A4067/A4217

CROSS VALLEY LINK AT PENTRECHWYTH

An Archaeological Assessment

L. A. Toft

The Glamorgan-Gwent
Archaeological
Trust Ltd.

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SWANSEA
APRIL 1990

FRONT COVER ILLUSTRATION
THE HAFOD COPPER WORKS 1812

ACKNOWLEDGEMENTS

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AN ARCHAEOLOGICAL ASSESSMENT

1.0 Introduction

1.1 The two class A roads intended to be linked by the new road are sited either side of the lower Swansea valley and between these roads lies an area which has been subject to industrial use for around three centuries. This lower Swansea valley was the copper refining centre of Great Britain during the nineteenth century and some of the works over which the link will run were of great commercial and technological significance in their day. Intensive industrial use of the lower Swansea valley commenced early in the eighteenth century and continued without a break through to the first two decades of this century. Coal mining on the eastern side of the valley can be traced back to medieval times and that area was subject to extensive mining.

1.2 The Cross Valley link road will pass over the site of three former copper works, one of which was the leading works of its day, whilst another had an eighteenth century origin. Although the new section of the A4217 at its southern end will pass over the site of former works and the Smith canal, it runs for much of its length in an intensively mined area where there is a probability of previously unrecorded sites being present. In addition to the industrial archaeological dimension there is a possibility of a classical one, as the unearthing of a hoard of Roman coins occurred during the nineteenth century.

1.3 By the end of the third decade of this century all but one of the nonferrous metal works had been closed down and the area was abandoned. The impact of the resultant and notorious dereliction led to the setting up of the Lower Swansea Valley Project in 1962 and during the progress of this project, clearance of the derelict industrial sites took place. These old industrial sites were used by Territorial Army Engineers as a training ground in the use of mechanical earth moving machinery and explosive demolition. This ad hoc demolition together with the subsequent leveling of waste tips etc has created considerable uncertainty about the surviving state of buildings leveled as part of the clearance programme.

2.0 Geography

2.1 The lower Swansea valley is roughly triangular in shape and extends from Morriston and Llansamlet down to Swansea docks, with its narrow portion at the seaward end. Running beneath the valley is the Tawe geological fault and the valley itself is filled with glacial debris and alluvium. The present day soil, however, suffers from the effects of waste products from the former metallurgical works and mines. This once derelict industrial land is now used for amenity and light industrial/retail purposes. For the whole length of the lower Swansea valley the River Tawe is tidal, but completion of the river barrage, will end the tidal nature of the river. The river, however, is subject to occasional 'flash' flooding and the valley bottom once formed the natural flood plain of the

River Tawe. As industrial and commercial development proceeded, the natural drainage pattern was changed in a piecemeal fashion.

2.2 The valley lies between Pennant sandstone hills with coal outcrops at various places. It was the presence of these coal outcrops close to a navigable river ending in an established port which attracted eighteenth century copper refining works to the lower Swansea valley. Between the road at the northern end of the lower Swansea valley, connecting Llansamlet and Morriston (A48) and the road crossing the river at the southern end (A483), the only cross valley links are the railways, with an occasional private river bridge serving works on the opposite side. During the eighteenth century tram/waggon ways were augmented/replaced by canals on both sides of the valley, to be followed in the following century by railways. Thus each side of the valley had its own road, canal and railway system. The cross valley link road from Landore to Pentrechwyth crosses the site of the former Swansea canal (Gazetteer site 2 below) whilst the new section of the A4217 runs over a part of the Smith canal (site 7) and former railway.

2.3 It is difficult to assess the extent to which the valley floor attracted medieval and earlier settlement, however, the fact that there was a Roman fort at Loughor and one at Neath does suggest that an east west road once existed across the valley. The original road along the east side of the valley now no longer exists. It was located to the west of the new road and ran alongside the old railway embankment for part of its length.

