

THE INDUSTRIAL HERITAGE TRAIL

The trail developed by the Amlwch Industrial Heritage Trust and described in this pamphlet has numbered features of interest – indicated by eleven **GREEN MARKERS** – that can be seen during a two-hour visit.

A shorter one-hour visit is possible from the Mona Mineyard (**SITE 3**) following seven **RED MARKERS** along the trail to the Windmill (**SITE 9**). Views are excellent and a wet-weather shelter has now been provided in the windmill.

If you prefer a still shorter visit of 25 minutes, a panoramic view of the Great Opencast can be obtained from **SITE 2**.

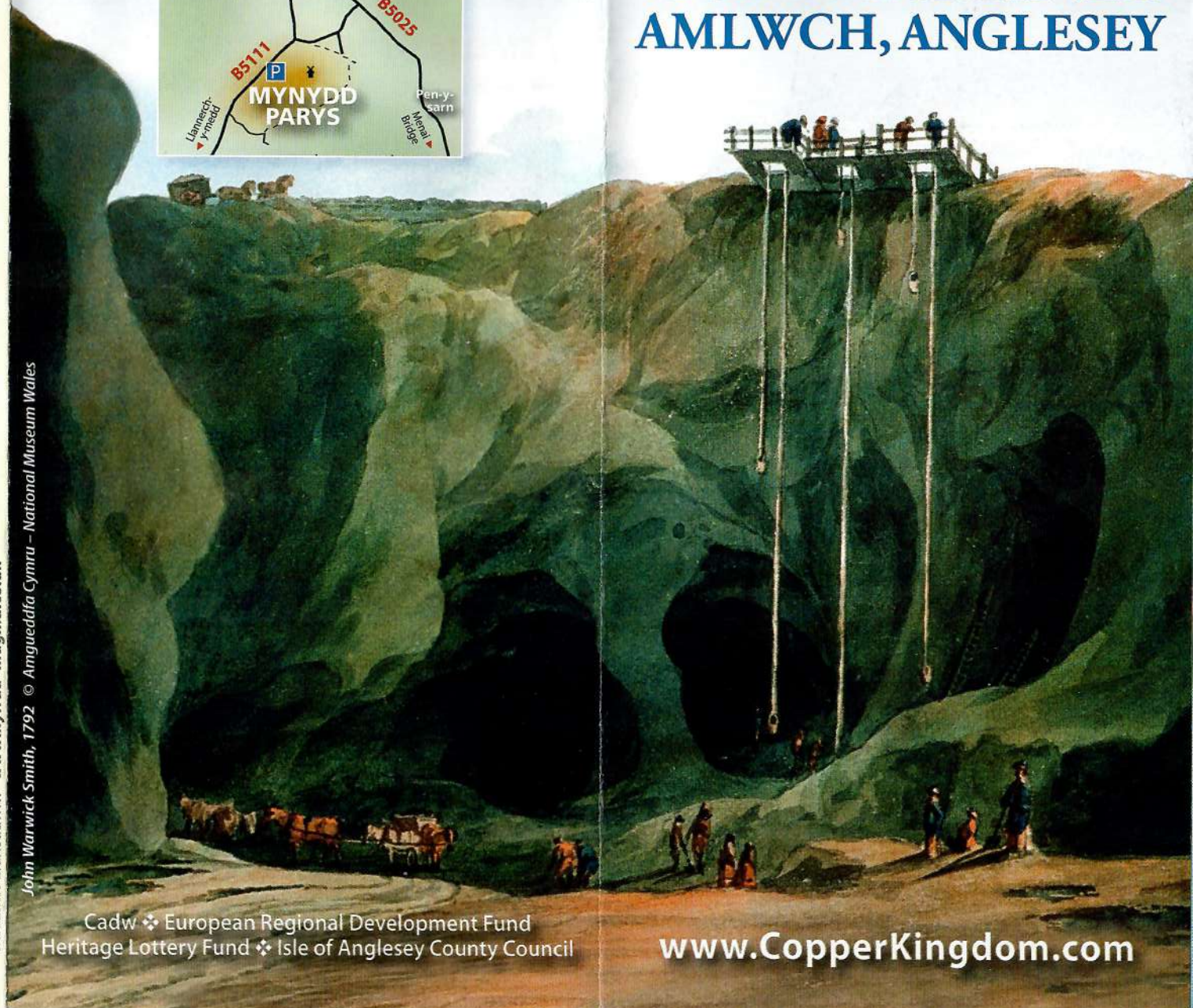
Please bear in mind that the Trust is insured only for the marked Heritage Trail and not beyond. All mine sites are potentially hazardous and require sensible care in keeping to the indicated path and in avoiding steep slopes and loose spoil. There are features of particular scientific and archaeological value and several have now been designated as 'Sites of Special Scientific Interest' because of their geological or biological content. Other features are 'Scheduled Ancient Monuments' in the care of Cadw. Please take care to avoid damage, even to what may appear to be just loose rock or ruins.

