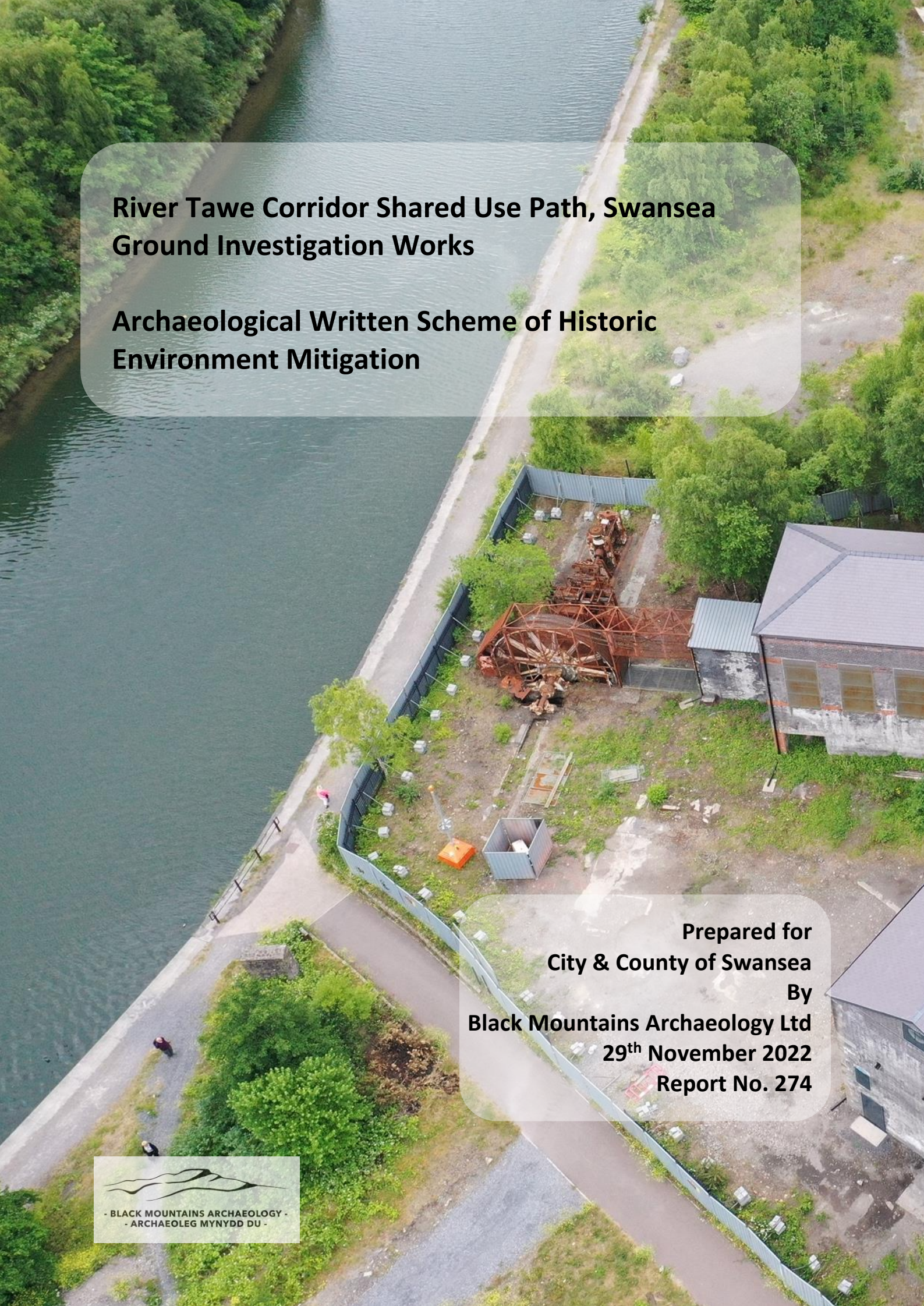




River Tawe Corridor Shared Use Path, Swansea Ground Investigation Works

Archaeological Written Scheme of Historic Environment Mitigation

**Prepared for
City & County of Swansea
By
Black Mountains Archaeology Ltd
29th November 2022
Report No. 274**

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Crynodeb

Comisiynydd Archeoleg Mynydd Du Cyf gan Dinas a Sir Abertawe i baratoi Cynllun Lliniaru Ysgrifenedig o Amgylchedd Hanesyddol (WSHEM) i gefnogi cais am Drwydded Forol gan Cyfoeth Naturiol Cymru. Mae'r WSHEM yn manylu ar y gofyniad am briff gwylio archeolegol i'w gynnal yn ystod archwilio tir ar gyfer Llwybr Defnydd a Rennir Coridor Afon Tawe arfaethedig, sy'n dilyn llwybr ar hyd glan orllewinol Afon Tawe, Abertawe, rhwng Gwaith Copr yr Hafod-Morfa, SA1 2LE a Glanfa Pipehouse, SA1 2EN (Ffigur 1).

Mae'r adroddiad presennol yn manylu ar y gofynion ar gyfer briff gwylio archeolegol yn ystod gwaith archwilio tir a nodir uchod. Bydd y briff gwylio archeolegol yn cael ei gynnal yn unol â safonau proffesiynol o 'Standard and Guidance for an Archaeological Watching Brief' gan y Chartered Institute for Archaeologists (cyhoeddwyd 2014, diwygiwyd 2020).

Summary

Black Mountains Archaeology Ltd have been commissioned by the City & County of Swansea to prepare an archaeological Written Scheme of Historic Environment Mitigation (WSHEM) in support of a Natural Resources Wales Marine Licence application. The WSHEM details the requirement for an archaeological watching brief to be conducted during ground investigation works for the proposed River Tawe Corridor Shared Use Path, which follows a route along the west bank of the River Tawe, Swansea, between the Hafod-Morfa Copperworks, SA1 2LE and Pipehouse Wharf, SA1 2EN (Figure 1). Specifically, the archaeological watching brief should apply to Trial Pits (TP) 01 and 02, Inspection Pits (IP) 01 and 02 and Window Sampling Holes (WS) 01 and 02, all of which are situated within the archaeologically sensitive former Hafod-Morfa Copperworks site.

The present report details the requirements for an archaeological watching brief for the duration of the above mentioned ground investigation works. The archaeological watching brief will be carried out to the professional standards of the Chartered Institute for Archaeologists' Standard and Guidance for an Archaeological Watching Brief (published 2014, revised 2020).

Acknowledgements and Copyright

The project is managed by Richard Lewis BA MCIfA. The report and illustrations were prepared by Richard Lewis, Libby Langlands BA MA and Dr Rhys Morgan PhD. Archival research was carried out by Libby Langlands. The Welsh translation was provided by Dr Rhys Morgan. The authors would like to thank Gordon Randlesome of the City & County of Swansea for his cooperation and support. The copyright of this report is held by Black Mountains Archaeology Ltd, who have granted an exclusive licence to the City & County of Swansea, enabling them to use and reproduce the material it contains. Ordnance Survey maps are reproduced under licence 100058761. Black Mountains Archaeology Ltd retains copyright of any annotations.

