

EXPLORING *the* MINING HERITAGE

 Wicklow  
Mining Heritage



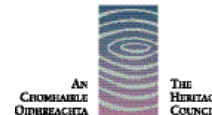
*of* COUNTY WICKLOW

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# THE MINING HERITAGE *of* COUNTY WICKLOW

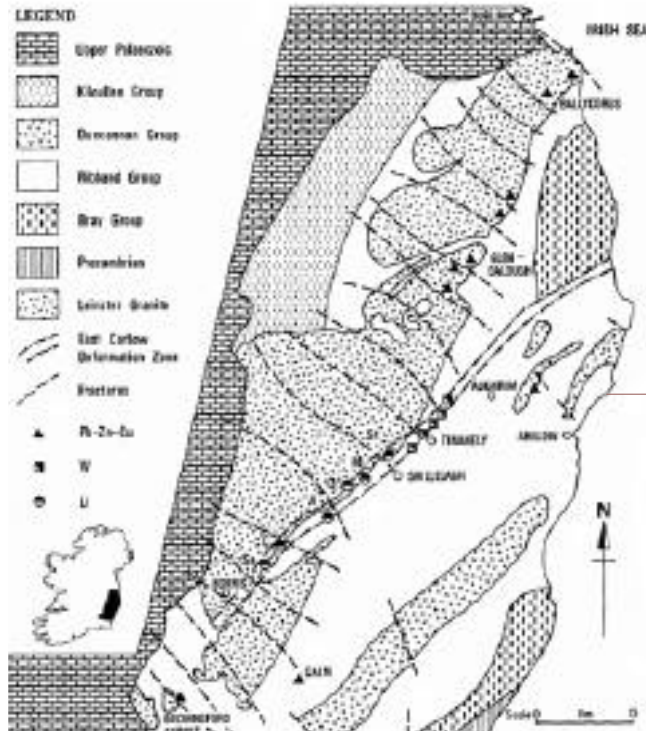
County Wicklow has a long and rich heritage of mining, probably starting in the Bronze Age and continuing until recently. This mining was principally for copper, lead as well as lesser amounts of sulphur, iron, ochre, gold, silver and zinc. The main areas of mining activity were the Avoca Valley, Glendalough and Glendasan Valleys and in Glenmalur.

This publication describes the history of mining at each area, and is designed to complement the local Mining Heritage Trails which have been, or are in the process of being developed. The aim of the brochure is to provide people, particularly those enjoying the walks, with information on the history of each mining area and to promote visits to individual sites of former mining activity; thereby providing a stimulus to future plans to promote the conservation of artifacts and features of the mining heritage at each site.

**For health and safety reasons** walkers using these mining trails are advised to stay on the walking trails and never to enter abandoned mine workings as many of these are extremely dangerous and may be flooded or at risk of collapse. Trails are generally on rough, uneven ground, therefore appropriate footwear is required.

Anyone using these Mining Heritage Trails does so at their own risk. Wicklow County Council accepts no liability for any injuries suffered or damage incurred by those who use these heritage trails. Neither is any liability accepted by Wicklow County Council for any loss and damage sustained by any party visiting or exploring these trails, nor does Wicklow County Council accept any liability or responsibility for any damage to property or goods, caused by any persons visiting or exploring these mentioned trails.

# MINING *in* WICKLOW: *the* GEOLOGY



Prior to 1960, Wicklow was the premier mining county on the island of Ireland. This was based in part on the substantial production of copper and sulphur from the Avoca district. It also reflected the lead output from several veins along the eastern margins of the Wicklow Mountains and centred on Glendalough (Map 1).

Map 1

Simple geological/location map of Wicklow with Mine Sites

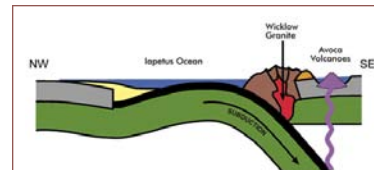


Fig. G1

Cross section of Iapetus Cocena showing formation of Wicklow Granite and Avoca Volcanoes

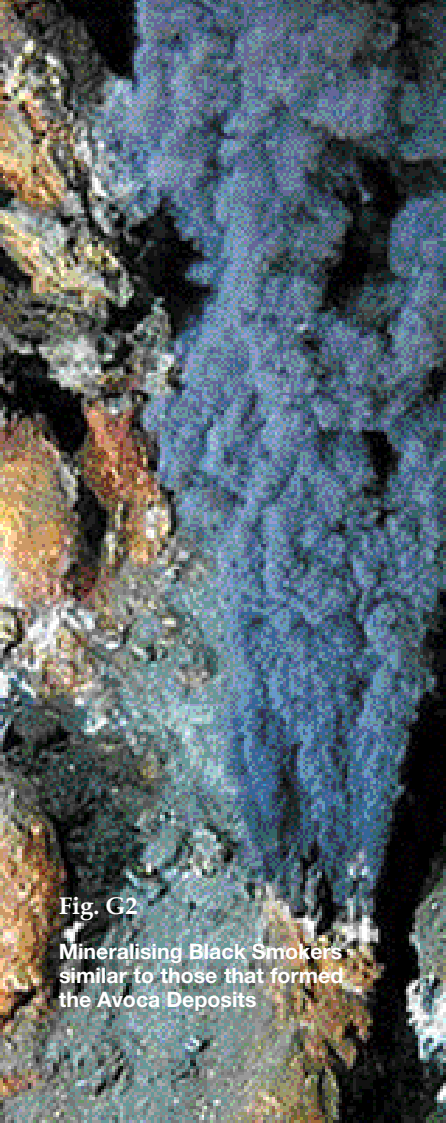


Fig. G2  
Mineralising Black Smokers  
similar to those that formed  
the Avoca Deposits

The rock sequence containing the mineralisation of County Wicklow is at least 500 million years old and it records the plate tectonic history of the Earth's crust over the period 535-400 million years ago. This history involved the opening of an extensive ocean (the Iapetus Ocean) about 480 million years ago as two plates of the Earth's crust moved apart. Landslides and volcanic eruptions deposited mud and sand along the ocean floor, building up large volumes of material. Immense weight was exerted on the lower levels of these deposits compressing it into rock, forming mudstones and sandstones (types of sedimentary rock). Slowly the ocean closed as the plates came back together again, leading to the deformation and heating of the rocks as well as the intrusion of *granites* such as the Leinster Granite. In all of this time, Wicklow was situated on the southern margin of this ocean (Fig. G1). The bedrock history of Wicklow effectively finished around 400 million years ago when the Leinster Granite was intruded and cooled down. The granite now forms the central core of the Wicklow Mountains.

Avoca lay close to the boundary between these two colliding plates and was the site of much volcanic activity. The volcanic ashes accumulated on a seafloor where jets of metal-rich, superheated waters were injected into the cold seawater, causing the metals to be deposited as a thin layer of *sulphides* (Fig. G2).

Unprocessed copper occurs mainly as *chalcopyrite*, or fool's gold, composed of copper, iron and sulphur. The ore typically contains 1% copper or less, generating an awful lot of waste ore in mining. *Pyrite*, an iron-sulphur mineral valued for its sulphur content, was originally used for making gun powder but more recently has been used in fertiliser production. Lead and zinc occur with the copper in minor quantities but neither have been recovered commercially at Avoca. *Ochre*, naturally occurring yellow-brown pigment consisting of iron oxides and kaolin, forms the near-surface of the copper and pyrite deposits and was mined on a small scale until the 1940s.