The history of Parys Mountain is linked to that of Amlwch Port, 4km to the north.

This small important inlet developed with the mines in the late eighteenth century to become a major port in North Wales, with ship-building, smelting and chemical industries. At that time Amlwch was said to be the third largest population centre in Wales. The port's fortunes declined with those of the mines and it is now a fascinating relic of bygone industry with Heritage Centres and a café – well worth visiting!



Industrial Heritage Trail PARYS MOUNTAIN COPPER MINES AMLWCH, ANGLESEY



MAGMA Liansadwrn www.llyfrau-magma.co.uk

John Warwick Smith, 1792 © Amgueddfa Cymru – National Museum Wales

Cadw ❖ European Regional Development Fund
Heritage Lottery Fund ❖ Isle of Anglesey County Council

www.CopperKingdom.com

A BRIEF HISTORY OF THE MINES

It was in 1768 that the first major ore deposit (the Golden Venture Lode) was discovered on the mountain by Jonathan Roose, a mineral agent for Charles Roe of Macclesfield. His tombstone and elegy may be seen today in Amlwch churchyard. At this time the mountain was divided between two owners leading to the development of two separate adjoining mines – the Mona Mine to the east (owned by an ancestor of the present Marquess of Anglesey) and Parys Mine to the west.

The cheap abundant copper from these two mines dominated the world's markets in the 1780s and controlled world prices. It was used to sheath, and bolt onto, the admiralty's ships of war to prevent the growth of seaweed and barnacles and to prevent boring by shipworms. This increased ship mobility and contributed to Nelson's victories. Amlwch grew from a hamlet into a major industrial town in Wales with a significant port. After the Napoleonic war competition from mines abroad and less accessible ore reserves on the mountain led to the decline of the mines and to the end of deep mining in the 1880s.

The ore was initially worked from shallow shafts then by open-pit mining ('opencasts') accessed by adits and footways and later by workings up to 300m deep. The ore was broken into small lumps by hand, the richest being transported by ship from Amlwch Port to Lancashire, Flintshire or South Wales for smelting. Copper was concentrated and extracted from the poorer ore using kilns and furnaces, on site and at the port itself. Small amounts of metal were also obtained efficiently by its precipitation from drainage water with scrap iron in the many purpose-built ponds around the mountain. Associated with the mines, other important chemical industries were established on the mountain and at the port based on by-products such as iron ochre (pigments and gas purification), sulphur, vitriol and alum.

The eighteenth century miners recognised that they were following in the steps of much earlier workers. Recently, surface and underground excavations have

enabled mining debris to be dated to nearly four thousand years ago (the early Bronze Age). Parys Mountain is one of the few sites in Britain where there is evidence for the pre-historic beginnings of our British metal mining industry. It is therefore internationally important both as an historic industrial mine and as an archaeological site.

GEOLOGY & BIOLOGY OF PARYS MOUNTAIN

The rocks of Parys Mountain started as muds in the margins of a sea basin around 440 million years ago. At that time submarine volcanoes were erupting lavas and ashes, and the fumes they exhaled formed 'smokers' on the sea floor producing rich deposits of metals. These occur as their sulphide minerals: chalcopyrite (copper and iron), galena (lead), sphalerite (zinc), with abundant pyrite (iron), and they form an ore deposit which is unusual in Britain.

During later distortion of the earth's crust (the 'Caledonian Orogeny', circa 400 million years ago) it is thought that the ore deposits were deformed by being fractured (North/ South faults), and folded (a sharp East/West syncline) and tilted steeply over to the south. During this deformation some of the metals were remobilised giving rise overall to a complex ore body.

The weathering of this sulphide deposit has produced very acidic conditions. The abundant oxidised iron has been re-deposited in different forms to give the striking red-brown-yellow and, where fired, purple colours of spoil on the mountain. There is little surface sign of copper today, but lead was re-deposited as its sulphate, 'anglesite', for which Parys Mountain is the type locality.

This extreme, harsh, acidic setting has resulted in a unique environment supporting unusual forms of life. Special bacteria derive their energy from the oxidation of sulphides, and a rich flora of specialised lichens can be found coating rock surfaces, whilst only heather generally survives over most of the mountain. Bats, including the rare lesser horseshoe bat, have colonised some of the mine workings, and amongst the birds to be seen soaring with the jackdaws over the opencasts are choughs, ravens and peregrines.