3.0 Historical Background

3.1 Mining

Although it may have existed before the Norman arrival, the town of Swansea is essentially a medieval creation; although it was primarily a garrison town it became a commercial trading port. Strictly, Gower is the area between the rivers of Loughor and Tawe but the manor of Kilvey on the east bank of the Tawe was held by the marcher lord of Gower. Coal is present on both sides of the Swansea valley and it is not known when the working of these coal deposits first began. It is asserted that mining at Kilvey is recorded as early as 1217[1], whilst the Swansea Charter of 1306 gives town burgesses the right to extract "Pit Coal"[2]. Whether commercial exploitation of coal deposits took place at that period is unclear. By the sixteenth century, however, coal was mined commercially in Llansamlet parish[3] (the east side of the valley which includes Kilvey) and a seventeenth century manorial survey certainly implies it[4]. The arrival of "copper manufactories" early in the eighteenth century led to an increased demand for coal to feed their furnaces and resulted in more intensive mining of the area. The presence of "fire engines" on a mid eighteenth century turnpike road map[5] implies that shaft mining (as distinct from pit mining) was becoming necessary to fulfil demand. Increased demand for coal continued throughout the nineteenth century causing further exploitation of coal deposits beneath the valley by an unknown number of collieries. Eventually the demand for coal exhausted the available supplies beneath the valley and mining ceased there. Seven colliery and shaft sites in the locality are shown on map 1 (in wallet inside back cover) but in view of

the very long history of mining in the area it is unlikely to be an exhaustive tally.

3.2 'Copper' Working

3.2.1 In order to be self sufficient in brass cannon for his Navy, Henry VIII set up an organisation to prospect for the raw materials of brass, copper and calamine, (zinc carbonate). The royal monopoly did not prove an economic success and its interests were transferred to the Mines Royal Society in 1564. This second attempt also ran into financial difficulties and the Mines Royal Society leased out some of their rights to private venturers. In 1583 a group which included the Earl of Pembroke re-opened disused copper mines in Cornwall and sited their smelter at Aberdulais, Neath. (The manor of Neath was at that time held by the Earl of Pembroke.) Brass was first produced at Tintern Abbey in 1568. As calamine deposits were found at Worle (Western-Super-Mare) in 1566 and as copper was present in Cornwall, the Bristol Channel became a natural location for the non-ferrous metal industry. Copper smelting at Aberdulais began in 1584 but ceased by the end of the century. No further activity took place in South Wales until the Mines Royal Society monopoly ended in 1689 and interest in the Cornish copper mines revived once more. Non-ferrous metal refining required large amounts of coal and as Cornwall is deficient in fuel supplies, it made sense to ship copper ore to the fuel supply. The Swansea area with ports and navigable rivers was an obvious location for copper smelting since supplies of hard (low smoke) coal were locally available.

3.2.2 About 1717 Dr Lane came from Cornwall to set up copper works within the lower Swansea valley. A copper works beside the town seems to have been soon abandoned and another works was sited at Landore (Llangyfelach copper works) on the west bank of the Tawe where it was beyond control of the Swansea burgesses. Shortly afterwards (c 1730) on the eastern bank of the Tawe the White Rock works (site 8), close to Foxhole, was set up. This
829w works was followed in 1755 by the Middle Bank works (site 5) and shortly afterwards by the Upper Bank works (site 10) where lead and zinc (Spelter) was refined. The coal for these three works came from mines in the lower Swansea valley and was transported to the river by trams.[6] Circa 1784 the Smith canal (site 7) was built to link the coal mines with the works and wharves beside the White Rock works. This canal was the first to be built in the Swansea valley, and was followed in the last years of the eighteenth century (1798) by the Swansea canal on the western side. Non-ferrous metal production during the eighteenth century was dominated by the Morris family, but increasing demand for copper resulted in a growth in the number of works in the valley and the arrival of other industrialists.

3.2.3 At the opening of the nineteenth century the Vivians came from Cornwall to a copper works at Penclawdd. In 1810 the Vivians opened a new
812w copper manufactory at Hafod (site 4) on the west bank of the River Tawe. This works, which eventually dominated copper production, joined seven other non-ferrous works located in the lower Swansea valley. In the valley only one further 'copper' works was set up after the Hafod works, the Morfa
841w (site 3) (1834). Whilst South Wales could meet the demand for copper the Vivian organisation based at Hafod dominated the local, national and international copper industry. Swansea's importance began to decline in the 1880's with preliminary smelting of copper taking place in South

America and the importation of 'blister' (partially refined) copper instead of ore. As the copper industry declined Spelter (zinc) manufacture increased in importance. By the end of the nineteenth century only the Hafod, Morfa and Middle Bank works still processed copper whilst the other copper works had ceased, either closing down or processing other products. Spelter manufacture increased to a total of five works. Iron working was on a small scale until the establishment of the Landore Siemens steel works (site 22) in 1869 and increased demand for steel led to the setting up of larger works on the other side of the river. The manufacture of tin plate also increased from the mid nineteenth century onwards as steel replaced iron.