The lead-bearing *veins* of southeast Ireland are largely concentrated in County Wicklow but they also occur elsewhere. In the Leinster Granite they are confined to its eastern margin close to the junction between the granite and the surrounding rocks (*schists*). The lead-bearing veins are composed of *galena* (lead sulphide), *spbalerite* (zinc sulphide) and pyrite (iron sulphide) along with the non-economic minerals quartz and calcite (Fig. G3).

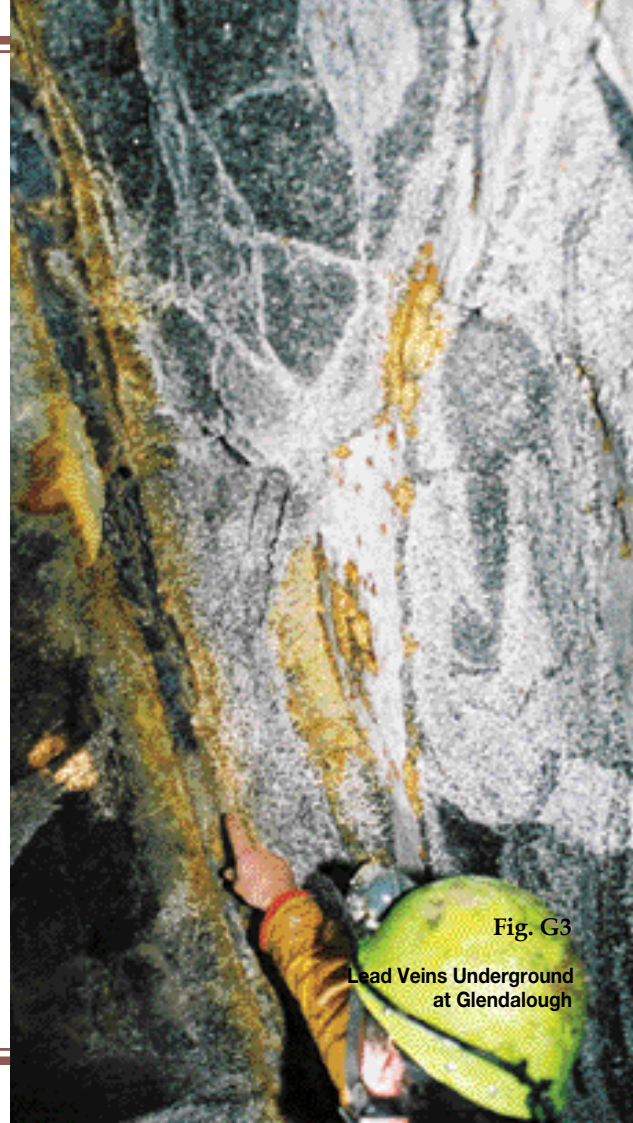


Fig. G3

Lead Veins Underground  
at Glendalough





Fig. G4

U-Shaped Glacial Valley (Glendasan)

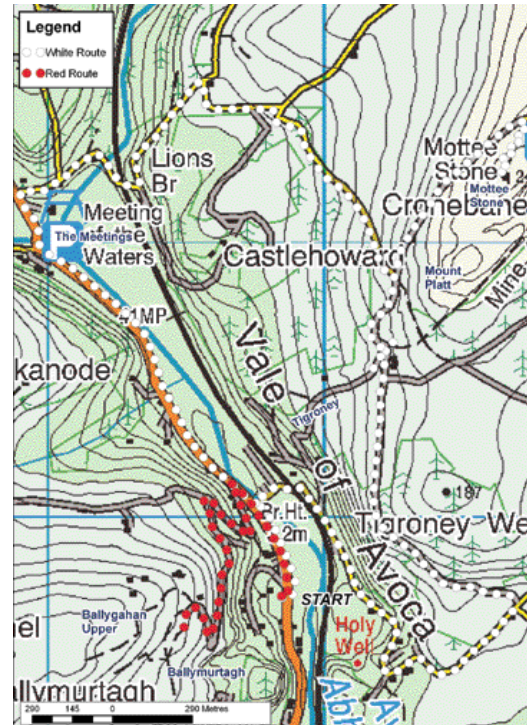
The Wicklow lead-bearing veins all occur in granite close to the junction with the surrounding schists. They are typically situated close to the courses of major fracture zones in the rock.

Human activity has led to the commercial extraction of copper and lead ores from County Wicklow over the past 200 years. However these mineral ores were originally either buried by later rocks, in the case of the Avoca copper deposits, or were formed at a depth below surface of 5-10km, in the case of the lead veins. That was until the geological processes that led to the erosion of this landscape exposed the mineral deposits at surface and made their extraction feasible. Geologists have established that an uplift of the Wicklow Mountains occurred between 36 and 10 million years ago, associated with the opening of the present day Atlantic Ocean. During the uplift, the rocks overlying the mineral deposits were eroded. Only the glacial sculpting of the Quaternary Ice Age, which ended over 20,000 years ago, modified the landscape significantly, providing the steep valley walls where veins could be feasibly mined (Fig. G4).

# THE AVOCA MINES

## *Introduction*

There were three main ore bodies in the Avoca Valley – East Avoca (**Ballymurtagh** and **Ballygahan Mines**), West Avoca (**Tigroney Mine**) and **Cronebane**. The ore bodies, usually 3m-15m wide, but occasionally up to 22m wide, occur within the volcanic-sedimentary rocks. These ore veins were worked on both sides of the valley, making this site the second largest copper mine in Ireland. There is evidence to suggest that Avoca was worked for copper as long ago as the Bronze Age (c.2500-600 BC), when metal was first introduced to Ireland and used in the production of bronze axes and other tools, and possibly through medieval times. Almost 2,000 years ago, around 150 AD, the Greek cartographer Ptolemy drew a map of the known world. On that map, one of the few features on the island of Ireland is a river spelt 'Oboka'; some believe that this name refers to the modern name Avoca. The history of the Avoca Mines shows how a mine survives by turning to other minerals when the main deposits become exhausted. From the 12th century, the site was mainly



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producing iron but this had been exhausted by the end of the 17th century. Lead mining took over until about 1750, subsequently followed by copper mining until around 1812. Sulphur, from the pyrites, was produced from 1840-1865, when Britain's major supply from Sicily was interrupted, and intermittently until 1949, especially during the two World Wars.

A modern operation between 1958-1962 produced over 3 million tons of 0.6% copper ore (chalcopyrite) and another between 1970-1982 produced 8 million tons (Fig. A1). Over the years, small amounts of gold, silver and zinc have also been extracted but these were never significant. Some efforts were made in recent years to extract gold from the tips but not very successfully and there is still some active mineral exploration being undertaken in the area today.