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1 Introduction

- 1.1.1 Black Mountains Archaeology Ltd have been commissioned by the City & County of Swansea to prepare an archaeological Written Scheme of Historic Environment Mitigation (WSHEM) in support of a Natural Resources Wales Marine Licence application. The WSHEM details the requirement for an archaeological watching brief to be conducted during ground investigation works for the proposed River Tawe Corridor Shared Use Path, which follows a route along the west bank of the River Tawe, Swansea, between the Hafod-Morfa Copperworks, SA1 2LE and Pipehouse Wharf, SA1 2EN (Figure 1). Specifically, the archaeological watching brief should apply to Trial Pits (TP) 01 and 02, Inspection Pits (IP) 01 and 02 and Window Sampling Holes (WS) 01 and 02, all of which are situated within the archaeologically sensitive former Hafod-Morfa Copperworks site.
- 1.1.2 The present report details the requirements for an archaeological watching brief for the duration of the above mentioned ground investigation works. The archaeological watching brief will be carried out to the professional standards of the Chartered Institute for Archaeologists' Standard and Guidance for an Archaeological Watching Brief (published 2014, revised 2020).

2 Background

- 2.1.1 The proposed ground investigation works, as specified above and illustrated in Figure 1, are situated in an area that originally constituted the southern end of the Hafod Copperworks, which comprised one of twelve such works once situated within the Lower Swansea Valley between the early 18th and late 20th centuries. The first copperworks in the valley was founded in 1717 at Llangyfelach by John Lane of Bristol. Lane chose the area to build a smelting works due to its advantageous position near the River Tawe and the ready supply of bituminous coal nearby (Hughes 2000, 18). At this time, bituminous (as opposed to anthracitic) coal was preferred for the smelting of copper. The only ingredient missing from the valley was copper ore, although this was transported easily enough from Devon and Cornwall, where large veins penetrate the local bedrock deposits. In the following decades, further smelting sites were established in the valley including the White Rock Copperworks of 1736; the Upper Bank Copperworks of circa 1757; the Penclawdd Copperworks, founded prior to 1788; and others (Hughes and Reynolds 1988, 11–14). By the early nineteenth century, the copper industry of the Lower Swansea Valley had grown to such an extent that, by 1801–05, the area was producing around 90% of global copper supplies (Reynolds 1990, 32). Such growth was attributable, in part, to a new method of smelting copper that developed within the valley between the 18th and 19th century. This method was known as the Welsh Process, the benefits of which were twofold. Firstly, through utilising reverberatory furnace technology, it permitted a more effective reduction of copper ore via coal (which was plentiful in Britain), as opposed to charcoal (which was not). Within a reverberatory furnace, the fuel (coal) and charge (ore) are kept separate, meaning that impurities within the former fail to contaminate the latter. Secondly, the Welsh Process allowed copper to be produced in a cost-effective manner, as it could exploit a wide variety of ores, the impurities of which, when combined, aided in the process of reduction. This meant that smelting could be achieved without the need to purchase independent fluxes (Newell 1990, 77).

- 2.1.2 The Hafod Copperworks, on the southern boundary of the later Morfa Copperworks, was established in 1808-09 by the Cornish entrepreneur John Vivian with his sons John Henry Vivian and Richard Hussey Vivian. The Vivians, in conjunction with other Cornish industrialists such as Michael Williams and Pascoe Grenfell, took over the majority of Swansea's smelting industry throughout the first decade of the 19th century (Hughes 2000, 35). John Vivian was involved in business at an early age. He was a wine and lime merchant in partnership with William McCarmick in Truro until 1777 before beginning his involvement in the metal industry. His initial role in the copper trade was in Cornwall where he worked as an agent for the copper magnate Thomas Williams and the Staffordshire Cheadle Brass and Wire Company, purchasing copper ore from the mines in the county on their behalf and arranging for its shipment to their smelting works in south Wales. Sometime close to 1800, John Vivian, who was now representing the associated miners of Cornwall, visited Swansea to investigate the conditions of copper-smelting as a profitable occupation. In 1800 he became a partner in the Cheadle Brass and Wire Company, whose copper smelting works were at Penclawdd, to the west of Swansea. This marked the beginning of the Vivians' involvement in copper smelting in Wales. In 1808 he resigned from the Cheadle Brass and Wire Company to start his own company in partnership with his sons at a place called Hafod. The plot chosen by Vivian lay between the River Tawe to the southeast and the Swansea Canal to the west. A letter written to the Vivians by a local landowner at the time refers to the site as 'The Brickyard' (Rees 2000), thus revealing the possible previous function of the Hafod site. Although the Hafod site is shown as being empty on a 1777 map of the local area (*Plan of River Swansea in Glamorganshire*, by B Jones, NMW IBASE350) but owned by the Duke of Beaufort, from whom the Hafod site was initially leased. By 1810 a dedicated canal basin had been constructed at the northern end of the works, to offload coal from the barges into the works.
- 2.1.3 The Hafod site continually modernised, changed and expanded, with a rolling mill being added to the smelters sometime in 1819 for making bars and plates from copper ingots. Facilities were constantly improved over the course of the century, to enable the works to increase output and adopt improved technology. The prime obstacle became the lack of available land on which to maintain this expansion program, with the site becoming progressively cramped. Increased production led to an increased amount of waste that needed to be disposed of. Eventually, in 1865, with the construction of a new tramroad incline, the company was able to transport waste slag over the canal to the west, therefore releasing more areas for site development. The pressure created by the amount of waste slag was also partly eased by casting this waste material into usable building blocks (slag and ash bricks, blocks and cobbles) for building with
- 2.1.4 The layout and development of the Hafod site is discussed at length by Hughes (2000). In summary, the Hafod Works consisted initially of a long smelting hall known as the 'Long House' which was 380ft long and contained a double row of furnaces. The approximate layout of this hall is indicated by a series of drawings published in Tomlinson's Cyclopaedia in 1852. A steam-powered rolling mill was constructed in 1819 on the site of the current Musgrave Engine House to take advantage of the huge demand for rolled copper sheets for sheathing ships. The dock wall very likely was extended at this time from the original dock located to the northeast that serviced ore

yards to the Long-House. The Hafod works rapidly expanded with the construction of an additional furnace house in 1822, followed by three parallel smelting halls between 1826 and 1833 and a final furnace house by 1844 (Hughes 2000). The Vivian Engine House was constructed in 1862 to power an additional rolls and the adjacent 1819 Engine House replaced in 1910 with the Musgrave Uniflow Steam Engine to drive Rolling Mill No.1. The Hafod and Morfa works amalgamated in 1924 and were subsequently operated by Yorkshire Imperial Metals. These new works, the Hafod-Morfa Copperworks, closed in 1980, when it was the last operating copperworks in Swansea.