3.2.4 Considerable technological advance took place during the nineteenth century at works sited in the lower Swansea valley. Muntz metal, one of the most useful of the copper zinc alloys (brasses) was developed by G F Muntz at the Upper Bank works (site 10) c 1823. Not only has this alloy good resistance to corrosion but it can be readily hot worked and cast. The Upper Bank works had a Spelter works attached to it from very early in its existence thus making it an obvious place for the development of special purpose brass. By 1841 the Spelter works was disused but Muntz metal continued to be produced at the Hafod works until 1955[7]. It was the Vivian organisation where innovation was most marked. Production methods were constantly under review including the purification of "Copper Smoke" to reduce environmental polution. This work which, at one stage, involved Sir Humphrey Davy and others working at the Royal Institution of South Wales in Swansea, eventually resulted in sulphuric acid, alkali (site 21) and phosphate production (map 2) in the valley[8]. By the end of the century the production of virtually every known metal had been undertaken, including the setting up of a works to produce nickel and cobalt (Hafod Isha).

3.2.5 At the opening of the twentieth century operational non-ferrous metal works in the Swansea valley amounted to; five Spelter works, the Hafod Isha nickel and cobalt works and three 'copper' works (Hafod, Morfa and Middle Bank) (sites 4, 3 and 5) with the White Rock works (site 8) processing residues from the Vivian works. After the end of the 1914-1918 war amalgamations occurred and most of the surviving non-ferrous works were shut down. Following 1929 only one copper works (Hafod) and one Spelter works (Swansea Vale) remained operational. The Swansea Vale Spelter works closed in 1971 and the Hafod works in 1980 thus ending two hundred years of non-ferrous metal production in the lower Swansea valley.

4.0 Recommendations

4.1 Archaeological Monitoring of Construction Works

In view of the possibility of archaeological sites becoming exposed or damaged by road construction we would recommend an archaeological 'watching brief' during ground clearance and foundation works. In view of the interpretative complexity associated with long duration industrial occupancy, it is also recommended that, wherever possible, walls, foundations etc should if found, be photographed and after recording line and position be retained and incorporated rather than destroyed.

4.2 Contingency Arrangements

It is not possible to identify with certainty all archaeological problems liable to be encountered during construction works. Should an unforeseen archaeological discovery occur during construction works it is recommended that consideration be given to providing facilities and expenditure to cover unforeseen exploration and recording.

5 SPECIFIC REFERENCES

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5 Royal Institution of South Wales No 356.

6 P R Reynolds Morgannwg Vol XXI 1977 p 42 et seq.

7 N L Thomas The Story of Swansea's Districts and Villages p 85 (Neath 1964).

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9 S R Hughes The Swansea Canal Industrial Archaeological Review Vol 4 No 1 (1979).

GENERAL REFERENCES

K J Hilton (ed) The Lower Swansea Valley Project (London 1967)

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Swansea Museum Fact Sheets Nos 1 to 6

6 GAZETTEER OF SITES INDICATED ON MAPS 1 and 2

2641w (Site 1) Mile End Pottery

Apart from its presence on the nineteenth century OS map (map 2) nothing is known, at present, about this works.

(Site 2) Swansea Canal

Original length 16 1/4 miles - Abercrave to Swansea Docks.
Constructed 1794 - 1799 navigation ended 1931 change in level 91 m (300 ft).
This canal connected mines and works sited within the middle and upper sections of the Swansea valley, also those appropriately located in the lower valley, to Swansea's North Dock. The extent to which this canal served as an energy supply for works situated beside it made it almost unique, as the total of works served was around forty two.[9] Even after navigation ceased it supplied industrial water to various works. This canal was an important factor leading to the choice of the Swansea valley as the site for the present Mond (Nickel) Refinery in 1900.