The Avoca community has a unique identity in its mining heritage as almost all aspects of life in Avoca originated in its mining past. Now a local community group, along with national stakeholders, is developing the former mine site into a themed mining heritage park, with walking trails, where visitors will be able to experience the mining-heritage at first hand. Currently the **White Walk**, on the East side of the valley, and the **Red Walk**, on the West side of the valley are being developed. In general the mines of East Avoca were owned by British companies, loyal to the Crown, and the mines of West Avoca were owned by Irish companies, which led to interesting times during the rebellion of 1798!



Fig. A1  
Cronebane Open Pit

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## *E a s t A v o c a*

East Avoca comprises a number of mines going west to east; such as **Tigroney**, **Cronebane** and **Conary**. The earliest documented activity at East Avoca was in 1752 when 500 miners were reported to be at work at “Crone Bawn” (Cronebane). In 1766 the lands at East and West Avoca came into the possession of John Howard Kyan (Snr.) by marriage. Kyan initially worked the mines himself but later sold the mineral rights for Tigroney and Cronebane in East Avoca to Charles Roe and Company of Macclesfield, England. Roe and his partners had been the founders of the famous Parys Copper Mine in Anglesea (Wales) but had lost their lease in 1785. Charles Roe was involved in the *smelting* of copper and zinc ores and the production of brass at Neath near Swansea in Wales. In 1791 Roe’s company was incorporated as the Associated Irish Mine Company (AIMC) by Act of Parliament in that year – at the time the only means of forming a legal entity such as a company was through an Act of Parliament. This company extracted copper ores from the mines and at its peak employed up to 2000 people in the valley. The Irish ore was shipped directly to Neath for smelting. The new mine manager, Thomas Weaver, vigorously developed the mines and, in addition, copper was recovered from mine waters through the use of scrap iron, a very modern technique at that time.

The Associated Irish Mine Company’s (AIMC) newly purchased copper mines were those previously worked around Cronebane by the Hibernian Mine Company (HMC). The Hibernian Mine Company had been established by John Howard-Kyan sometime after 1766 when lands in both east and west Avoca came in to his possession. By 1786 the HMC had moved the centre of their operations to Ballymurtagh on the western bank of the Avoca River. The sale of the Cronebane mine to AIMC was, in retrospect, to prove a bad move for the HMC as rather than being “worked out” the

Cronebane mine continued to hide its best-kept secret until 1788. In this year a six to eighteen feet wide vein of high grade copper ore was discovered. This rich vein was to prove extremely lucrative for the AIMC for many years. The AIMC is also famous for the minting of the 'Cronebane Token'. This was a copper coin with a monetary value of half a penny (1/2d). Often the miners were paid in currency produced by a landowner or company and could only spend the tokens in shops that were owned by the company! An increasing demand for coins arose from the "Industrial Revolution" and in the late 18th Century there was a shortage of small denomination coinage throughout the British Isles. The AIMC, along with many other companies in Britain and Ireland, decided to mint their own coins to pay their workers. The Avoca coins were issued between 1789 and 1799. There are many varieties and several contemporary forgeries of the coins. The rival Hibernian Mine Company across the river also issued their own coins between 1792 and 1797 (Fig. A2).



Fig. A2

Cronebane and HMC Tokens



Fig. A3

Williams' Engine House

A milestone in the history of mining technology at Avoca, was the takeover by the Williams' Brothers and Company of Cornwall, of the lease of the Tigroney and Cronebane Mines (East Avoca) in 1811. In 1835 it was stated that Cronebane and Tigroney '*.....affords employment to above 600 persons. These mines are entirely worked by water; there are 8 water wheels, one of which is 50 feet, and two are 40 feet, in diameter; they produce about 90 tons of ore weekly, which yield from 5<sup>1</sup>/<sub>2</sub> to 7<sup>1</sup>/<sub>2</sub> per cent of pure copper*'. The Williams' Brothers brought Cornish technology to the workings including the use of steam power. Cornish steam engines were installed both for pumping water out of the mines and for haulage of ore up the shafts. Cornish engines typically comprise of a vertical steam cylinder and piston. The piston is attached to one end of a long iron beam which is pivoted on the outside wall of the engine house over the shaft. This translated either to a circular motion for winding or a vertical motion of pump rods in the shaft. Prior to this, pumping would have been undertaken using power from waterwheels and haulage using horsepower. The remains of two *engine houses* can be seen in East Avoca, including the fine Williams' Engine House which was built around 1860 (Fig. A3).

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During this period there was a change in the importance of the minerals being extracted at East Avoca. Up to the 1850s copper was the most important mineral being produced. After this date, iron pyrites was the dominant mineral being mined. The iron pyrites may have been sold to their rival across the river, Henry Hodgson, who had developed a chemical works in Arklow. Another important output of the mines at this time was ochre, yellow iron oxide, which was present as fine particles in the mine waters and was extracted from the waters in settling ponds. The ochre was sold as a pigment for painting and dying. The Williams' Company ceased operations at East Avoca in 1873 and a number of short-lived companies took up the lease, but very few persons were employed.

Work recommenced in East Avoca in 1959 when the St. Patrick's Copper Mines Ltd drove a new level (the 850 level) to mine the upper parts of the Tigroney Mine that had been left by the old miners. This mine was worked until 1962. The final phase of mining was undertaken by Avoca Mines Ltd in the 1970s when two large *opencast* pits were excavated. About 880,000 tonnes of ore, grading 0.53% copper, were extracted from the East Avoca pit and 540,000 tonnes, at 1.23% copper, from the Cronebane pit.

The waste rock from the Cronebane pit was dumped on the surface between the two pits and now forms a local landmark, '**Mount Platt**' (Fig. A4). Both these pits largely destroyed most of the 18th and 19th Century underground workings but some of the surface remains. Short parts of the old underground workings still survive and can be seen in sections of the pit walls.





Fig. A4  
Mount Platt

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## *West Avoca*

West Avoca consists mainly of workings at **Ballygahan** and **Ballymurtagh Mines**. Modern references for West Avoca began from the end of the 17th century when Adam Kyan came into possession of the Ballymurtagh Estate through marriage to Mary Howard, whose family later became the Earls of Wicklow. The Kyan family were descendants of Donal O’Cahan, the last chief of Derry, who died around 1598. The Ballymurtagh mine appears to have been worked in the first part of the 18th Century by a Mr. Whalley but may have lain idle until John Howard-Kyan (Snr.), the grandson of Adam Kyan, decided to work the mine himself. In 1780 John Howard-Kyan established the Hibernian Mine Company (HMC). It would appear that initially the HMC worked mines on both sides of the Avoca River but in June of 1787 John Howard-Kyan entered into a contract with Charles Roe and others from Macclesfield to work all the mines for 41 years. Charles Roe and his partners worked the mines through their company – the Associated Irish Mine Company (AIMC). They also worked Ballymurtagh for a short time but were in fact more concerned with the operations east of the Avoca River and due to a dispute with Kyan they surrendered their lease to Ballymurtagh in 1790. John Howard-Kyan then formed new liaisons with brothers Turner and Col. John Carmac which led to the incorporation of the Hibernian Mine Company by Act of Parliament in 1792.

