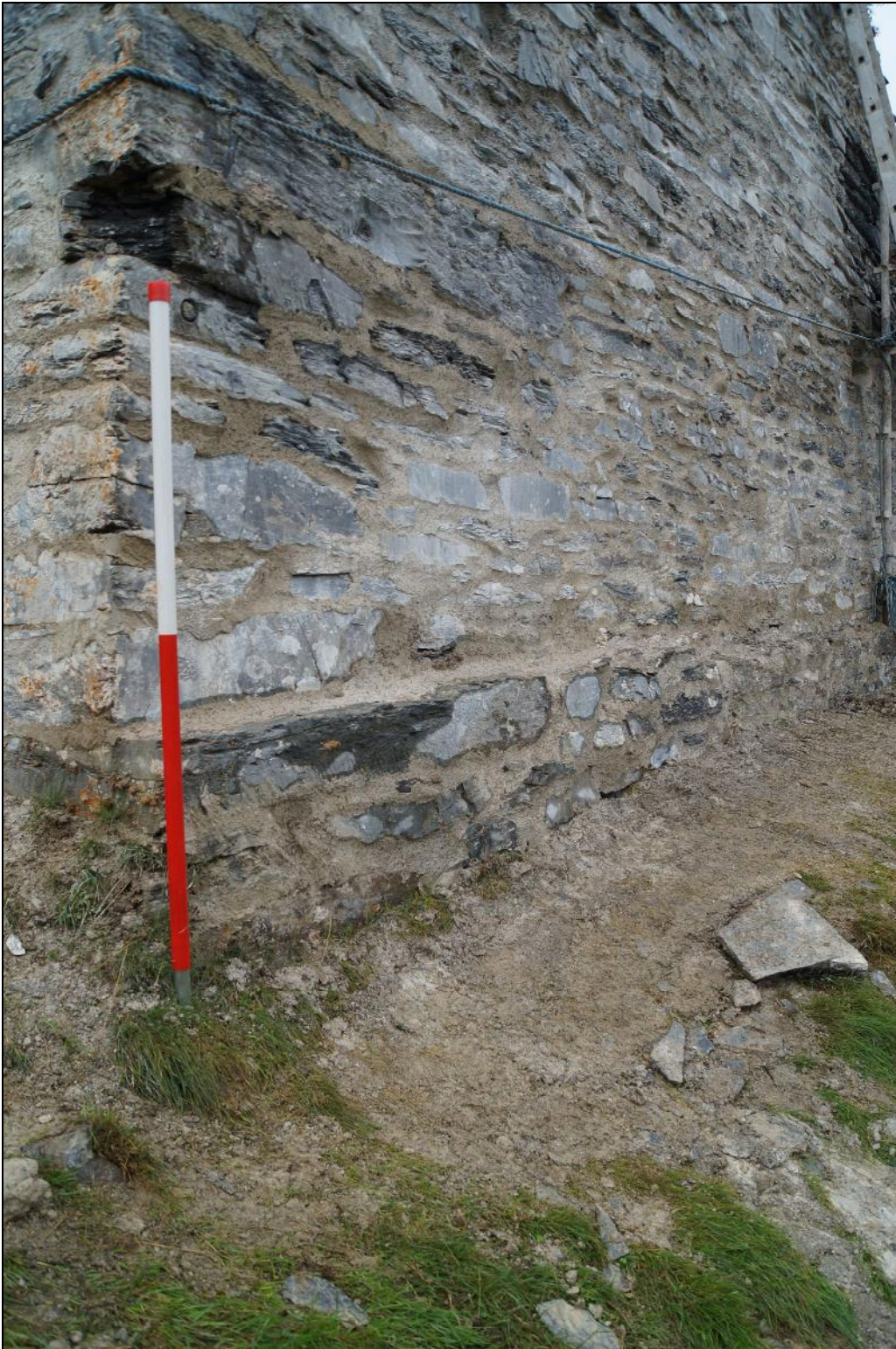


Plate 6: CEM2018_106. A view of the eastern side of the wheel pit, showing the plinth courses at the base of the structure. Looking northwest.



Plate 7: CEM2018_107. A view of test pit after the removal of the turf layer (001). The rubble (002) associated with the gradual dereliction of the wheel pit is revealed. Looking north-northeast.



Plate 8: CEM2018_110. Another view of test pit after the removal of the turf (001) and showing (002). The arched outlet at the base of the wheel pit is visible to the left. Looking north-northeast.



Plate 9: CEM2018_111. A view of test pit showing more collapse rubble (002) exposed. Looking north-northeast.



Plate 10: CEM2018_113. A view of test pit as the collapse rubble layer (002) is being removed. It was underlain by a clay layer (003) interpreted as material deposited when the water wheel was in use. Looking north-northeast.



Plate 11: CEM2018_114. A view of the gravel and clay layer (004) at the base of test pit. This lower layer is thought to have been lain down during the construction of the wheel pit and overlies bedrock. The stone seen right of centre is the base stone of the wheel pit at the southeast corner of the structure. It sits directly on the bedrock, and it appears that the site was quarried to create a level platform before the wheel pit was constructed. Looking northwest.



Plate 12: CEM2018_116. A view of test pit showing the full stratigraphy from the turf (001) down through (002), (003) and (004) to the bedrock where water is flowing and in the foreground. Groundwater began flowing strongly from beneath the wheel pit at this depth. Looking west-northwest.



Plate 13: CEM2018_118. Another view of test pit. Looking north-northeast, showing (001) and (002) in section, and (003) and (004) in test pit.



Plate 14: CEM2018_121. A view of the iron axle that is now laying in a cell to the west of the wheel pit. Looking east.



Plate 15: CEM2018_122. A more detailed view of the iron axle. Looking northeast.



Plate 16: CEM2018_123. A more detailed view of the southeastern end of the iron axle. Looking northeast.



Plate 17: CEM2018_124. A view of the wheel pit. Looking north-northeast.



Plate 18: CEM2018_125 A view of the wheel pit. Looking north-northeast.



Plate 19: CEM2018_126. A view inside the wheel pit during consolidation work. Looking south-southwest.



Plate 20: CEM2018_127. A view of the wheel pit. Looking north-northeast.



Plate 21: CEM2018_129. A view inside the wheel pit after consolidation work had been completed. Looking south-southwest.