(Site 3) Morfa Copper Works

Built in 1834 by William Foster and Co
1840 Silver works added
1888 Linked with Fankfurt Metalgesselischaft of Germany
1893 Merged with Pascoe Grenfell and Sons
1924 British Copper Manufacturers Ltd and incorporated in Hafod works
1928 ICI Ltd
1929 Silver works dismantled.

(Site 4) Hafod Copper Works

Built in 1810 by Richard Hussey and H H Vivian
1828 Rolling Mills added
1916 H Vivian and Co
1924 British Copper Manufacturers Ltd
1928 ICI Ltd
1960 Yorkshire Imperial Metals
1980 Closed.

In addition to copper, silver and gold were also produced as were chemicals such as sulphuric and other acids derived from the manufacturing processes. This became the leading copper works of the nineteenth century and a centre for industrial inovation.

(Site 5) Middle Bank Copper Works

Built 1755 by Chauncey Townsend - coal to come from Llansamlet Parish.
Lead and zinc were also processed
1765 John Rotton and Co
1769 George Pengree and Co
1787 The Stanley Co
1804 Williams and Grenfell
1824/6 Pascoe Grenfell and Sons
1890 Williams Foster and Co
1893 Pascoe Grenfell and Co Ltd
1929 Closed

(Site 6) Coin Hoard

A hoard of 500 Roman coins came to light on 1 June 1835. The coins were of third century date and could have been associated with a burial, (as bones were reported to have been found and thrown away).

(Site 7) Smith Canal

This canal was built between 1783 and 1785 to supplement/replace earlier tramways transporting of coal from pits at Llansamlet to works and shipment points at Foxhole. The canal remained in use until about 1854.

(Site 8) White Rock Works

Built in 1737 by the White Rock Copper Co alias John Hoblyn and Partners

1744	John Freeman Copper Co
1764	Joseph Percival and Co The ore was smelted and refined at these works into 'cakes'before being sent to Bristol for working into sheets etc
1853	Lead and silver working introduced
1870/1	Williams, Foster and Co also Vivian and Sons The works was partitioned between the two firms. The Vivian and Sons portion was used to extract precious metals from electrolytic tank residues from the Hafod works
1916	Vivian and Sons Ltd
1924	British Copper Manufacturers Ltd
1928	ICI Ltd
1929	Dismantled.

(Site 9) White Rocks Works Tunnel

The section of the Smith canal (site 7) running beneath the White Rock works. A long cut and cover tunnel with brick voussoirs circa 1784.

(Site 10) Upper Bank Works

Built in 1757 by John Smith and others to refine lead and Spelter

1777	Joseph Rotton and Co
1782	Parys Mine Co (copper refining)
1804	Williams and Grenfell
1825/6	Owen Williams
1828	Muntz Patent Metal Co
1850	Pascoe Grenfell and Sons Ltd
1890/2	Williams Foster and Co also Pascoe Grenfell and Sons Ltd
1924	British Copper Manufacturers Ltd
1928	ICI Ltd
1930	Closed
1938	Ministry of Supply 'Q' Factory (operated by ICI Ltd)
1964	Addis Ltd

(Sites 11 and 12) Mill Pits

These are two of a set of pits in the immediate locality of the road. Little is known about them or when they were in operation.

B63 (Site 13) Tramway

This colliery tramway (only the final part of its course is shown on Map 1) transported coal from collieries situated on Kilvey Hill into the valley and operated between 1757 and 1930. One branch served coke ovens in the valley.

2645W
2646W (Sites 14 and 15) Pits

These are two pits situated either side of the road. Little is known about them or when they were in operation. Site 14 may, or may not be, associated with ruined buildings indicated on the map.

2647W (Site 16) Coal Level

This level is indicated on the earliest 6" OS map and again, nothing is known about its period of use.

2648W (Site 17) Tir Bach

This hamlet is shown on the early 6" OS and tithe maps.

2649W
2650W (Sites 18 and 19) Farm Complexes (Tir Owen Roser and Tir Owen Bowen David)

The age of the buildings is unknown but they appear on the Tithe records and early 6" OS maps.

2651W (Site 20) White Pit

Apart from its position being indicated on OS 6" maps little is known.