Intense rivalry between the Irish owned Hibernian Mine Company (in West Avoca) and the English controlled Associated Irish Mine Company (in East Avoca) was to become a dominant theme in their two close-knit histories. No doubt the bad feelings between the two companies, and their ethnically different workforces, reached a peak during the civil unrest in Ireland that led up to the abortive Irish Rebellion of 1798. Prior to the rebellion both mining companies had

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raised their own private militia and fitted them out with uniforms and arms. However, the HMC's owners and workforce were strongly suspected of having sympathies with the outlawed Republican group the "United Irishmen" and their allegiance to the Crown was most definitely in question. In fact the mine militia was found to be so infiltrated by the United Irishmen that it was actually disbanded by the government as the rebellion began. Production at the mines was halted temporarily during the 1798 Rebellion when peasant insurgents were defeated by British forces, including members of the Associated Irish Mine Company management who were subsequently rewarded for their "spirited and judicious conduct". Esmonde Howard-Kyan a brother of John Howard-Kyan (Snr.) was executed for his part in the Rebellion.

In 1798 the partners in the Hibernian Mine Company seem to have fallen out and John Carmac issued legal proceedings against John Howard-Kyan. The cost of the legal proceedings, the high operating costs of the mine and the death of John Howard-Kyan (Snr.), who died penniless in 1801, resulted in Ballymurtagh lying idle from 1798 until 1813. Howard-Kyan's son, also named John Howard-Kyan (Jnr.), migrated to England where he invented a process for preserving timber in mercury chemicals, a process still known today as "kyanisation".

In 1813 Henry Hodgson leased the West Avoca Ballymurtagh Mine from the Hibernian Mine Company and formed a new company known as the Wicklow Mine Company. Hodgson was a very resourceful businessman. One new initiative started by Hodgson was the development of the chemical industry at Arklow based upon sulphur from the iron ores. From the Middle Ages down to the end of the 19th century, Sicily was the main source of sulphur to the world. In 1839 the King of Sicily granted the sulphur trade to a French monopoly and placed a high tax on its export. In these

circumstances the low-grade sulphur of Avoca suddenly became very valuable. It was reported that the mine roadways were even dug up to extract the sulphur from them. Hodgson made a fortune. When the sulphur market fell he decided to develop his own chemical works at Arklow to process the raw sulphur. His factory was the forerunner of the later Kynocks explosives works and Irish Fertiliser Industries which have given Arklow its legacy of chemical plants.

A constant problem was the provision of transporting ore to Arklow for shipment to the smelter. The roads were poor and the Avoca River was not fully navigable. To resolve this Hodgson developed a mineral *tramway* to Arklow. The tramway followed the line of the river from Arklow to the Lower Ballygahan Mine; terminating somewhere near the present day location of the 20th Century mine office. This section of line, constructed around 1847, was probably single track and the wagons were pulled by horses. Sometime later a branch line was constructed up the hillside to the west to reach the Upper Ballygahan Mine. This branch line took the form of a double tracked incline. The incline appears to have operated in two sections with a steam engine situated mid-way, for hauling the rope attached to the wagons (Fig. A5). Only the footwalls of the engine house remain, but there is a fine bridge, 'The Tramway Arch', where the upper section of the incline crosses a mine road (Fig. A6). Hodgson's tramway was subsequently purchased by the Dublin, Wicklow and Wexford Railway Company in 1859, who changed their original planned route to include part of the Avoca tramway in the mainline route from Wexford to Dublin.



Fig. A5

Tramway Incline 1950s

Hodgson, a real entrepreneur, also developed the harbour in Arklow through a Poor Law Famine Relief Scheme. This gave him control of the port of Arklow, until the Local Government Act of 1872, and of course he never allowed the East Avoca companies to use the port.



Fig. A6

Tramway Arch

The 19th Century was the golden era of mining at both West and East Avoca. In 1856 it was reported that the Wicklow Mine Company had made a profit of £100,000 since its incorporation and the value of the mine was £400,000 at this time. All of this based upon an initial investment in the mine of £5,000. The profits from this period allowed for the introduction of relatively costly new technologies such as steam engines for pumping and winding. Good examples of steam engine houses can be seen adjacent to twin shafts on the Red Walk at Upper Ballygahan. Mining at West Avoca continued until 1885; although production rapidly declined after 1870. The decline of West Avoca (as well as East Avoca) in the late 19th Century can be mainly attributed to low metal prices and competition from new larger mineral resources in Australia and elsewhere. The mineral resources of Avoca were in no way exhausted by the end of the 19th Century, as evidenced by the large-scale mining that took place in the second half of the 20th Century.

Prior to the 20th Century the main mining method employed at West and East Avoca was underground mining, following the richest parts of the deposit. In fact the mineralisation at Avoca is not a thin vein system but a wide zone of low-grade mineralisation with pockets of richer ore. Modern underground and surface bulk mining methods developed in the 20th Century opened up the potential for a new phase of mining (Fig. A7). The potential for pyrite and copper ore was explored by the State owned mining company, Mianraí Teoranta, which led to the establishment of large, low-grade ore reserves in 1956. This in turn brought in a Canadian mining company, Mogul International, to mine some three million tonnes of copper and pyrite ore, trading as St. Patrick's Copper Mines Ltd. This company was forced, by falling ore grades and metal prices, to close in 1962. The actual closure was shrouded in some mystery as it followed the loss of an ore carrier off the Irish coast.



Fig. A7  
1940s Workers

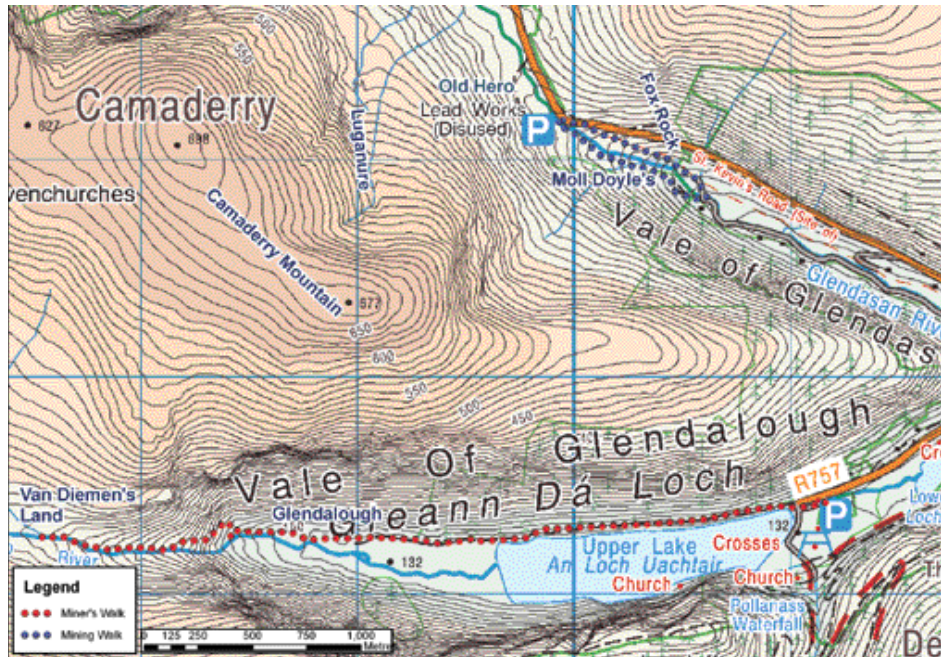
A period of care and maintenance followed until 1969 when a consortium led by Discovery Mines of Canada reopened the mine as Avoca Mines Ltd. By use of trackless mining methods this company mined some 8 million tonnes of ore until it too was forced by falling grades and metal prices to close in 1982 and the underground workings are now flooded. Only the gaunt mine office (Fig. A8) remains as a reminder of this final phase of mining in Avoca.