2.2 Cartographic Evidence

- 2.2.1 **1777:** *'A Plan of the River Swansea'* by B. Jones (NMW IBASE350) dated to 1777 illustrates the navigable course of the river from Fabian's Bay to Landore and marks the docks, quays and early industrial sites situated along its banks including the White Rock and Middle Bank Copper works. The plan predates the establishment of both the Hafod and Morfa Works on the west bank of the river which is at this time described as 'a Low Marsh' with 'Hafod Marsh' being specifically labelled. The earliest transport route in the area is also illustrated. Chauncey Townsend's wooden horsedrawn wagonway built in 1756 to connect the collieries of Llansamlet and Birchgrove with his copperworks at Middle and Upper Bank (lean and zinc) and to his dock at the White Rock Copperworks. (Hughes 2000, 82-96).
- 2.2.2 **1813:** An 1813 Ordnance Survey plan labelled '*Swansea 21*' and drawn by Thomas Budgen similarly shows the yet undeveloped Morfa Lands and the Swansea Canal. Whilst the plan appears more accurate topographically, there is some confusion with the Hafod Copperworks being labelled as Upper Bank. However, it is worth noting that the plan depicts a large canal dock at Hafod at this time (British Library OSD 179, 21).
- 2.2.3 **1815:** An 1815 plan of the lands of the Briton Ferry Estate (Plate 1) shows for the first time a formal dock and ore yards on the bank of the River Tawe at the Hafod Copperworks. The Hafod Copperworks (founded 1808-9) consisted initially of a long smelting hall known as the 'Long House' which was 380ft long and contained a double row of furnaces. The approximate layout of this hall and the dock and ore yards are indicated by a drawing of the Hafod Copperworks published in Tomlinson's *Cyclopaedia* in 1854 (Plate 2). The dock and ore yards are clearly labelled as "q q Landing Quays" and "h h Heaps of ore" and extend almost the entire length of the long smelting hall.
- 2.2.4 **1822:** An 1822 '*Plan of the Copperworks and Sundry Tenements and Lands situated on the Banks of the River Tawe near Swansea*' (NMW 2011.4), illustrates the layout of the Hafod Copperworks (founded 1808-9), including river dock and ore yards on land marked as 'The Havod Farm' (Plate 3). The layout of the Hafod Copperworks mirrors that depicted in 1815.
- 2.2.5 **1835:** An 1835 plan entitled '*Plan of Improvements to Swansea Harbour showing the River Tawe from the piers to the Forest Weir*' (WG Archives P/60/CW/197) was drawn to illustrate the proposed New Cut canal that would straighten a large bend in the River Tawe and convert its original path into a new dock. The plan depicts all of the plots along the river valley, however, the Hafod Works area is illustrated as a homogenous block adjoining the River Tawe (Plate 4). The size of the block up to the bend in the river would indicate that Rolling Mill No1 (built 1819) is now included, as

must an extension to the original dock wall to the northeast down to the mill.

- 2.2.6 **1842/1847:** The 1842 Tithe Map of the Parish of Llangevelach in the County of Glamorgan and the 1847 Tithe Map of the Parish of St John Juxta Swansea, Glamorganshire show little detail of the Hafod Copperworks.
- 2.2.7 **1884:** The 1884 Ordnance Survey map shows the Hafod Copperworks at the point where the works begin to decline. The dock wall in front of Rolling Mill No.1 is indicated as is the great tip surmounted with the arsenic works. The Swansea Canal and docks area shown in detail as is the 1865 tramroad incline (Plate 5). A plan produced by ICI in around 1951 shows the buildings of the Hafod works in great detail including the dock wall and Rolling Mill No.1 and the Vivian Rolls (Plate 6). This plan is well contextualised by an earlier aerial photograph (Plate 7) of the Hafod Copperworks by Surrey Flying Services that shows a the extent of the copperworks and spoil tips.



Plate 1. 1815 Plan of the Briton Ferry Estate showing Hafod Copperworks river dock and ore yards. © West Glamorgan Archives (D/D BF E/157A).

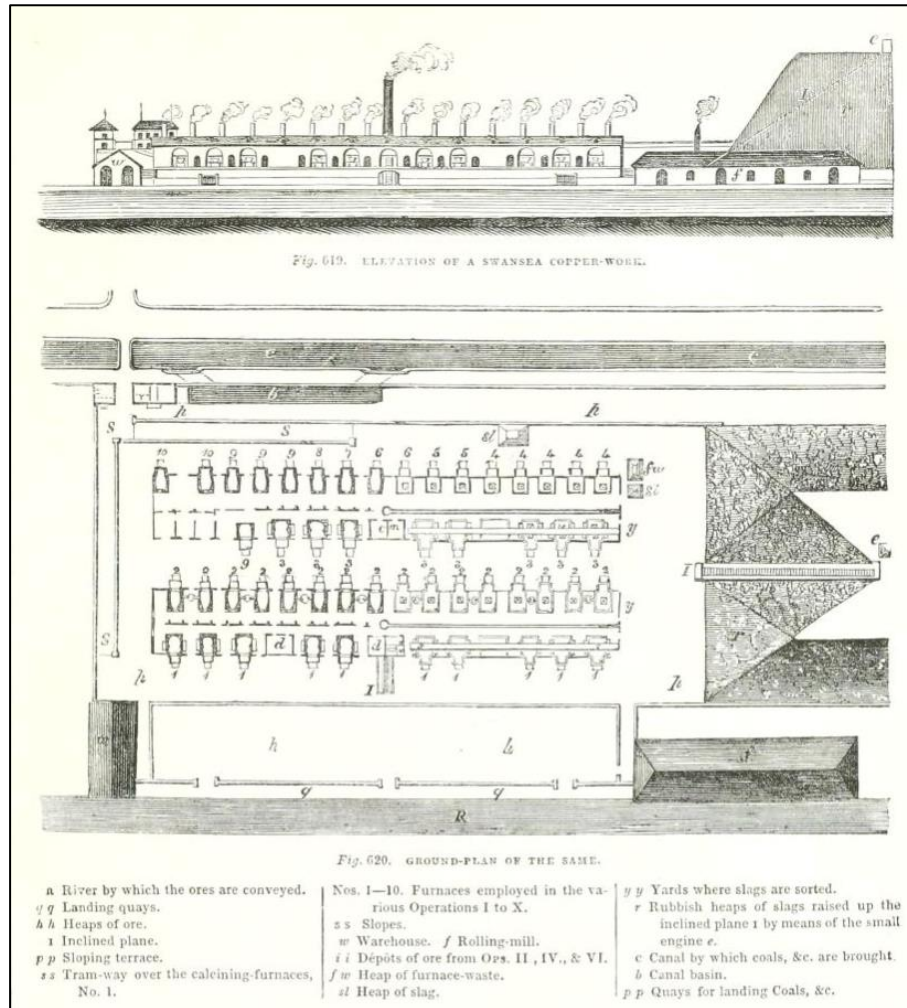


Plate 2. 1815 Plan of the Hafod Copperworks river dock and ore yards in Tomlinson's *Cyclopaedia* in 1854.



Plate 3. 1822 Plan of the Copperworks and Sundry Tenements and Lands Situated on the Banks of the River Tawe Near Swansea. (© NMW 2011.4).





Plate 6. 1951 ICI Plan of the Hafod-Morfa Copperworks © Swansea Museum Collections Centre.



Plate 7. 1926 aerial photo by Surrey Flying Services of the Hafod-Morfa Copperworks. ©NMW.

