



# Geography



# Geography

## Introductory Notes for Teachers

Methods for studying the area will obviously relate to the nature, age and level of study of the students involved. The area can easily cater for a days field study related to many issues and would provide the opportunity to demonstrate many of the fieldwork skills demanded at GCSE and A level as well as studies for younger age groups. For classroom studies the audio-visual clips, mining and quarrying photos on the accompanying CD will help bring the subject to life.

Cross Curricular themes with Science and History could be developed e.g. simple biogeographical studies and geological trails across the area (the Discovery Trail route would be a good starting point).

### Key Stage 2

The Discovery Trail around Halkyn Mountain would be an ideal field visit as part of a **geographical study of the local area**.

**Geographical enquiry and skills** can be used to study the local area and for studies of contrasting localities. This will enable students to develop a better and fuller understanding of their own local area and community within the wider context of Wales.

#### Possible study themes

1. Identification of ways in which people affect the environment.
2. Investigation of the ways in which the environment is looked after (managed), for its present and future use (conservation and sustainable development).
3. Recognition of the variety of views about changes to the environment e.g. quarrying
4. Understanding of the responsibility of both the individual and organisations in managing the environment. Individuals opinions do matter.

Many other 'environment topics' could be studied using this area as a 'case study' within your 'Schemes of Work'.

### Key Stages 3, 4 and Sixth Form

Halkyn Mountain provides a huge range of opportunities for study.

- The area can be used to investigate a variety of environmental issues including those related to sustainable development and to recognise its implications for people, places and environments.
- Settlement patterns...changes over time can be studied via OS maps (sections from the 1890 and 1915 maps are included). Reasons for change can then be investigated.
- Environmental change studies...both physical and human change.
- Management of environments...on an individual, interest group, NGO and local and National government level.
- Ecosystem studies across a variety of sub environments.
- Impact of quarrying - physical and human impacts (see case study on Pant y Pwll Dŵr quarry).
- Meteorological studies - Len Walls runs a weather station at Moel-y-Crio and also has weather records from earlier years. He is happy to provide data to help schools undertake studies and for individual student projects (see 'Useful contacts', page 7).





## Teachers' Background Notes: Geology

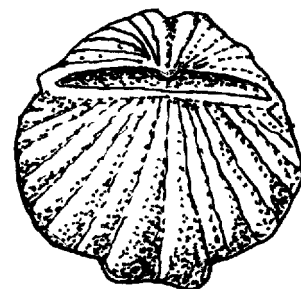
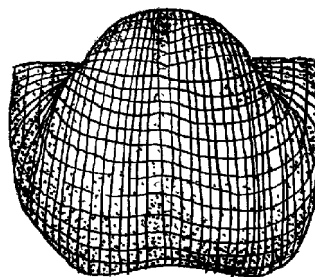
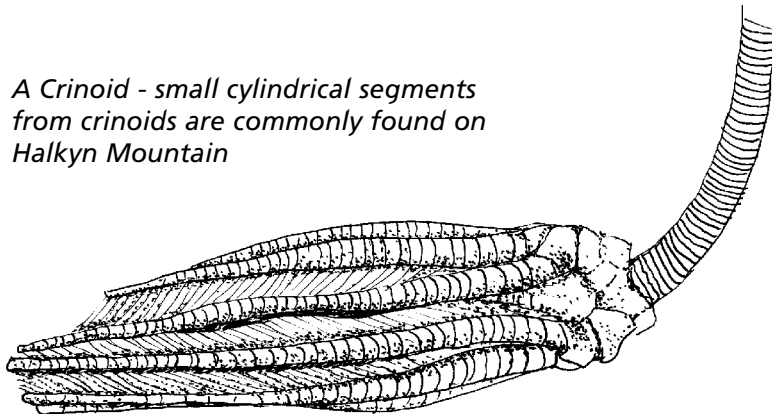
Halkyn Mountain is described as a limestone plateau, although its geology is far more complex than that with layers of chert, millstone grit, clay and sand and gravel. (see Geological cross section).

The limestone was formed 340 million years ago when a shallow tropical sea covered the area. The shells of sea creatures built up on the seabed over thousands of years. The climate slowly changed and other layers formed above, over millions of years, gradually compressing the shells to form limestone. Many fossilised marine plants and animals are found in the limestone.

Earth movements caused the rocks to fracture, thrusting the land upwards. Mineral-rich solutions bubbled into the cracks that appeared in the limestone, forming veins of lead and silver. The softer rocks on the surface gradually eroded leaving the limestone exposed on the higher ground, forming the limestone plateau that we see today.

Both above and below ground are typical features of limestone areas with outcrops of bare jointed rock, fossil beds, thin soils, and little surface water. The limestone is dissolved by the carbon dioxide in rain water as it passes through fissures resulting in the formation of caverns and underground lakes, most notably the enormous underground lake in Powell's Lode Cavern, beneath Rhosesmor.