Fig. A8  
c.20th Mine Office



# THE GLENDASAN *and* GLENDALOUGH MINES

## *Introduction*



**Glendalough** is one of Ireland's most famous heritage sites. Over half a million visitors come here each year to see the monastic remains, view the valley or take walks on the hills. Few of these visitors realise that Glendalough and the nearby **Glendasan** valleys were once the most important sites for lead mining in Ireland (Map).



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Lead has been in demand for thousands of years. The Romans used it in plumbing (which takes its name from the Latin name for lead – *‘plumbum’*) and it was used for roofing and windows in medieval times. In more recent times lead has been used as a pigment, for solders and for batteries. The main lead mineral in Wicklow is galena (PbS) which often contains small amounts of silver, which could also be economically extracted. At Silvermines in Co. Tipperary there were active lead mines in the 13th Century, but the first reference to lead mining in Wicklow is in the early 19th Century. Lead was first discovered in Glendasan and later these veins were followed through the mountainside to the adjacent valley of Glendalough.

There were three distinct phases to the mining at Glendasan/Glendalough. The first phase was associated with the development of the mines by the Mining Company of Ireland from 1825 until 1890. The second phase was a re-working of the mines and tips by the local Wynne family from 1890-1925. A modern operation between 1948 and 1957, the final phase, concentrated on the development of new workings at depths below old workings in the Glendasan valley.

At the Glendasan and Glendalough lead mines there are remains of this mining landscape which it is hoped can be preserved. There is a wealth of mining heritage remains, including buildings, waterwheel pits, *leats* and *dressing floors*. Glendalough and Glendasan valleys are now under the care of the Wicklow Mountains National Park, which cares for the natural flora and fauna and surviving built heritage of the area. The mining heritage trails are the ‘Mining Walk’ in Glendasan, currently being developed, and the ‘Miners Walk’ in Glendalough.

# *G l e n d a s a n*

The earliest phase of mining, dating from the turn of the 19th Century was when the manager of the Avoca mines, Thomas Weaver was commissioned by the government to undertake a survey of gold in County Wicklow. Not long after the 1798 Rebellion he discovered a rich vein of lead ore in the Glendasan valley. To develop this Weaver established the Glendalough Mining Company in partnership with local investors. Weaver was responsible for the day-to-day management of the mines. The Mining Company of Ireland took over operation of the Glendasan mines in 1825 when they bought Weaver's shares. The price of lead on the open market was always a factor in the running of the mines. Price fluctuations meant that wages also varied over time, the typical boom and bust of mining in general. The Mining Company of Ireland operated their own smelting mill at Ballycorus near Dublin – no smelting was done on the mine site.

When times were good the mining company prospered and invested in buildings, equipment and machinery. A road to the Lughnure ore



Fig. GG1

Glendasan Dressing Plant

body was constructed in 1826 and on it a railway track, for wagons, was also laid which extended 126 feet into the mine. Dressing floors for separating the ore were built on the site. To extract this ore body 'The Hero Mine' was opened initially, to a distance of 30 feet, and 'The Fox Rock' mine was opened in 1828. Over the next 10 years, machines for pumping water out of the mines were installed so that lead could still be extracted. There was also a crushing mill erected and a new water wheel replaced horse-power (Fig GG1). 'The Ruplagh Mine' and a new pump house opened at the site in 1835. An improvement in lead prices in the 1850s resulted in a fresh wave of investment with old workings being re-opened, a new crushing mill erected and machinery brought in. A modern forge was built in the 1870s which saw further advances in machinery and cut the cost of labour. This meant that 2 or 3 boys could now do the work of 9 men.

With the general rise in population, as a result of the mining, came a demand for housing and the Mining Company of Ireland built houses for its work force, believing that both the miners and the company would benefit. Built in the mid 1850s, a row of houses close to the mining works is reputed to have once housed eight musicians. Hence the name... 'Fiddlers Row' (Fig GG2).



Fig. GG2

Old photo of Fiddlers Row

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The National School system was established in Ireland in 1831. In 1864, The Mining Company of Ireland built a school to provide for the children of their workforce. The 'Mining School' operated alongside other National Schools in the Glendalough area.

A very important aspect of mining exploration is the use of timbers to support the tunnels. The shafts and tunnels needed to be propped up as the miners worked their way into the mountain. In the 1850s and 60s The Mining Company of Ireland planted approximately one million trees in the Glendalough Valley for use as timber props in the mines. This was also a commercial venture for the company as some of the timber was sold on the open market, adding to the company profits.

By the 1850s, 200 men were working above and below ground and 120 tons of lead ore was produced each month (Fig. GG3). As well as working below ground the miners were involved in building the Roman Catholic Church at Laragh. Despite being in the middle of the Famine, the money to build the church was raised and after four years it was opened on St. Kevin's feast day, 3rd June 1851. The other major religious denomination – Church of Ireland – was not neglected as some miners contributed to the building costs of St. John's Church in Laragh in 1843.

As Fr. Mathew, the temperance priest, toured the country in the 1840s preaching the virtues of abstaining from alcohol, the miners also came under his gaze. Some were criticised for their over indulgence. While he was responsible for many people giving up drink, it was still a problem among certain miners. In the 1870s the local Royal Irish Constabulary force was not able to cope with drunk miners who got into brawls on pay day and extra forces had to be called in from Roundwood.

It is probably no surprise that the men drank and played hard as their working day down the mines was anything but easy. The average life expectancy for a miner, at this time, was 42 years. The work was dangerous and the risk of tunnels collapsing was always present. This is exactly what happened in 1825 when two miners were trapped by a rock fall. The accident was not discovered until the next shift change occurred and the men were finally rescued after 33 hours.



For over a hundred years there was no mining in the Glendasan valley until the St. Kevin's Lead and Zinc Mine was set up by J.B. Wynne, along with other investors in 1948, the third and final phase of mining. A work force of 80 operated it for 9 years. They were divided into two main groups with 55 men employed underground, and 25 men employed in the processing plant and on compressors.

Fig. GG3

Miners at Glendasan, 1951

Many men started working in the processing plant at the age of 16. Each shift had four men to operate the plant. The shift supervisor oversaw three others – a man collecting the processed lead from the *jig tables* (Fig GG4); a man feeding the raw material to the *crusher* and a third man dumping the rock into the crusher house. Above ground there was also a fitter, a helper and a man for bagging the lead. Many men started work in the processing plant and then discovered that the men underground had much better wages – so they approached their supervisor to get a job down the mine.