2.3 Previous Investigations

- 2.3.1 In 2002, a desk-based assessment was produced by the Glamorgan-Gwent Archaeological Trust for the Landore park and ride scheme. The assessment identified 21 extant buildings and the location of 14 demolished buildings associated with Hafod/Morfa Copperworks site.
- 2.3.2 In 2002, a site appraisal was produced by Dyfed Archaeological Trust in order to establish management plans for the identifiable heritage assets at the Hafod-Morfa Copperworks site.
- 2.3.3 In 2004, an archaeological watching brief was undertaken by Glamorgan-Gwent Archaeological Trust on the excavation of ground contamination testing test-pits. A total of eighteen test pits were excavated across the site of the copperworks. Some of the eighteen test pits confirmed a depth for natural on this site, whilst other test pits revealed solid structures.
- 2.3.4 In 2004, a building survey was undertaken by Glamorgan-Gwent Archaeological Trust on a section of the Swansea Canal wall that was to be demolished to make way for the bus lane.
- 2.3.5 In 2008, a desk-based assessment was undertaken by Cambria Archaeology on the area of the Hafod-Morfa Copperworks. This assessed the current condition of all buildings and features on the site and revised the individual building management plan published in 2002.
- 2.3.6 In 2008, an environmental impact assessment was undertaken by Cambria Archaeology for the Morfa Distributor Road which was intended to follow the line of the southern section of the Swansea Canal as it passes through the Hafod-Morfa Copperworks.
- 2.3.7 In 2013, The Glamorgan-Gwent Archaeological Trust Ltd were commissioned by Swansea University to undertake a community archaeological excavation of the Hafod-Morfa Copperworks. Three trenches were excavated, trenches 1 and 2 were both abandoned as a result of contamination and Trench 3 was excavated to examine the approach to the works via the canal bridge approach to the main entrance.
- 2.3.8 In 2015, The Glamorgan-Gwent Archaeological Trust Ltd was commissioned to carry out a watching brief on six geotechnical pits in advance of construction of Morfa Distributor Road, Swansea. A number of Post Medieval deposits were uncovered and likely to relate to the partial demolition of the Morfa Copperworks and the in-filling of the Swansea Canal.
- 2.3.9 In 2015 and 2016, Rubicon Heritage conducted archaeological investigations ahead of the Morfa Distributor Road. A series of evaluation trenches in advance of the construction of the road was undertaken (Rubicon Heritage 2015) together with supplementary works (Rubicon Heritage 2016).
- 2.3.10 In the spring of 2018 and on behalf of Swansea University, Black Mountains Archaeology Ltd delivered a very successful community history and archaeology project at the world renowned Hafod-Morfa Copperworks. The Copperworks Discovery Project provided opportunities to get involved with historical and archaeological research workshops to explore the copperwork's past and on-site building survey workshops. The community project formed part of the wider regeneration project that aims to turn the renowned copperwork site into a world

class heritage, innovation, and education destination.

- 2.3.11 An archaeological field evaluation was conducted in 2018 on three parcels of land within the copperworks area (Lewis and Eyre-Morgan 2021). Twelve 20m long by 2m wide evaluation trenches were strategically excavated across the site of the former copperworks, in three defined areas, in order to achieve the most comprehensive understanding of the archaeological potential of the site. Trenches 1-3 (Area B) were targeted over the Canal Dock and the western end of the power house/boilers of the Morfa works; Trenches 4-6 (Area A) were targeted over the Long House furnaces (and calcining furnaces); Trenches 7-9 (Area A) were targeted over the Ore Yards and later buildings housing a Bessemer Converter; and Trenches 10-12 (Area C) were targeted to the south of the Rolling Mills and Gasworks. The results of the evaluation revealed a deep layer (>2m) of waste and debris overlying extensive archaeological remains of the former copperworks. The archaeological remains included: the floors and walls to various buildings, culverts, reverberatory furnace bases, machine bases and various foundation layers. The overlying debris and waste were the result of copper production and the demolition of the copper works.
- 2.3.12 A survey was recently undertaken of timber design patterns found discarded in the basement of the Powerhouse (Lewis and Cook 2019). The basement floor of the Powerhouse building was cleaned and a 3D photogrammetric survey was carried out to produce a comprehensive record of the timber design patterns held within for archival purposes and to provide for further study and research. Many hundreds of pieces of timber were either too fragmentary, unidentifiable or in such degraded state that survey was impracticable. However, despite the challenges a total of 97 timber objects including 39 design patterns were recorded together with five fully measurable 3D photogrammetric models. The floor was composed of rectangular worn ceramic bricks, uneven in places due to subsidence. This floor was contemporaneous with the construction of the Powerhouse building but built over the back-filled pond, which may have been causing the subsidence.
- 2.3.13 An archaeological field evaluation was undertaken in 2019 on the Silverstack Canal Bridge, Hafod-Morfa Copperworks and Smith's Canal, Whiterock Copperworks (Lewis and Langlands 2019). An open excavation (clearance) was carried out around the base of the demolished Silverstack Canal Bridge and five trenches were machine excavated along the Smith's Canal followed by hand cleaning and recording. The investigations identified the remains of the Silverstack Canal Bridge abutments and the canal walls belonging to the Smith's Canal.
- 2.3.14 A watching brief was conducted in August 2019 during geotechnical investigations of a derelict area between the Powerhouse (LB11691) to the south and Rolling Mill (LB16878) to the north, which forms the Hafod-Morfa Copperworks redevelopment site. During the investigations a total of ten test pits and two boreholes were excavated (Langlands 2019). The work revealed the quarry tile floor of a known 1920s 'Cloakroom and Baths' and beneath it a limestone surface, both enclosed by the west revetment wall. East of this, a N/S aligned wall and brick floor were discovered and were thought to be related to the later phase of a known cast house. Adjacent to the weighbridge office, the intact walls of the weighbridge itself were uncovered and in the same area two E/ W aligned masonry walls appeared to represent a continuation of the north and south revetment walls.

- 2.3.15 A Strip Map Record (SMR) of the same derelict area was carried out between November 2019 and February 2020 to inform on the nature and extent of any archaeological remains on the site in advance of the planned redevelopment. Among the principle discoveries were the remains of a large pond (labelled number 46 on historic maps) (Area 1), the well-preserved remains of an early 20th century bath house (Area 2) and the west and north walls of the Yellow Metals Mill Cast House within which were discovered a WWII air raid shelter and a series of early-19th century furnaces (Area 4). Further, a large culverted water filtration system was discovered to the north of the weighbridge office in Area 5. Area 3 of the excavation was located north of the foundry (Yellow Metal Mill Cast House) and was bounded to the north by the Rolling Mill building (LB16878) and its compound. Area 3 was an extremely complicated and deeply stratified area that has been redeveloped many times in the 19th and 20th centuries resulting in a very fragmentary (in terms of survival of complete features) area. Within this area the remains of one of the early Morfa Rolling Mill buildings was recorded. Built in 1828 to principally roll copper brought in from the Rose Works. The rolling mill is known to have burnt down in the 1840s after which the present rolling mill building was extended (and now houses the Museum stores). A long forgotten memorial plinth and garden dedicated to the servicemen and civilians from the Hafod-Morfa Copperworks who died during WWII was revealed on the gable end of the surviving building. The east gable end of the original Morfa Laboratory building was found on the western edge of the excavations. The laboratory was used to test the metal mixtures during smelting and alloying and dozens of small ceramic assaying cupels were recovered from the demolition rubble; the building had been apparently demolished sometime after 1926. A large stone and brick tunnel was also identified in Area 3. Aligned N/S the tunnel ran from the corner of the Yellow Metals Mill Cast House to the Morfa Rolling Mill. The tunnel is likely to be a very early walkway or tramway providing access under and into the rolling mill. As the works expanded it would appear that the walkway was roofed in brick to maintain access and was eventually buried by industrial waste material (Lewis 2020).
- 2.3.16 Black Mountains Archaeology Ltd carried out a community archaeology excavation at the Hafod Copperworks in 2021. Archaeological investigations comprised the excavation of six trenches on land to the south of the Musgrave Engine House on the site of a former rolling mill between the River Tawe to the east and the Morfa distributor road to the west, in order to examine and record the nature and extent of any archaeological features associated with industrial activity at the Hafod-Morfa copperworks. During excavations, the remains of a 20th century hot well were uncovered within Trench 1, into which recycled water from the boilers attached to the Musgrave Engine was pumped; as well as the remains of the Hafod Plate Rolling Mill's western annex. Within Trench 2, the interior of the western annex and plate rolling mill proper were uncovered, as well as some 19th century structural foundations associated with the Hafod Works prior to the construction of the plate rolling mill. Within Trench 3, the remains of an early 20th century annealing furnace were uncovered, as well as remains associated with a quenching pool. Within Trench 4, structural remains associated with the exterior of the plate rolling mill annex were uncovered. Within Trench 5, the interior of the plate rolling mill were uncovered, including the foundations of a plate flattening machine. Finally, within Trench 6 structural foundations possibly associated with the 19th century hammer house were