Thomas Williams (1737-1802)



by Sir Thomas Lawrence © Amgueddfa Cymru - National Museum Wales

The divided ownership of the mountain led to the formation of two separate mines. Legal disputes marked the early mining until both mines came under the control of the local lawyer Thomas Williams (*Twm Chwarae Teg*: 'Fair Play Tom'). He became a major British industrialist of his time, equal

in prowess to Wilkinson, Boulton and Watt, and someone of whom Anglesey can be justifiably proud.

Under his successful management Amlwch, at its peak in the 1780s, came to dominate the world's copper markets when a workforce of over a thousand was employed at the mines and up to 4,000 tons of copper were produced annually.

Further reading

Robert Williams & Philip Steele, *Copper Kingdom* (2010)

B D Hope, *A Curious Place: the industrial history of Amlwch, 1550-1950* (1994)

J R Rowlands, *Copper Mountain* (1981)

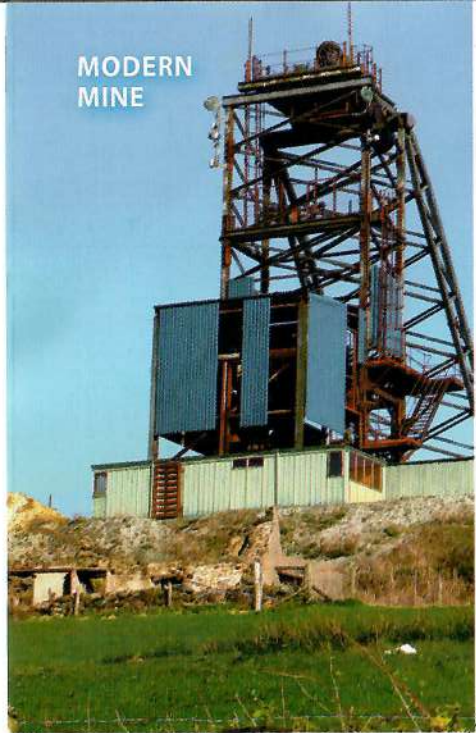
J R Harris, *The Copper King* (1964)

AMLWCH INDUSTRIAL HERITAGE TRUST

The Trust was established in 1997 and has charitable status. Its aims are to conserve the natural and industrial landscape of the mountain and port, promote scientific and historical research, and to present the heritage for the appreciation of the visiting public. Its symbol is the elegantly designed Anglesey Penny, a token used for payment in the late eighteenth century.