When these young men first went underground they worked filling wagons and shovelling ore. They then moved on to helping a *driller*. Opportunities to drill a few shallow holes with compressed air drills and charge these with explosives followed. Eventually, after a couple of years, they could become drillers themselves. The miners worked in pairs – a driller and a helper – in three, eight-hour shifts per day. There were about four pairs working each shift. Day shift started at 8 a.m. and they drilled 30 holes – each five feet deep – into the face of the rock that would be blasted at lunchtime. After lunch they started filling wagons with the broken rock – usually about 30 wagons of rock from one blast – approximately fifteen tons (Fig GG5). In the centre of the rock face was a vein of lead, two to three inches wide, and that was the important area. The remainder was waste.



Fig. GG4  
1950s Mining



Fig. GG5

1950s Processing Plant

There were also a number of men filling wagons with ore and extending the rail, air and water pipelines. A blacksmith sharpened drills and tools. Pit ponies worked in the tunnels carting the ore from the mine to the Processing Plant and three men followed the ponies. The compressors and generators ran continuously and there was a man on each shift looking after this machinery to ensure air pressure was adequate at all times. Work in the tunnels was difficult because of flooding and dust from drilling. As a result, many miners developed lung and chest problems.

The two main tunnels in the 1950s were the 'Fox Rock' and the 'Moll Doyle', driven from the floor of the Glendasan valley. Fox Rock was three quarters of a mile long and the Moll Doyle was less than half a mile long. Lack of money continued to be a problem for St. Kevin's Lead and Zinc Mine. While sufficient ore was found, the company did not have the technology to process it. A Canadian mining company leased the mines from the Wynnes in 1956.

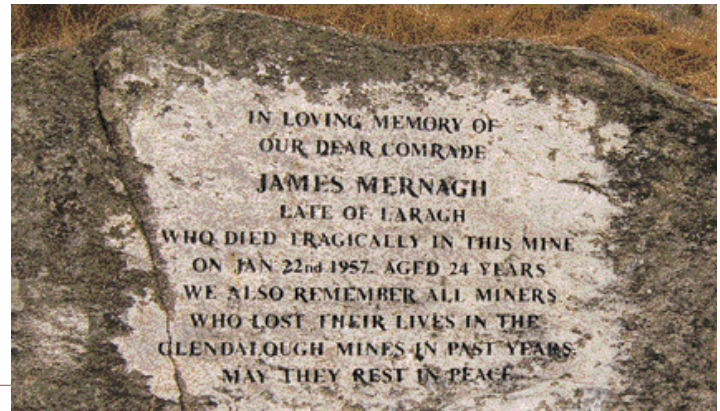


Fig. GG6

Memorial to Jim Mernagh



Given that mining is such a hazardous activity, it is remarkable that there were only three recorded fatalities over the 150-year lifetime of the Glendalough Mines. George Reid was killed in 1864 and Thomas Devlin in 1875. The exact cause of their deaths is unknown. Over 80 years passed until the final fatality occurred on 22nd of January 1957. Two miners were drilling into the rock when tragedy occurred. Their drill somehow struck a piece of dynamite and an explosion hurled the pair to the ground. Jim Mernagh, a married man with two young children was killed instantly. His co-worker Robbie Carter was seriously injured (Fig GG6).

The Canadian Mining Company, which had taken over the mines in 1956, was not successful in locating the expected amount of lead and this, along with the fatal accident in January 1957, was the main reason the mines finally closed in June of that year.

# Glendalough

The **Camaderry Mountain** separates the two valleys and the two mines – the Glendasan mine and the Glendalough mine. The **Luganure** mineral vein cuts across Camaderry Mountain between the two valleys. The workings in the Glendasan valley were connected by a tunnel through Camaderry Mountain into Glendalough. This allowed for natural drainage of the Luganure shafts and tunnels and made transportation of the ore for processing in Glendalough valley easier.

Work in the Glendalough valley in the 1850s marked a new location in the exploration of minerals in the area. Construction of a second set of buildings including a water wheel powered-crushing mill was undertaken. Workings further up the Glendalough valley were developed (Fig. GG7). The far end of the valley was aptly named '**Van Dieman's Land**' by the miners (after the distant colony of Van Dieman's land off Australia – now called Tasmania) because it seemed so far away from civilisation. Mules were initially used to carry materials up the steep mountainside and bring the ore down. These mules were later replaced by an inclined railway, resulting in greater efficiency and productivity. This tramway brought the ore down from Van Dieman's Land to the floor of the Glendalough valley for processing.

The 1880s saw a major decline in the fortunes of the Mining Company of Ireland which had experienced losses over several years. The lead was running out in the areas being worked and world prices for lead were in decline. Employment fell dramatically and many of the most experienced miners emigrated to England and America. Although mining in this valley only lasted for approximately 20 years, mined lead continued to be processed here even into the 1900s.



Fig. GG7

Overview of Glendalough Mines

The Mining Company of Ireland sold the mines to the Wynne family in 1890, denoting a new phase. The Wynnes were an Irish family with previous mining experience in the Avoca and Glenmalure mines. This operation didn't run too smoothly, however, and after a few years, mining came to a halt due to problems with flooding and a lack of machinery. Needing cash to develop the underground workings, in 1913 the Wynnes set up a water plant in the Glendalough valley to treat the waste from the mines in both the Glendasan valley and Van Dieman's Land. The waste was transported on a tramway and loaded by hand into a crusher by a mainly female work force. The crushing work continued until 1925 (Fig. GG8).

The demand for lead during the years of the First World War, 1914 to 1918, brought the Glendalough mines to the attention of the Ministry of Munitions in London which granted aid to the Wynnes to re-open the Fox Rock mines in Glendasan. However, government financial support was withdrawn at the end of the war. Funds dried up, and so did the mining. This was the last phase of mining in Glendalough.

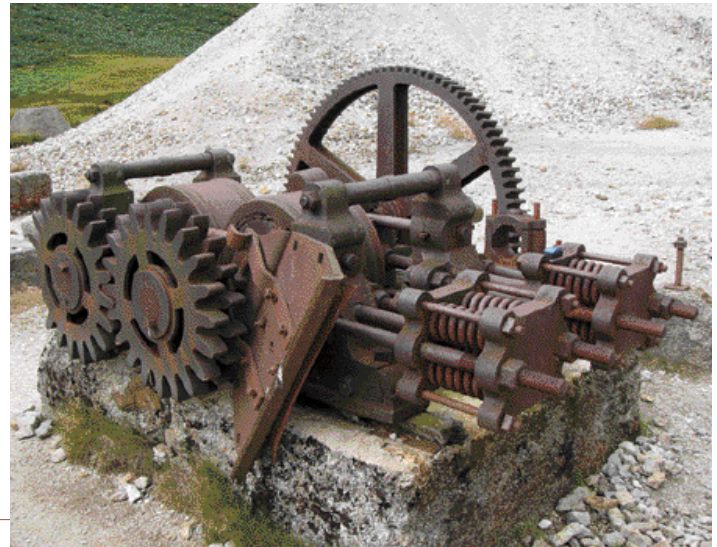


Fig. GG8

Glendalough Crusher

# GLENMALURE

## *Introduction*



The vale of **Glenmalure** is one of the most remote, and arguably, one of the most beautiful of all of the glens of County Wicklow (Fig. GM1).

In viewing its majestic tranquillity from the starting point of this Mining Heritage Trail, off the “Wicklow Way”, it is perhaps hard to visualise the tides of events which have swept through this glen: from the time during the last Ice Age, to the periods of human occupation up to and beyond

the time of the events of the 1798 rebellion and 19th Century mining activity. This area and the Mining Heritage Trail are currently being developed by Coillte.

