Hafod and the Lower Swansea Valley:

Understanding Urban Character

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Introduction

Aims of the Study

Historic character lies at the heart of local distinctiveness and sense of place. No two places share a history, so every place has a unique historic character, which is a powerful asset in regeneration. Responding to local character is an important objective of good design; sustaining it can bring social, economic and environmental benefits.

Urban characterization is a tool that can help us use historic character to create sustainable and distinctive places for the future. It aims to describe and explain the historic character of towns, to give a focus to local distinctiveness and help realize the full value of the historic environment. It seeks to inform and support positive planning, regeneration and conservation programmes, help improve the quality of planning advice, and contribute to local interpretation and education strategies.

Urban characterization defines the unique historic character of individual towns and identifies the variety of character within them. It looks at the history of a town and identifies its expression in patterns of space and connection, and in traditions of building, which are the fundamental ingredients of historic character.

The immediate purpose of this study is to inform plans for regeneration and development at the former Hafod–Morfa copperworks site, so that they can be securely based on an understanding of its wider physical and historical context, and relate well to it.

The legacy of copper: the Hafod area in the late 1920s, soon after copper smelting had come to an end (Amgueddfa Cyrmu — National Museum of Wales).

Historical Background

Hafod and the lower Swansea Valley lay outside the limits of the borough of Swansea until 1835, but the area acted as one of the principal engines that enabled Swansea to become 'the metropolis of South Wales.'[1] 'For its advancement and almost unprecedented commercial prosperity, the place is not less indebted to the mineral treasures abounding in its neighbourhood than to its highly advantageous maritime situation. The vast stores of coal, culm, ironstone limestone, rotten-stone, flags, fire-clay and other mineral productions, combined with its local facilities of intercourse with the sea… led to the establishment of furnaces for the smelting of copper-ore, which were conducted with such complete success, that Swansea soon became the principal seat of the copper trade of Great Britain.'[2] Although it was the copper industry that drove the dramatic growth of Swansea, it was the combination of mineral resources in the hinterland and the advantages of a maritime location on a navigable estuary that made its environs the chosen place for the establishment of the copper industry. These resources of course encouraged other industries and activities.

The Foundations of Industrial Development

'*Delightful Hafod, most serene abode*'[3].

Early Land Use

We know Hafod and the lower Swansea Valley as a thoroughly industrialized landscape, notable as the home of an internationally significant industry with a long history. This environment is testament to a series of radical changes associated with first the development and then the decline of industry. Rural land-use patterns from which industrial development emerged were quickly overlaid and concealed as that development gathered pace during the nineteenth century. In turn, much of the direct industrial legacy has been cleared from the modern landscape. But although there are few surviving physical traces of the early history of the area, some of the features that structured later development were inherited from a rural past. There is also

A view of Hafod and White Rock in the mid-nineteenth century (City and County of Swansea: Swansea Museum).

intangible evidence, particularly in the form of place names, which provides pointers to geographical features in the landscape, to land use and to the cultural and linguistic allegiances of those living there. These names remain as an important link to the past.

On the west bank of the River Tawe, the area now known as Hafod is situated in the historical parish of St John-juxta-Swansea. It is south of Landore and immediately north of the historical limits of the borough of Swansea, the boundary of which was Cwm Burlais until 1835. Hafod was an ancient farmstead, mentioned in Powell's 1641 survey of the manor of Millwood.[4] Hafod Farm survived into the 1870s, but was lost to the expansion of the railway adjacent to the goods station which was once located near Villiers Street.

There were at least two other farms in the area. One was Aberdyberthi, its site later occupied by Aberdyberthi House and commemorated in Aberdyberthi Street. Another farm, Pentre Mawr, lay to the north of Aberdyberthi and is remembered in Pentre Mawr Road. Until the early twentieth century, the site of the farmhouse was probably marked by a row of three cottages on the north side of the road almost opposite the junction with Odo Street. According to *The Cambrian* newspaper, the land at Pentre Mawr was used for cultivating barley, wheat and oats in 1805.[5]

East of the river, the land formed part of the parishes of St Thomas and Llansamlet until incorporation in the borough of Swansea in 1835. Here too, a pattern of rural land use survived until the nineteenth century. But it was this side of the river that saw the earliest introduction of industry and industrial transport, which were already beginning to change the organization of land use by the early eighteenth century.

Topographical names in this once-rural area are predominantly Welsh, in contrast to the relatively anglicized names of Swansea town. Surviving examples include Aberdyberthi, Hafod, Morfa, Pentre Mawr and Pentrechwyth. Names were gradually anglicized as development promoted by English industrialists took hold — Glandwr, for example, was anglicized as Landore.[6]

Landownership

Access to land was the indispensable prerequisite for industrial development and the location of development reflects ownership patterns. It was also influenced by the ban on copper smelting within the confines of the borough of Swansea in the eighteenth century. One of the first smelters in the area lay immediately north of the borough boundary at Cwm Burlais. At the beginning of the nineteenth century, most of the land on both sides of the river formed part of the Briton Ferry estate owned by the Vernon family, earls of Jersey, but other significant landowners included the Bennett family of Gower and smaller landowners such as the Pritchard, Matthews and Vaughan families. Land was leased or sold in small workable parcels to individual farmers. The situation was complicated because the duke of Beaufort retained manorial rights to the land and there were occasional conflicts over mineral rights.[7]

Industrial concerns needed substantial quantities of land for production as well as the dumping of waste. The activities of the Vivian family in the early nineteenth century provide a good example of how industrial enterprises were built up on the basis of access to land. In 1814, Pentre Mawr Farm was owned by Richard Mansel Phillips but was leased by John Vivian for £1 13*s*. 1*d*. Vivian had acquired this farm by 1844, together with Aberdyberthi.[8] It was on these farms that much of Trevivian was developed.

Hafod Farm remained in the ownership of Lord Vernon. Although the Hafod Copperworks and canal docks were developed on this holding, the land to the east of Neath Road was not released for housing until development at Trevivian was already well advanced. Street names still record distinctions in ownership, which are not necessarily apparent in the style of building. Thus, on the west side of Neath Road, names relate to the Vivian family, but those on the east side — Jersey Street, Earl Street, Villiers Street and Vernon Street — provide a strong link to the Vernon ownership at the time the area was developed.

Industry and Agriculture

Until the mid-nineteenth century, industry was essentially contained within a recognizably rural framework, though it had made its often toxic mark

on the landscape. This was as true for the 'new' industries, such as copper smelting, as it was for the 'old' industries, such as corn milling. There was a corn mill (Greenhill Mill) in Cwm Burlais, which was first mentioned in 1367, serving the borough of Swansea. Map evidence shows this rural underlay very clearly, particularly the 1844 tithe map for the parish of St John-juxta-Swansea, which records a mix of arable and pasture land in mostly small fields. Industrial activities also seem to be accommodated in what was essentially the existing field pattern. Even in 1862, George Borrow noted a mix of land uses as he travelled north from Swansea: 'As I proceeded, I sometimes passed pleasant groves and hedgerows, sometimes huge works; in this valley there was a singular mixture of nature and art, of the voices of birds and the clanking of the mists of heaven and the smoke of furnaces.'[9]

Industry, however, was ultimately destructive of the rural landscape. Its effects were already painfully apparent several decades before Borrow's visit and graphically illustrated in the testimony of the plaintiffs at the Great Copper Trial of 1833. The barrister for the claimants, who were all farmers, opened the case with an attack on the fumes. He stated that, 'like the poisonous Upas tree, it spread desolation all around'. Land soon failed to produce grass and in wet weather, when rainwater acted as a solvent for the poisons in the smoke, crops could be destroyed within hours. Animals exposed to the poisoned pastures sickened and died. Topsoil, no longer secured by plant roots and fibre, had been washed from the slopes and the exposed subsoil eroded into a desert of gulleys and ridges. Four farms near the Hafod works had been abandoned. The once verdant and beautiful Kilvey Hill, under constant bombardment from a battery of chimneys at its foot, was now 'as barren as a road.'

Cattle exposed to the smoke became lame, lost their teeth and were unable to eat. A farmer testified that after the enlargement of the Hafod works, the bones of his cattle became brittle and their ribs broke; lumps as big as fists appeared on their knees and leg joints, and their hoofs 'grew wild'. Unable to stand, the cattle fed lying down or on their knees. None had milk. The symptoms of the sick animals were so consistent that they acquired a name, 'effryddod', or crippling disease in Welsh, and 'smoke disease' in English. Other farmers contrasted the pleasant landscapes of their youth with the leafless and barren ones of their maturity. They spoke of times, as one observer put it, 'not before the flood, but before the smoke.'[10]

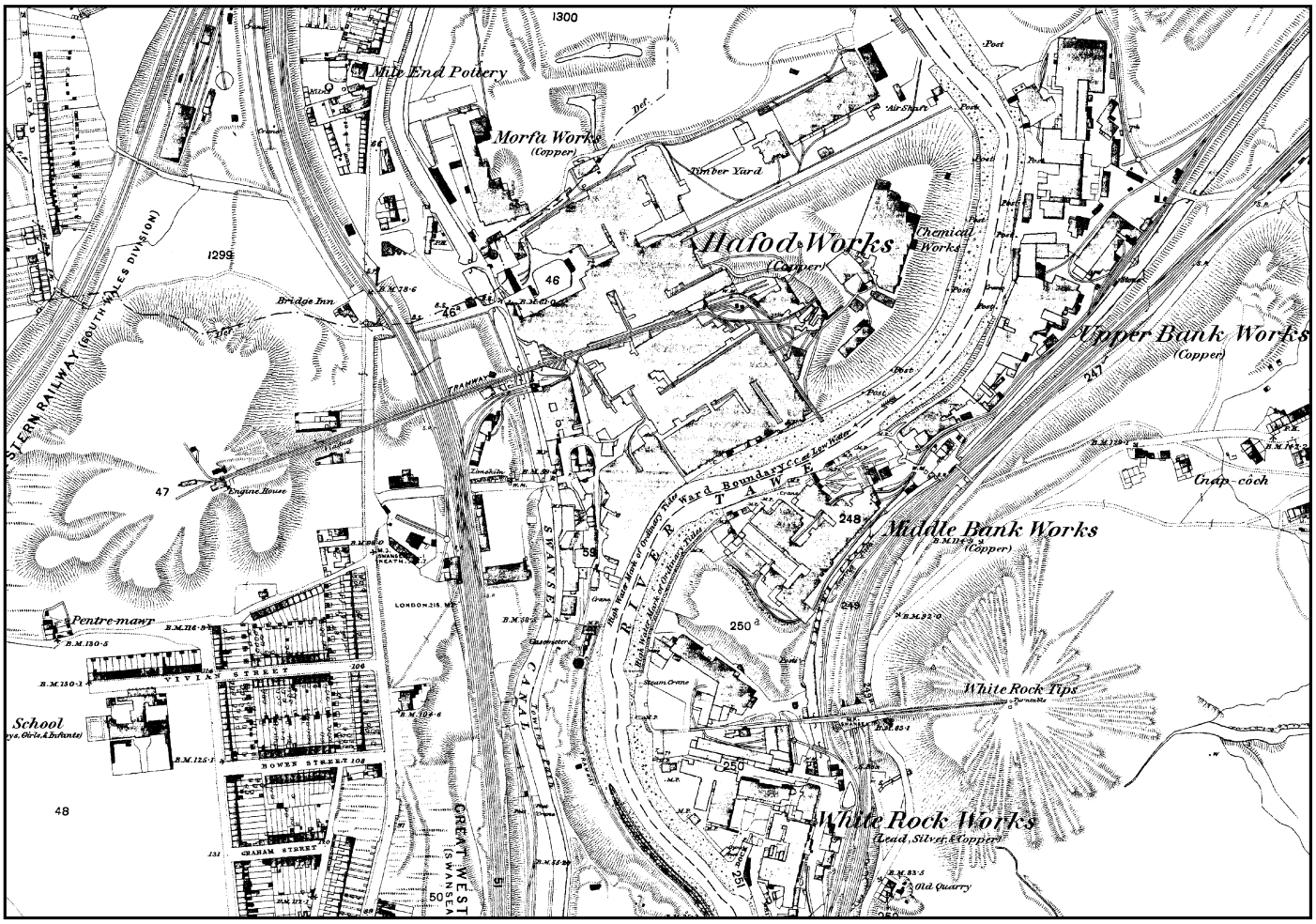
It is perhaps not surprising that virtually nothing of this earlier pattern of land use survived the transformations brought about by rapid industrial development in the second half of the nineteenth century. Even the network of roads and lanes which served the area from early times has only survived in part. Pentre Mawr Road and the road in Cwm Burlais are certainly pre-nineteenth century in origin. Neath Road is probably earlier too, though, when it was turnpiked in 1822, its route may have been modified. Most farm lanes and local access routes were either lost completely or heavily modified.

There was a similar picture to the east of the river in the mid-nineteenth century, where the largest land holding was retained by the earl of Jersey. Of the three copperworks, only White Rock was owned by the copper company that operated the site — the Middle Bank and Upper Bank works were leasehold. There was substantial waste land on Kilvey Hill, surrounded by a pattern of small fields and isolated holdings, with a network of apparently older tracks and lanes providing something of a framework for the growth of settlements.[11]

The Growth of Industry

'One spectacle however, we had the luck to meet with on our return to Swansea, and it came the more grateful as it was unexpected. This arose from the smelting houses which in the middle of a heavy rain and a dark night, displayed such a glorious light, and so many beautiful colours … that I should not have regretted being wet through, if it was for the pleasure of seeing these alone.'[12]

A rural way of life still had traces in the landscape into the nineteenth century, but the big story from the eighteenth century onwards was the rise of industry and, in particular, of the copper industry and its derivatives. From the late eighteenth century until the early twentieth century, Glamorgan dominated the British production of copper. In the late eighteenth



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By the late nineteenth century, the landscape was entirely dominated by industry as shown in this extract from the first edition Ordnance Survey map, 1876.

and early nineteenth centuries, however, it was the main world centre for copper smelting.[13] The lower Swansea Valley was well placed for a commanding role by virtue of its situation at the southern edge of the south Wales coalfield with good coastal access to the source of copper ores. At first, much of the ore came from Cornwall and later from Anglesey. From the 1820s, however, it came from many parts of the world. The 4:1 ratio of coal to ore needed for the smelting of copper made it more economical to transport ore over larger distances rather than coal ('carrying the smaller quantity to the greater'[14]), and to house the industry as close as possible to its coal supplies. Two-and-a-half miles (4km) of navigable river provided convenient frontage for the receipt of raw materials, in particular coal, and the despatch of finished products.[15]

These geographical advantages could only be realized through investment. Non-ferrous metal smelting was a complex operation requiring considerable capital. Some of this came from copper-mining interests in Anglesey and Cornwall, as well as from manufacturing firms based in Birmingham, Bristol and London. The Vivians of Hafod and the company behind the Morfa works had interests in Cornwall; Chauncey Townsend of the Upper Bank and Middle Bank works came from London, and merchants from Bristol were involved at White Rock in the late eighteenth century.[16]

The story of copper in the region actually began in the Neath Valley in 1584, when the first copper smelter was established. The first works in the Swansea Valley was the Llangyfelach works at Landore in 1717, to the north of the study area in what became Morriston. This was soon followed by a second works at the foot of Cwm Burlais (the Cambrian works, 1720) immediately to the south of the study area. White Rock Copperworks was established on the east bank of the Tawe in 1737, where it was followed in 1755–57 by the Middle Bank and Upper Bank works. Meanwhile, on the west bank, the Landore works was set up in 1793 and Hafod in

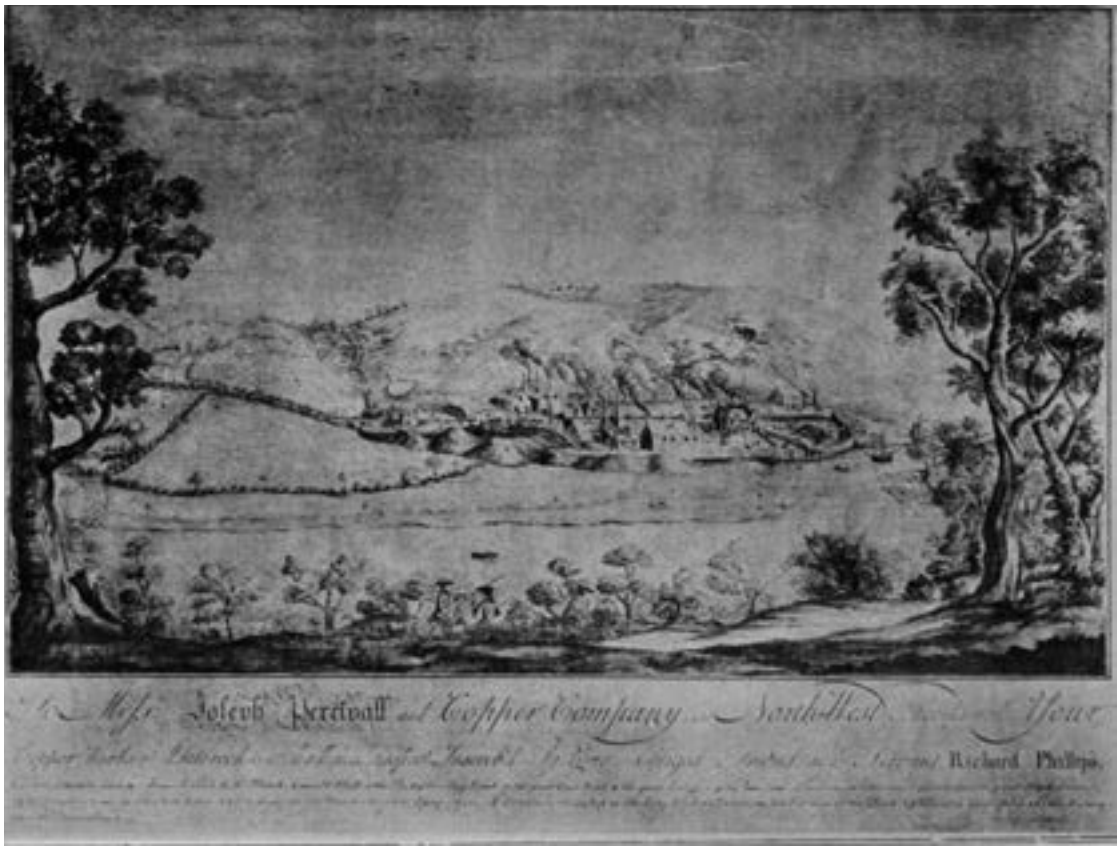
1808–09. With the establishment of the Morfa works (initially as a rolling mill from 1828 with smelting added in 1835), the study area had its full complement of copperworks. There were other works further north up the valley. By 1850, there were 13 works in total, five of which were located within the study area.[17]

Although the main story is that of copper, it was not the only industry in the valley. Other coal-using industries also thrived here, including fire clay and pottery. The Cambrian Pottery even reused the abandoned Cambrian Copperworks (established in 1720) on the southern edge of Cwm Burlais. The pottery was established some time after 1764 and continued in operation until 1870.