uncovered, as well as a 20th century quenching bosh, situated within the confines of the plate rolling mill proper.

- 2.3.17 2020–ongoing – Black Mountains Archaeology Ltd is currently conducting an archaeological watching brief for Swansea Council during the construction phase of the above-mentioned whisky distillery and visitor centre. Key discoveries include the remains of a reverberatory furnace towards the southern end of the Yellow Metals Mill Cast House, as well as a hot gas flue associated with the reverberatory furnace discovered during the SMR. Excavations to the east of the Morfa Powerhouse building uncovered a 19th century hot gas flue that was seen to run in a broadly E/W direction towards the large flue feeding into the Silverstack chimney. The remains of a series of 19th and 20th century buildings were also uncovered here which, according to a late 19th century plan of the works, may have been a series of workshops. Along the southern edge of the Morfa Powerhouse the remains of an incline tramway were uncovered, with a further section of in-situ tramrail observed to the east of the building. To the west of the Morfa Powerhouse, groundworks revealed the full depth of the large pond that predates the construction of the Powerhouse, as well as two brick relief arches within the western gable wall of the Powerhouse building. Excavations on the upper terrace uncovered the footings for a large Lancashire boiler, probably used in the 20th century to store oil or fuel.

3 Location, Topography and Geology

- 3.1.1 The former Hafod-Morfa Copperworks (NGR SS(2)66250,(1)95020) is located approximately 4km north of the city centre on the banks of the River Tawe (Figure 1, Plates 1-7). Swansea is situated on Carboniferous Coal measures and the extraction of coal from this area has greatly influenced the history and development of the region. The soils over the study area are largely un-surveyed but are likely to include alluvium associated with the River Tawe and substantial peat deposits (SSEW 1983).
- 3.1.2 The geology generally comprises of the South Wales Upper Coal Measures formation, which is made up of Mudstone, Siltstone, Sandstone, Coal, Ironstone and Ferricrete and ranges between the geological ages of Westphalian D to the Bolsovian (West Phalian C). This sedimentary would have formed between 306 and 308 million years ago within the Carboniferous Period, and would have been dominated by rivers which deposited sand, gravel, detrital material, silt, clay and some bogs including alluvium. Superficial deposits within the development area are confined to clay, silt, sand and gravel, which would have been deposited in the Quaternary period approximately 2 million years ago. (BGS Sheet 247).

4 Objectives

- 4.1.1 The definition of an archaeological watching brief as set out by the *Chartered Institute for Archaeologists* (CIfA) is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.
- 4.1.2 The purpose of an archaeological watching brief (as defined CIfA 2014) is:
- to allow, within the resources available, the preservation by record of archaeological

deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works.

- to provide an 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 itself are not sufficient to support treatment to a satisfactory and proper standard.
- 4.1.3 A watching brief is not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.
- 4.1.4 The objective of a watching brief is to establish and make available information about the archaeological resource existing on a site.
- 4.1.5 (Chartered Institute for Archaeologists Standard and guidance for an archaeological watching brief. Published 2014, revised 2020)
- 4.1.6 The *Research Framework for Wales* sets out the knowledge base of past research and sets out a rationale for future studies (<https://www.archaeoleg.org.uk/index.html>). The present investigations will be undertaken considering the key themes and where there are limitations in current knowledge, particularly where the present investigations can enhance our understanding of some of these key areas. For example, current important Industrial themes for consideration where there are weaknesses in the knowledge base are: the significance and scale of technical change within the major industries of coal, iron, copper, tin, lead and slate, and the impact of that change within the landscape; their context and significance in terms of similar sites elsewhere in the world; their relationship with the markets they served. It has been noted that a gap still exists in our understanding of the 'scientific' elements of past industries, particularly metallurgical industries where limited scientific investigation has been undertaken as there has tended to be a reliance on contemporary documentary accounts to tell us 'what we need to know'. An opportunity exists to pursue an avenue of research in the identification of waste products from the metallurgical industries; more specifically collaboration with metallurgists would be worthwhile to establish if it is possible to identify the unique qualities and origin of these wastes and whether anything could be understood about the processing of these materials on-site.

5 Legislative Framework

- 5.1.1 *Planning Policy Wales* (PPW 11th Edition) sets out the land use planning policies of the Welsh Government. Chapter 6 sets out the Welsh Government's policy towards the historic environment. It states:
- 5.1.2 "The planning system must take into account the Welsh Government's objectives to protect, conserve, promote and enhance the historic environment as a resource for the general well-being of present and future generations. The historic environment is a finite, non-renewable and shared resource and a vital and integral part of the historical and cultural identity of Wales. It contributes to economic vitality and culture, civic pride, local distinctiveness and the quality of Welsh life. The historic environment can only be maintained as a resource for future generations if the individual historic assets are protected and conserved. Cadw's published Conservation Principles highlights the need to base decisions on an understanding of the impact a proposal

may have on the significance of an historic asset.” (2021, p126)

- 5.1.3 Underpinning PPW are a series of legislative powers and *Technical Advice Notes* (TANs). *The Planning (Wales) Act 2015* sets out a series of legislative changes to deliver reform of the planning system in Wales, to ensure that it is fair, resilient and enables development. The 2015 Act also introduces a mandatory requirement to undertake pre-application consultation for certain types of development. *The Town and Country Planning (Development Management Procedure) (Wales) (Amendment) Order 2016* defines in *Schedule 4(I)* the parameters and definitions for the requirement of pre-application consultation by Welsh Ministers, particularly in response to the effect of statutory designated monuments, buildings, and parks and gardens.
- 5.1.4 Any works affecting an ancient monument and its setting are protected through implementation of the *Ancient Monument and Archaeological Areas Act 1979*. In Wales the 1979 Act has been strengthened by *The Historic Environment (Wales) Act 2016*, which makes important improvements for the protection and management of the Welsh historic environment. The 2016 Act also stands at the centre of an integrated package of secondary legislation (Annexes 1-6), new and updated planning policy and advice, and best-practice guidance on a wide range of topics (*TAN 24 Historic Environment*). Taken together, these will support and promote the careful management of change in the historic environment in accordance with current conservation philosophy and practice.
- 5.1.5 The *Ancient Monument and Archaeological Areas Act 1979* and *The Historic Environment (Wales) Act 2016* sets out a presumption in favour of preservation in-situ concerning sites and monuments of national importance (scheduled/listed), and there exists in the current *Planning Policy Wales* (Chapter 6) a presumption in favour of preservation in-situ of all types of heritage assets.