Even by Irish standards, the historic mines of Glenmalure, all lead mines (with or without silver), are relatively obscure, and none were substantial enterprises – even though the first of them was opened before those of the mines in Glendalough and Glendasan. There were a number of attempts to work visible lead, in the form of the mineral galena (lead sulphide)-quartz veins at various locations. Various sources note a total of six principal lead mines, with or without zinc and copper in the Glen. These mines were at **Ballinafunshoge** and **Baravore**, the two largest enterprises, **Ballinagoneen**, **Clonkeen**, **Corrasillagh** and **Cullentragh Park**, as well as other workings in **Ballyboy**, **Camenabologue**, and **C(D)onavalla**.



Fig. GM1

The Glenmalure Valley

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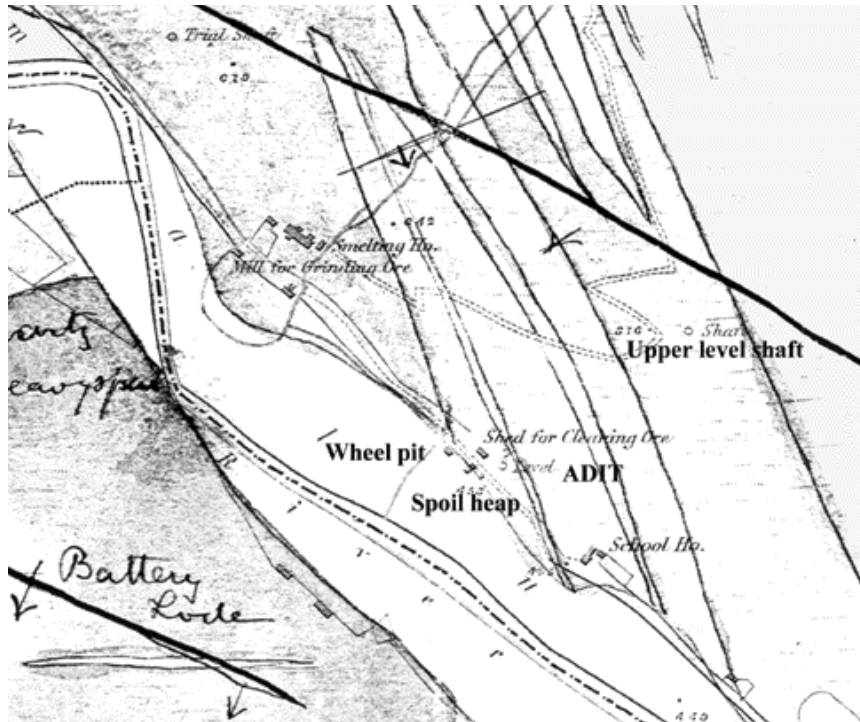
# *Ballinafunshoge: Mining History*

The **Ballinafunshoge Mine**, also referred to as *Ballinafinchogue*, *Ballynafinsbogue*, may have opened as early as 1797, though other sources suggest a slightly later date of about 1800. At that time, it was the only operational mine in Co. Wicklow. Whichever is correct, both dates suggest that the mine opened, or was operating during the period of the 1798 rebellion. This is, in itself, quite remarkable, as Glenmalur was one of the last places in which the rebellion was eventually suppressed. Various other records document intermittent production between 1811 and 1900.

A plan by Thomas Weaver, dated 1812, shows the substantial extent of underground workings which had been developed by that date. This included various *shafts* and *adits* as well as various levels inside the mine, to a depth of about 510 feet (153m). By 1853, the geologist Warrington Smyth noted that the principal lead ore, the *vein*, had been proven over a total length of more than 3,000 feet (900m). Weaver was a prominent developer of the mines in Wicklow. He was involved with the Associated Irish Mine Company in Avoca and was one of the first persons to develop the Glendasan lead mines.

Nothing is, so far, known about the people who worked in the mines, or where they lived, and very little about either the mine owners or management – a lack of knowledge all too common for many historic mines in Ireland. Reports from 1845 record that about 30 men were working at the mine in the early 1840s. It is reasonable to surmise that some at least of these people resided with their families in the immediate district, as the site of a school is shown immediately adjacent to the mine on an early Ordnance Survey map (Fig. GM2).

Henry Hodgson, who also owned other mines in Glenmalure, Avoca and elsewhere in Co. Wicklow, is recorded as the mine owner between 1861 and 1873. A Mr. H. Robinson is recorded as the mine manager at Ballinafunshoge in 1867 and 1868. Robinson was also a director of the Associated Irish Mine Company in Avoca.



Remains of 19th Century mine exploration activities are visible at various points along the length of the trail. The most conspicuous are off-white coloured spoil heap composed principally of fine quartz and rock debris. Infilled and overgrown shafts are also visible but none should be entered for safety reasons.

Fig. GM2

An enlargement of the c.1865 Geological Survey of Ireland 6":1 mile scale field sheet, showing the principal features of the Ballinafunshoge Mine.



# *Ballinafunshoge: Mine Site*

The extent of the spoil heaps still visible on either side of the road attest to the relatively substantive nature of this mining operation, which occurred nearly continuously from c.1800-1900, at least. Much of this spoil has weathered and blended into the landscape, particularly on the steep slope on the northeast side of the road. Natural re-vegetation is obvious here, and, in places, in the far more extensive spoil heaps on the southwest side of the road, although seriously damaged and eroded by quad/motor bike scrambling activities (Fig GM3).

Noteworthy historic features, which may still be discerned include:

- The collapsed adit entrance with active drainage creating an ochre precipitate in the drainage channel at either side of the road;

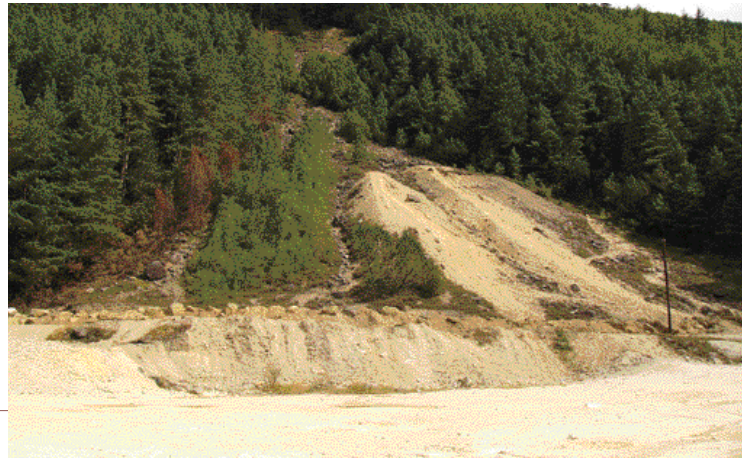


Fig. GM3

A general view of the Mine Spoil/Scree covered hillside at Ballinafunshoge

- Remains of a c.1.5m wide x 8m long, masonry construction water wheel pit. The function of the water wheel is unknown, though it may have operated some form of ore crushing machinery (Fig GM4).

