

Penllegare Beech Tree Group

eNewsletter 6 for February 2021

Coal mining number

Coal in the Llan valley

Long before the valley became a country estate there was coal. In common with all of this part of Glamorgan, coal is everywhere. It's easy to forget about coal in the post-industrial world, particularly as climate change encourages plant growth over once bleak waste tips.

There was modern coal mining in the eastern part of the valley at the Charles and Gladys pits, the remnants of which still dominate the land under a century of pine and oak regeneration.

What seems more interesting are the remains of coal mining in the main valley at the Red Ash Track and the flanks of Nyddfwich. Interesting because any activity must have ceased by the end of the eighteenth century...after at least 600 years of mining!

Pit coal mining was an important industry from at least the 1200s. Access to coal and the rights to mine it were jealously guarded and argued over. In his 1306 charter of liberties to the Swansea burgesses and the men of Gower, William de Breos was forced to acknowledge coal mining rights



openly for the local privileged land owners.

Here's a trip through some of the interesting features of that early industrial age as we can see them today.



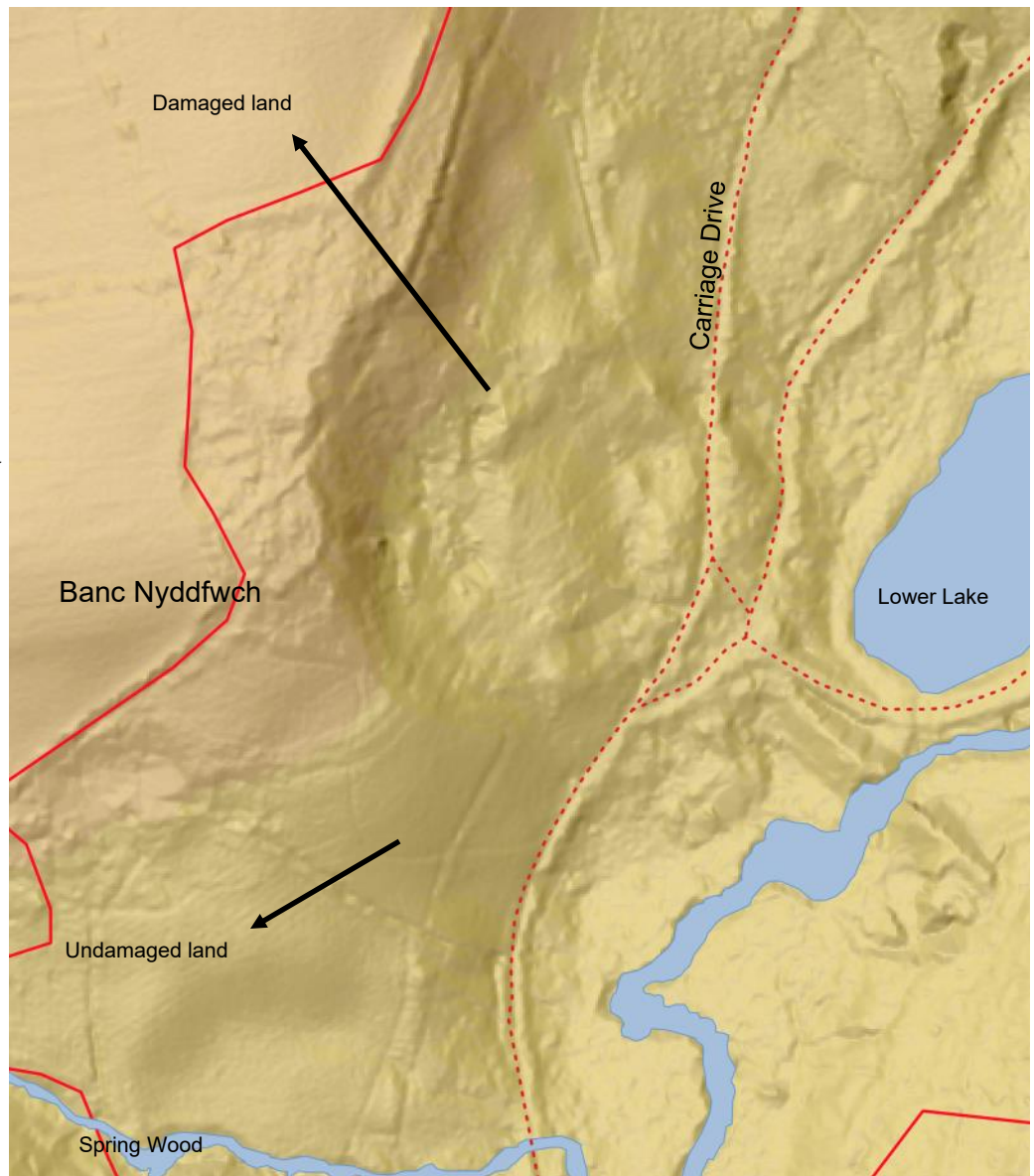
Left: The remains of a drift mine at the bottom of the Red Ash Track in winter. Probably abandoned in the late 1700s. It must have been a substantial structure to still have a visible trace today.

When I first started mapping the valley in 2012, I noticed unusual drainage from the western side. Unusual because the streams were not following contours and springs were cropping up in areas I couldn't see as natural. This was particularly apparent in the area known as Silt Site which was a pleasant hillside until it was completely transformed by the dumping of hundreds of tonnes of silt from the Upper Lake. Even so, a number of springs continued to surface from beneath the silt dumps partway down the hill, and still supply the ponds on silt site today.

At the time I explained away the anomalies as the remains of Victorian efforts to drain the land in much the same way as many other estates did at the time by submerged stone drains or clay pipes. The efforts to create better drainage can still be seen as streams cross the Carriage Drive and particularly in Spring Wood where a number of excavations and features exist to show the efforts to improve the fields there.

Early on I saw the trace of a drift mine at the bottom of the Red Ash Track. Woodlands in Glamorgan are littered with the remains of drift mines and I've seen hundreds in surveys of Forestry Commission plantations. Although I knew the history of the land, it is always best to identify physical remains and I remember being pleased to find this one. Keith Clements had already shown me the remains of coal drifts up on the Carriage Drive above the Silt Site and I knew that there was a tentative identification of a site further south on the Carriage Drive on the flanks of Nyddfych. But I knew there had to be more.

In 2016, I was able to get more access to better quality satellite mapping to add to my own surveys. It was then I started to put together the story of what is likely to have happened in the valley.