6 Scope

- 6.1.1 The archaeological watching brief will be applied to all ground investigation works relating to the proposed River Tawe Corridor Shared Use Path that are situated within the archaeologically sensitive former Hafod-Morfa Copperworks. Specifically, the archaeological watching brief will apply to Trial Pits (TP) 01 and 02, Inspection Pits (IP) 01 and 02 and Window Sampling Holes (WS) 01 and 02.
- 6.1.2 Trial Pits (TP) 01 and 02 will measure approximately 1.2m x 1.2m and will be machine excavated to a maximum depth of 5m. Inspection Pits (IP) 01 and 02 will measure approximately 1.2m x 1.2m and will be hand excavated to a depth of 1.2m. Window Sampling Holes (WS) 01 and 02 will be drilled using either a 150mm diameter cable percussion or rotary rig to a maximum depth of 5m. Should the rig penetration be stopped by an obstruction the rig would be relocated nearby. If a further obstruction is encountered, this would be investigated and removed through machine excavation. A copy of the WS borehole record will be provided for inclusion within the archaeological watching brief report.
- 6.1.3 The watching brief will meet the standards of the Chartered Institute for Archaeologists' *Standard and Guidance for Archaeological Watching Briefs (2014)* and shall be undertaken on the specified works likely to expose archaeological features, deposits and structures within the former Hafod-Morfa Copperworks.
- 6.1.4 A watching brief involves an archaeologist observing development works that can take

the form of any ground penetration or earth moving work such as topsoil stripping, the excavation for foundations, test-pitting, service trenches and demolition or alteration to buildings or structures (whether above or below the ground). In some cases the watching brief may need to observe vegetation clearance.

6.1.5 The watching brief process is a staged approach:

- If archaeological features or deposits are revealed then the archaeologist will quickly record these with minimum interruption to the construction programme.
- Should the discovery be more complex and require more time and resources then a programme that allows the archaeological discovery to be recorded/mitigated can be agreed on-site with the developer and archaeologist.
- Should the archaeological discovery be of such importance, scale or complexity, or result in significant difficulties to the construction programme, then a meeting would have to be convened with the City & County of Swansea, and Cadw to agree an appropriate way forward for the watching brief and the asbestos removal programme. This may include contingency arrangements for additional staff to be deployed.

6.1.6 Contingency costs are beyond the scope of this specification and would need to be agreed in advance before any extension to the programme commences.

6.1.7 The contractors on site will need to allow the site archaeologist conducting the watching brief reasonable access to their works for the purpose of recording archaeological remains. No ground works should be undertaken without the site archaeologist.

6.1.8 Should human remains be encountered, the nature and extent of those remains will be established and recorded, and the coroner, police, LPA and Cadw informed. Following consultation with the client and Cadw, and if appropriate, an exhumation programme would be agreed. In such cases, contingency arrangements would need to be agreed prior to the commencement of the exhumation.

6.1.9 The human remains would be archaeologically recorded and removed under current professional guidelines and legislation, including the provision of exhumation licences and for eventual reburial following appropriate analysis. All human remains would be excavated by hand in accordance with the *Chartered Institute for Archaeologist's Professional Practice Paper No 7 Guidelines to the Standards for Recording Human Remains (2004)* and *Excavation and Post-Excavation Treatment of Cremated and Inhumed Human Remains: Technical Paper Number 13 (1993)*.

7 Programme

7.1.1 Black Mountains Archaeology Ltd is happy for its work to be monitored at any time during the programme of works by:

- The client and/or their representatives,
- Cadw and/or their representatives,
- The Chartered Institute for Archaeologists (CIfA) and/or their representatives, provided that:
 - Advance notice is provided for the monitoring visit,
 - Attendees fully observe site and Health & Safety rules,
 - Attendees cause no undue delay to the programme of works,

- Attendees do not provide any instruction to vary the agreed works without prior consultation and agreement with all relevant parties,
- Attendees have the appropriate academic and professional qualifications and relevant experience to comment on the archaeological works being undertaken, or in lieu of are attended by an appropriate specialist.
- Attendees provide a written monitoring report in line with ClfA guidance, particularly Para 1.69.3, Chartered Institute for Archaeologists (ClfA) *Standard and guidance for archaeological advice by historic environment services* (Published December 2014, updated June 2020). Monitoring reports should be provided within one week of the visit or in line with the organisation's monitoring policy.

7.2 Fieldwork

- 7.2.1 The archaeological watching brief will be conducted in accordance with the ground investigation works programme. The total requirement of the watching brief is entirely dependent upon the nature and extent of archaeological discovery, however, where discrete areas have been proved devoid or mitigated (recorded) of archaeological deposits, structures and features then with Cadw and C&CS approval the watching brief will no longer apply to these discrete areas.

7.3 Reporting

- 7.3.1 Depending on the extent of the archaeological programme and the required professional response (analysis and reporting), and provided no separate post-excavation programme is agreed, the watching brief report would usually be completed within six weeks of the cessation of fieldwork activities.

8 Fieldwork methodology

8.1 Method of recording

- 8.1.1 The archaeological recording techniques will conform to the best industry standard. All significant archaeological deposits will be recorded with a single continuous context numbering system pro forma. Contexts will be drawn at a suitable scale in plan and in section usually, but not always, 1:20 in plan and 1:10 in section. All significant contexts will be photographed in digital and the images archived in RAW or TIFF format. If relevant, excavated areas will be subjected to 3D photogrammetric recording in high resolution by 35mm equivalent 20mp, 1" sensor, 4k UHD camera, or a 35mm equivalent (24mm) camera with a 12mp 1/2.3" CMOS sensor and/or a terrestrial Canon EOS 650D DSLR camera with a 20mp CMOS sensor. All ground investigations will be tied into the Ordnance Survey National Grid and Datum using a GNSS/Glonass (GPS) Receiver and data logger with a <20mm tolerance. All photogrammetric 3D models will be produced using proprietary photogrammetry software and aligned using known ground control points (GCPs). Dimensional control will then be applied to each model and then reprocessed using the new parameters and optimised cameras to create dense point clouds and high face count meshes exported to OBJ format. Any high resolution orthographic renders (orthoplanes and orthomosaics) will be exported and scaled in georeferenced raster (TIFF and JPEG) format.
- 8.1.2 The use of photogrammetry in modern survey is rapidly evolving and as such there are a limited number of published standards and guidance documents available to help

clients (commissioners of work) and surveyors maintain quality control. Historic England's *Photogrammetric Applications for Cultural Heritage Guidance for Good Practice* (published 2017) provides guidance on SfM techniques in relation to cultural heritage, particularly the photogrammetric recording of historic buildings and landscapes, and outputs (3D models, 2D topographical plans, building plans and elevations etc). The principles of this guidance will be followed by any archaeologist undertaking the survey work.

- 8.1.3 The Survey Association have produced a series of handy guides to surveying with drones and photogrammetry. They are primarily aimed at other professionals such as engineers, architects, planners and clients in general. They are not intended to go 'in depth' into practical issues but to act as a basic guide on a particular topic and, in particular, on procedures and regulations which may govern how a particular aspect of the survey is carried out. Further information can be found here <https://www.tsa-uk.org.uk/downloads>.