There are two prominent building ruins opposite the spoil heaps, on the south side of the Avonbeg River. It is not clear if either or both buildings bore any relationship to the mine, though proximity to the mining works suggests a connection. Both buildings are constructed on a substantial masonry base, which forms part of a walled enclosure between them and the river. Very little now remains visible of the “School House” which was located south east of the mine site (Fig. GM2).

Fig. GM4

A close view of the remains of the “Wheel Pit”



## *Ballinafunshoge: Smelting Site*



A map of the area, from around 1835, shows a smelter house and ore grinding mill located separately from and about 500m northwest of the ore extraction and processing site. There are now very few visible remains of this complex, the last remnants of which were apparently cleared as recently as about 10 years ago to make a car park and adjoining camping ground (Fig. GM5). What is believed to be at least part of the wall foundation footprint of the principal building at this site may just be discerned as a low masonry wall around parts of the car park, although there is now no obvious expression of either of the other two buildings which once existed at this site.

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Immediately opposite this site, on the opposite side of the road, it is just about possible to discern the roughly rectangular, but heavily overgrown, outline of the ore grinding mill, and beside it a bare patch of soil in which pieces of smelting slag are still evident. Peat was apparently used as the fuel for smelting. Nearby, and partially overgrown by forestry, it is possible to discern the outline and part of the course of a *leat* (water channel) system, which loops around the site and back towards the stream, which flows under the road, just to the southeast of the car park.

A recorded output of 334 tons of lead is noted in 1811, when the metal was worth £30 per ton. Production in 1819 is given as 300 - 400 tons of ore, grading 68% lead. Later production figures, given in "*Mineral Statistics*", include a period of virtually continuous production between 1845 and 1864. During that period, a maximum of 367 tons of lead ore was produced in 1845, and a maximum of 950 ounces of silver in 1852. The mine continued to be listed in the records for various intervals after 1864, either to note production aggregated with production from the Luganure mine in Glendasan, or to note that works had been suspended, which happened from 1869 to 1873.

## *Baravore Mine*



The **Baravore Mines** are situated at the top of the Glenmalure Valley, just past the car park at the end of the road and across the ford. The Baravore Mine worked the northern extension of the Ballinafunshoge vein. There are remains of several mine tips and more importantly two crushing houses (Fig. GM6). The ‘old’ crushing house is located close to the road near to the hostel whilst the new crusher house is about 100m from the road midway between the ford and the hostel.

These mines appear to have been developed as trials in 1846 for lead, zinc and copper, but they were reported as abandoned in 1853. The ‘old’ crusher house may date from this period (Fig. GM7). In 1859, a prospectus was issued for the Baravore Silver-Lead mining company with a capital of £6,500 in £1 shares. Under the direction of Capt. Skimming, this new company, immediately erected new machinery; including waterwheels for

working stamps and crushers. Despite the optimism of the promoters the Baravore Silver-Lead mining company appears to have not been successful and it was wound-up in early 1861. The 'new' crusher house (Fig. GM8), which may date from this period, is a substantial building. It is possible that the directors of the company spent most money on buildings and surface works so as to impress the shareholders in the size of the operation; rather than develop the mine properly underground. From 1865 until 1875 the mines were under the ownership of Henry Hodgson who was also working the Ballinafunshoge Mine. There are no production figures for the Baravore Mine from this period and the mine appears to have been abandoned shortly afterwards.



Fig. GM7

Old Crusher House at Baravore



Fig. GM8

New Crusher House at Baravore

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# *Definition of Mining Terms*

**Adit** A horizontal tunnel into a mine from the surface.

**Chalcopyrite** Copper Iron Sulphide ( $\text{CuFeS}_2$ ), golden yellow in colour, sometimes mistaken for gold ('fools gold'), but much harder than gold. A source of copper.

**Crusher** A machine for breaking the ore taken from the mine into smaller fragments prior to dressing. Usually consists of two iron wheels (rolls) which roll together breaking the rock which is placed between them. Mostly driven by water power.

**Dressing floor** A surface part of the mine where the ore minerals were separated from worthless waste minerals; either by hand, water or machinery. Buildings and cobbled floors may still be visible in these areas.

**Driller** A miner who specialised in drilling holes in the rock. The holes would be filled with explosives to break the rock. Originally holes would be drilled by hand; one miner holding a long metal drill bit and a second miner striking the end of it with a hammer. Modern mining uses mechanical devices, driven by compressed air.

**Engine House** A building which housed a steam engine which drove winding, pumping or crushing machinery.

**Galena** Lead Sulphide ( $\text{PbS}$ ), bright grey in colour when fresh. Often breaks into cubic shaped fragments. Source of lead.

**Granite** A rock formed deep in the Earth's crust by cooling of magma (molten rock).

**Leat** A man-made channel built to divert the flow of water from a river or a reservoir to power waterwheels or to be used in other processes of mining.

**Ochre** Hydrated iron oxide ( $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ ). Very soft (earthy) yellow mineral. Used as a pigment (colouring agent).

**Opencast** A surface excavation of a mineral deposit (similar to a quarry).

**Ore** A mineral or mix of minerals containing metals which can be economically extracted.

**Pyrite** Iron Sulphide ( $\text{FeS}_2$ ), brassy yellow in colour. Used as a source of iron metal and sulphur.

**Schist** A rock which has been altered by heat and pressure. In Wicklow these formed as mudstones and shales before being altered. Usually dark grey in colour with prominent plate-like structure and shiny surface.

**Shaft** A vertical entrance to a mine from the surface.

**Smelting** Process of the conversion of ore minerals to native metals through the use of heat and chemical reactions.

**Sphalerite** Zinc Sulphide ( $\text{ZnS}$ ). Dark brown or honey brown in colour. A source of zinc.

**Sulphides** Minerals composed of one or more metals in a compound with sulphur (eg. Galena is lead sulphide –  $\text{PbS}$ ).

**Tramway** A narrow gauge railway used for transporting rocks, ore and materials over the surface of the mine.

**Vein** A crack or fissure within the rocks which contains ore minerals. Usually vertical or sub-vertical and extending downwards below the surface.



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## *Further Sources of Information*

### **Avoca Mines**

<http://www.celtic-copper.eu/>

**Geological Survey of Ireland** <http://www.gsi.ie/Programmes/Heritage/Exhibitions/The+Mining+Heritage+of+Wicklow.htm>

### **Glendalough Mining Heritage Project**

<http://www.glendaloughmines.com/>

### **Industrial Heritage Association of Ireland**

<http://www.steam-museum.com/ihai/>

### **Mining Heritage Trust of Ireland**

<http://www.mhti.com>

### **Wicklow Mountain National Park – Mining**

<http://www.wicklownationalpark.ie/pages/mining.php>

## *Other Mining Sites in County Wicklow*

### **Cloghleagh Mine, Kilbride, Nr. Blessington. A Manganese and Iron Mine.**

<http://www.ria.ie/cgi-bin/ria/papers/100598.pdf>

### **Ballyknockan, The Granite Stonecutters Village**

<http://homepage.tinet.ie/~tbowen/index.htm>

### **Greystones – Possible Bronze Age Copper Workings**

**Gold Mines River, Croghan Kinshela Mountain, Co. Wicklow**



Wicklow  
Mining Heritage