Above: An enlargement of the Lidar map for Nyddfych. Here you can see damaged land to the north from ancient coal mining and as a contrast the undamaged surface of the eastern slope of Banc Nyddfych. The disturbed land results in bad drainage and more springs of water and occasional damp or marshy areas. The smooth land surfaces further south have well-defined streams with only a few banks and field boundaries.

In 2019, some clearance of rhododendron on the flanks of Nyddfych gave me another drift mine and a further walk with Keith took us to a massive mine just below the old Nyddfych Farmhouse site. A nearby badger sett showed coal tip waste in the excavations. Lockdown restrictions will have to end before we get back to map any more.

Looking at Landscape

The disaster in Aberfan in 1966 changed the perception of industrial waste and pollution in Wales. Since that time local authorities in Wales have constantly been under pressure to make old tips safe or even remove them. Swansea has a particularly bad pollution problem with both the coal and metal industries. The Lower Swansea Valley project of the 1960s addressed the appalling levels of toxic pollution in the Lower Swansea Valley. Families such as the Dillwyn–Llewellyns and the Vivians closed their factories and moved away. Clearing up the waste of their factories was left to local councils and public money.

In the valley, the available evidence suggests that the impact of coal mining was intense. We see far less of it today because of the gradual recovery of the land through the planting of the Penllergare Estate, Forestry Commission and the natural regeneration of nature.

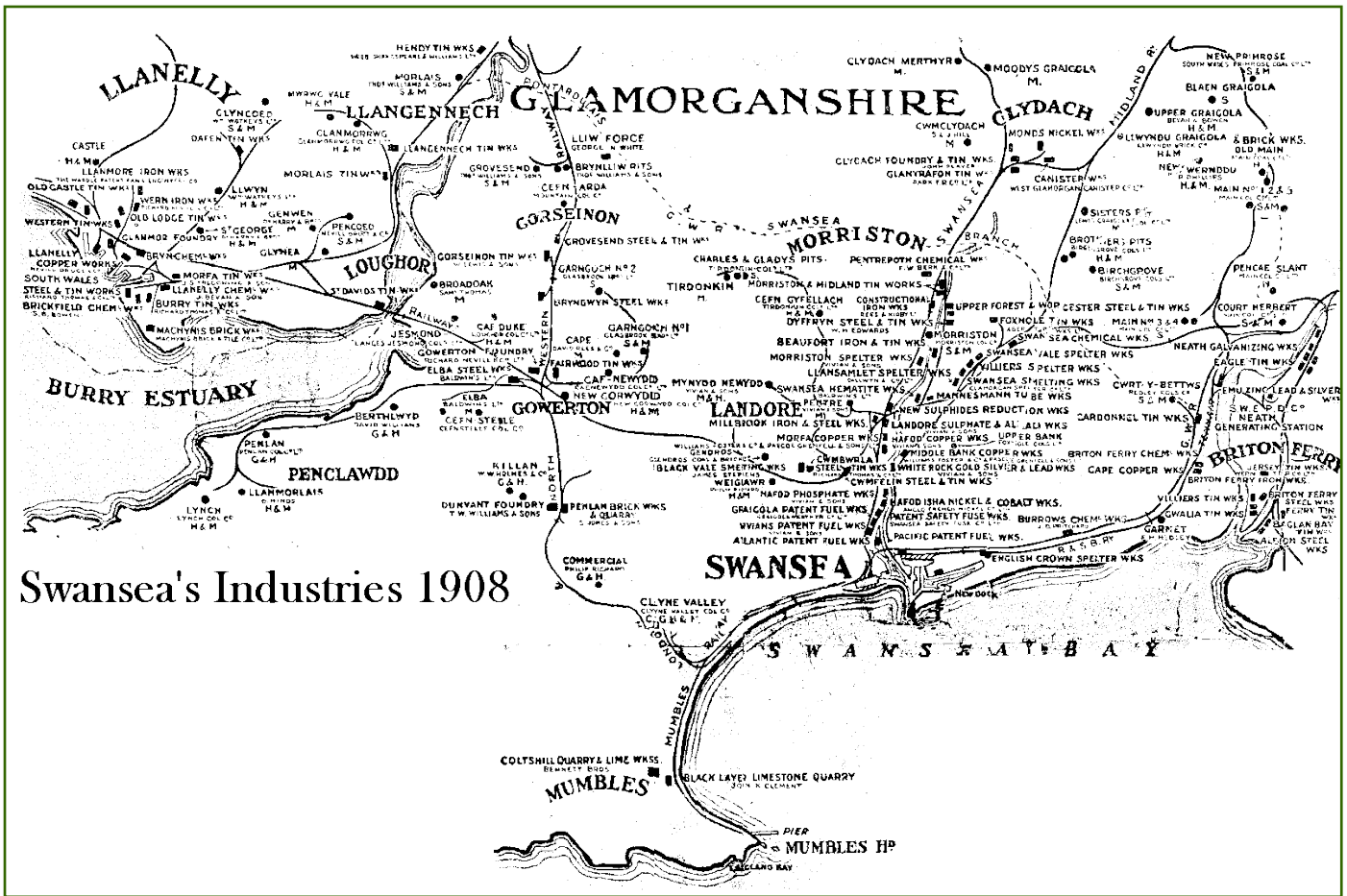
These days, ecologists and historians spend more time looking at the impacts of the industrial revolution and re-evaluating older sources to gather new insights. Here's an excellent example. Above right is a woodcut from *'De Re Metallica'* a famous book from 1556. *'Metallica'* was the single most important industrial reference book of the time. For over 200 years it was the primary reference book for industrial and chemical processes all across Europe. As a student *'Metallica'* was something I used extensively to understand the processes and techniques of the early industrial revolution.

The knowledge in *'Metallica'* dates from Roman times and the knowledge was even considered strategic to early nation states. Although written as an encyclopaedia of the metal industries, the book catalogues all important mining and extractive industries. The image top right shows a series of surveying techniques used to search for minerals. You can see dowsing (marked 'A'), and several excavations of various types. This original image is all about showing the activities of surveying.