8.2 Artefact recovery and recording

- 8.2.1 All items that may be subject to *The Treasure Act 1996* will be reported to the HM Coroner for the local area and C&CS.
- 8.2.2 Due to the potential for contamination at the Hafod-Morfa Copperworks no finds will be removed from site. All recording of finds will occur on-site. Should a find or artefact of importance be identified, and it is not in the public interest for it to be left on-site, such as a copper ingot, then discussions between the client, Cadw, the museum and ourselves will be convened to identify the correct approach to safeguard the find.
- 8.2.3 All classes of finds will be retained (recorded and catalogued) on-site in appropriate conditions until arrangements for final deposition have been agreed, in line with the requirements of the *Chartered Institute for Archaeologists' Standard and Guidance for the collection, documentation, conservation and research of archaeological materials (2014)*. Ownership will be transferred to the institution receiving the archive unless other arrangements are agreed with the C&CS.
- 8.2.4 If substantial quantities of undiagnostic, residual or modern material are recovered, an on-site recording and discard policy for these classes of find will be employed. However, sufficient material will be retained to understand the nature, date and function of the deposit from which it was recovered.
- 8.2.5 Specialist contingency artefact advice, analysis or conservation may be necessary during the course of the fieldwork or in post-excavation. The scope for such work would need to be agreed in advance with C&CS.

8.3 Sampling

- 8.3.1 Due to the potential for contamination at Hafod-Morfa Copperworks a general policy of limited or no sampling will be implemented to protect members of the public and site staff. Should for any reason we be required to take samples, such as for metallurgical analysis, then environmental recording and sampling will follow the principles Historic England's *Guidelines for Environmental Archaeology* (2011), *Archaeometallurgy: Guidelines for Best Practice* (2015) and *Science for Historic Industries: Guidelines for the Investigation of 17th- to 19th Century Industries* (2018). However, all deposits will still be assessed for high potential for the preservation of palaeoenvironmental/metallurgical material. Sampling of such deposits would be

carried out by column, bulk etc, for subsequent analysis. In accordance with professional guidelines sampling and recording will be the responsibility of an identified member of the field team with relevant experience. Any sampling strategy would be advised by Geoarch, leaders in archaeometallurgy analysis, during the archaeological programme.

9 Post-excavation and Reporting

9.1 Assessment and archive preparation

- 9.1.1 Following completion of the fieldwork programme all artefacts, ecofacts and samples will be processed, assessed, conserved and packaged in accordance with Chartered Institute for Archaeologists' *Standards and Guidance for the collection, documentation, conservation and research of archaeological materials* (2014), and *Museums and Galleries Commission Standards in the museum care of archaeological collections* (1994). The archive of archaeological records and artefacts will be prepared to the guidelines set out in Historic England's *Management of Archaeological Projects* (1991) Appendix 3 and if appropriate for the project the *Management of Research Projects in the Historic Environment MoRPHE* (2015).
- 9.1.2 Should a significant archaeological discovery be made and/or archive of artefacts and other materials be recovered, a formal post-excavation assessment will be undertaken following the completion of the fieldwork. A Post Excavation Research Design (PERD) will be prepared and submitted to Cadw for approval. A full post-excavation analysis would be undertaken complete with final written report incorporating all of the evidence and material recovered during the investigations. The report would consider all available archaeological and historical sources in order to place the results of the fieldwork in an appropriate archaeological and historical framework. In particular, the report will be influenced by the Research Framework for Wales (<https://www.archaeoleg.org.uk/index.html>), which sets out the knowledge base of past research and sets out a rationale for future studies. For example, current important Industrial themes for consideration where there are weaknesses in the knowledge base are: the significance and scale of technical change within the major industries of coal, iron, copper, tin, lead and slate, and the impact of that change within the landscape; their context and significance in terms of similar sites elsewhere in the world; their relationship with the markets they served. It has been noted that a gap still exists in our understanding of the 'scientific' elements of past industries, particularly metallurgical industries where limited scientific investigation has been undertaken as there has tended to be a reliance on contemporary documentary accounts to tell us 'what we need to know'. An opportunity exists to pursue an avenue of research in the identification of waste products from the metallurgical industries; more specifically collaboration with metallurgists would be worthwhile to establish if it is possible to identify the unique qualities and origin of these wastes and whether anything could be understood about the processing of these materials.
- 9.1.3 Should the outcome of the archaeological watching brief not warrant the formal post-excavation process, i.e. little or no archaeology was discovered and/or recorded, then a report on the watching brief will be produced to discharge professional and planning (Cadw/LPA) obligations. However, the report will still assess the potential of any recovered evidence and then a programme of analysis and research should be

undertaken (however brief) resulting in the preparation of a site narrative and supporting information, including finished drawings and photographs if required.

- 9.1.4 Subject to the landowner's permission the site archive, including all artefacts, ecofacts, samples and records will be deposited whole with a receiving institution (excepting any that may be subject to the Treasure Act 1996) in accordance with ClfA Guidelines (*Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation* (2011)). The final archive of records relating to the preparation of the reports should be prepared to Historic England's guidelines set out in the *Management of Archaeological Projects* (1991) Appendix 6, the *National Standard and Guidance to Best Practice for Collecting and Depositing Archaeological Archives in Wales 2017* and if appropriate for the project the *Management of Research Projects in the Historic Environment MoRPHE* (2015).
- 9.1.5 A final report detailing the results of the watching brief will be submitted when the fieldwork and post-excavation analysis process has been completed. The report will conform to the professional standards as set out in section 3.4 of the *Chartered Institute for Archaeologists Standard and guidance for an archaeological watching brief* (published 2014), as well as the *Guidance for the Submission of Data to the Welsh Historic Environmental Records (HERs)* (published 2018). Following formal approval, a digital copy of the report and archive summary will be supplied to the client, LPA, regional HER and the Royal Commission on the Ancient and Historical Monuments of Wales.

9.2 Publication

- 9.2.1 As a minimum, and if appropriate, short summaries of the report will be submitted to the local CBA Journal or regional equivalent. Larger journal contributions should be set according to the agreed post-excavation project design for more significant archaeological discoveries.

9.3 Notification of important remains

- 9.3.1 Where it is considered that remains that may satisfy the criteria for statutory protection have been identified, the archaeologist will inform the LPA, their archaeological advisors (GGAT) and the national archaeological agency with statutory responsibility (Cadw).

9.4 Archive deposition

- 9.4.1 With the permission of the landowner, the report and archive will be deposited with Swansea Museum. An accession number will be generated on completion of the project. A digital copy of the archive will also be offered to the regional HER (GGAT) and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW). Submission of photogrammetric images acquired by drone to the RCAHMW will follow *RCAHMW Unmanned Aerial Vehicle (UAV) Policy*.
- 9.4.2 Black Mountains Archaeology Ltd Data Management Plan sets out the company's policy on managing data during archaeological projects and is available upon request. We operate a paperless office system, whereby we effectively reduce the use of all paper records as far as feasibly possible. All data gathered in the field, whether paper or digital records, are digitised and stored on our servers, which are both physical servers on-site, duplicated live on cloud servers hosted by Microsoft and regularly backed up off-site. All data is digitally stored in appropriate formats (SHP, DXF, TIFF,

RAW, JPEG, PDF etc) with the archive destination in mind. All data will be submitted to the relevant archives in accordance with the RCAHMW's *Guidelines for Digital Archaeological Archives* (2015) and the WAT's *Guidance for the Submission of Data to the Welsh Historic Environmental Records (HERs)* (published 2018).