In the second half of the nineteenth century, other industries were coming to the fore, such as tinplate and steel. At the same time, many of the copperworks diversified into big integrated complexes smelting other metals and producing other materials as by-products. By 1879, the Vivians were also responsible for a foundry, a phosphate works, and a nickel and cobalt plant (Hafod Isaf). Proprietors of pioneering works in Birmingham joined forces with John Vivian in 1855 and the plant at Hafod was the first to be used for the separation of nickel and cobalt. Fragmentary remains of these works were recorded by the Royal Commission on the Ancient and Historical Monuments in Wales in 1978. In 1886, as many as 3,000 people were employed in the various Vivian enterprises.[18]

By 1870, the copper industry was beginning to decline in the face of competition from overseas production and the increasing expense of coal. The last ore was smelted in 1924, though copper processing continued to some extent until 1980. The Hafod and Morfa works were amalgamated in 1924, later taken over by ICI and then Yorkshire Imperial Metals in 1957. The works remained in operation until 1980. Most other works closed in the 1920s.[19]

The diversification that the success of copper had engendered ensured the survival of an industrial base in the area as other smelting industries continued, and as steel and tinplate manufacture developed. But, in the interwar period, coal production in the Swansea Valley came to an end and other industries also declined. Although there were still 74 firms working in the valley in 1961, they were relatively small concerns.[20]



An early depiction of the White Rock Copperworks, 1744 (© Crown Copyright: RCAHMW).

The landscape around the copperworks in the 1920s, shaped entirely to the needs of industry (Amgueddfa Cyrmu — National Museum of Wales).

The Creation of an Industrial Landscape

The impact of copper production on the landscape had been remarked upon since the late eighteenth century, and it was the agricultural landscape that was the focus of this concern. As late as the 1840s, tithe maps record industries integrated into an essentially rural landscape. By contrast, the first edition Ordnance Survey map of 1876 shows a landscape completely dominated by industry (p. 9). The copperworks had expanded, other industries had arrived and, on the west bank of the river, settlements stretched in a continuous urbanized band for several miles to the north of Swansea. The situation on the east bank was rather different: here, settlement was limited to a series of straggling hamlets. Although there remained pockets of agricultural land, large areas were devoted to the extraction of raw materials and the tipping of waste. Three major copperworks along the river ensured that this too was very much an industrial landscape.

Transport

'Great facility of communication between the various works and the harbour is afforded by means of canals and tramroads, by which the produce is conveyed to the port'.[21]

Essential to the success of all these industries was the development of a transport infrastructure to deliver raw materials and to take away finished goods. Foremost were the sea and the river. The sea had played an important part in the economy of Swansea for a long time: coal was exported from the sixteenth century when the first quays were built, and the first tidal docks were built in the seventeenth century. As trade increased, so did the need to improve the harbour facilities. Under the auspices of the Swansea Harbour Trust formed in 1791, a small tidal harbour was built in 1809.

Far more ambitious was the creation of the North Dock, achieved by diverting the river in the 'New Cut' so that its original course could

Swansea Docks in 1923 (© Crown Copyright: RCAHMW).

serve as an enclosed dock. This project was completed in 1852 and a second enclosed dock (the South Dock) was begun in the same year. This was completed in 1859. Trade continued to grow resulting in the construction of the Prince of Wales Dock on the east bank, which was opened in 1881 and extended in 1898. Two other docks followed on this side of the river in the early twentieth century (Kings Dock and Queens Dock). The North Dock closed in 1930 and was eventually filled in; its site was comprehensively redeveloped.[22]

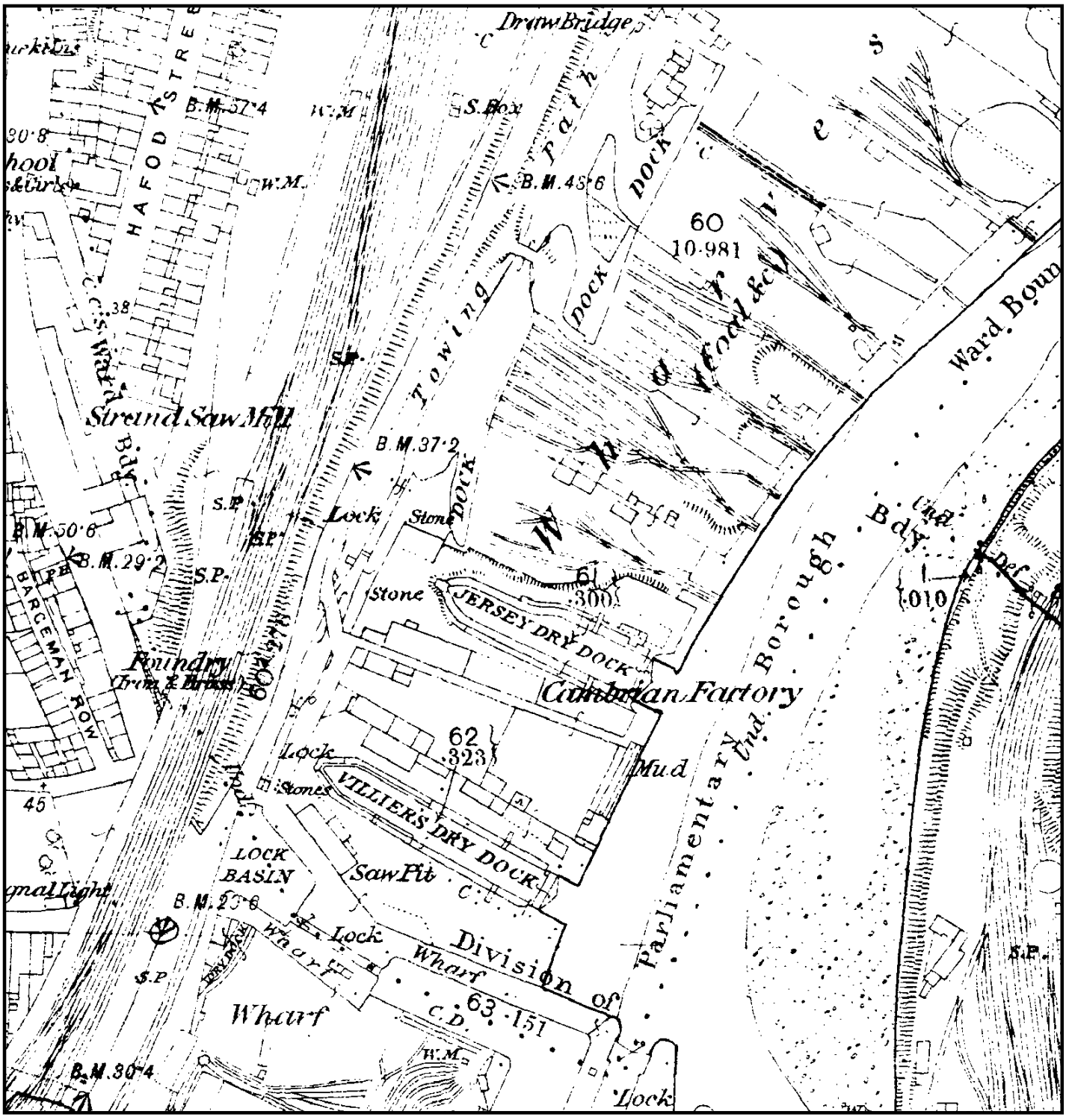
Industries clustered close to the navigable lower reaches of the Tawe from where ore supplies were delivered to the works and finished products could be transported. There was a river dock at White Rock as early as 1737 and there were many others by the late nineteenth century. From the other direction, coal was at first transported from mines further inland to the river and then to the works by road, tramroad and railway. In the seventeenth century, coal was brought by road from Llansamlet to a quay at White Rock. By the 1750s, an early railway linked the coalfield with the three copperworks at White Rock, Middle Bank and Upper Bank, which was developed by the entrepreneur associated with two of these works, Chauncey Townsend. There was another early railway in Cwm Burlais, which brought coal from collieries at the head of the valley for both export and use at the Cambrian Copperworks.[23]

The docks at White Rock were first established in the eighteenth century (© Crown Copyright: RCAHMW).

At the end of the eighteenth century the construction of the Swansea Canal enabled the efficient transport of coal in greater quantities, which stimulated the expansion of production in new works conveniently sited between canal and river. The canal was promoted as an agent of economic improvement in an area which was 'little cultivated, owing to the want of public roads and water carriage. The whole extent of the value and adjoining country abounds with limestone, iron ore and coal in almost inexhaustible quantities which have been but little worked … but are capable of being brought into full effect by the proposed canal.'[24]

Development of the canal was initially vexed by arguments over where goods should be transhipped, with some promoters and the Swansea Corporation wanting wharves close to the river mouth, and others wanting the canal to meet the river at Landore. A short length of canal — sometimes known as Morris's Canal — had already been built with an outlet to the river at Landore in 1784. This was eventually incorporated into the Swansea Canal, though remained under separate control for a time. An Act of Parliament authorized the main canal in 1794; the first section opened in 1796 and the rest opened fully in 1798.

The Swansea Canal as it passed through the Hafod works, 1931 (City and County of Swansea: Swansea Museum).



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The terminus of the Swansea Canal at Swansea North Dock, as depicted on the first edition Ordnance Survey map of 1876.

There were extensive wharves associated with the transhipment docks, which were located immediately north of the mouth of the Burlais Brook. With the creation of the North Dock in 1852, the tidal docks were superseded by a lock directly into this new dock.

The canal was an immediate success, stimulating a flurry of activity along its banks. In 1801, a visitor walking along the canal from Morriston to Swansea found the walk 'pleasant, amusing and instructing; a busy scene the whole way. The potter, iron, copper and other works and manufacturers succeeded each other with immense coal wharfs and barges constantly passing up and down through the different locks.'[25] In 1823, another visitor to the canal observed 'at present carrying on, eight large

copper houses, collieries of binding coal, culm and stone, a copper rolling mill, a brasswork, a large tin work, an iron forge, two iron furnaces an iron foundry, two potteries and a brewery.'[26]

Connections between the canal and sources for the supply of raw materials were as vital as its link to sea-going navigation and, under the terms of its Act of Parliament, public railways could be built to serve it to a distance of 8 miles (13km).

Meanwhile, on the east bank of the river, a short canal had also been built. This was Smith's Canal, built in 1783–84 to replace an earlier wagonway or tramroad for the transport of coal to the river wharves. It also supplied coal directly to the White Rock Copperworks from collieries at Llansamlet. This it did in style, since the canal passed through the site in a tunnel, with side openings enabling the delivery of both water and coal to the works. The canal was 3 miles (4.8km) long and had a terminus at Foxhole, opposite the Swansea Canal wharves. In 1816, it was paralleled in part by a tramroad (Scott's Tramroad). Although the canal was well used for a time to transport coal, it may not have survived for long after the opening of the Swansea Vale Railway, which incorporated Scott's Tramroad in 1845.

Coal was transported from Llansamlet direct to the White Rock Copperworks on Smith's Canal, which passed through the site in a tunnel (© Crown Copyright: RCAHMW).

Entrance to the canal tunnel at the White Rock Copperworks site (© Crown Copyright: RCAHMW).

The Landore viaduct was built in 1850 to carry the South Wales Railway across the valley of the Tawe (© Crown Copyright: RCAHMW).

As a trunk route, the Swansea Canal also soon faced competition. In the 1850s, main-line railways arrived in the Swansea Valley. The first of these was the South Wales Railway (later absorbed by the Great Western Railway), which ran from Chepstow to Swansea and crossed the valley at Landore immediately north of the study area. The principal route was authorized by an Act of Parliament in 1845 and a second Act quickly followed authorizing its extension into the heart of Swansea (High Street Station). The railway opened in 1850 and was connected to the Great Western Railway at Chepstow in 1852. In the same year, the line was extended from Landore to Carmarthen and a branch for goods traffic only was opened to Swansea Docks. A further branch to the South Dock was built by the harbour trustees and leased to the South Wales Railway in 1862, before it was absorbed by the Great Western Railway (GWR) in 1865.

The South Wales Railway was to be fed by mineral lines, including the Vale of Neath Railway (1851) and the Swansea Vale Railway. The latter was 'designed to open that important district, now imperfectly served by a canal.'[27] It had originated as a local tramroad (Scott's Tramroad) taking coal from Scott's Pit near Birchgrove to river wharves at Foxhole in 1816. In 1852, it opened a mineral railway to collieries at Graigola. It was extended to Ystalyfera in 1859 and Ystradgynlais in 1861, with a branch to Brynamman in 1864, thus penetrating deep into the coalfield. This line was absorbed by the Midland Railway in 1874, providing it with a route to Swansea Docks. Part of the line survived at Pentrechwyth and was run as a heritage railway until 2007 but was then redeveloped.

The canal was integrated into the railway system when it was bought by the Great

Western Railway in 1873. The Great Western Railway operated it successfully until the 1890s, but it was abandoned by successive Acts of Parliament between 1928 and 1962, and was last used for commercial traffic in 1931. Most of the route was filled in and some sections were absorbed in new road development. In the study area, the line survives through the Hafod–Morfa complex, but has been obliterated elsewhere.

In the twentieth century, the strategic role once played by the canal and the railways was taken on by roads. The Lower Swansea Valley Project found 'an area shredded by inadequate roads and tracks, railway lines, the abandoned canal and the River Tawe, used only for dumping effluent.'[28] Since then, an upgraded road on the east side of the river and a new river crossing (the cross-valley link road), which cuts across the sites of the Middle Bank and Hafod–Morfa copperworks immediately north of White Rock to link with the new A4067, have radically altered the pattern of movement and the landscape as a whole. A further relief road is planned, parallel to Neath Road, linking Morfa Road with the roundabout immediately south-west of the Liberty Stadium.

Top: Railways were also important for transport around the copperworks: this railway turntable was one of the features exposed during excavations at Upper Bank in 2007 (© Crown Copyright: RCAHMW).

Above: The line of the Swansea Canal is still visible as it passes through the Hafod–Morfa complex (© Crown Copyright: RCAHMW).

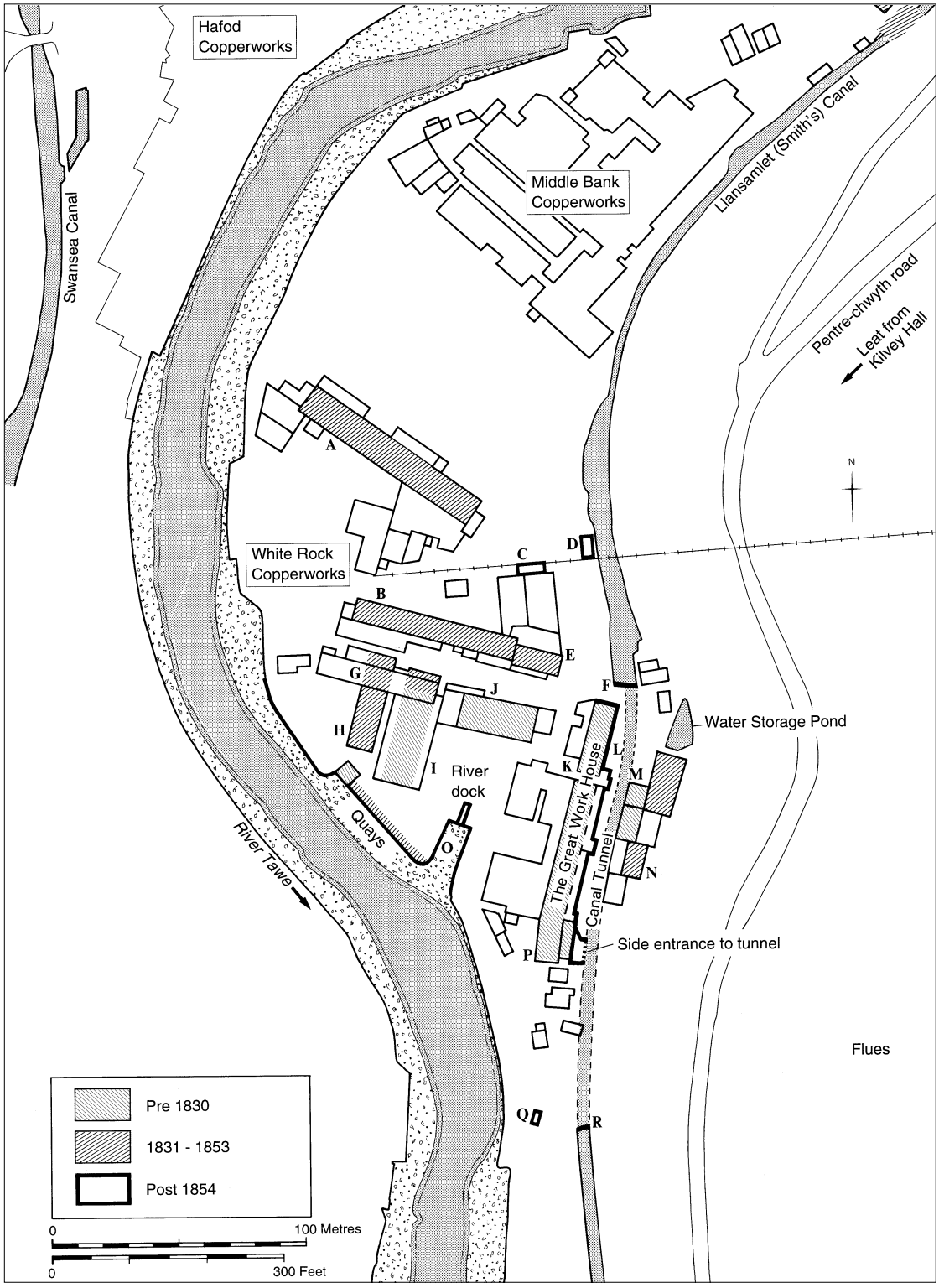
Right: Modern roads have radically altered the pattern of movement in the river valley (© Crown Copyright: RCAHMW).