2652W (Site 21) Landore Alkali Works

It is possible this was the site of the L H Dillwyn and Co silver works (1853-5) and from 1863 re-used for the production of chemicals in connection with 'copper smoke' control. There is a suggestion that at one stage it became a Spelter works. The works closed in 1929.

1585W (Site 22) Landore Steel Works

The Swansea Canal map dated 1793 shows a forge on this site, and buildings were still there in the mid nineteenth century (1844).

1869 - 1888 Landore Siemens Steel Co Ltd
1889 - 1898 Mannesmann Tube Co

2653W (Site 23) Pit

The site of this shaft is indicated on 6" OS maps.

ARCHAEOLOGICAL SITE REFERENCES

Site No	Grid Reference Easting	Grid Reference Northing	Site Description	Map No(s)	Primary Record Number in County Sites and Monuments Record
1	5997	9534	Mile End Pottery	1 & 2	2641 W
2			Swansea Canal	1 & 2	C03 01046.0W
3	6606	9525	Morfa Copper Works	1 & 2	841 W 1121 W
4	6620	9510	Hafod Copper Works	1 & 2	842 W 1583 W?
5	6635	9495	Middle Bank Copper Works	1 & 2	843 W
6	6641	9486	Coin Hoard (Roman)	1 & 2	432 W
7			Smith Canal	1 & 2	C16 01073.0W
8	6630	9474	White Rock Works	1 & 2	829 W
9	6633	9454	White Rock Works Tunnel	1 & 2	1073 W
10	6655	9512	Upper Bank Works	1 & 2	2642 W
11	6695	9530	Mill Pit	1	2643 W
12	6711	9535	Mill Pit	1	2644 W
13			Tramway	1	B63 02962.0W
14	6725	9553	Pit	1	2645 W
15	6740	9552	Pit	1	2646 W
16	6753	9575	Coal Level	1	2647 W
17	6767	9607	Tir Bach (Hamlet?)	1	2648 W
18	6811	9636	Tir Owen Roser (Farm?)	1	2649 W
19	6804	9649	Tir John Bowen David (Farm?)	1	2650 W
20	6830	9652	White Pit	1	2651 W
21	6620	9557	Landore Alkali Works	1	2652 W
22	6615	9577	Landore Steel Works	1	1585 W
23	6617	9583	Pit	1	2653 W