The artist Justin Berry was more interested in what

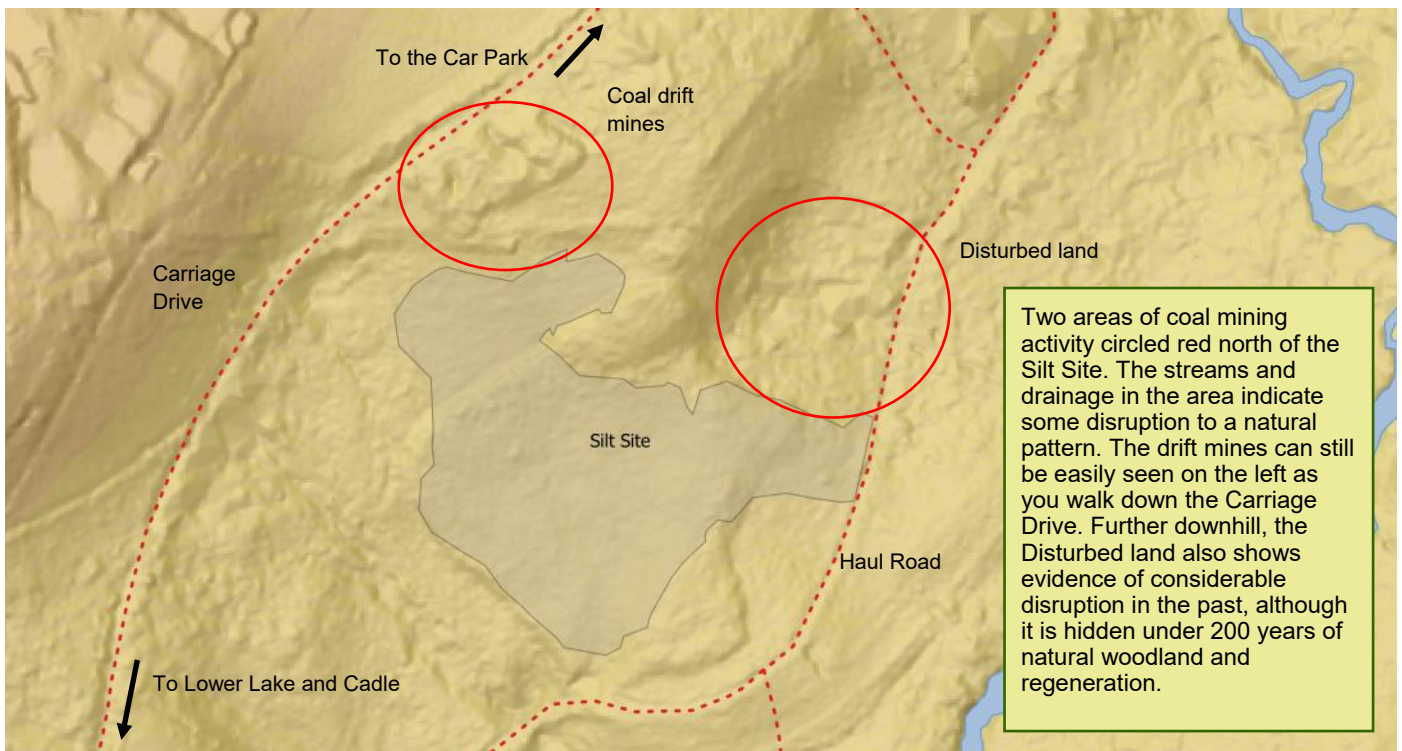


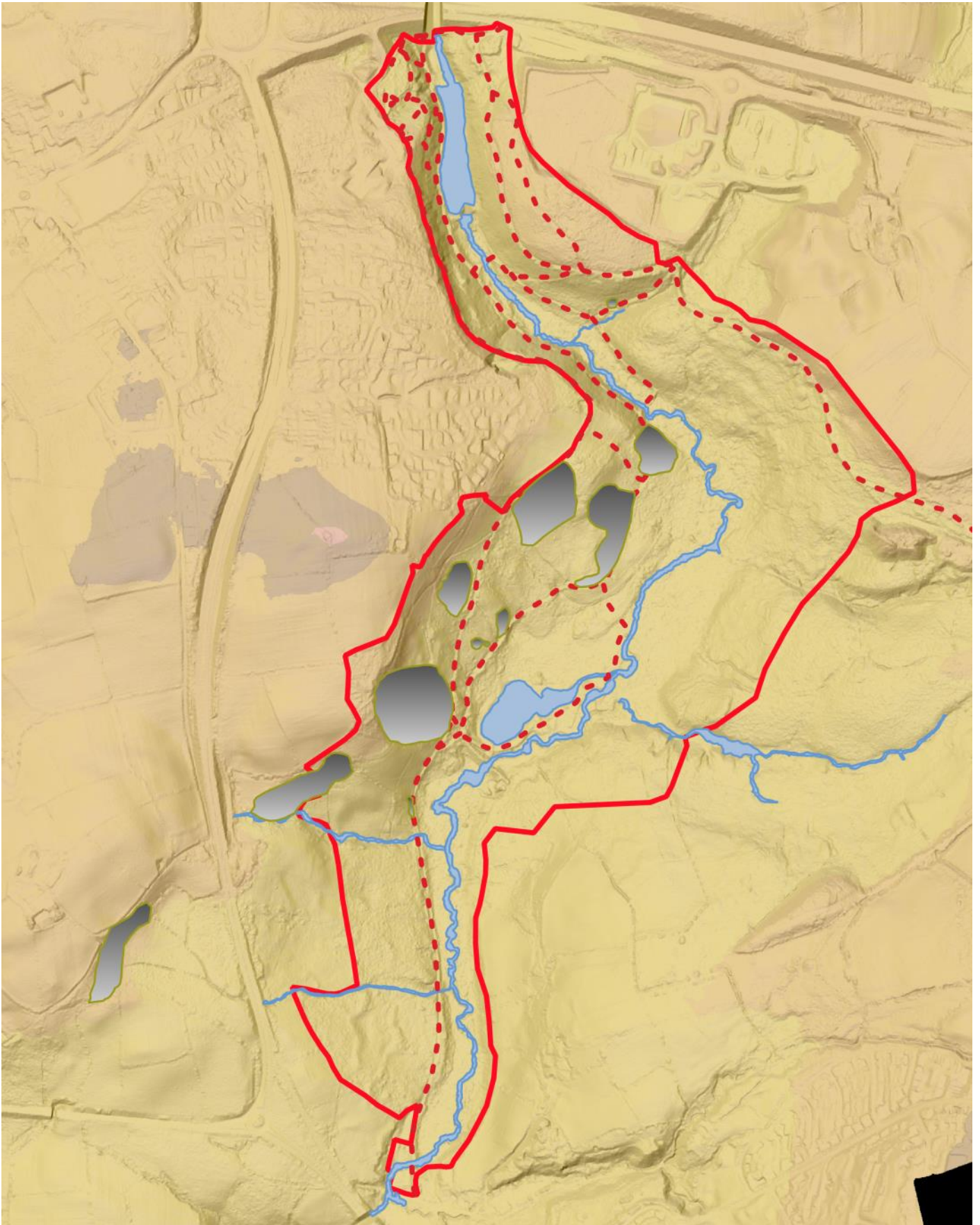
lay behind the presented image. He was after the 'unwitting testimony' or insights beyond what the original image sought to convey. In the larger image above, Berry removed the humans from the image and left us with the impacts of the activity on the landscape. Tree stumps and waste piles. This is a good idea of how the valley looked like at the end of the eighteenth century. If you look at the tree stumps you can see they are quite tall. This is the sign of medieval axes and saws rather than the machines we use today.