White Rock and Upper Bank copperworks, as depicted by Henry Gastineau, 1830 (City and County of Swansea: Swansea Museum).

The Copperworks

By the end of the eighteenth century, the lower Swansea Valley was becoming established as the world centre of copper smelting and the 'Welsh method' of smelting was already commanding attention. It consisted of a series of calcinations of copper ore in reverbatory furnaces, alternating with treatment in smelting furnaces before roasting and refining. The complexity of the process was remarked upon by John Evans in 1804[29] and was described in considerable detail in later accounts.[30] From start to finish, the process of copper production had its own spatial requirements which were met in a variety of ways at different works. Fundamental was sufficient land to accommodate the complexities of the production process and associated storage, as well as the waste, access for raw materials and labour, and transport for finished goods.

The Hafod works and the ruins of the White Rock works in the 1960s (© Crown Copyright: RCAHMW).



A plan of the works at White Rock, showing principal phases of development (© Crown Copyright: RCAHMW).

White Rock

The earliest works in the study area are White Rock, established in 1737 on land leased from Lord Mansel. Here, the original smelting hall (known as the Great Workhouse) was a long, narrow range at the eastern edge of the site. Raw materials were originally delivered by road, later by tramroad and then by canal, which ran in a tunnel immediately adjacent to the eastern wall of the smelting hall. Side openings in the hall enabled water (previously supplied by leat) and coal to be delivered direct from the canal. Ore was brought by river and there were wharves and a dock at the southern end of the site from a very early stage, which gradually expanded around the western perimeter of the site through the eighteenth and nineteenth centuries.

The site of White Rock Copperworks from the air in 2005 (© Crown Copyright: RCAHMW).

As the site expanded, additional calcining and smelting halls were built close to the dock and quays, at right angles to the Great Workhouse. By 1830, the main buildings roughly formed three sides of a square. The Great Workhouse was the eastern range and there were additional smelting halls to the north and west. Waste was initially deposited within the site, which raised the ground level above the river, but tips were later established on the lower slopes of Kilvey Hill. The waste was transported to the new tips by an inclined plane. White Rock probably did not have a rolling mill at first because its copper was taken to mills in Bristol for finishing, but there is some evidence of limited rolling taking place on the site by the early nineteenth century.

A track from the northern end of Foxhole provided access to the site for people and goods arriving by road.[31]

Ruined structures at White Rock Copperworks, around 1980, including the Great Workhouse (© Crown Copyright: RCAHMW).

Above: Former smelting sheds at Upper Bank (© Crown Copyright: RCAHMW).

Middle Bank and Upper Bank

The Middle Bank and Upper Bank works of the 1750s were also largely concerned with smelting, though rolling mills were added in the nineteenth century. Middle Bank was established by a London entrepreneur, Chauncey Townsend, on a 4-acre (1.6ha) site leased from the Mansels, along with an additional 15 acres (6ha) on which clay for bricks was to be dug. Although Chauncey Townsend already operated coal mines on the estate at Llansamlet and was shipping coal from wharves at White Rock, the lease stipulated that only coal from Mansel lands was to be used at the works.[32] Townsend had interests in non-ferrous metal mines in mid-Wales and he established the Upper Bank works to smelt lead and zinc. Copper smelting was introduced later in the eighteenth century. Both works were owned by the company of Williams and Grenfell in the early nineteenth century.[33]

These works were sited precisely on a strip of land between the inland transport route (wagonway, tramroad and canal) that brought coal from Llansamlet and the seaward route for ore and the despatch of the finished product from docks on the river. The Middle Bank works adopted the form pioneered at White Rock and Llangyfelach in which smelting furnaces were contained in large halls. By 1771, it had five main ranges, with the largest (and probably the

Right: Excavations in 2007–08 exposed the extensive remains of the copperworks at Upper Bank (© Crown Copyright: RCAHMW).

earliest) laid out across the hillside, parallel to the tramroad for the convenient delivery of coal. Lateral ranges ran from this towards the river and also probably housed smelters. Copper from Middle Bank was mostly taken to rolling mills in the Greenfield Valley in Flintshire, but some rolling may have taken place on the site by the early nineteenth century.[34] Something of the complexity of the layout at Upper Bank was revealed in excavation work in 2007–08, but the most enduring structure here is the large smelting hall at right angles to the river.

A track down from the village of Pentrechwyth appears to have been the main access to both sites for people.

Hafod

The Hafod works of 1808–09 was planned functionally from the outset. It had a large smelting hall laid out parallel to the river wharves beyond an extensive storage yard for copper ore and at right angles to the canal. The storage yards were important because it was here that ores from different sources were piled and mixed — the mix was deemed to be one of the reasons for the success of the industry.

Coal was brought to the smelting hall by railway from the canal docks at a slightly higher level. Railways ran along the rear of each row of furnaces and slag was also removed by railway to tips at the north-east of the site. This tip was so high that by 1826 it needed a steam-powered winding engine to haul waste wagons to the summit. In 1865, it was superseded by a new tip to the west (on land which had formerly been part of Pentre Mawr Farm) and connected to the site by an inclined plane. The top of the original tip then housed sulphuric acid chambers, which were introduced in an attempt to reduce pollution.

The Hafod works in the 1860s (© Crown Copyright: RCAHMW).

As the site expanded in the early decades of the nineteenth century, further smelting halls were added adjacent to the original hall, both at right-angles to it and parallel. By 1814, Hafod also had a rolling mill, close to the river to the south-east of the site. Other rolls were added in the 1840s, and this area of the site remained in use for rolling into the twentieth century. The surviving rolls, adjacent to the 1910 engine house, lie to the south-west of the original hall.[35]

There were major phases of redevelopment in the 1860s and again in the early twentieth century, but the site proved limited for the scale of operations housed here and was 'hopelessly cluttered and crowded' by 1924, with buildings occupying virtually the whole area.[36]

Above: The two surviving engine houses at the Hafod works in 2013 (© Crown Copyright: RCAHMW).

Right: The surviving remains of the Hafod and Morfa copperworks in the 1990s (© Crown Copyright: RCAHMW).

Access to the site for people was via a lane running from Neath Road at the northern end of Trevivian, which originally crossed the canal on a stone-arched bridge.

Morfa

The Morfa Copperworks began life in 1828 exclusively as a rolling mill, but smelting was also underway here by 1835. The works were established on 15 acres (6ha) of land leased from the duke of Beaufort and the freehold of another parcel of land which was acquired from another landowner. There were river docks from the outset and the original rolling mill was sited at the western boundary of the site, parallel to the canal. It was rebuilt in 1840 and this successor survives substantially intact.[37] The works expanded eastwards across the site, with tipping on site to the north until a new area on the east bank of the river to the north of the Upper Bank works was made available in 1909. This was linked to the site by rail carried on a bascule bridge across the river.

Access to the site was via two lanes from Neath Road, which originally crossed the canal on cast-iron bridges.

Top: The site of the river docks at Morfa in the 1980s (© Crown Copyright: RCAHMW).

Above: Site of the entrance to the Morfa works (© Crown Copyright: RCAHMW).

Left: A lifting bridge built in 1909 linked the Morfa works on the west bank of the river with tips on the east bank (© Crown Copyright: RCAHMW).

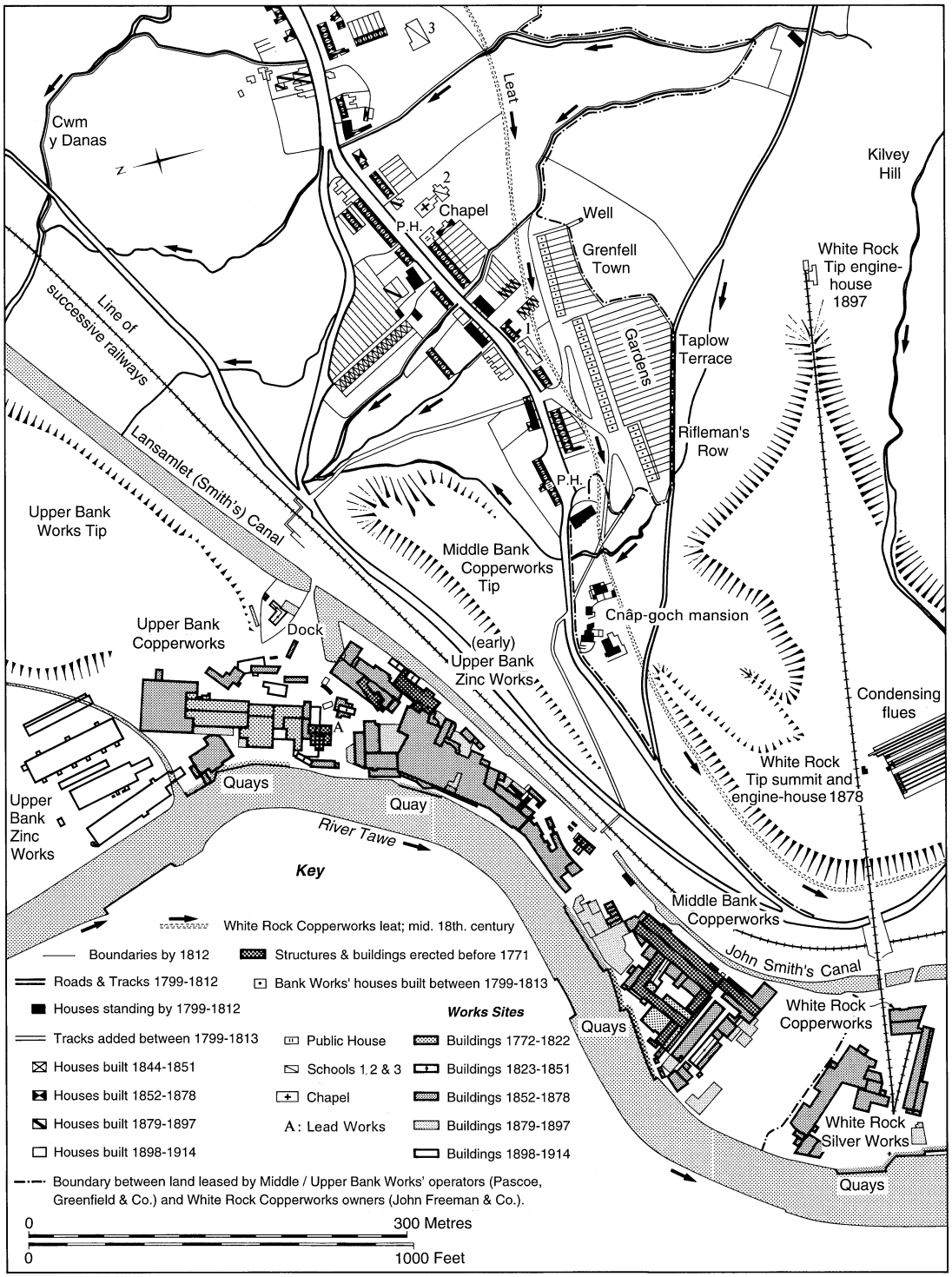
Industrial Settlements

The corollary of rapid industrial growth during the nineteenth century was the rapid expansion of settlements from which workers were drawn. The early copperworks employed relatively few people — there were 55 at White Rock in 1755, for example, but by 1886, the Hafod works had a workforce of 1,000. The proprietors of all of the copperworks in the study area took some responsibility for the provision of housing, possibly because decent accommodation was an incentive for loyalty amongst a skilled labour force in a competitive environment.

The area was sparsely populated as late as the 1840s, though by this time the Vivians had started on the development of Trevivian. On the east bank of the river, the Grenfells had already completed significant housing development. Before these decisive planned interventions in housing provision, the pattern had been much more haphazard. The 1844 tithe map for the parish of St John-juxta-Swansea shows something of this with rows of cottages in tiny plots along the old road from Llangyfelach, which continued down Cwm Burlais. Only a remnant of this pattern survives in the little rows of houses at the western end of Pentre Mawr Road.

Small cottages on Pentre Mawr Road are amongst the oldest surviving industrial houses west of the river (© Crown Copyright: RCAHMW).

One of the long rows in the small planned settlement of Grenfelltown (© Crown Copyright: RCAHMW).



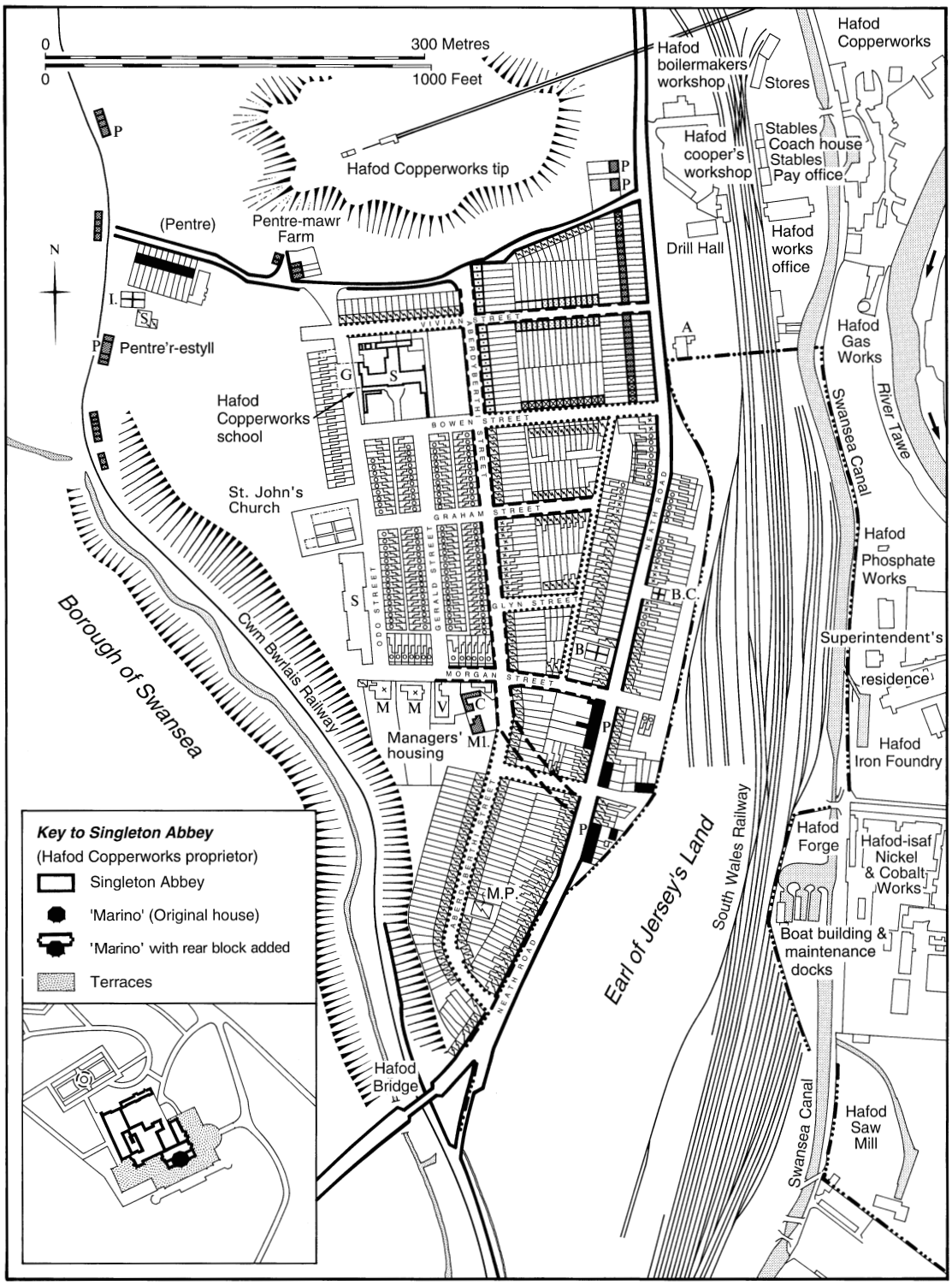
Grenfelltown was established as a planned settlement between 1803 and 1813 (© Crown Copyright: RCAHMW).

There was probably a similar pattern on the east bank, which was particularly inaccessible for the people of Swansea, where workers at the White Rock Copperworks developed the settlement of Foxhole piecemeal. There was probably also scattered housing at Pentrechwyth strung out along the road beneath Kilvey Hill.

The first planned settlement in the study area was on the east bank of the river where, between 1803 and 1813, Grenfell and Williams, the proprietors of the Middle and Upper Bank copperworks, began to develop Grenfelltown. Forty houses were built in three staggered terraced rows. The Grenfells were later responsible for further building here and at Foxhole, where (on land given by the owners of White Rock) they funded a school in 1806. This was enlarged and divided into schools for girls and boys in 1839 and 1842. A church was also provided in 1842 and an infants' school was built at Grenfelltown in 1839.

West of the river, the planned settlement of Trevivian was begun around 1837. The 1844 tithe map for the parish of St John-juxta-Swansea records its progress to that date. It shows two rows of houses on Neath Road flanking what was to become Vivian Street, where there were two other rows. The map also shows a schematic layout of streets with dotted lines marking the projected positions of Aberdyberthi Street, Graham Street and Morgan Street.

By the late 1840s, Thomas Williams commended this settlement in glowing terms: 'grouped into streets and villages ample in room, sound in structure, floored with dry brick, roofed with tile and ceilinged, partitioned into convenient apartments, supplied with all the requirements of a civilized life, they offer to the miner and the copper smelter… a house, attractive by its cleanliness, soothing by its comforts, and ennobling by its independence.'[38]



A plan of Trevivian showing the main phases of development (© Crown Copyright: RCAHMW).