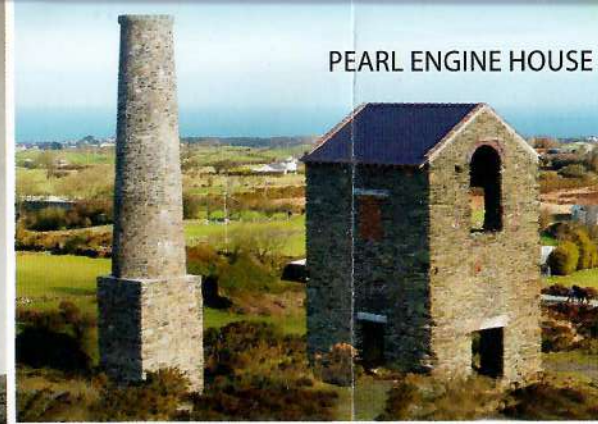
MODERN MINE



WINDMILL



PEARL ENGINE HOUSE



CRUCIBLE SLAGS



Modern Mine 11

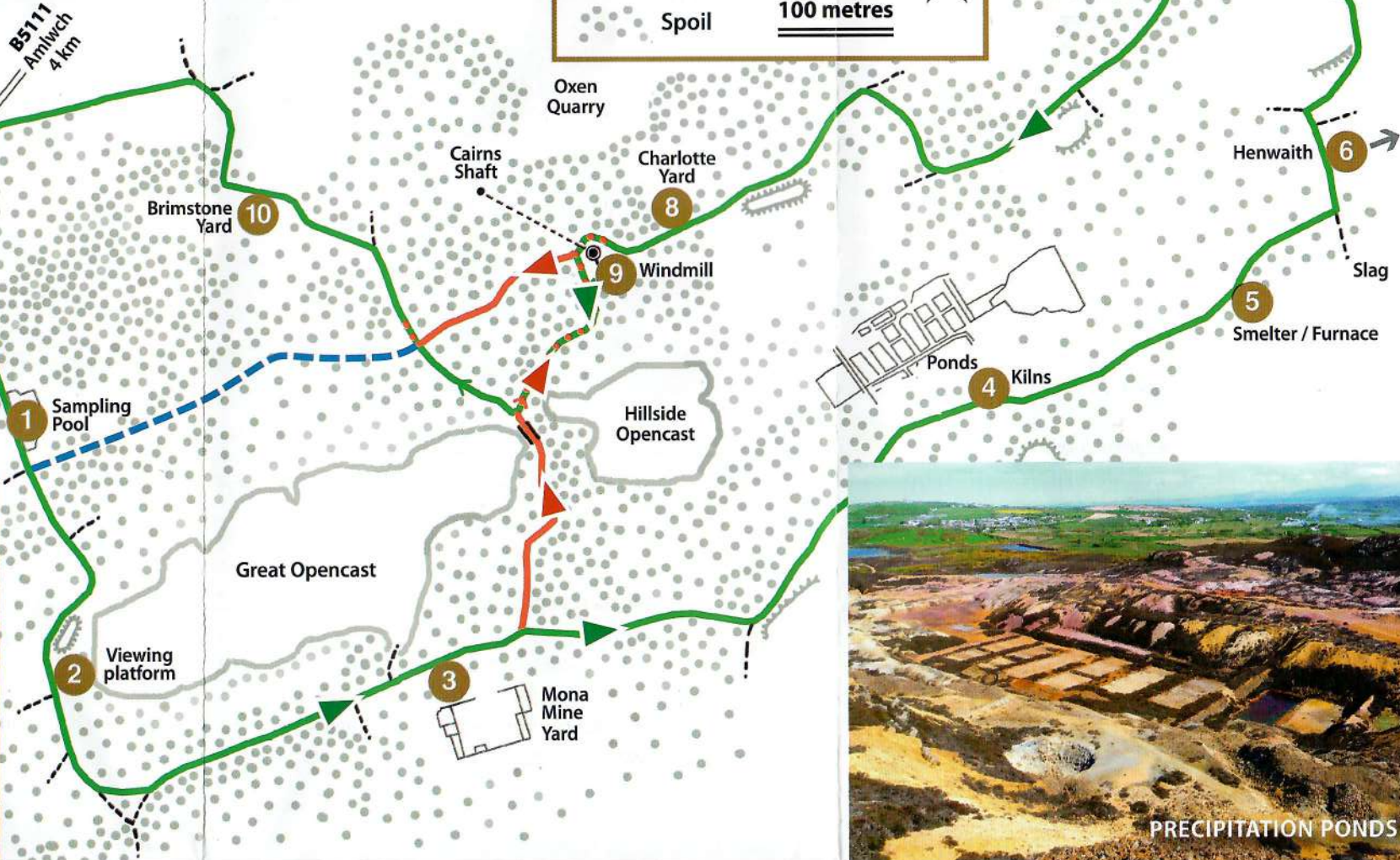
B5111 Llanerch-y-medd 7 km



B5111 Amliwch 4 km

FULL TRAIL (two hours)
SHORT TRAIL (one hour)
 Short cut
 Spoil 100 metres

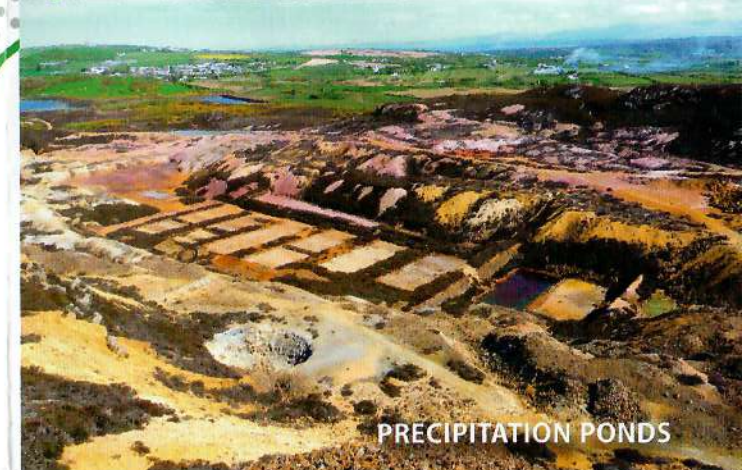
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GREAT OPENCAST



PRECIPITATION PONDS



1 SAMPLING POOL

Up to 50 tonnes per year of dissolved copper was recovered by its precipitation on addition of scrap iron to the drainage water. This was done in a sequence of purpose-built, brick-lined 'ponds', the best preserved being those seen at **SITE 4**. This pond is now used for sampling the very acid, brown water; the colour is due to iron and dominates in spoil from the mines.