Above: Although covering an era after the main coal mining in the valley, it's worth looking at this map. In 1908, the South Wales Daily Post carried a large map commemorating the extent of industry in Swansea. You can see on this the large number of pits and mines that made up industry in the area. The Daily Post couldn't have known this but they were cataloguing the point in time of Swansea

industry's greatest moment. It was downhill from here. Although the British coal industry actually peaked in 1913, Swansea industry was already declining as the USA and Germany moved ahead in efficiency and productivity. This map also gives you the reason why the Lower Swansea Valley was one of the most polluted regions on the planet.





Above: Areas of likely coal mining are shown in grey. If the coal was easy to dig out there may be far more, although the waste tips and broken land are hidden under 200 years of woodland growth. The survival of the valley as a country estate preserved the scars in the land whereas they have been eliminated elsewhere in Swansea by housing and

road developments. The areas I identified largely follow the Tir Donkin geological fault and show that early miners were keen to get coal from the Swansea Beds lying to the west of the valley. The steep valley sides around Nyddfwrch make it easier to get at the best coal seams.



Above: A typical big coal dram from the fifteenth century. Although many people rightly associate coal with the increased use of iron, it wasn't the case before the mid-eighteenth century. In a woodland drift mine the most ubiquitous material was obviously the surrounding timber. Medieval mineworkers would all have had substantial technical skills to build their equipment. The design of coal trucks would have a lot in common with other types of truck used for heavy materials such as cannons.

The technology of this truck is incredible. You can see minimal use of iron which would have been expensive to forge or replace whereas the wood was growing all around them. The central spine (or chassis) of the truck is an oak trunk which gives the vehicle a central core of flexible strength. This would be called the 'perch' in later vehicles.

The 'wheels' are more shaped tree trunks and run on oak rails. The axles would have been lubricated with tallow. The flex in the rails allowed for resilience when heavy trucks were rolled along

them. Later generations of cast iron rails caused considerable problems and the engineer Richard Trevithick often cursed the quality of Merthyr's cast iron rails that would snap under load. The oak was resilient in water and easily replaced from trees around the mine. The rail was shaped to prevent rock and debris from accumulating on the rail surface and fouling the wheels.

The boards of the truck sides are removable to allow for easy loading and unloading and they can also be easily replaced whenever needed. A truck like this would have an indefinite lifespan as parts would be replaced in turn as required.

The coal industry replaced these timber trucks for cast and wrought iron throughout the eighteenth century as the industry transformed into much larger scale operations. They had disappeared from industry by the 1790s. There is probably much here that a roman military engineer would have recognised.

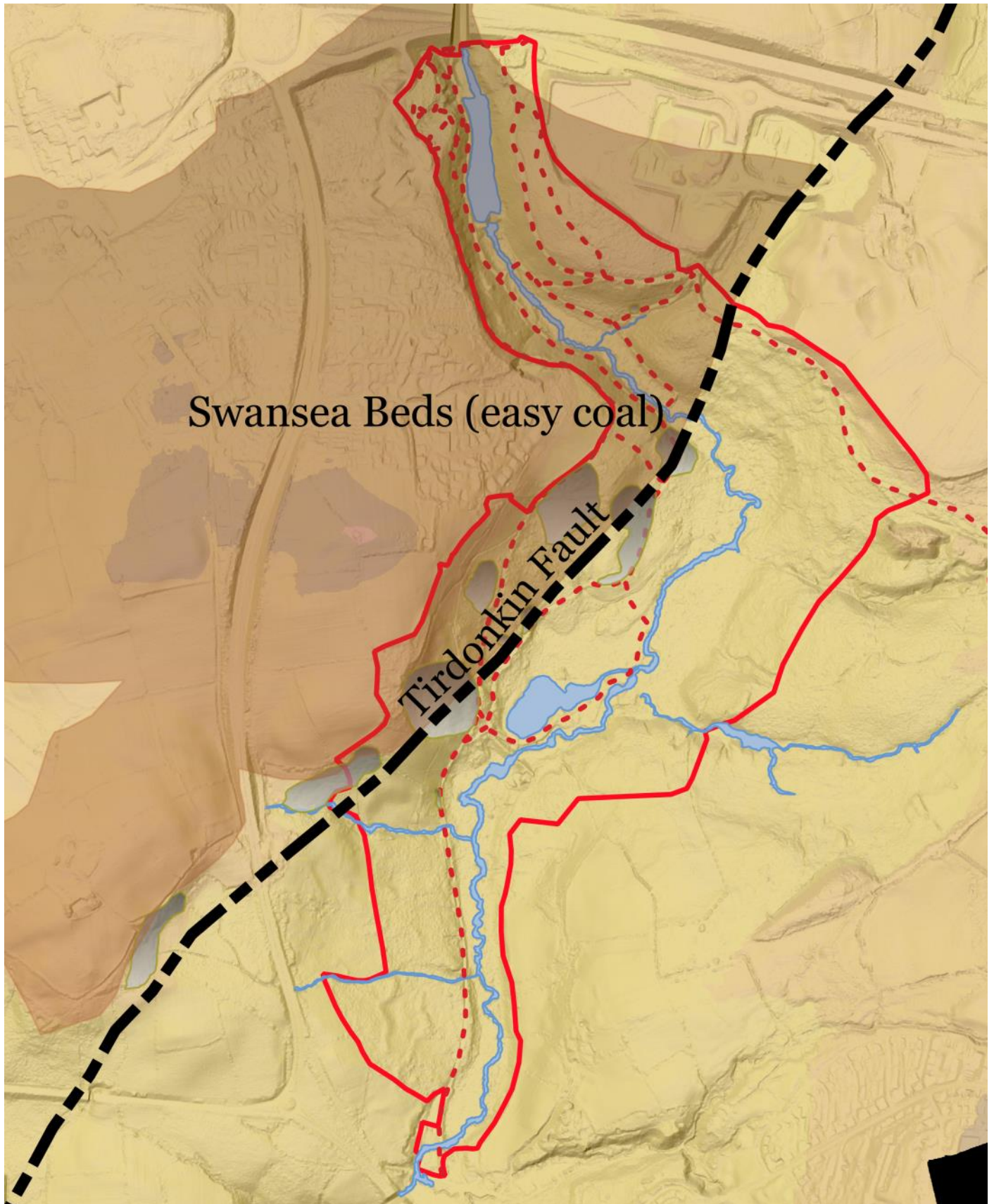
These are the sort of trucks that were used in the bigger drifts of Penllergare.