Key to Trevivian Map

- Existing pre-settlement roads
- 'Trevivian' roads laid out by 1844
- Roads added 1845-1867
- Roads added 1868-1897
- Boundary of Vivian land in 1844
- M — Managers' houses — M1. Main manager's house
- S — Schools — G. Original garden
- Chapel buildings
- Anglican church building — Planned extensions
- V — Vicarage
- A — Possible temporary school 1844-1846
- P — Public house
- B — Philadelphia Baptist Chapel (seats for 800)
- I. — Siloam Independent Chapel
- B.C. — Bible Christian Chapel
- C — Coach house (main manager)
- Pre-1837: Buildings on the Vivian's Hafod Estate pre-dating Trevivian.
- 1837: First workers' houses built by Vivian
- Hafod Copperworks schools 1846-1847 & 3 teachers houses.
- Built 1838-1844
- Built 1845-1848
- Built 1849
- Built 1850-1867
- Built 1868-78
- Built 1879-1896
- Built 1897-1914
- Built 1914
- M.P. Missionary Chapel/Sunday school of Mount Pleaseant Baptist Chapel

Neath Road, Trevivian (© Crown Copyright: RCAHMW).

The houses here were described as being of two classes: one was two-up two-down and the second had two good rooms, a parlour, kitchen and passage on the ground floor, with three rooms upstairs. These houses were depicted as being lofty and well lit. Development continued in several phases. There were 94 houses here in 1861, but the settlement did not extend beyond the west side of Aberdyberthi Street until 1879.

Odo Street was laid out in 1879–80, but its west side was not developed until about 1897–1914.

The Vivians provided a large school, built 1847–48, which comprised separate accommodation for boys, girls and infants; teachers' houses were also incorporated. The Vivians also contributed substantially to the cost of St John's church, 1878–80.

The former school at Trevivian was built 1847–48 (© Crown Copyright: RCAHMW).

Below: The church of St John was built between 1878 and 1880 (© Crown Copyright: RCAHMW).

Houses on Field Street were amongst several provided for workers at the Morfa Copperworks (© Crown Copyright: RCAHMW).

Meanwhile, by the 1870s, the settlement had expanded onto land belonging to the earl of Jersey on the east side of Neath Road (land which had formed part of Hafod Farm). Ownership here is indicated by the street names — Earl Street, Jersey Street, Villiers Street and Vernon Street.

Accommodation was also provided for workers by the Morfa Copperworks Company. This probably numbered some 40 houses on land to the west of Neath Road, which had been acquired by the company in1838. The original development was probably along Neath Road; the short streets running back from it post-date the railway of 1850 (Field Street and Tabernacle Street). Despite losses along Neath Road, this is still a coherent area.

Although these settlements owed their existence to the copperworks in the first place, they were not exclusively tied to these works. At Trevivian in1861, for example, it has been estimated that 59 per cent of its population worked in the copperworks and others were general artisans, craftspeople, retailers, etc. There was also a small percentage of professionals — agents, managers and teachers.[39]

The area was home to a growing number of commercial businesses, particularly during the 1850s, 1870s and 1880s. This gives a measure of its vibrancy, even after the copper industry itself had started to decline. A sign of the growing prosperity of the Hafod area was the presence of more and more businesses selling luxury goods or services. These included watchmakers, hairdressers and newsagents.[40]

Above: A ruined landscape: the site of White Rock around 1980 (© Crown Copyright: RCAHMW).

Right: A waste tip at White Rock (© Crown Copyright: RCAHMW).

'Renewing the Acres Spoilt By Man': Degradation and Regeneration[41]

'the cold chimneys dotting the valley floor like hideous stalagmites, men's dead mountains so foul that scarcely a weed grew'[42]

With growing recognition of the importance of the heritage of copper to Swansea, it would be easy to lament the loss of so much of the tangible evidence of that heritage in twentieth-century reclamation and redevelopment work. The scant remains at White Rock — impressive as they are — the former rolling mill, canteen and laboratory buildings at Morfa, and the Hafod engine houses are only tiny fragments of what

was once there. New roads, retail and business parks and the stadium now occupy the sites of industries which were of world significance. But even in their heyday, these industries created what was in many respects a toxic environment.

As early as 1812, the devastating impact of industry on the landscape could be observed: 'about a mile or two towards the entrance of Swansea, the appearance is frightful, the smoke of the copper furnaces having entirely destroyed the herbage; and the vast banks of scoriae (slag) surrounding the works, together with the volumes of smoke arising from the numerous fires, gives the country a volcanic appearance.'[43]

This was to be a recurring theme in visitors' descriptions of the valley. 'The scene is widely different in open day from that which was presented at night. There is no beauty now, and little of the picturesque. The first impression, indeed, the mind is apt to receive, is that of a sense of painful weariness. Hundreds of chimneys — we speak literally — are vomiting forth that white, peculiar-looking, and unmistakeable vapour called copper-smoke. Enormous masses of that ugly, black, siliceous refuse, known in the smelting vocabulary as slag, is piled above and around in such quantity as to change even the physical appearance of the country.'[44]

'At night the Swansea valley forms no bad representation of the infernal regions…. Large groups of odd chimneys and rickety flues emit sulphurous arsenical smoke, or pure flame. A dense canopy overhangs the scene for several miles, rendered more horrible by a peculiar livid glare.'[45]

'From whatever direction the traveller approaches the town, he will be struck, even at some miles distance, by the appearance of a heavy vapour eternally brooding over it; a strange blot on so beautiful a scene; — dull, dark grey, tinged with red by day, and by night like a mass of smouldering, lurid smoke, rolling off from some tremendous conflagration, and blasting the vegetation for miles around.'[46]

These were images born from success. In their decline, these industries blighted the landscape with acres of waste and dereliction. 'There is a great deal which is not romantic in the slightest degree which blights and degrades the environment in which so many live their lives. Industrial wastelands are a visual affront, dangerous to life and health, and contribute to depopulation and outmigration in those very development areas where the government is trying to entice people and a deterrent to industry that can contribute to continued decline.'[47]

For decades, little could be done to address the problems caused by industrial decay. The provisions of the Special Areas Act of 1934 did not apply to Swansea and, after the Second World War, there were other redevelopment priorities, including the docks and the reconstruction of the 20 acres (8ha) of the city centre which had been blitzed in 1941. The borough was so large that development opportunities could be found elsewhere without the need to tackle the significant issues of reclamation presented by the lower Swansea Valley's blighted landscape.

It was through an initiative originating in University College, Swansea that progress was eventually made in the 1960s, with the establishment of the Lower Swansea Valley Project. In collaboration with the local authority and the Welsh Office, and with funding from the Nuffield Foundation, a multi-disciplinary project investigated many different aspects of the physical and socio-economic environment of the valley. Their aim was to 'bring the area back into the natural stream of social and economic use', by examining obstacles and how to remove them, and identifying opportunities for immediate practical action.[48]

The study found vast acres of dereliction in an area awkwardly subdivided by a mesh of railway lines and waterways, with a transport network that 'hampered the efficiency of existing industries, inhibited the prospects for redevelopment and isolated some residential areas from central Swansea.'[49] Transport was one of the key areas of the study and it looked at the scope for improving rail, road and even river traffic. In the final blueprint published in 1967, the transport study recommended a cross-river bridge link, filling in the canal, a comprehensive new road network for the valley floor, and a widening of the roads of the valley sides.[50]

Bottom: Ruins among greenery: the site of the Hafod works in 2011 (© Crown Copyright: RCAHMW).

Below: Redevelopment on the site of Upper Bank Copperworks began in 2007–08 (© Crown Copyright: RCAHMW).

However, the study also found communities which were viable, even perhaps vibrant. 'A typical nineteenth century street has a tip at the end epitomizing the close connection of houses and industry. The west side is now almost a continuous urban area, although the east still appears as a series of villages, connected by pre-1919 ribbon development. Beautiful at night, when the darkness mercifully hides the debris, and yellow and white lights twinkle and float above the chains of orange lights which glow in the valley below, daytime reveals the confused development. The hillsides are an extraordinarily patchy mixture of bits of terraces, odd detached houses, waste ground, tin shops and disused quarries. Many of the roads are unmetalled and unadopted… Above all this, the great stone-built chapels, so typical of all Welsh towns, stand out as a tribute to the strong community life and the enduring faith of the nineteenth century inhabitants.'[51]

The valley was home to between a quarter and a third of the borough's total population and 60 per cent of its housing stock was pre-1919. Its demographic and socio-economic profiles were not dissimilar to those of other parts of the borough. The study recommended the adoption of an area-based approach to renewal to enable the retention of existing housing stock where possible, but also to introduce new residential development into the valley floor areas that had formerly been dedicated to industry.

As far as the problems of dereliction were concerned, some immediate practical action was set in hand. An ambitious programme of tree planting was initiated, where the land surface would permit. The Territorial Army was brought in to help demolish derelict factories, including the White Rock Copperworks, with its 'oddly elegant arches.'[52]

Beyond this immediate action, the report's recommendations pointed towards a master plan for the reuse of land for a variety of purposes including recreation. It identified options for implementing this comprehensive approach to redevelopment by unifying ownership of derelict land. Swansea City Council did begin to acquire areas of derelict land, including White Rock, which was reclaimed between 1967 and 1975. In the final phase of work here in the late 1970s, the industrial archaeology park was created. The council also acquired the sites of the Hafod, Morfa, Upper Bank and Middle Bank works during the 1970s. Following a development study in 1993, the park-and-ride scheme was initiated at Hafod–Morfa.[53] The site of Middle Bank was used as part of the cross-valley link road and Upper Bank was earmarked for redevelopment, which began in 2007–08. Other developments included the Morfa Retail Park and Liberty Stadium, built in 2006 on the site of an earlier athletics stadium which had been an outcome of the Lower Swansea Valley Project.

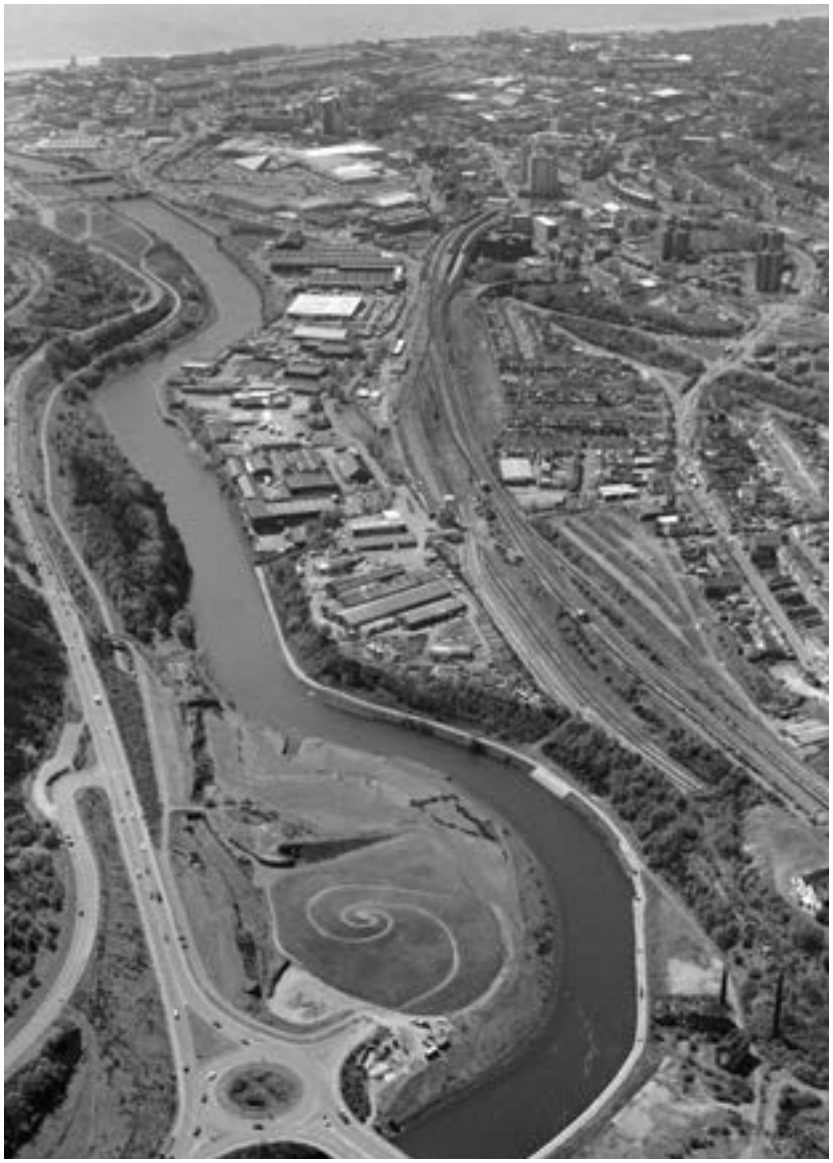
Historical Topography

The natural topography of the area comfortably supported the development of an urban industrial landscape and provided some of the pre-conditions for its growth, strategically situated as it was between the coalfield and the sea. In its lower reaches, the River Tawe cut through a range of hills, with a belt of low land on either side of the river that provided ample space — at least initially — for the accommodation of the copperworks and their associated settlements.

Industrial activity made good use of this topography. The copperworks were located on the flatter land, serviced on the landward side by transport routes dependent on manageable gradients (canals and railways), and on the seaward side from docks and wharves on the river banks. The slight fall towards the river could be exploited in the layout of the works, enabling the more efficient handling of materials.

But industrial activity also swiftly modified the natural topography. By the 1830s, the river had been deepened 'by confining its course with high banks of copper dag'[54] as the copperworks all tipped their waste on site at first. In 1852, the entire course of the river as it flowed towards the sea was modified by the New Cut to facilitate the creation of docks in its original course. On land, too, the original contours were modified by industrial activity, particularly by tipping. The vast waste heaps associated with the copperworks were dominant features until their removal in twentieth-century land reclamation schemes that once again re-profiled the landscape.

The provision of housing was a necessary adjunct to the works, but it occupied those areas that were less immediately amenable for industrial activity, in particular the steeper slopes of the valley sides. There was a striking distribution of land use on both sides of the river: the works occupied a corridor on each side, flanked first by a transport corridor with canal, railway and roads, then by a strip of settlement — albeit broader and more densely developed on the west bank.



An aerial view of the valley showing the clear differentiation of land use in a linear development pattern (© Crown Copyright: RCAHMW).

It was only with the demise of industry by the middle of the twentieth century that this historical division could be partially severed. It was one of the recommendations of the Lower Swansea Valley Project that residential and recreational development should be permitted on land that had formerly been in industrial use. Planning policies in the late twentieth century and early twenty-first centuries have begun to implement this different pattern, most notably with the redevelopment of the former Upper Bank works for residential use and with construction of the retail park and stadium.

Housing built on sloping ground beyond the works and main transport routes on the west bank of the river (© Crown Copyright: RCAHMW).

Right and below: Housing stepped to accommodate sloping ground at Grenfelltown (© Crown Copyright: RCAHMW).

The natural topography combined with these historical patterns of land use lent distinctive character to the area and divided it up into distinct zones. The river connected places, but it also separated them. There was no bridging point below Morriston, apart from railway bridges, until the late nineteenth century and the White Rock Ferry was the only ready pedestrian access.

The Swansea Canal and Smith's Canal, the tramroads that were linked to them, and the railways that ultimately supplanted them were also important connectors between places, though perhaps more important over a distance than within the area. They existed primarily for the transport of raw materials and goods, rather than people, though both the Swansea Vale Railway and the Great Western Railway ran passenger services and there were stations at Upper Bank and Landore. There were only limited local links across the transport corridor in the form of over-bridges that enabled historical routes (and some new ones) to continue.

The works themselves each had a topography of their own. Each was contained within definite boundaries, probably demarcated by a wall, each with limited points of access, and with an organization of land use that worked with the shape of the land as far as it was possible to do so. All works in the area had strong connections with transport routes, whether canal, river or rail. Each of the major works also had strong connections with a particular area of settlement to which it was linked by road, path or track. Much of this distinctive topography has been lost or eroded by recent change, but the pattern of holdings on the Morfa Industrial Estate retains something of the sense of distinctive compounds. Also, some of the access routes and other features can still be traced at the Hafod and Morfa works.

By the mid-twentieth century, when the rationale for these land-use patterns had come to an end, the area seemed 'shredded by inadequate roads and track, railway lines, the abandoned canal and the River Tawe, used only for dumping effluent'. 'The criss-cross of railway lines, canal and waterways divided the whole area into a series of small, awkwardly shaped sub-areas.'[55] Not only were changes in the general distribution of land use introduced, but there were also radical changes in the ways in which the area was connected. The canal, perceived as redundant, was partially filled in and its corridor taken for development; a new river crossing and new roads were built. Although the road network has provided improved connectivity over greater distances, to some extent the area is now again shredded by these new transport arteries at the expense of local connections.

The copperworks originally occupied compounds with definite boundaries, like this wall surviving at the former Morfa works (© Crown Copyright: RCAHMW).

The Character of Building

Above: Linear settlement following a main route at Pentrechwyth (© Crown Copyright: RCAHMW).

Housing

Settlement Patterns

Each copperworks had a settlement closely associated with it. Although there are occasional remnants of informal settlement and linear development along principal routes (most notably at Pentrechwyth), several of the copperworks companies introduced the formal provision of housing in planned layouts and these still dominate settlement patterns.

Although the first planned settlement in the Swansea Valley was at Morriston (1778), the earliest in the study area was the three terraced rows of Grenfelltown, with its symmetrical staggered layout. But it was the development of Trevivian from the late 1830s which marked the introduction of formal planning on an altogether larger and more ambitious scale. A whole neighbourhood was laid out on a grid pattern of streets that cut across inherited boundaries.