PLASMARL BYPASS

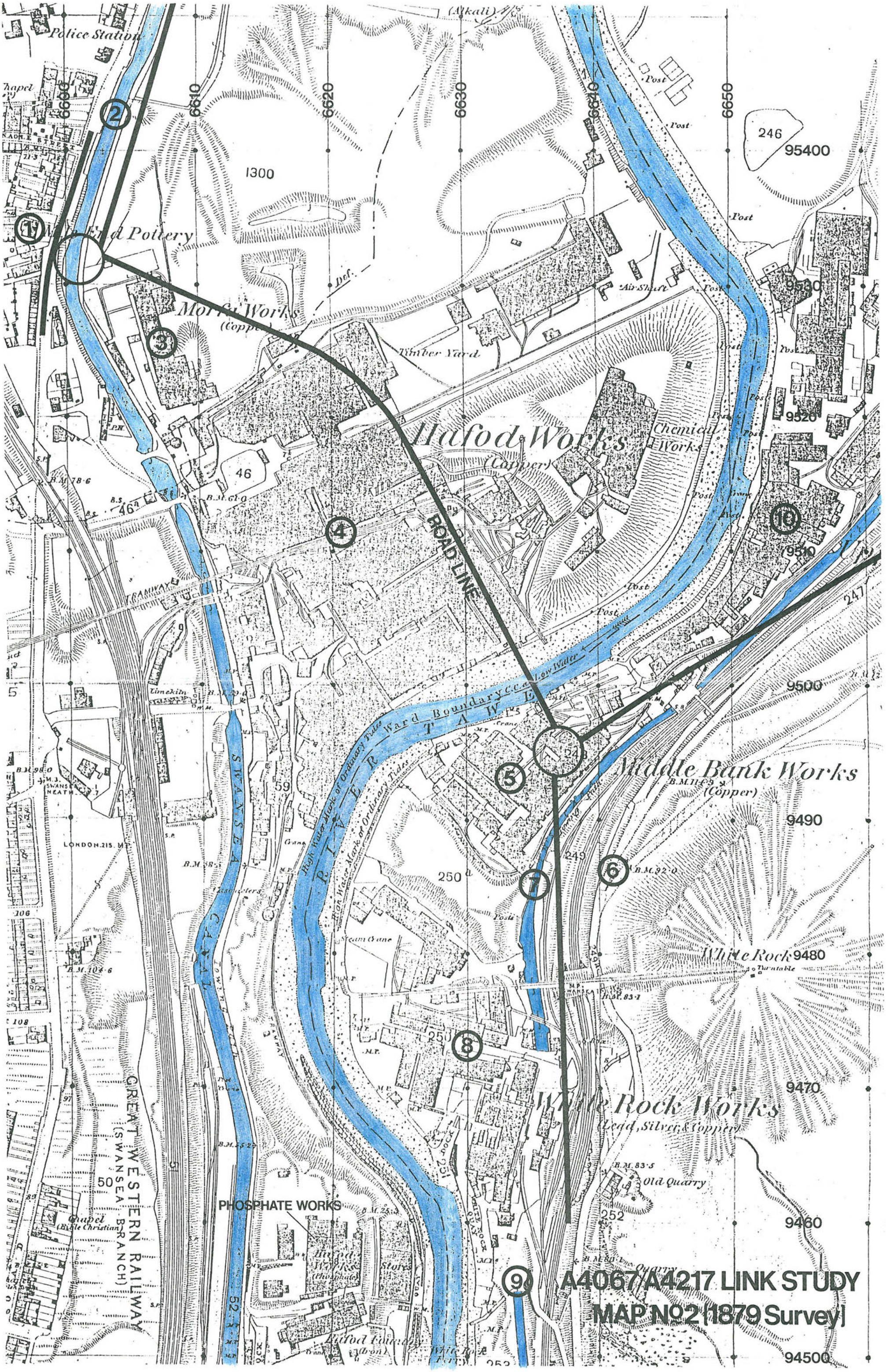
CWM LEVEL ROUNDABOUT

WHITE ROCK

ADDIS FACTORY

SWANSEA
(ABERTAWE)

A40677/A4217 LINK STUDY
MAP Nº1


Police Station
Chapel
NAOMI STREET
Morfa Lead Pottery
Morfa Works
(Copper)
Timber Yard
Hafod Works
(Copper)
Chemical Works
Air Shaft
Post
246
95400
1300
46
46a
ROAD LINE
TRAMWAYS
Tinkiln
Lime Kilns
Ward Boundary
RIVER TAWE
High Water Mark of Ordinary Tides
Low Water
Middle Bank Works
(Copper)
9490
White Rock
Turntable
9480
White Rock Works
(Lead, Silver & Copper)
Old Quarry
9460
PHOSPHATE WORKS
Hafod Tinplate Works
(Iron)
Stores
Steam Crane
Tramway
Tramroads
Canal
Basin
Dock
Lock
Weir
Sluice
Gates
Sidings
Goods Shed
Engine Shed
Turntable
Chapel
(Bible Christian)
GREAT WESTERN RAILWAY
(SWANSEA BRANCH)
SWANSEA
LONDON 215 M.
B.M. 78·6
B.M. 104·6
B.M. 98·0
B.M. 92·0
B.M. 83·1
B.M. 83·5
B.M. 75·2
B.M. 25
M.S.
Milepost
Telegraph Post
Pumping Station
Gas Works
Cemetery
Quarry
Ref.
Air Shaft
9530
9520
9510
9500
9470
9450
94500
247
249
250
251
252
1 2 3 4 5 6 7 8 9 10
A4067/A4217 LINK STUDY
MAP No 2 [1879 Survey]

A4067/A4217 Pentrechwyth Cross Valley Link (DT)
L.A. Toft
April 1990
GGAT 35

(Sites 14 and 15) Pits

These are two pits situated either side of the road. Little is known about them or when they were in operation. Site 14 may, or may not be, associated with ruined buildings indicated on the map.

A4067/A4217 Pentrechwyth Cross Valley Link (DT)
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(Site 17) Tir Bach

This hamlet is shown on the early 6" OS and tithe maps.

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2645W
2646W (Sites 14 and 15) Pits

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