Left: A cast iron coal truck wheel almost certainly made in the Neath Valley from the later part of the eighteenth century. Experiments with rails were based on the oak rails from earlier generations. The problems of derailing which were not apparent with wooden truck wheels caused a lot of experimentation across Britain. First attempts were L-shaped plateways although they were prone to snapping under weight. The thin wheels are intended to cut through debris and prevent the wheels fouling. Ironworks in Neath and Merthyr manufactured these for the whole of Europe between 1780 and 1830.

Eventually, advances in wrought iron production techniques and the move to flanged wheels superseded this type of design. For me this is the archetypical Welsh coalfield product...apart from coal!

I think the coal mining phase of the valley had just about ended by the time these were introduced but looking at the scale of the drift mines around Nyddfwch, I could be wrong and maybe there were iron trucks in the Nyddfwch drifts.

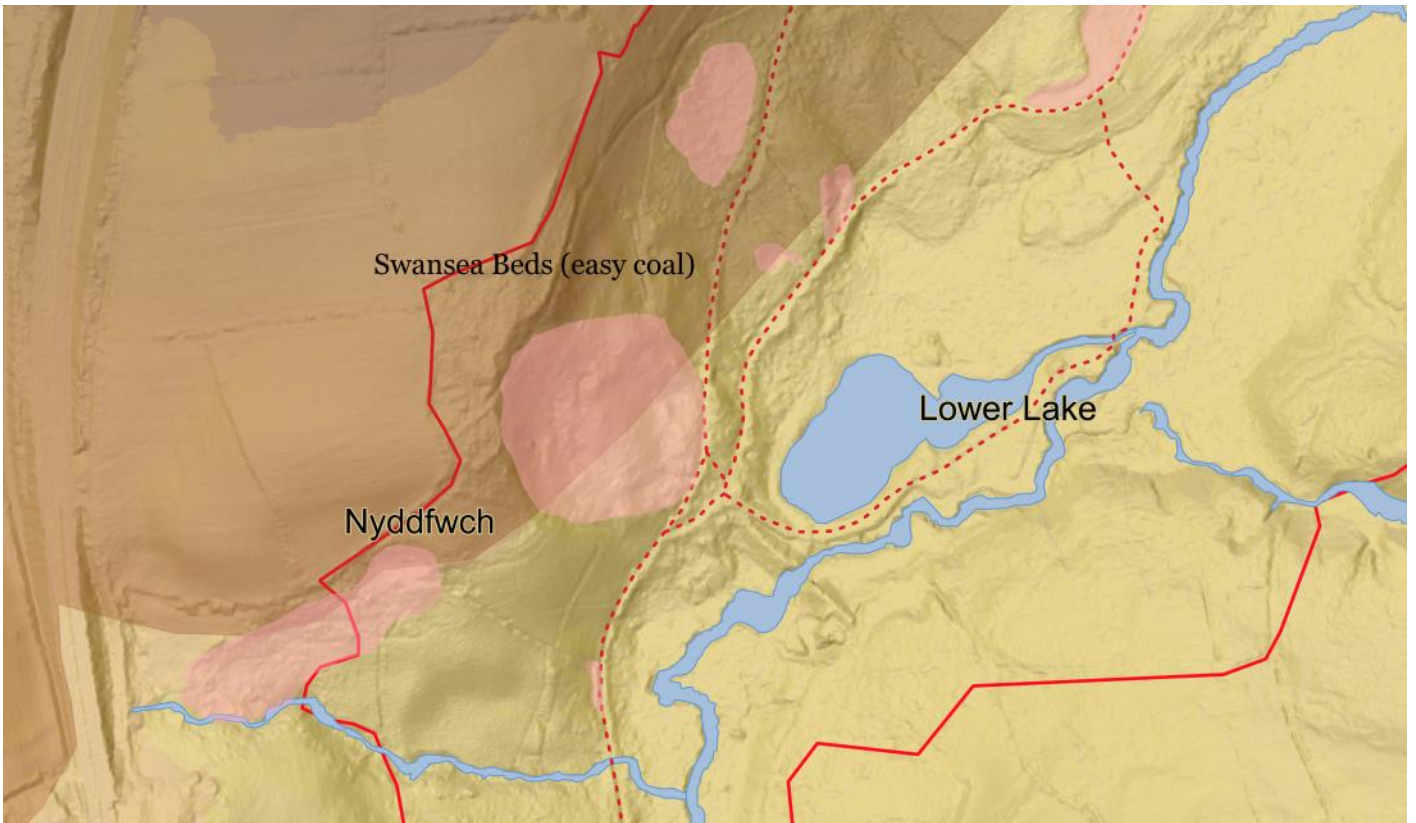




Above: This map shows the basic geology of the valley area. The interesting thing about this part of the Llan Valley is that a large geological fault runs through the area. This means there's a big crack in the rock and that the underlying rocks on the left side of the fault are different to the rocks on the right side. The fault is an important part of the structure of the South Wales Coalfield and even has its own name...the Tirdonkin Fault.