Development throughout the area proceeded steadily through the nineteenth century, but the decline of the industrial base is clearly seen in

Right: Trevivian from the air, showing the grid pattern of development (© Crown Copyright: RCAHMW).

the virtual absence of twentieth-century housing. It was only from the end of the twentieth century that significant new housing projects were initiated in the area, but because these were largely on former industrial or waste land, the nineteenth-century housing stock has remained substantially intact.

Development Patterns

Although the proprietors of the works assumed a general responsibility for housing provision, the houses themselves were not necessarily built directly by them. At Trevivian, early housing for key workers may have been the direct responsibility of the Vivians, but most of the settlement was developed through building leases. The streets were developed in small plots of no more than six houses and typically of only two or three.

We can see Neath Road being developed from the late 1830s, Aberdyberthi Street from 1858, and Bowen Street and Graham Street in the 1850s and 1860s. By the 1880s, much of the building activity on Aberdyberthi Street was undertaken by a single builder, though still in relatively small plots. The same builder was responsible for much of Gerald Street and some of Odo Street in the late 1880s and 1890s.[56]

The housing associated with the Morfa works was probably provided on a similar basis. Elsewhere, the typical pattern of short terraces also suggests that building leases were widely used.

Terraced housing at Trevivian: Neath Road (top), developed from the late 1830s; Aberdyberthi Street (above), 1880s; Odo Street (right), 1890s (© Crown Copyright: RCAHMW).

Below and right: Housing renewal has introduced a uniformity to the housing stock, masking its historical variety (© Crown Copyright: RCAHMW).

These development patterns — in which many hands were involved — probably accounted for a degree of variety in the detail and finish of the houses, which has been lost in the uniformity imposed by modern housing renewal. Photographs taken before the housing renewal work took place show an untidy variety of detail and finish. This may not all have resulted from piecemeal change after building, but may have been part of the character of the settlements from the outset.

Patterns of Change

Whatever variety there may have been in the character of building at the outset has probably been exaggerated by subsequent change. Detailed study of some of the housing has revealed the extent of rebuilding and modification. For example, the terraces at Grenfelltown display the character of later nineteenth-century enlargement rather than their original early nineteenth-century character. The same appears to be true for some of the Trevivian houses.

As a result, we no longer have a complete surviving picture of the development of housing in the nineteenth century. Studies of industrial housing in the Swansea area show that the baseline for urban housing was the one-up one-down terraced house. A development of this basic model saw the introduction of a catslide rear roof, which created a deeper plan that could accommodate a small rear kitchen and a second bedroom. In Morriston, from the late eighteenth century, there are also double-fronted houses, some of which also had a catslide rear roof.

The earliest houses at Trevivian were single-fronted with catslides and a two-room plan. From the 1860s, houses were built to a similar plan, but with a symmetrical roof and full-height rear rooms (Bowen Street, for example). It became increasingly common to provide houses with three bedrooms, at first accommodated within a traditional simply planned dwelling (as in the stepped terrace at Grenfelltown, built between 1851 and 1877) then by the provision of gabled wings split between adjacent dwellings. Some of the earlier houses were probably adapted to provide this improved accommodation.[57]

In the light of the findings of the Lower Swansea Valley Project, considerable resources were invested in ensuring that the established settlements could be sustained; renewal, rather than replacement, has remained the order of the day, and there have been relatively few losses, apart from the Neath Road area to the north.

Two phases of house planning at Trevivian (© Crown Copyright: RCAHMW).

Terraced housing at Grenfelltown (© Crown Copyright: RCAHMW).

The Profile of Settlement

The development of different types of house during the various phases of building in the nineteenth century introduced some variety into the housing stock, but the area is overwhelmingly dominated by small terraced houses within which there are small variations in size and scale. Larger houses are few and far between, and the industrialists themselves tended to live elsewhere. Some housing for managers was provided and some of this survives on Morgan Street, Trevivian. Otherwise, the settlements were remarkably coherent. Some variety was introduced by commerce: there were shops and public houses, particularly along Neath Road, but there was little that was purpose built rather than adapted from existing house types.

Settlements were punctuated by other building types, particularly schools and chapels, as well as St John's Church at Trevivian. The church was partly funded by the Vivians and was an ambitious design said to be modelled in part on the parish church in Truro (now the cathedral). The infants' school at Grenfelltown eventually became a church in the early twentieth century.

In practice, chapels, which pre-dated the establishment of Anglican churches, may have played a more important role in the life of the industrial communities. The community at Trevivian was initially served by a chapel at Pentre Estyll, on the old road from Llangyfelach (Siloam, rebuilt in 1864), and by Philadelphia Baptist Chapel. Philadelphia was a cause that originated in Greenhill, but was set up with a new building on Neath Road on land given by Henry Hussey Vivian in 1867.[58] A third chapel — the Trevivian Bible Christian Chapel — was built on the east side of Neath Road in 1873 on land also given by Vivian. This chapel has now been demolished, but Philadelphia, albeit reused and in poor condition, survives. Siloam closed in 2002 and has since been demolished following a fire. Philadelphia and Siloam were both built in a classical style featuring an open pediment and giant arch.

The former infants' school at Grenfelltown, reused as a church since the early twentieth century (© Crown Copyright: RCAHMW).

Philadelphia Chapel was built in 1867 (© Crown Copyright: RCAHMW).

Siloam Chapel was built in 1864, replacing an earlier chapel on the site. It closed in 2002 and has since been demolished following a fire (© Crown Copyright: RCAHMW).

The Congregational chapel at Pentrechwyth (© Crown Copyright: RCAHMW).

Above: Trevivian from the air, showing the school and church (© Crown Copyright: RCAHMW).

By far the most important building that resulted from the pioneering provision of schools by industrialists was the school at Trevivian. This was a large, rationally planned development incorporating three separate schools, each with its own playground, as well as accommodation for the teachers.

Building Materials

The production of copper generated materials that could be used in building. There are some documentary references to the use of copper slag: 'Immense quantities of this slag are cast into moulds for copings of walls, corners etc, and in this district, houses are occasionally constructed of it.'[59] It was said in 1830 that 'many of the houses of the commoner sort in the town and neighbourhood are constructed with copper slag cast into blocks.'[60]

But where walling material is exposed in local housing it is generally of Pennant Sandstone. Copper-slag blocks may sometimes have been used for quoins, but were more often used in boundary walls. Brick was often used for dressings and chimneys. There is little evidence for the original treatment of the walls. Limewash was probably the traditional finish. An early nineteenth-century description of the valley refers to 'the dismal gloom of the manufactories pleasantly contrasted by the whitened walls of their apendant villages.'[61] It may have still

Right: Pennant Sandstone was widely used as a building material (© Crown Copyright: RCAHMW).

been used in the 1840s and 1850s, when we might also expect to find some use of render or stucco. Render was widely used by the twentieth century, but isolated examples suggest it may have been introduced earlier. The best example of its use in the area is on the front of The Hafod Inn on Neath Road.

By the 1880s, the use of exposed stone is suggested by the higher quality finish displayed in the later housing on Aberdyberthi Street and Odo Street. Housing renewal has introduced a uniformity of finish with spar-dash render used to replace earlier renders. However, when the original finish was dressed stone — prevalent in the later decades of the nineteenth century — this has often been retained.

Copper waste did make its way into industrial buildings and structures. Cast copper slag was

Above: Render used to decorative effect in The Hafod Inn, Neath Road (© Crown Copyright: RCAHMW).

Left and middle: Copper slag as a walling material, or cast into blocks for copings, is a distinctive local material (© Crown Copyright: RCAHMW).

Copper slag as a walling material, or cast into blocks for copings, is a distinctive local material (© Crown Copyright: RCAHMW).

Left: Slag blocks in the entrance to the canal dock in the boundary wall of the Hafod works (© Crown Copyright: RCAHMW).

used extensively at Middle Bank Copperworks and in dock walls. A good example survives in the abutment that once supported the inclined railway from the Hafod works to the tip. There was also an attempt to produce bricks from crushed slag: examples of this survive in the Hafod locomotive shed and in the two engine houses, but it did not prove to be a particularly durable material and was not widely used.

Left and below: These abutments once supported an inclined plane (© Crown Copyright: RCAHMW).

Industrial Buildings

Very few industrial buildings survived the collapse of the copper industry and its associates in the twentieth century. Although the buildings that do survive are a disjointed series, they nevertheless give some capacity to understand several aspects of the organization of a copperworks. Academic and archaeological work has provided some background understanding, for example, on the typical form and layout of a smelting hall, which offers some context for what survives.

Across the area, there are surviving structures that clearly represent different aspects of the story of copper production. Although there are few intact groupings, these buildings have enormous collective significance. At Hafod, the surviving remains of river wharves and docks, together with the canal dock entrances in the walls (themselves an important relic of the boundaries that once defined the site) offer an important introduction to the role of transport. The role of local transport is demonstrated in a number of ways: the supports for the inclined plane that crossed the canal en route to the tip at Hafod, the Hafod locomotive shed and the Morfa bascule bridge.

The former locomotive shed alongside the river (© Crown Copyright: RCAHMW).

Also at Hafod, the two engine houses give an indication of the principal phases of investment and expansion at the site (in the 1860s and around 1910), as well as the importance of steam power to its operation. The story of power is taken up again in the former electrical power house at Morfa (the canteen building). The smelting hall at Upper Bank is the only surviving example in the area and is crucial to the interpretation of key aspects of production. Morfa contributes a rolling mill building and Hafod supplies an example of the rolls themselves. Also associated with Hafod is the limekiln — lime was used as the flux in the initial roasting of the copper ore, until it was eventually supplanted by sand. The former office building also survives as the Landore Social Club.

The two engine houses at the Hafod works (© Crown Copyright: RCAHMW).

The former power house of the Morfa works (© Crown Copyright: RCAHMW).

The former laboratory of the Morfa works (© Crown Copyright: RCAHMW).

The smelting hall at Upper Bank is the only surviving example of this important industrial building type in the area (© Crown Copyright: RCAHMW).

The former rolling mill at the Morfa Copperworks (© Crown Copyright: RCAHMW).

The rolls at Hafod are a rare survivor of plant which was an integral part of the production process (© Crown Copyright: RCAHMW).

Above: The limekiln at Hafod, where lime used as the flux in the initial roasting of copper ore was prepared (© Crown Copyright: RCAHMW).

Left: The former office building of the Hafod works (© Crown Copyright: RCAHMW).

Other important contributors to the character of the area are structures associated with the transport story. Most notable are the bridges and retaining walls associated with railways, from the early railway in Cwm Burlais through to the Great Western Railway's various lines.

The railway was vital to the success of the copper industry – bridges like these are an important reminder of this (© Crown Copyright: RCAHMW).

Boundaries

Works sites occupied clearly delineated areas which were probably demarcated by boundary walls. Most of these boundaries were removed in clearance and reclamation work, and the identity of distinctive sites is now hard to appreciate. Some important boundaries associated with industrial sites have survived, most notably the walls which flank the former canal as it runs through the Hafod site, but there are others here and there that serve as reminders of the essential organization of the area as a series of separate enterprises.

Other land uses also required demarcation — most notably the railways. Boundary walls or embankments with retaining walls are a strong feature, for example, containing the streets to the east of Neath Road.

Boundary walls were also an important component of the settlement areas, defining front gardens and rear yards. It is in surviving boundaries that copper slag is most often found as a construction material, though some has been lost in recent rebuilding activity. These walls retain a vernacular character and their undisguised use of local materials is an important link to the history of the area as well as a distinctive part of its physical character.

Above: Different land uses were separated by distinctive boundaries. This wall formerly separated streets of housing from the railway line (© Crown Copyright: RCAHMW).

Left: On a smaller scale, domestic boundary walls also contribute strongly to the character of the area, making undisguised use of local materials. This example is on Philadelphia Lane (© Crown Copyright: RCAHMW).

Character Areas

1. Hafod–Morfa Works

Historical Background

Before industrialization, the area was farmland in the ownership of the earl of Jersey. It was the construction of the Swansea Canal which made this area attractive for industrial development because the relatively level ground between the canal and the river was ideal for the supply of raw materials both from land and sea.

The boundary wall that once enclosed the Hafod works and separated it from the canal (© Crown Copyright: RCAHMW).

The opportunity was seized by John Vivian, who established the Hafod Copperworks on part of Hafod Farm in 1808–09. The works integrated smelting and rolling from an early period. It steadily expanded in somewhat piecemeal fashion, but there were major periods of growth in the 1860s and around 1910. Tipping was initially on site to the north, but, from the 1860s, a larger area was needed, and a new tip was established on Pentre Mawr Farm to the west.

The Morfa works was established immediately to the north in 1828, on land leased from the estate of the earl of Jersey. At first, it was just a rolling mill, but smelting began here in 1835. The complex was concentrated to the west of the site with some expansion towards the river. Tipping was initially in the north of the site, but was extended to the east of the river in 1909, linked by a railway carried over the river on the bascule bridge.

Hafod and Morfa works amalgamated in 1924 and worked as one until closure in 1980.

After the closure of the works, most of the two sites were cleared leaving only a handful of buildings. The construction of the cross-valley link road sliced across the area of both works; the modern industrial park to the east of the road also occupies part of the (Morfa) site.

The Character of Building

The two sites were originally quite distinct, separated by a boundary wall on the approximate line of the southern boundary of the present park-and-ride car park. The works sites had layouts which were more or less rational, exploiting the transport corridors that ran to either side. Each site had its own access from the settlements to the west, via bridges over the canal. Each was served by docks on the Swansea Canal and by river wharves. After construction of the railway, there were also branch lines into the works. Internal railways were used for the transport of materials around the sites and for the transport of waste to tips, at first on site and later at some distance.

On the Hafod site, surviving structures still reflect some aspects of this history. The (rebuilt) river quay of 1810 relates to river transport for the supply of copper ore and the export of finished products. The boundary wall of the canal and the blocked dock entrances (1810 and 1820) relate to canal transport for the supply of coal; the wall is also an important reminder that the site would have been enclosed once.

The Vivian engine house of 1860 powered adjacent rolls and highlights an important phase in the expansion of the site. It may also contain some early nineteenth-century fabric associated with the introduction of rolling in the 1820s.

The Musgrave engine house and chimney of around 1910 relates to a further period of expansion and retains its connection to a set of rolls via a surviving rope drive. The locomotive shed belongs to the same period and provides evidence for internal rail transport around the site. It also demonstrates the use of copper waste as a construction material. The pier to the waste tip tramroad and the copper-slag abutment both relate to the disposal of waste; they are probably the best surviving examples of the use of copper slag in building. The limekiln, located adjacent to the canal for the convenient loading of raw materials, provides direct evidence for another ingredient in the smelting process.

Above: The Vivian engine house was built in 1860 to provide steam power for the rolls (© Crown Copyright: RCAHMW).

Left: The Musgrave engine house was built in 1910: the rope drive and a set of rolls still survive (© Crown Copyright: RCAHMW).

The former office building also survives as the Landore Social Club.

These survivals support the interpretation of many key themes in the copper production process, including the supply of raw materials (coal, copper ore, lime), manufacture (via the rolling mills), power supply, ancillary services (offices, internal transport) and the disposal of waste. They also allow for some understanding of the development of the works over time, with investment continuing for at least 100 years. Missing is any understanding of the spatial organization of work on the site, the scale of operation, the precise connections between components and processes, and direct evidence of arguably the most significant process — copper smelting.

On the Morfa works site, the rolling mill of around 1840 survives with some later modification. It may also incorporate the remains of smaller structures of 1828 and therefore demonstrate the process of continuous adaptation that was the corollary of a successful enterprise. Elsewhere on the Morfa site, the power house provides evidence for early twentieth-century investment and for the introduction of electric power. The laboratory building (possibly originally an assay office) is an important link to the role of testing and investigation that supported the enterprise.

Elsewhere, the river quays survive, as does the bascule bridge of 1909, which was used for the transport of waste to tips east of the river. Connections between these features and the working site have been effectively severed by the construction of the cross-valley link road and the business park.

Key challenges will be to show the separate identity and containment of the two works, and to promote understanding of the relationship between the surviving buildings and the much more extensive working areas which have now been lost. It will also be important to re-establish meaningful connections between the buildings and structures that do survive.

The former rolling mill at the Morfa works, built around1840, but showing evidence both of earlier structures and later adaptation (© Crown Copyright: RCAHMW).

2. Hafod

Historical Background

Before industrialization, the area now known as Hafod was farmland and lay immediately outside the boundaries of the borough of Swansea. There were three farms in the area — Hafod, Pentre Mawr and Aberdyberthi. The site of the latter is still apparent though the building itself has been rebuilt (129 Aberdyberthi Street). Hafod Farm survived until the late nineteenth century, latterly as part of a timber yard. The area was bisected by the road from Neath and the road from Llangyfelach, which meandered east–west towards the north.

The first significant industrial development here was a copperworks, immediately to the south of the study area at the foot of Cwm Burlais, in 1720. This was the Cambrian Copperworks which was later reused as a pottery. Industrial activity outside the immediate area, including mining as well as manufacture, prompted construction of the Swansea Canal as a means of linking those industries (particularly coal mining) with the port of Swansea. The canal was opened in 1796 and proved to be a catalyst for rapid industrialization within the study area. In turn, the establishment of the Hafod Copperworks in 1808–09 prompted the growth of settlement for a growing workforce.

There was probably already informal settlement on the periphery of the area, particularly along the road from Llangyfelach and in Cwm Burlais. It was the Vivians, however, who established a formal settlement with a planned street pattern and some control over the character of building on the farmland which they had acquired on the west side of Neath Road.

The development of Trevivian began around1837 and 46 houses had been built by 1841. Further development is recorded in the1861 census, by which time there were 94 houses, with others being built. By 1877, there were 263 houses. The first houses were on Neath Road and Vivian Street, marking the beginnings of a grid of new streets between Neath Road and Aberdyberthi Street. This grid was extended to the south when Graham Street and Bowen Street were developed in the 1850s and 60s, and to the west when Odo Street was first laid out between 1879–80, though building here was not completed until around 1914.

The settlement of Trevivian (Hafod), seen from the air in 2011 (© Crown Copyright: RCAHMW).

Top: Trevivian seen from the air.

Below: The streets on the east side of Neath Road (in the foreground) were laid out for housing in the 1860s and 1870s (© Crown Copyright: RCAHMW).