10 Project

10.1.1 The project will be managed by Richard Lewis, who is a full *Member* of the *Chartered Institute for Archaeologists* (MCIfA) and implemented by a suitably qualified member of our team. All work will be carried out to the Codes of Conduct, Bylaws and Guidelines of the *Chartered Institute for Archaeologists*, irrespective of the status of individual's membership of the Chartered Institute.

10.2 Staff Structure

- Richard Lewis MCIfA, Lead Archaeologist: responsible for project management, fieldwork and post-excavation operations.
- Elizabeth Langlands MA, Senior Project Officer: responsible for community engagement, fieldwork and post-excavation finds analysis.
- Dr Rhys Morgan, Project Officer: responsible for community engagement, fieldwork and post-excavation finds analysis.
- Dr Graham Eyre-Morgan, Senior Archaeologist: responsible for fieldwork and post-excavation finds analysis.

10.3 Specialists

10.3.1 Black Mountains Archaeology Ltd have an established network of specialist advisors, these include:

- Agricultural (Post-medieval) implements and tools: Richard Lewis (Black Mountains Archaeology)
- Buildings, Architectural and Dendrochronology: Ross Cook (ArchaeoDomus)
- Clay tobacco pipes: Joyce Compton (Freelance)
- Conservation: Phil Parkes (Cardiff University)
- Early-medieval and Medieval Ceramics: Joyce Compton (Freelance); Steve Clarke (Monmouth Archaeology)
- Faunal remains: Cardiff University
- Flint/worked stone: Richard Lewis (Black Mountains Archaeology); Elizabeth Walker (National Museum of Wales)
- Human remains: Cardiff University
- Industrial Archaeology: Jennifer Protheroe-Jones (Principal Curator NMW), Richard Lewis (Black Mountains Archaeology), Ross Cook (ArchaeoDomus)
- Metallurgical analysis and geophysics: Dr Tim Young (Geoarch)
- Mortar analysis: Ross Cook (ArchaeoDomus)
- Palaeo-environmental remains: Dr Nigel Nayling and Dr Kate Griffiths (University of Wales Trinity St David); QUEST Reading University
- Post-medieval ceramics: Joyce Compton (Freelance); Richard Lewis (Black Mountains Archaeology)

- Prehistoric ceramics: Dr Adam Gwilt and Jody Deacon (National Museum Wales)
- Preserved organic leather and textiles: Quita Mold (Freelance)
- Roman brick, tile and other ceramic building materials: Joyce Compton (Freelance); Dr Graham Eyre-Morgan (Black Mountains Archaeology)
- Roman glass: Joyce Compton (Freelance);
- Roman metalwork: Johnny Crawford (GGAT); Dr Graham Eyre-Morgan (Black Mountains Archaeology)
- Roman pottery: Joyce Compton (Freelance); Dr Peter Webster (Freelance); Dr Graham Eyre-Morgan (Black Mountains Archaeology)
- Roman/later coins: Edward Besly (National Museum of Wales)
- Should further specialist expertise be required then these will be sought as required from suitably qualified institutions and individuals

11 Community Archaeology

11.1.1 Community archaeology is a strong focus for the company and we have successfully delivered several major community projects in south Wales. Our experience and energy make our community projects both rewarding and fun whilst delivering important academic results. Our volunteers gain many transferable skills into the workplace and we routinely host work experience placements. Where possible and practicable from a health and safety/contractual perspective we aim to have some community benefit from all of our investigations. Whether by publication of archaeological findings, local talks, information panels or a more 'hands on' experience 'digging' and surveying we are keen to involve the local community in our projects. However, we do have limitations placed on us from an insurance and safety standpoint and it is not always possible to engage with the local community where sites are deemed inappropriate and/or unsafe.

12 Variations to the specification or contract

12.1.1 The archaeological resource is unpredictable, and the encountering of unexpected archaeological deposits on the site cannot be ruled out. Where the examination of such archaeological deposits is required but exceeds the scope of this specification a variation to the contract may be required and this specification updated. Such variations will be agreed in advance with the Client and notified to, and wherever possible or appropriate, agreed in advance with, the relevant Planning Authority or their agents.

13 Reinstatement

13.1.1 The reinstatement of any part of the archaeological work outlined in this document are beyond the scope of this specification and if required must be agreed by separate negotiation.

14 Insurance

14.1.1 Black Mountains Archaeology Ltd is fully insured to undertake the work and full details of our policies can be supplied on request.

14.1.2 Black Mountains Archaeology Ltd will not be liable to indemnify the client against any compensation or damages in discharging the responsibilities set out in this document,

including satisfying professional and statutory/legislative obligations.

15 Health and Safety

- 15.1.1 Black Mountains Archaeology Ltd takes health and safety issues seriously and is committed to protecting the health and safety of its staff and all those affected by its business activities and attending its premises or places of work (site). We have prepared a Health and Safety Policy (2021) in accordance with current legislation, including *The Health and Safety at Work etc Act 1974* and *The Management of Health and Safety Regulations 1999*. At the design stage of any project a Health and Safety Risk Assessment will be undertaken and continuously updated as risks are identified/mitigated. A copy of these documents is both available on request, and will be displayed in any site office, and will be supplied to any other contractors working on site.
- 15.1.2 Archaeological work is not covered under the *Construction Design and Management Regulations 2015*; however, archaeological work may be undertaken where CDM regulations are applied. In such cases we will prepare any documentation required.

16 Professional standards

- 16.1.1 Black Mountains Archaeology Ltd is not currently a registered archaeological organisation with the *Chartered Institute for Archaeologists*. However, irrespective of corporate membership all employees are expected to adhere to the *Codes of Conduct, Bylaws and Guidelines* as a condition of employment. All work is overseen by a full Member of the *Chartered Institute for Archaeologists*.

17 Copyright and Arbitration

- 17.1.1 Black Mountains Archaeology Ltd/*Archaeoleg Mynydd Du Cyf* shall retain full copyright of any commissioned reports, tender documents or other project documents, images and plans, under the *Copyright, Designs and Patents Act 1988* (chapter IV) with all rights reserved; excepting that it hereby provides an exclusive licence to the client for the use of such documents by the client in all matters directly relating to the project.
- 17.1.2 Any dispute or difference arising out of a contract in relation to this work shall be referred for a decision in accordance with the Rules of the Chartered Institute of Arbitrators' *Arbitration Scheme for the Chartered Institute for Archaeologists* applying at the date of the agreement.

18 Bibliography

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Other Sources

BGS <https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer>

19 Appendix I – Figures



Figure 1. Plan showing proposed ground investigation locations (Provided by City & County of Swansea)



- BLACK MOUNTAINS ARCHAEOLOGY -
- ARCHAEOLEG MYNYDD DU -

Yn rhan o'n hawydd i wella ansawdd ein gwasanaeth, rydym yn croesawu unrhyw adborth y gallwch ei ddarparu.

As part of our desire to improve our quality of service we welcome any feedback you are able to provide.

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