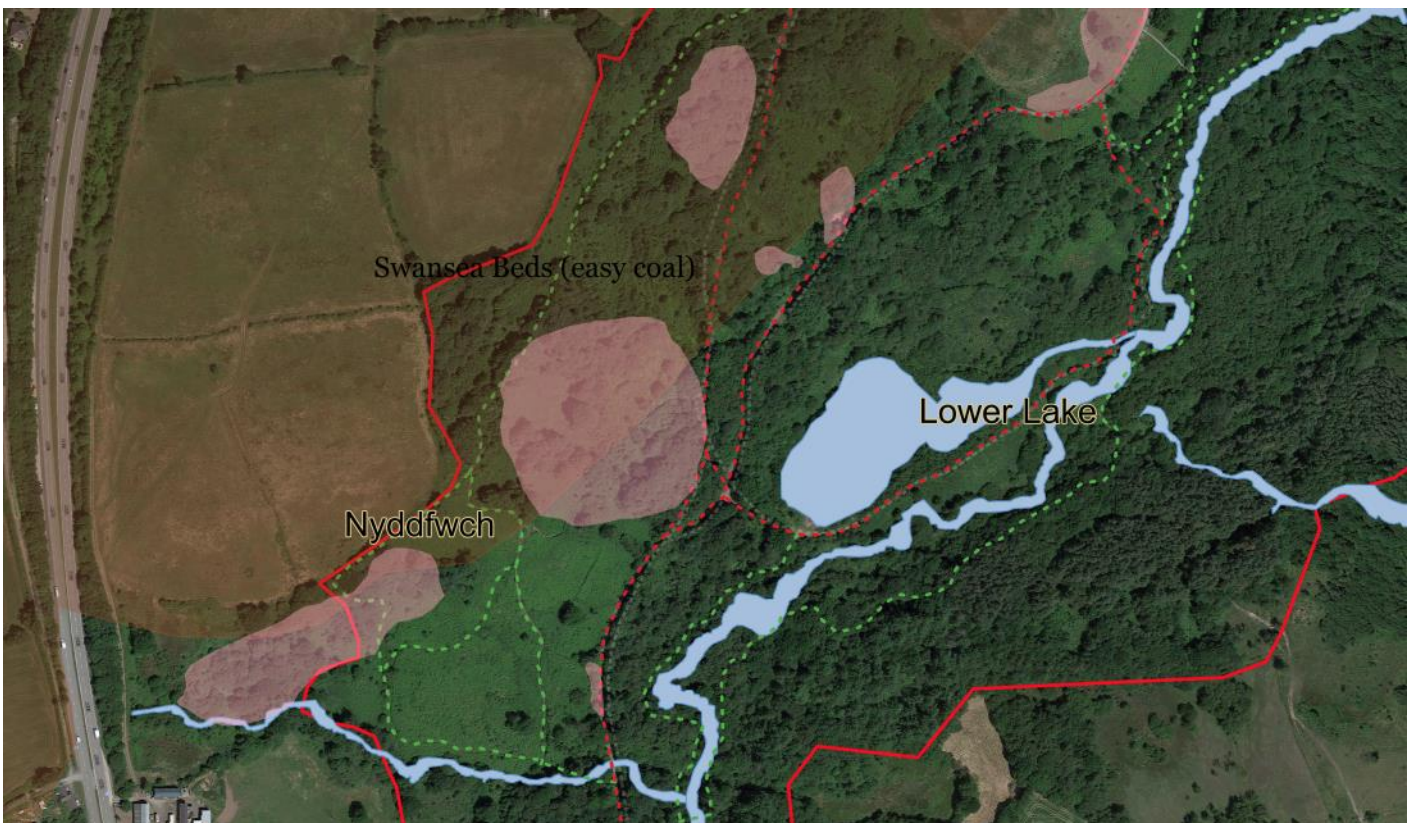
The fault and the surrounding rocks were all identified in the 1830s by the very famous geologist Henry De la Beche. He would have known the Penllergare family very well and I have no doubt he was entertained at Penllergare many times. Professionally, De la Beche was an incredibly talented geologist

and he pioneered mapping of the geology of England and Wales. He would have walked through the valley and recognised the existence of the fault because of the difference in rocks between the exposures along the Carriage Drive and probably Nyddfych and the different rocks on the eastern side by the Upper lake. Early coal prospectors in the 1400s and 1500s would most likely have identified the fault line and been aware that coal was close to the surface in these areas. Coal was Swansea's earliest industry and landowners were aware of the riches underground from the time of the 1306 de Breos Charter. The correlation between the fault and the disturbed land is very strong.

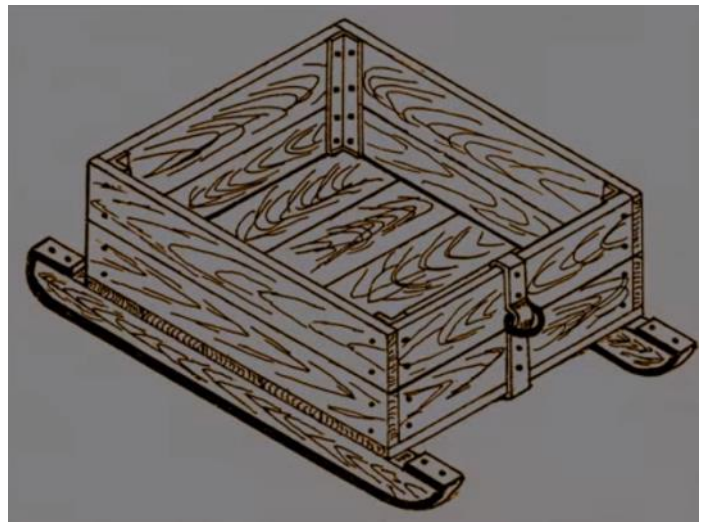


These two images show you the difference between the Lidar image of the land (above) and the normal satellite view (below). This is an enlargement to show the central Nyddfych region of the valley. The pink areas are land I can see with very disturbed land surfaces. There may have been very large coal mines on the steep slopes of the western side of the valley. The Swansea Beds to the west of the valley contain several coal seams separated by shale and sandstones. They would have been well-known as areas where coal was easy to find without digging too deep. The commons to the west are heavily pock

-marked with the remains of ancient coal pits. The coal from these areas was known as 'pit-coal' in the 1200s. It would have been poor quality compared to the coal seams deeper underground. The coal in Penllergare would not have been considered economic to dig and sell after better coal deposits were found in Morryston and Manselton in the 1750s, in any case, the land may have been considered as worked out which might explain why it was relatively easy to coalesce several land titles to create the estate lands of Penllergare in the early 1800s.