Trevivian was provided with a school and a church. The Vivians also donated land for the construction of two chapels on Neath Road.

By 1850, construction of the railway to Swansea and the docks reinforced a transport corridor begun by the Swansea Canal to the east of the area, which limited the capacity for expansion on the east side of Neath Road. A small block of land between the road and the railway (part of Hafod Farm and belonging to the earl of Jersey) was laid out for housing in the 1860s, distinct from Trevivian, though developed in a similar fashion and with similar types of houses.

To the north of the area, part of Pentre Mawr Farm was given over for the tipping of waste from the Hafod works in the 1860s — 'reputedly the largest and most ugly copper-slag tip in the whole of South Wales.'[62] The tip was linked to the works by an inclined plane and aerial tramway. It was removed in the 1970s and a school now occupies the site. There was another small area of tipping to the north of Maliphant Street on what is now Tawe Avenue.

The Character of Building

To either side of Neath Road, settlement is dominated by terraced housing, which was developed as a series of short connected rows according to a set of consistent plans. There is some development in plan types from the earliest single-unit houses, with a rear outshut, to full height, double-depth houses, a type introduced in the 1860s. By the late nineteenth century, rear wings shared between pairs of dwellings were added. Some of these distinctions have been lost in later remodelling work, but small differences in size and scale still differentiate houses of different dates or minutely different status. On the whole, however, the housing stock is remarkably uniform, with only a small number of houses of significantly higher status — a small group of managers' houses on Morgan Street and the former teachers' houses on Vivian Street.

Despite superficial similarities, small distinctions in size and scale differentiate houses built at different times or for different types of occupant (© Crown Copyright: RCAHMW).

Although the area was clearly carefully planned and laid out, there was little attempt at overall design and composition. Corner houses on Graham Street entered from their gable ends are an interesting example of townscape design and there are rare instances of shared detail, for example, in paired doorways. Strong townscape qualities come not so much from deliberate design as from topography, such as the slopes and curves of Vivian Street and Philadelphia Lane.

Right: A corner house on Graham Street, unusual for having the entrance in the gable end ` (© Crown Copyright: RCAHMW).

Right: Terraces stepped over sloping ground have a distinctive character of their own: Vivian Street (© Crown Copyright: RCAHMW).

Below right: A sloping eaves line on Philadelphia Lane (© Crown Copyright: RCAHMW).

Below left: Paired doorways are a feature of these houses on Aberdyberthi Street (© Crown Copyright: RCAHMW).

Changes in construction detail correspond to the broad phases of development with the introduction of dressed stone as a facing material in the late nineteenth century, combined with stone or brick dressings. Earlier houses were built from Pennant Sandstone rubble, but may have been limewashed or even rendered. Brick or stone was used for dressings. Because building work was carried out via a series of separate building leases, there was probably a degree of variety in finish and detail; and further variety was introduced through piecemeal change. Before housing renewal work began, the earlier housing exhibited a variety of render finishes, with some distinctive detailing, for example on Vivian Street. Recent housing renewal programmes have introduced uniformity in the use of modern renders, slate roofs and brick chimneys, together with standard detail for doorcases and windows.

Above: Dressed stone and contrasting brick dressings on Gerald Street (© Crown Copyright: RCAHMW).

Left: Housing renewal has introduced a uniformity to the area (© Crown Copyright: RCAHMW).

Housing renewal has introduced a uniformity to the area (© Crown Copyright: RCAHMW).

Left: Long front gardens with their distinctive boundary walls on Neath Road; (© Crown Copyright: RCAHMW).

Left: Retaining walls and steep steps to front gardens, also on Neath Road (© Crown Copyright: RCAHMW).

Below: Slag block detail in a wall on Vernon Street (© Crown Copyright: RCAHMW).

There are some commercial premises on Neath Road, mostly either adapted houses or buildings of a similar type and scale. Little early detail survives, but The Hafod Inn is a notable exception, with its pebbledash and rusticated rendered facade with striking classical detail (p. 45).

East of Neath Road, very little early detail has survived renewal.

The earliest houses were provided with quite long gardens. Although later developments were more constricted, front gardens or yards were an important mark of status where they were provided. Copper slag was often used in garden walls and rear boundaries, including cast blocks used as quoins. Some of these have already been replaced, but should be treasured wherever they survive.

3. Landore South

Historical Background

Historically, this small area was farmland bounded on the east by Neath Road. It probably remained substantially undeveloped until it was acquired by the Morfa Copperworks Company as part of the holding on which the copperworks were developed from 1828. The company was building housing for its workers in the 1830s. Little is known about this development, but it was probably along Neath Road, which provided a convenient axis for building.

Construction of the Great Western Railway line to Swansea Docks in 1852 limited the scope for expansion, but the space between Neath Road and the railway had been laid out with small streets by 1876. Access to the Morfa works from this settlement was by small roads bridged by the railway line on the east side of Neath Road.

This area developed with something of a mixed economy and, despite its small size, quite a range of house types. In more recent times, there have been significant losses from this area (including the former chapel on Tabernacle Street) especially to the north, where there are extensive areas of derelict land and patchy new development. The area has also been the subject of some housing renewal.

The Character of Building

As surviving, housing in this area has much in common with Trevivian — exhibiting a similar range of types, with small single-fronted terraced houses, some with tiny front gardens. The housing on Neath Road is slightly larger with bigger front gardens (the boundaries all renewed). Slight differences in height and width suggest that the terraces were built as a series of short separate developments, but where renewal work has taken place, other variations in detail have been lost.

Above: Small single-fronted houses opening directly off the pavement on Tabernacle Street (© Crown Copyright: RCAHMW).

Right: Terraced houses with front gardens on Neath Road (© Crown Copyright: RCAHMW).

On Neath Road, the stone walls associated with the railway line to Swansea and the Swansea Loop, and those flanking the original access to the Morfa works are a dominant feature. Immediately north of the railway bridge, building has a varied character, including the former cinema which has bold rendered detail, an unusual example of a polychrome brick terrace and the rusticated stone frontage of Stadium House.

On Station Road, the boundary wall to the gardens of houses on Neath Road has copper-slag coping. The stonework of the retaining walls and bridge contains evidence for phases in the development of the railway and has a robust architectural character.

Above: The former cinema on Neath Road is one of several commercial buildings with a distinctive character of their own (© Crown Copyright: RCAHMW).

4. Morfa Road Area

Historical Background

Before industrialization, this area was part of Hafod Farm. The buildings of the farm survived until the late nineteenth century, latterly in use as a timber yard. Construction of the railway in 1852 had entirely cut the farm off on the landward side and the timber yard was accessed via a short branch of the Swansea Canal. There was also some early industrial activity immediately south of the area, where the Cambrian Copperworks had been established in 1720. Its site was reused by the Cambrian Pottery from around1764 until 1870. Predating the canal, an early railway brought coal from Llangyfelach via Cwm Burlais to river wharves and to these works.

Left: This area was once busy with industries developed alongside the canal (© Crown Copyright: RCAHMW).

This area was once busy with industries developed alongside the canal (© Crown Copyright: RCAHMW).

The construction of the Swansea Canal in 1796 had an immediate impact in the south of the area, which was extensively developed with docks, wharves and coal yards associated with transhipment from canal to river. The tithe map of 1844 shows a series of dock compounds opening off the canal onto enclosed yards running down to the river. Docks were retained here after construction of the New Cut and the creation of the North Dock in 1852 on the former course of the river. The northernmost of these docks was filled in and built over by a patent safety fuse works around 1900.

It was probably not until the 1860s that the rest of the area began to be developed for industry. Between the docks to the south and the Hafod Copperworks to the north, the 1876 first edition Ordnance Survey map records a large timber yard at Hafod Farm, the Hafod Isa nickel and cobalt works, the Hafod iron foundry and the Hafod phosphate works. These works occupied a series of compounds between the canal and the river, largely dependent on the canal for supply and despatch (topography meant that there was no direct access to the river), with limited road access via Maliphant Street. These developments were all part of the Vivian enterprise, which was in expansionist mode in the 1860s. They survived into the twentieth century and were redeveloped as light industrial units following the construction of Morfa Road on the line of the Swansea Canal.

The Character of Building

Although most of the buildings on the industrial estate appear to be modern, several of the historical boundary lines survive and modern buildings respect the alignments of these works. There may be some fragments of earlier buildings, particularly to the north (for example, on the site of the Hafod iron foundry).

5. Upper Bank, Middle Bank and White Rock

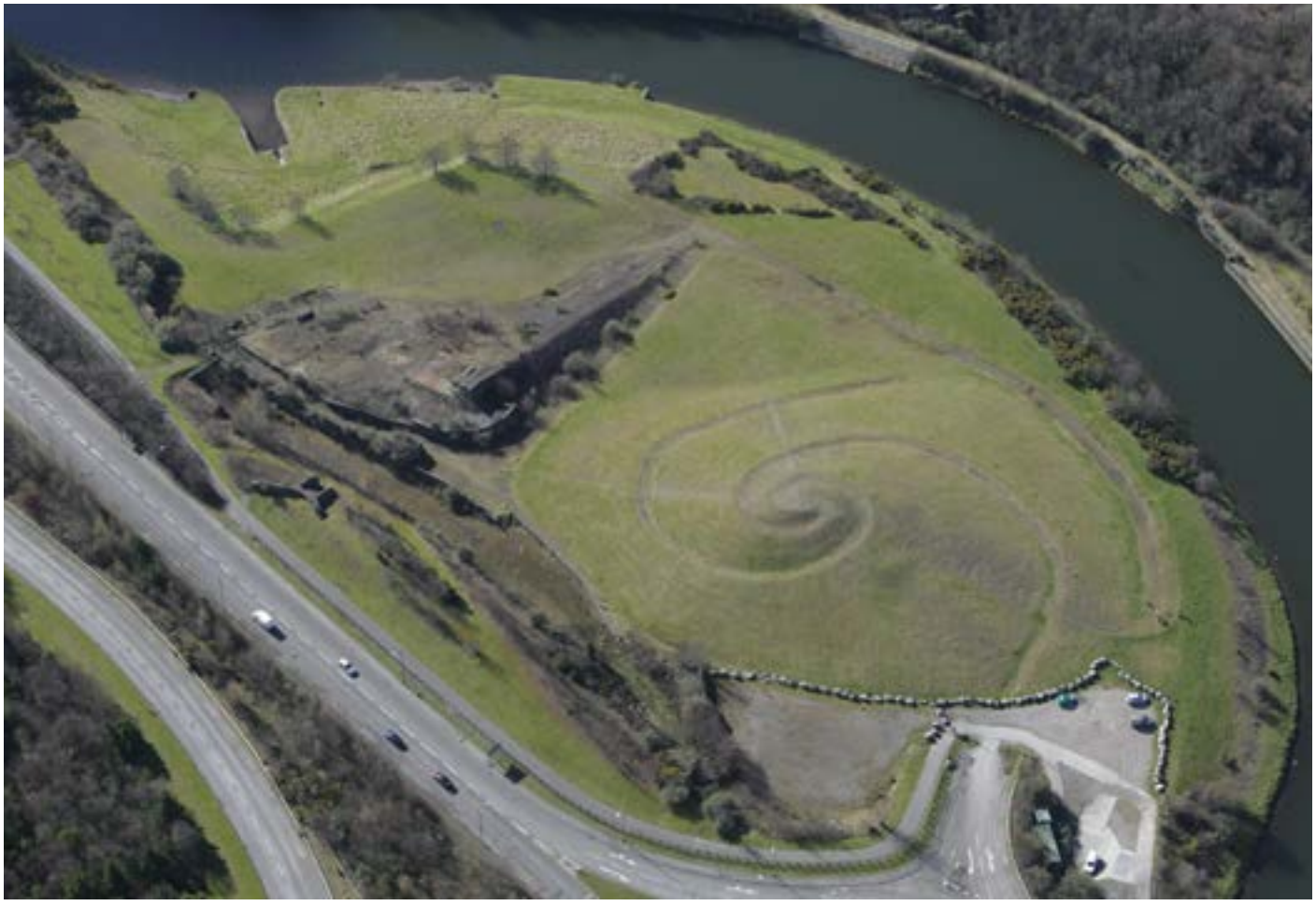
Historical Background

From the seventeenth century, the area on the east of the river was already an important transhipment point for coal brought down by wagonway from mines in Llansamlet and there were coal wharves on the river since at least this period. It was the combination of a convenient source of coal and the ease with which ore could be imported by river that prompted the establishment of the White Rock Copperworks by a Bristol-based partnership in 1737.

Middle Bank and Upper Bank works followed in 1755–57. These were both developed by Chauncey Townsend who had local mining interests and they remained in joint ownership thereafter. They were initially used for smelting lead and zinc, but began smelting copper from 1775. All three works were served by improved inland transport when Smith's Canal was constructed in 1783–84. The canal was partially superseded by a tramroad in 1816 (Scott's Railway), upgraded as the Swansea Vale Railway in 1845. This was taken over by the Midland Railway in 1874. The line had closed completely by 2007 and the route south from Middle Bank was then taken for road widening.

The copperworks were all subject to periods of expansion, redevelopment and change; for example, the introduction of silver and lead smelting at White Rock in 1870–71 and the re-introduction of zinc smelting at Upper Bank in the 1890s. The complexity of some of these changes was graphically revealed in the excavations at Upper Bank in 2007–08.

The copperworks all closed in the 1920s, though the works at Upper Bank were reused as a munitions factory for a time and later as a plastics factory. White Rock closed in 1924 and the site was cleared in the 1960s and 1970s prior to the establishment of the White Rock Industrial Archaeology Park in the 1970s. The surface



The site of the White Rock Copperworks in 2008 (© Crown Copyright: RCAHMW).

The site of the Upper Bank Copperworks in 2010 (© Crown Copyright: RCAHMW).

remains of the Middle Bank works were obliterated and the Upper Bank works were redeveloped for housing in 2007–08 leaving a solitary smelting hall. Archaeological investigations that preceded this redevelopment yielded extensive information on the development and use of the site. Docks paved with cast copper slag, narrow-gauge railway lines, gas-powered furnaces associated with conversion to zinc smelting after 1890, as well as the remains of earlier copper furnaces, granulation pits and a calcining furnace were all uncovered.

The Character of Building

Many of the known remains at White Rock are protected as a scheduled monument in the industrial archaeology park. They include (rebuilt) river wharves and dock, part of Smith's Canal in a cut-and-cover tunnel, which is adjacent to the remnants of the Great Workhouse of 1737, and part of the inclined railway that was built in the 1870s to remove spoil to tips on Kilvey Hill.

Modern housing occupies the site of the Upper Bank works, where a single smelting hall, which was probably built in the late eighteenth century, survives. It is rubble walled with distinctive arched vents with fretted brickwork, roundels in the gable apex and broad ground-floor entrances. It is the only surviving smelting hall in the area and as such is of particular importance to the story of copper here.

6. Pentrechwyth and Grenfelltown

Historical Background

Historically, the area north and east of the three copperworks was largely undeveloped agricultural land, albeit cut by transport routes carrying coal to river wharves and copperworks from Llansamlet. The original wagonway survived until the end of the nineteenth century, but its route had disappeared by 1914. Smith's Canal was first built in 1783–84 and survived until the late nineteenth century, despite construction of a tramroad in 1816 and its successor, the Swansea Vale Railway.

Grenfelltown and Pentrechwyth from the air (© Crown Copyright: RCAHMW).

The area retained something of an agricultural character for a time, but was increasingly shaped to the needs of industry. The three copperworks on the Tawe did not stimulate the extensive urban development that characterizes west of the river, but there were settlement clusters associated with them. To the south-east of White Rock, Foxhole (outside the study area) developed on the lower slopes of Kilvey Hill. To the east of the Upper Bank works, the village of Pentrechwyth grew up, partly along the old road to Bonymaen and partly as the planned development of Grenfelltown, developed by the proprietors of the works between 1803 and 1813, and thus the earliest of the planned workers' settlements in the area.

Beyond Pentrechwyth, remnants of an agricultural landscape — suggested on the 1876 first edition Ordnance Survey map — were progressively colonized by small-scale industrial activity, as well as by tipping on Kilvey Hill and on both sides of the canal and railway. By this time, the Morriston Loop had been built from the Swansea Vale Railway at Upper Bank station and there were extensive sidings north-east of the station. The Swansea Vale Railway remained open until 1967; part of it was later leased to a heritage railway company until 2007. Smith's Canal also survived until the late nineteenth century, but was shown as a marshy strip on the second edition Ordnance Survey map of 1899.

Extensive reclamation in the later twentieth century filled much of the area with trees, creating the extensive area of woodland recommended and initiated by the Lower Swansea Valley Project, extending from Nantong Way in the west (on the line of the Morriston Loop) to Pentrechwyth in the east.

Connectivity in the area was radically altered by the construction of the cross-valley link road in 1989, with the associated upgrading of the road from Swansea on the east bank of the river and the construction of a new road to Llansamlet (A4217). These new roads may have improved medium-distance connectivity, but they have all but severed the settlements from the former works areas and the river.

The Character of Building

Grenfelltown is important as the earliest planned settlement in the area, comprising three staggered terraces originally begun in 1803, but remodelled in the later nineteenth century. Housing along Pentrechwyth Road developed more informally as a series of short terraced rows without a consistent building line. Much of this is late nineteenth century — the tithe survey of 1844 records only sporadic development along this route — but there is at least one building which may be earlier. Small variations in the size of property suggest that the terraced rows were developed on individual building leases. The houses also exhibit considerable variety in detail, reflecting piecemeal change, but including some detail that may be late nineteenth century. Most of the houses are rendered in various styles, but there is some exposed stone. Some rows have small front gardens, often with copper slag in their boundary walls.

Taplow Terrace, Grenfelltown (© Crown Copyright: RCAHMW).

The varied character of housing at Grenfelltown (© Crown Copyright: RCAHMW).

Principles and Parameters for Redevelopment

Redevelopment and regeneration activity in the area can take its cue from the organizational principles which governed its historical development and operation.