2 THE GREAT OPENCASTS

This chasm, seen from the viewing platform, was opened up after the collapse of mine workings from numerous shallow shafts. Projecting platforms with their windlasses are shown in early paintings, as are miners working the ore from the sides, suspended on ropes. Most of this opencast was worked by the Parys Mine, the remaining third at the eastern end and in particular the smaller Hillside Opencast by the Mona Mine. Later mining at depth resulted in large chambers ('stopes') accessed by shafts, up to 300m deep (now flooded below 90m/45 fathoms) and by 20km of passages, half of them flooded.

3 MONA MINE YARD

Buildings on the south side of the Opencast are the remains of the Mona mine yard. The offices, smithy, mortuary and stores surrounded a courtyard, and were the focus of the mine's surface activities. Here miners bought their tools, candles and explosives from the Mona Mine company, and bid in small groups at auctions for 'bargains' to work underground sections of the mine. The buildings of the Parys Mine at the south-west corner of the Opencast are in a more ruinous state and now barely visible. Across the ridge or arête between the two opencasts a walkway has been constructed which allows a safe and spectacular short-cut in the Heritage Trail. This leads across the ridge to the windmill, **SITE 9**, a route that takes only an hour or so and is marked by red, rather than green, indicator posts.

4 PRECIPITATION PONDS & KILNS

Precipitation ponds, probably the best preserved in the UK, can be seen in the valley floor to the north.

The poorer ore from Mona mine was roasted in large kilns (seen to the east) for many weeks, filling the air with sulphurous fumes. Later flues, added to the kilns, condensed yellow sulphur that was then sold as a valuable by-product.

5 SMELTER / FURNACE

To the south are the brick remains of what is probably a smelter with its flue running up to a chimney.

Fifty metres down the trail to the right large black glassy 'crucible' slags can be seen.

6 HENWAITH

To the east are further extensive ponds for precipitation of copper and of iron ochre. The adjacent buildings now mark the site of early shallow mines, now flooded.

7 PEARL ENGINE HOUSE

This building, prominent on the skyline at the east end of the mountain, housed a Cornish Beam Engine. It was one of the earliest steam engines in north Wales, installed in 1819. This was later replaced by a larger engine in the 1850s. It pumped water from the adjacent 230m deep Pearl Shaft (which is now capped) at its southern end.

Its chimney at the western corner collapsed in 1980 but it has recently been rebuilt and the house re-roofed. In front are the remains of a capstan pit used to raise and lower the heavy pump rods in the shaft.

8 CHARLOTTE YARD

Just to the north of the hard quartz-rich white knoll known as Carreg y Doll, traces of a 'dressing' or 'cobbing' floor can be seen as a cobbled surface, sadly now much depleted by removal for road stone in the 1930s.

Here the ore from Mona Mine was broken into small pieces by the famous 'Copar Ledis' with iron flat-hammers on 'knockstones'.

9 THE WINDMILL & OXEN QUARRY

Built in 1878 on the summit of Parys Mountain, the windmill helped to pump water from the underlying mine. It was connected to a steam engine at the 270m deep Cairns Shaft by a system of reciprocating wooden rods ('flat rods'). This unique wind 'pump' was also unusual in having five sails. The building now serves as a sheltered information site.

Oxen Quarry to the north was named after the custom of treating miners to roasted ox and beer each March 2nd to celebrate the discovery of copper deposits in 1768. Ancient spoil was discovered here, containing rounded hammer stones ('mauls') and charcoal from fire-setting, an early technique used to shatter rock by fire. The charcoal and material from underground workings has now also been dated to the Early Bronze Age, 4,000 years ago. These are some of the earliest copper mines known in Britain.

10 BRIMSTONE YARD

Here the two mines obtained and processed sulphur from the sulphide ores (especially iron pyrite) for subsequent sale. The mortar of the derelict buildings here (as in the mineyards) has weathered out. This has decreased the soil acidity allowing grass to grow, giving such places their distinctive green colour.

11 THE MODERN MINE

The four thousand years of mining history continues today. Anglesey Mining plc, was formed in 1984 and in 1988 it sank an exploratory shaft to a depth of 300m with more than a kilometre of underground tunnels, raising over 2,000 tonnes of ore. This was processed by a new technique ('froth flotation') but further mining development was suspended by poor market conditions. In 1995 Anglesey Mining began a programme of further drilling from the surface, identifying the company's resource as 6.5 million tonnes, containing zinc, copper and lead, with small amounts of silver and gold.