Right. Another image from *De Re Metallica* which has had the humans removed by artist Justin Berry. Again, you can see the tree trunks and environmental destruction associated with extractive industry. The strip running across the centre of the image is a representation of a coal seam or band of iron ore bearing rock bed. *Metallica* was a store of early geological knowledge dating from earliest times. Roman engineers and later Cistercian monks would have been very skilled at spotting valuable geological structures in the land. Several images show how coal seams would manifest themselves at the land surface. Great geologists such as Henry de la Beche would have started learning their geological mapping skills from *Metallica*. The local industrialist John Henry Vivian would also have been very familiar with *Metallica*.



Above: This is an archaeological reconstruction of a coal truck based on remains found in ancient coal mines in England. This type of sled was for the smaller drift mines and was pulled by the miners in small and low tunnels. Blacksmith's wrought iron is used for the runners and some iron straps for strength. This type of man-hauled truck was probably used in many of the small drift mines in the valley. Some of the larger drift mines on Nyddfych look to have been much larger and would have used wheeled trucks as shown on page 6.

Left: The incredibly luxurious woodland now growing on the Tir Donkin coal tips on the east side. Originally planted with Scots Pine (a tree that can grow on very poor soil). The area is now starting to regenerate as semi-natural woodland as the pine starts to die.





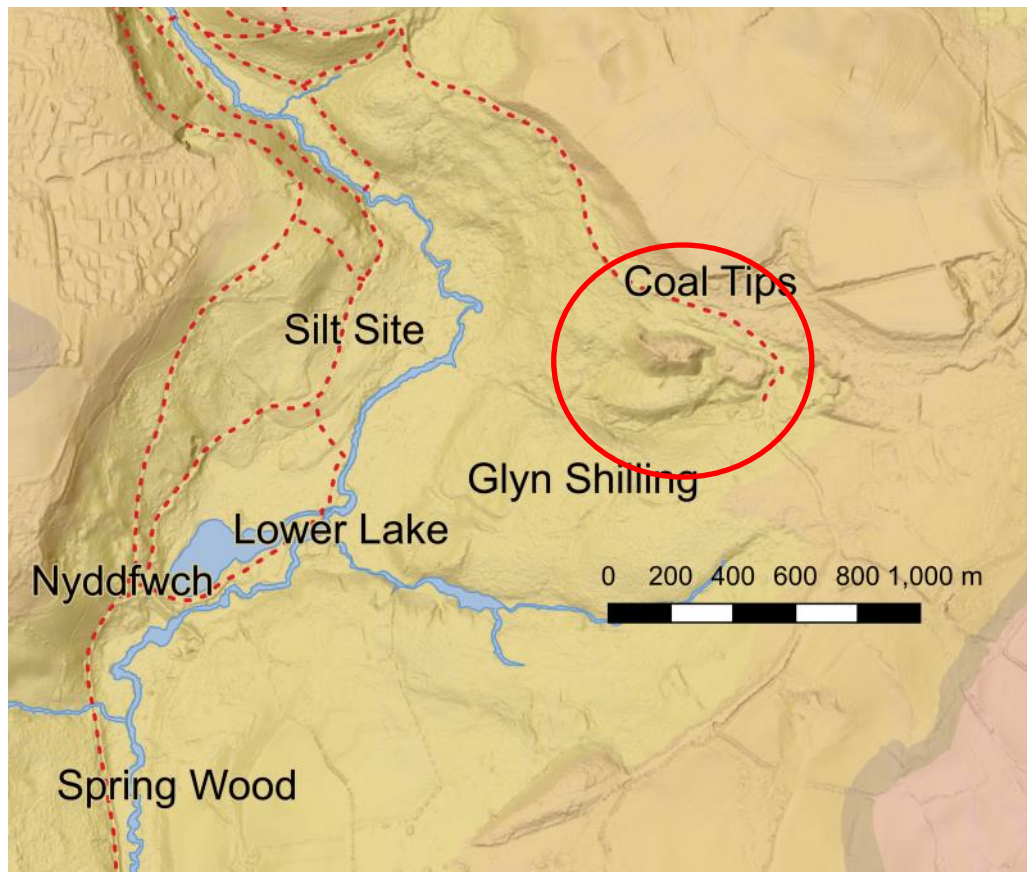
Above: The remains of an old drift mine at the bottom of the red ash track. Probably abandoned in the late 1700s. This one is best spotted in the winter. The range pole is at the entrance to the drift. There is a cavity under the small rhododendron to the right of the pole. Natural regeneration and slumping of the surrounding earth have helped to soften the contours around the entrance. This one is a bit smaller than the larger remains around the base of Nyddfych further south.

Below: A close-up of the eroded coal tip material near Tir Donkin in the east. This is tip material from a deep mine that has been weathering since the 1920s. Frost and water action is breaking down the waste into smaller particles. Biological processes are beginning to affect the waste and develop basic nutrients to allow a greater range of plants to flourish. The original Scots Pine plantation trees act as a pioneer species, paving the way for other trees and plants. This is a relationship and process that allows vegetation to develop after ice ages.



Right: the large coal tips of the Tir Donkin collieries produced a lot of waste in the short time they operated. You can see the remains of the tips circled in red on this Lidar plan. The tips were planted with Scots Pine which has a well-deserved reputation for and ability to grow on all kinds of rocky debris with minimal soil. The area is heavily wooded today. As the pines grow they are often blown over by strong winds. The gaps created are being filled with natural oak regeneration.

I have a trial area centred on the main tip as shown below. After 50 years the coal waste is starting to change into smaller particles as the process of soil formation accelerates. You can see a closeup of the new soil on the opposite page.



The Quarry Tramway

Although not part of the coal story in the valley, this is a good place to talk about the remains of the small rail system used to move stone from the quarry up to the Upper Lake dam site. It seems to me that the quarry was linked to a small inclined plane tramway that passed under where Quarry Bridge now is. Stone was then easily moved down the slope to a small tramway that ran up towards the Upper Lake.