1. Connectivity

The area had a hierarchy of transport systems, ranging from 'trunk' routes, which provided connections outside the area to sources of supply, through to local routes for the local movement of people and goods. 'Trunk' routes included roads — Neath Road, Llangyfelach Road and the early route from Llansamlet to the river (now lost). They also included the two canals (the Swansea Canal on the west bank and Smith's Canal on the east), early railways (the line in Cwm Burlais, and Scott's Tramroad to the east) and main-line railways (Swansea Vale Railway and the Great Western Railway). Local routes included access roads connecting settlements to works and tramroads for the movement of goods within and between sites. There were strong associations between specific settlement areas and specific works, reinforced by the location of the main access points to each of the works.

Many elements of the historical transport network have now been lost (notably both canals and the Swansea Vale Railway) and some important connections have been severed (notably the link between Morfa Copperworks and its river quays). However, there is scope for some reinstatement and enhancement of those elements that do survive, including the line of the canal through the Hafod site, the original access routes to the Hafod and Morfa works, the old road from Llansamlet and the early railway in Cwm Burlais. The historical link from Pentrechwyth to the site of the Upper Bank and Middle Bank works is now a neglected thread which could be strengthened. In addition, the robust architectural qualities associated with the Great Western Railway are a strong feature of the townscape of Trevivian and Mile End, and warrant appropriate management.

2. The Works

Each of the five copperworks in the area had its own principles of spatial organization, but they shared some common characteristics. Salient features to note are their clear demarcation, probable enclosure by definite boundaries, specific and limited access points, and the organization of production within the site which dictated certain relationships between buildings. Access to the copperworks from the river and canal was by specific wharves and docks, and there were limited entry points by road. In the later nineteenth century, rail access to each site was established via sidings from the main railways. Later industries to the south (now Morfa Road) were also clearly demarcated in defined yards — modern uses generally respect historical boundaries. These sites were primarily served by the canal and the most northerly site may have had no direct connection to the river, though there had been wharves further south.

Each works was an amalgam of inter-dependent processes and structures. On the copperworks sites, the major buildings were the smelting halls and rolling mills around which were clustered ancillary structures, including those associated with power supply and the storage of raw materials. The sites came to be very densely developed as they expanded their operations throughout the nineteenth century. They were dominated by large buildings, typically long and low, and punctuated by many chimneys.

Demolition and clearance has left surviving buildings isolated from each other and with no sense of their historical relationship to an integrated series of processes and structures. Any redevelopment will need to ensure that these important structures, which collectively are still capable of interpreting key aspects of the copper story, do not remain as detached monuments. Some sense of context needs to be restored. The siting, massing and design of

new buildings will need to have particular regard to this. It will also be important to consider the extent to which the spatial organization of once separate enterprises can be reflected in the layout of new development, enabling clearer distinctions between the Hafod and Morfa sites to be reinstated.

Although no single site retains a coherent set of structures, across the area as a whole, there are industrial buildings which together demonstrate most of the major elements in the story of copper production, including the river wharves, the sole surviving smelting hall at Upper Bank, the rolling mill at Morfa, the Hafod rolls, and the ancillary buildings, including engine houses, offices and laboratory. It is vitally important that all these surviving structures are retained, conserved and interpreted to enable this story to be told.

3. The Settlements

Planned settlements at Hafod and the smaller development at Grenfelltown are historically important and the dominant elements in the townscape. Smaller-scale developments are less formally laid out, typically in small terraces developed piecemeal along main roads. Building work was probably organized in a similar fashion irrespective of the origin of settlement: small units of development undertaken by many hands. The terraced house was by far the dominant unit with only slight variations in size. This introduced a degree of variety into the building stock, which was compounded by subsequent piecemeal change. Recent housing renewal work has focussed on the planned aspect of settlement and has introduced a uniformity of detail which these settlements may never have had. Future work should consider whether there is scope for retaining some of the variety of finish which remains characteristic in Pentrechwyth.

4. Boundaries

Across the area, boundary walls are an important feature which demarcated land use and occupancy. They often retain distinctive character in the use of materials, including copper slag. Retention rather than replacement of surviving walls will be an important aspect of retaining distinctiveness.

Statement of Significance

Hafod and the lower Swansea Valley are justly celebrated as the home of the copper industry in the UK and the site of what were once works of world significance. The industries themselves were intimately linked with historic transport systems and routes, which provided a web of local and more distant connections. They were also closely associated with settlements planned and built for their workers, with schools, churches and chapels alongside a full complement of housing. Together, these components added up to a remarkable integrated industrial landscape which provided powerful testimony to an industrial economy and way of life.

Decay and dereliction in the twentieth century took their toll. All that is left of the copperworks are isolated and sometimes fragmentary remains, their immediate context lost and their connections severed by new roads and redevelopment. However, amongst the survivors are individual structures of considerable importance which, together, are capable of interpreting many aspects of the story of copper production in Swansea. The associated settlements have lost relatively little of their historical integrity. Although little historical detail has survived, housing renewal work has helped ensure a sustainable future for the housing stock. On both sides of the river, the surviving settlements are still a valuable repository of social history which is an important counterpart to the technological and industrial history of the works.

Historically, the area was tightly organized: industrial sites were laid out for specific processes, precisely connected by road, rail and water transport for supply and despatch. They were closely linked to settlements which were themselves coherently planned. The principles of this organization have been damaged, but not entirely lost in post-industrial regeneration, and there are opportunities to ensure that future planning and redevelopment activity repairs and reinforces them. These underlying principles were part of the distinctive character of the area — the powerful physical impression of an industrial history of global importance.

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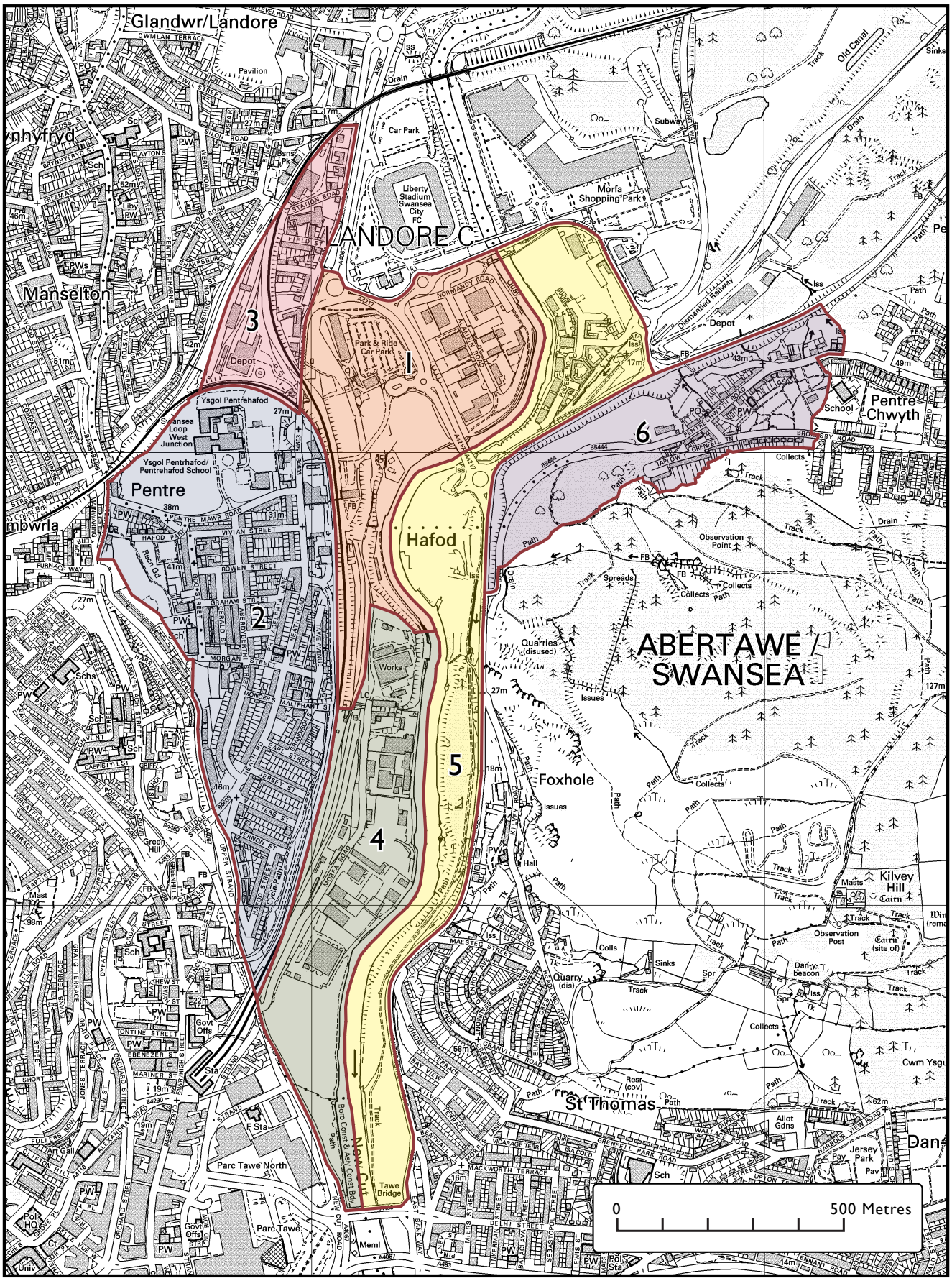
All Character Areas



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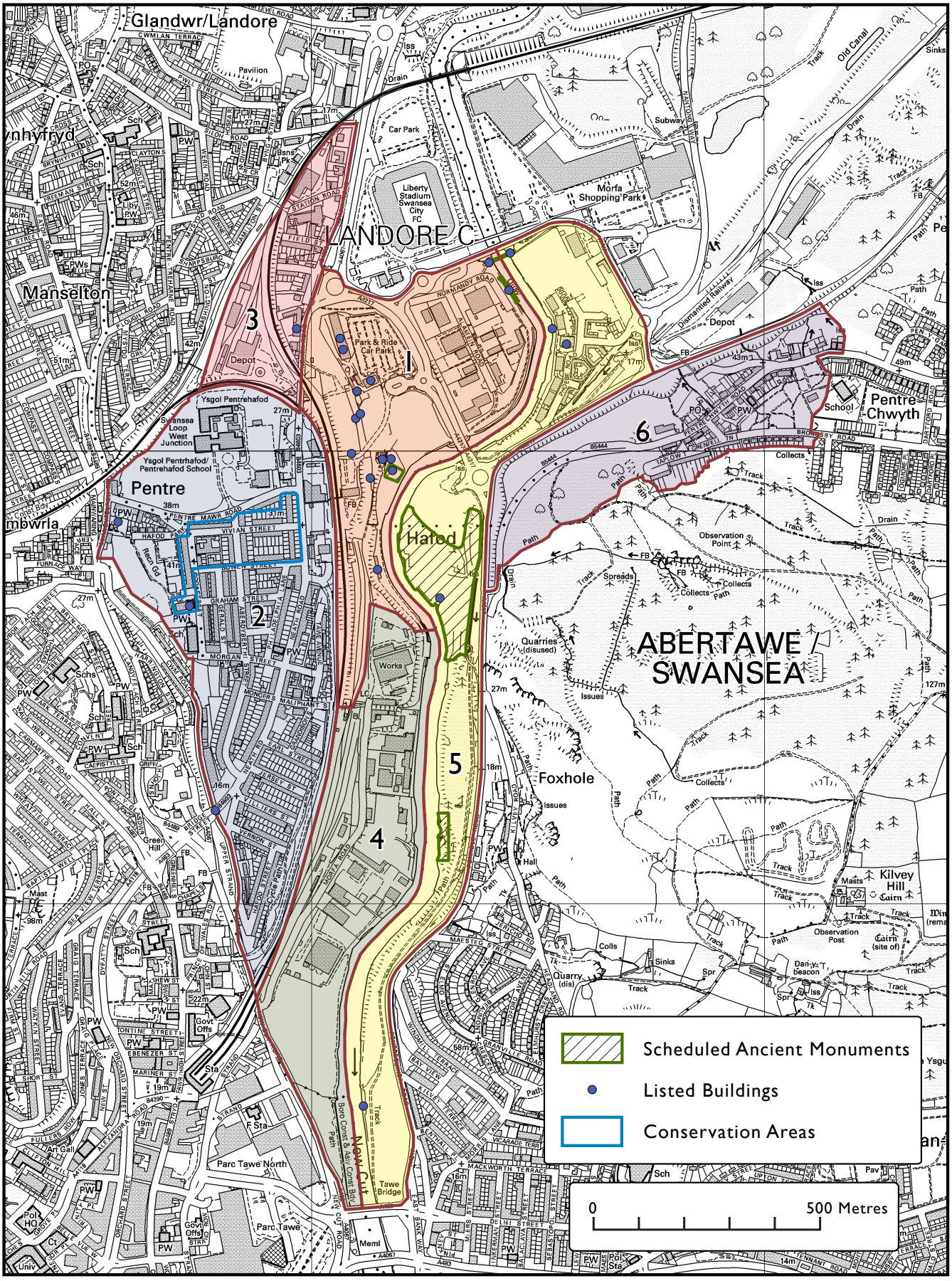
2 All Character Areas with Historic Environment Designations



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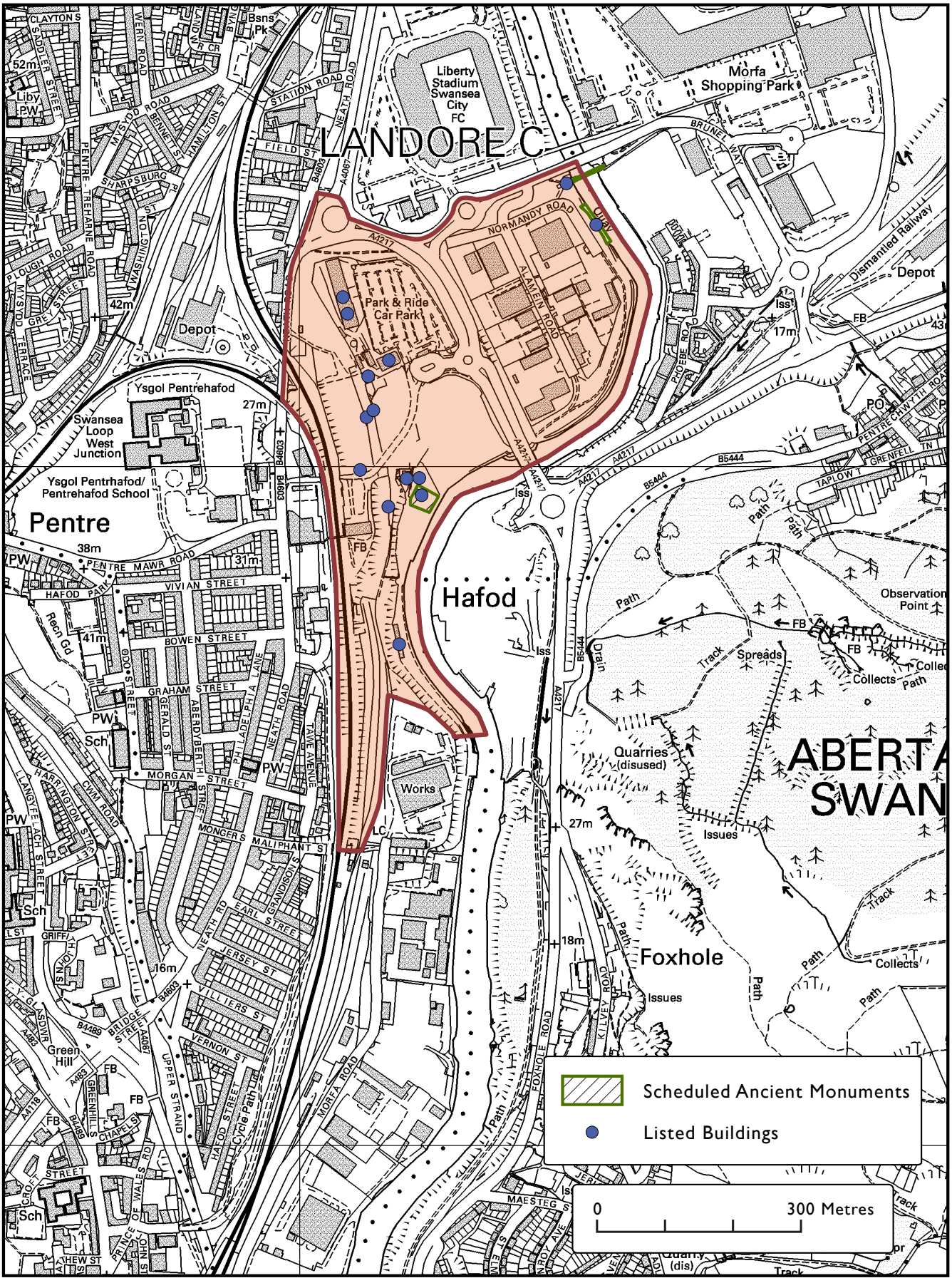
3 Hafod–Morfa Works (1)