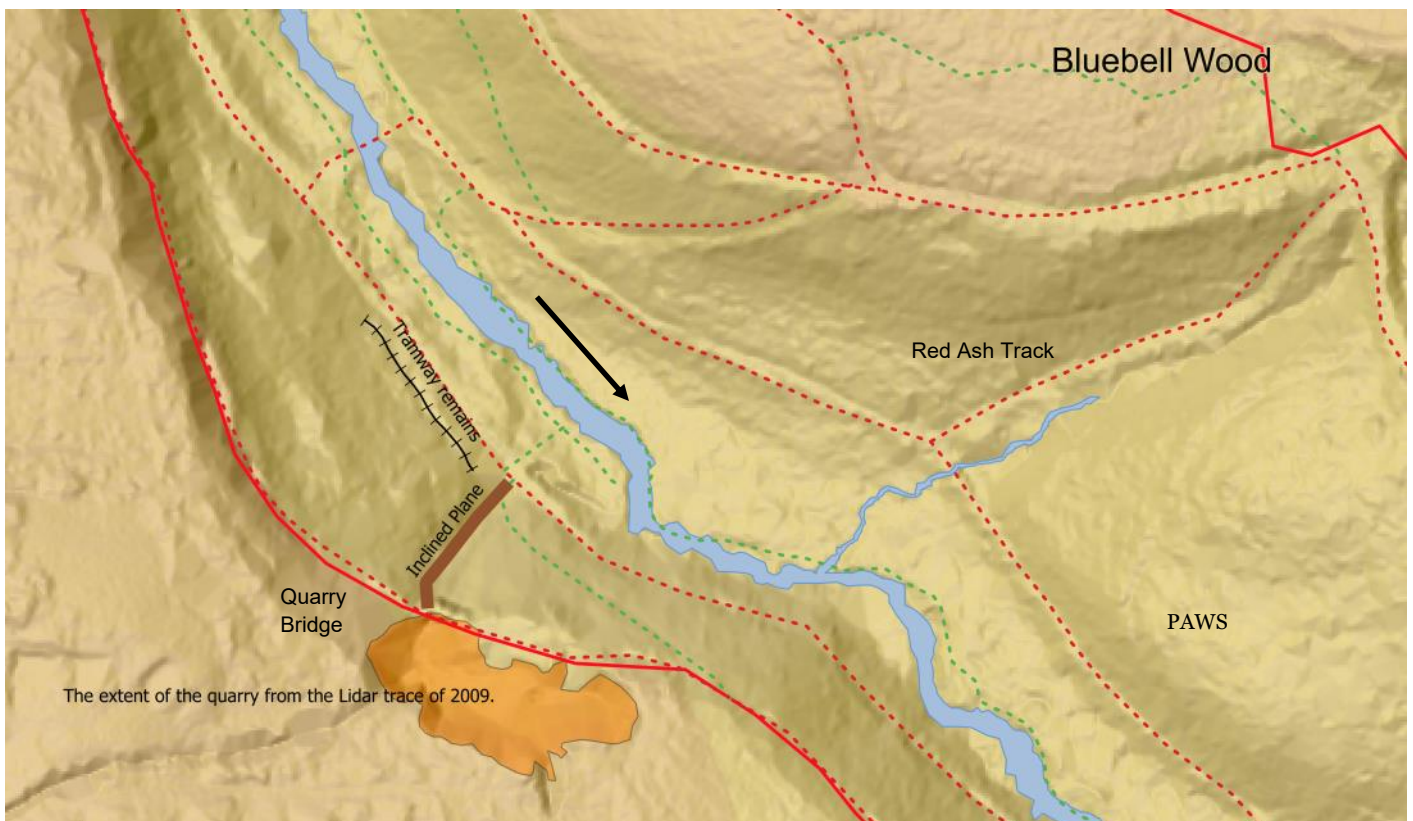
The remains at the foot of the quarry incline are a set of plateways and some truck wheels. They have their origins in the coal industry and would have been standard items in the 1820s. They may even have been recycled from old coal mining fittings.

Right: A closeup of one of the remaining wheels of the quarry tramway. Its an interesting spoked design and looks heavier and more substantial than the early iron tramway wheels I talked about earlier. When these wheels were made, this kind of equipment was everywhere because of the massive size of the local coal industry. Inclined planes were also used in many coal mines so it was easy to install and use a system and it was widely understood.



The plateway is standard 'L'-shaped plateway. It is thick iron which indicates it is improved plateway made thicker to avoid snapping under heavy load. It is likely to be late eighteenth-century or slightly later.

The wheels are very interesting as they are also improved equipment from the later years of plateways. They are good heavy spoked wheels designed to sit on the thick plateway. They are historically significant because they mark the era just before rails and flanged wheels get introduced into industrial scale coal mines. Sadly despite being flagged up to the Penllergare Trust on numerous occasions, their significance and part in the story has been ignored and they have been left to rot.





Above: Pieces of L-shaped plateway from the quarry tramway remains.



Left and below: Perhaps the last tangible link with coal mining is this coal dram or tub from the 1930s. Ignored by the Penllergare Trust and left to be destroyed by the housing developers. A typical combination of steel and iron with flanged wheels. The steel of the tub was in a poorer state of repair than the iron of the remains at the quarry. Testament to the incredible resilience of cast and wrought iron compared to steel.



Good conservation needs constant monitoring

Further Reading

Alban, J.R., (1984), *Swansea, 1184-1984*.

Bayliffe, D., Harding, J., (1996), *Starling Benson of Swansea*.

Boorman, D., (1986), *The Brighton of Wales*.

Childs, J., (2018), *The Parish of Llangyfelach*.

George, G.T., (2008), *The Geology of South Wales*.

Gilbert, O.L., (1989), *The Ecology of urban Habitats*.

Griffiths, R.A., (1990) *The City of Swansea, Challenges and Change*.

Jones, W.H., (1922), *History of the Port of Swansea*.

Rackham, O., (1986), *The History of the Countryside*.

Rees, R., (2000), *King Copper*.

Ross, J.E., (1983), *Letters From Swansea*.

Thomas, W.S.K., (1990), *The History of Swansea*.

Williams, G., (1990), *Swansea an Illustrated History*.

UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008, Open Mosaic Habitats on Previously Developed Land, <https://data.jncc.gov.uk/data/a81bf2a7-b637-4497-a8be-03bd50d4290d/UKBAP-BAPHabitats-40-OMH-2010.pdf> (accessed January 2021).



Colophon

The Penllergare Beech Tree Group is a small group of volunteers and users of the Afon Llan valley currently in the care of the Penllergare Trust.

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Created using MS Publisher. Maps and geospatial PDFs created with *QGIS 3.12.0-București*. If you have a version of this newsletter with an Annex, you will have the Geospatial PDF and can explore the layered map of the Llan Valley woodlands.

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