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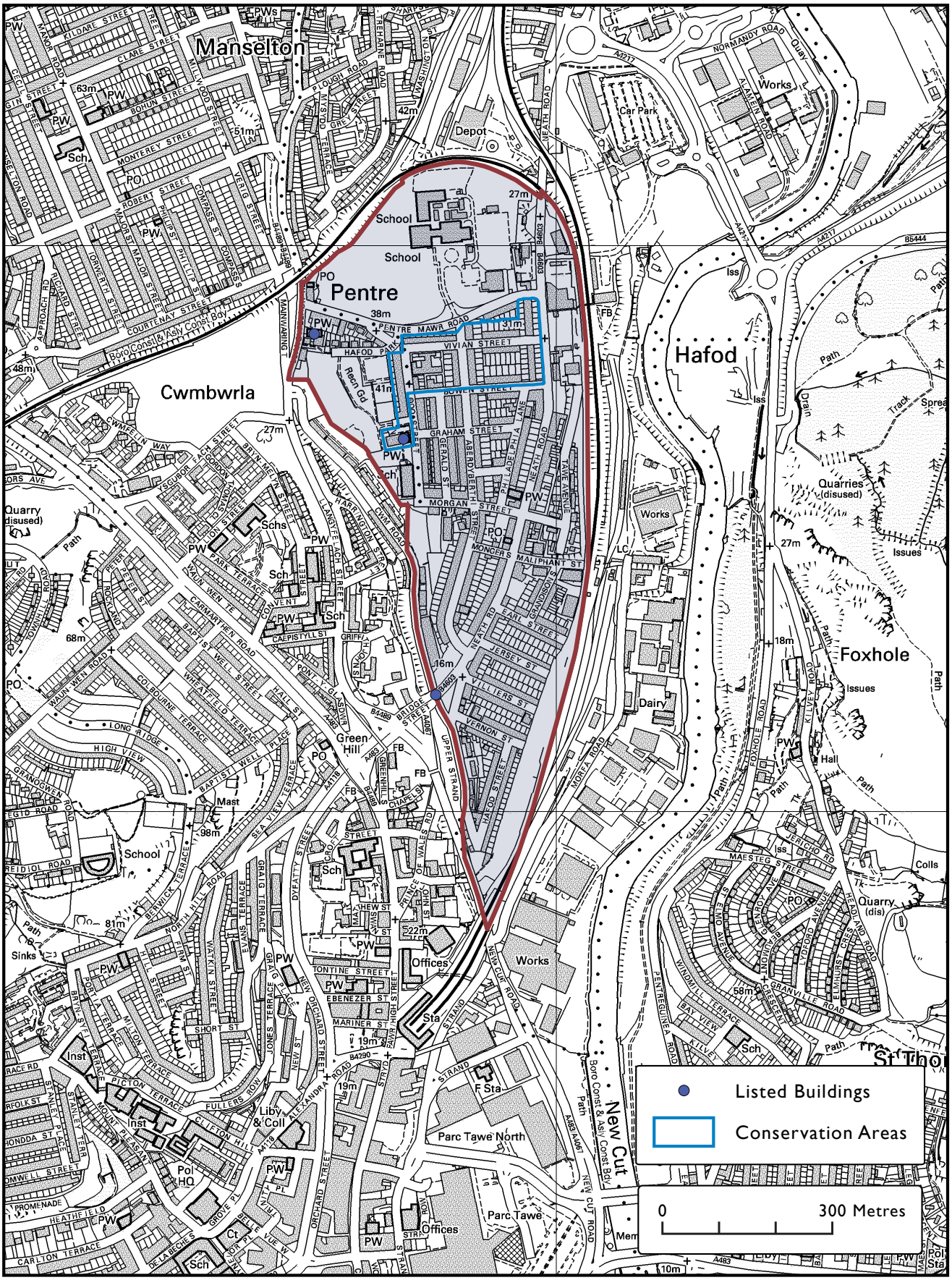
4 Hafod (2)



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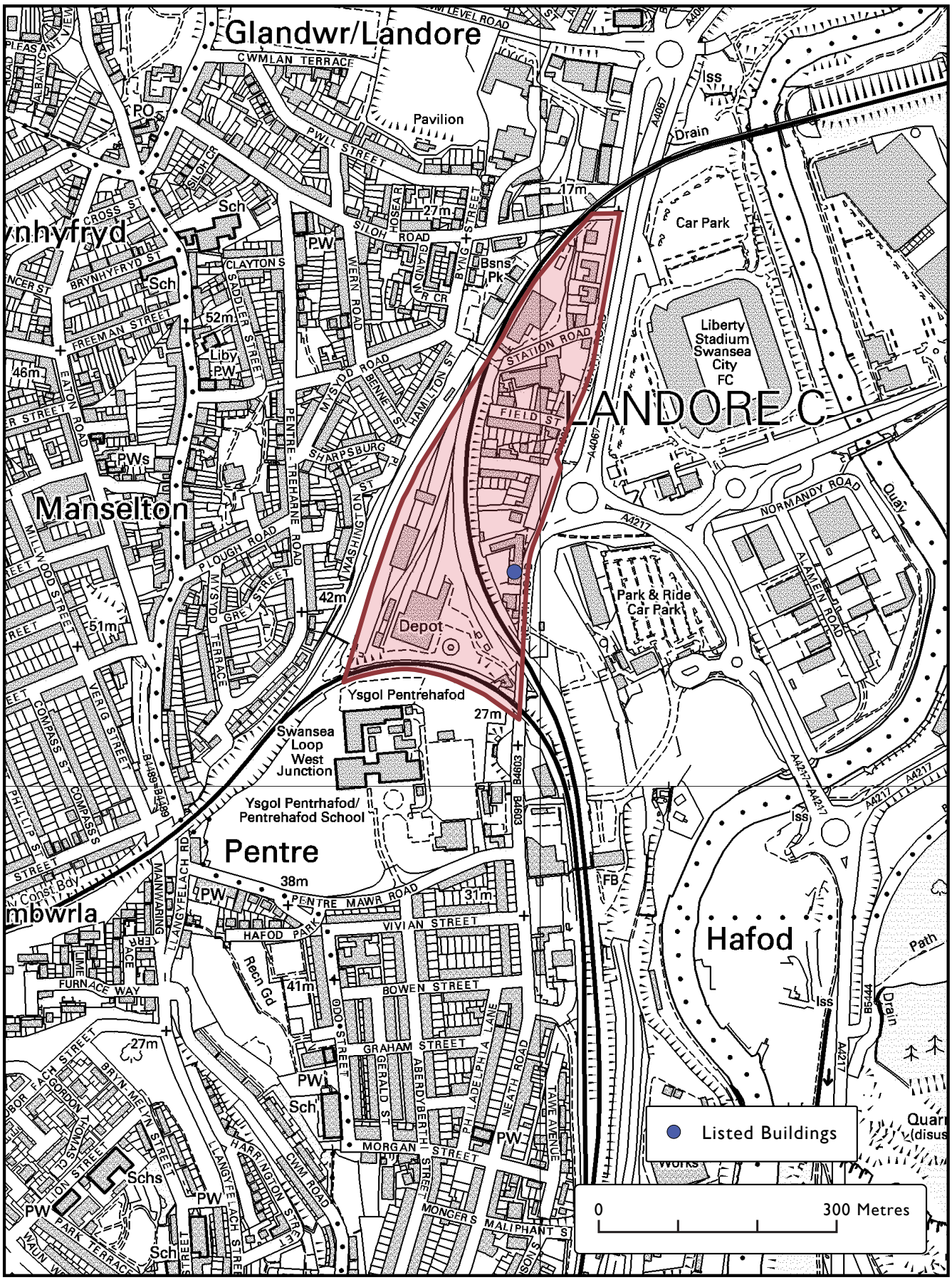
5 Landore South (3)



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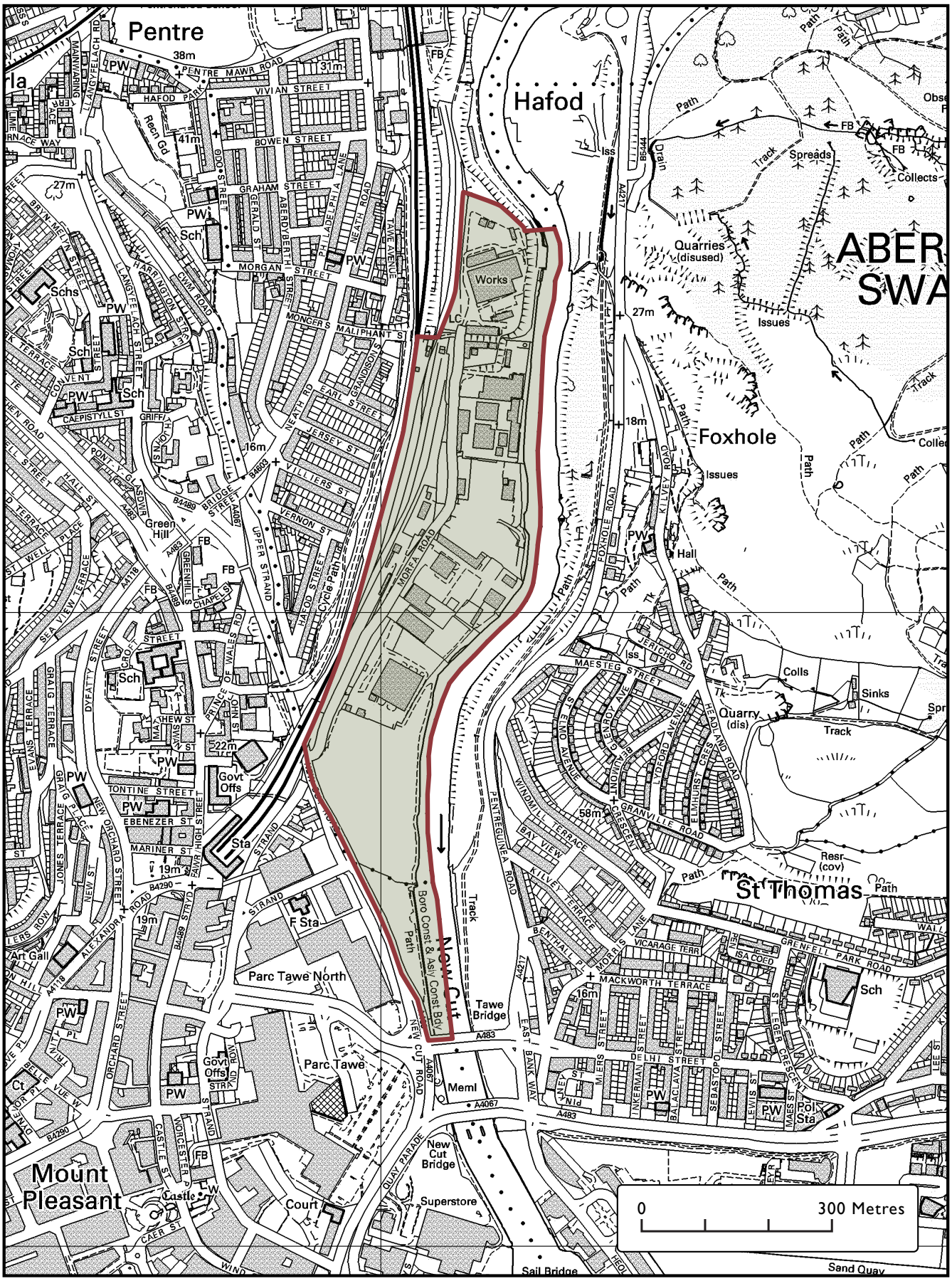
6 Morfa Road Area (4)



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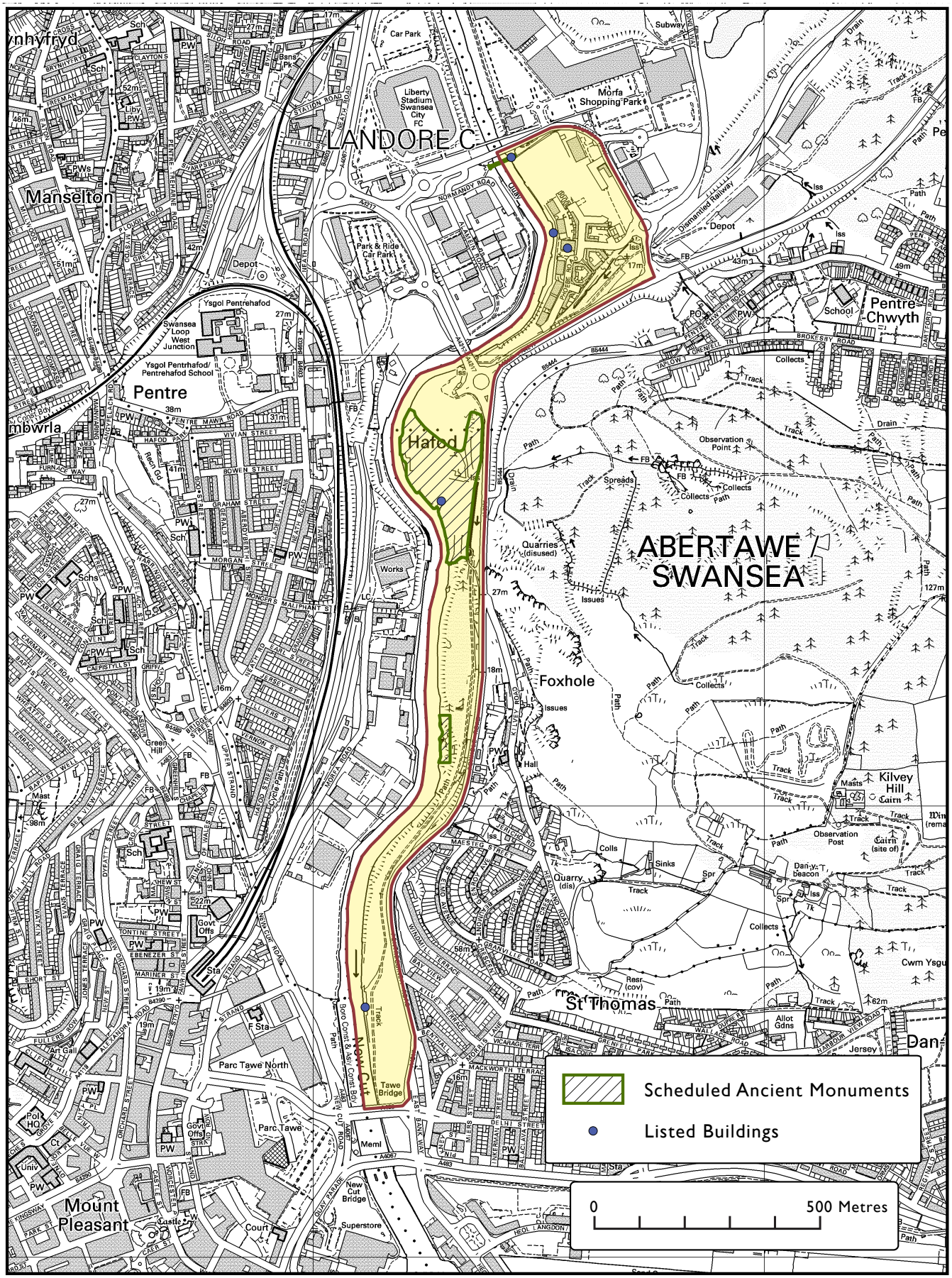
7 Upper Bank, Middle Bank and White Rock (5)



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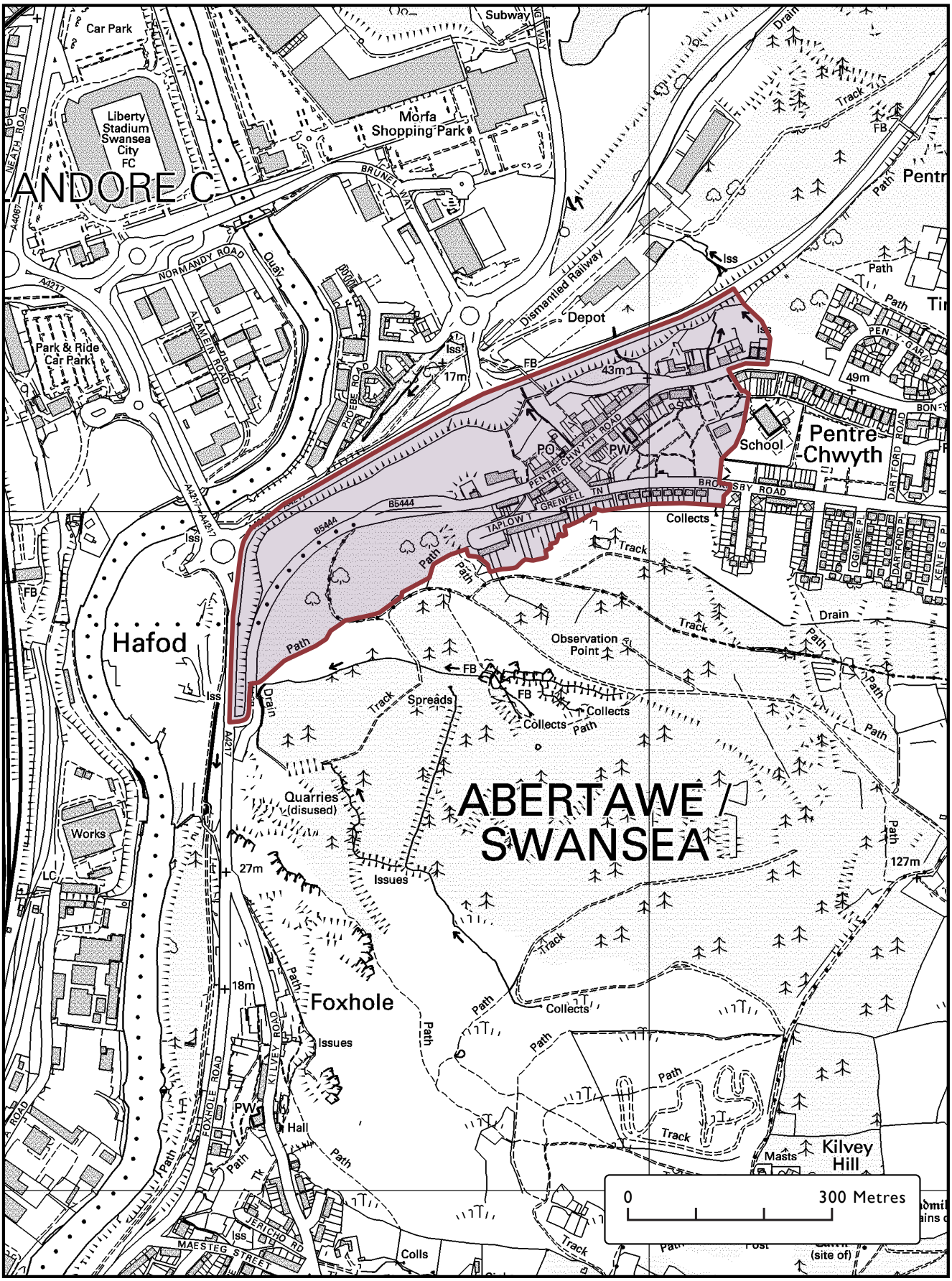
8 Pentrechwyth and Grenfelltown (6)



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