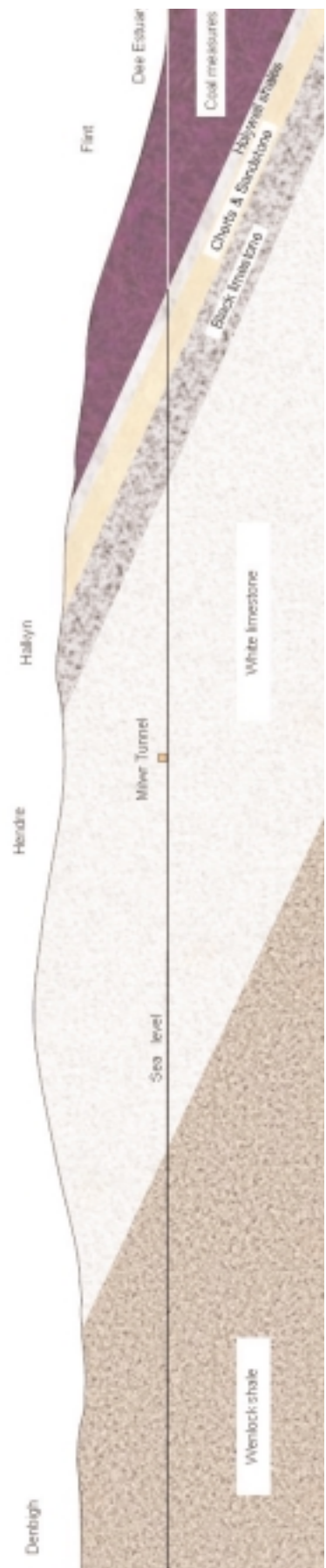
*A Crinoid - small cylindrical segments from crinoids are commonly found on Halkyn Mountain*



*Brachiopods - commonly found on Halkyn Mountain*



Geological Section of Halkyn Mountain



Chert



Black limestone



White limestone

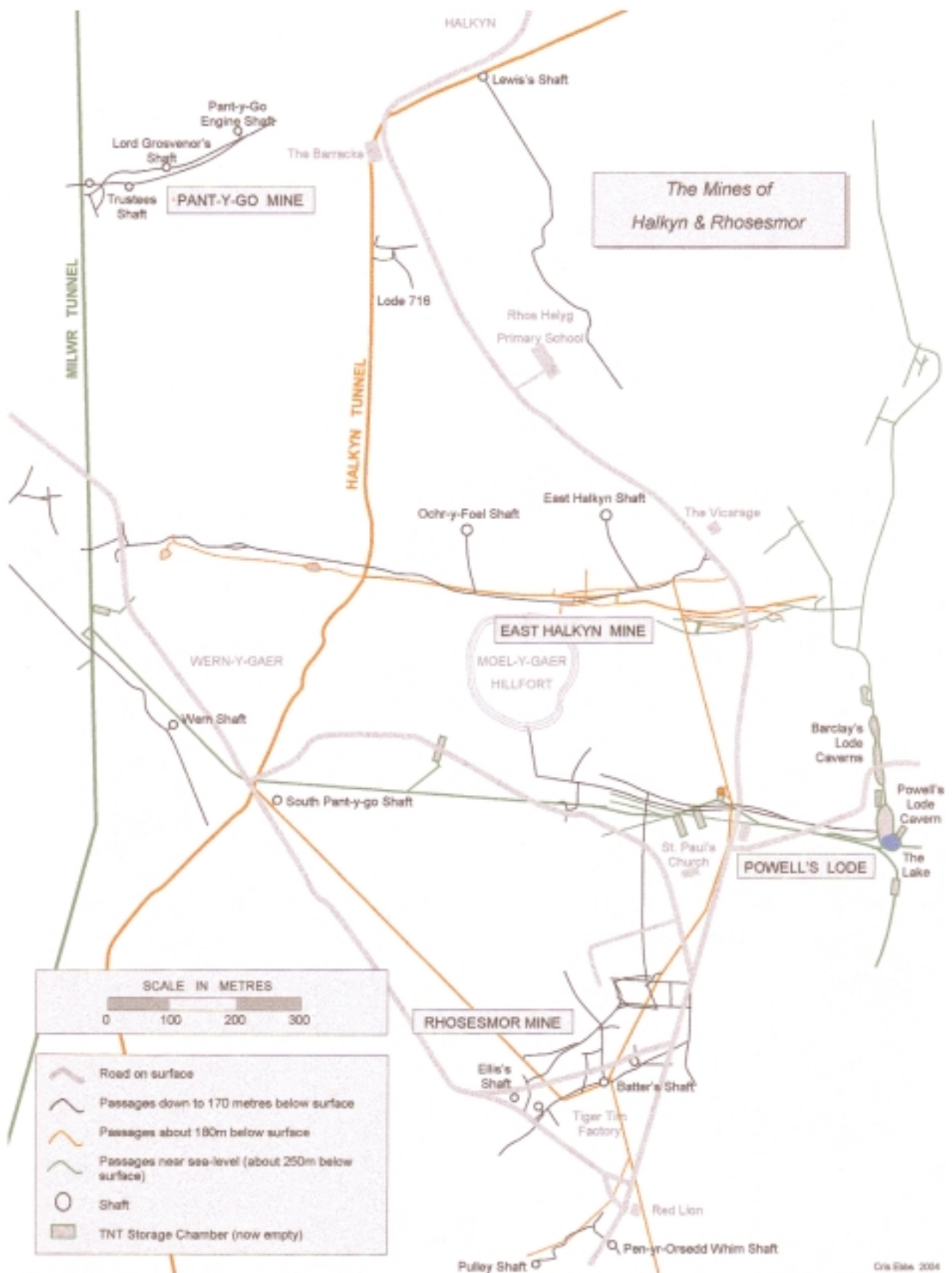


*Underground lake at Powell's Lode, Rhosesmor, painting by Chris Hull*



## Mine plan for Halkyn and Rhosesmor area

(surface landmarks are in pale grey)



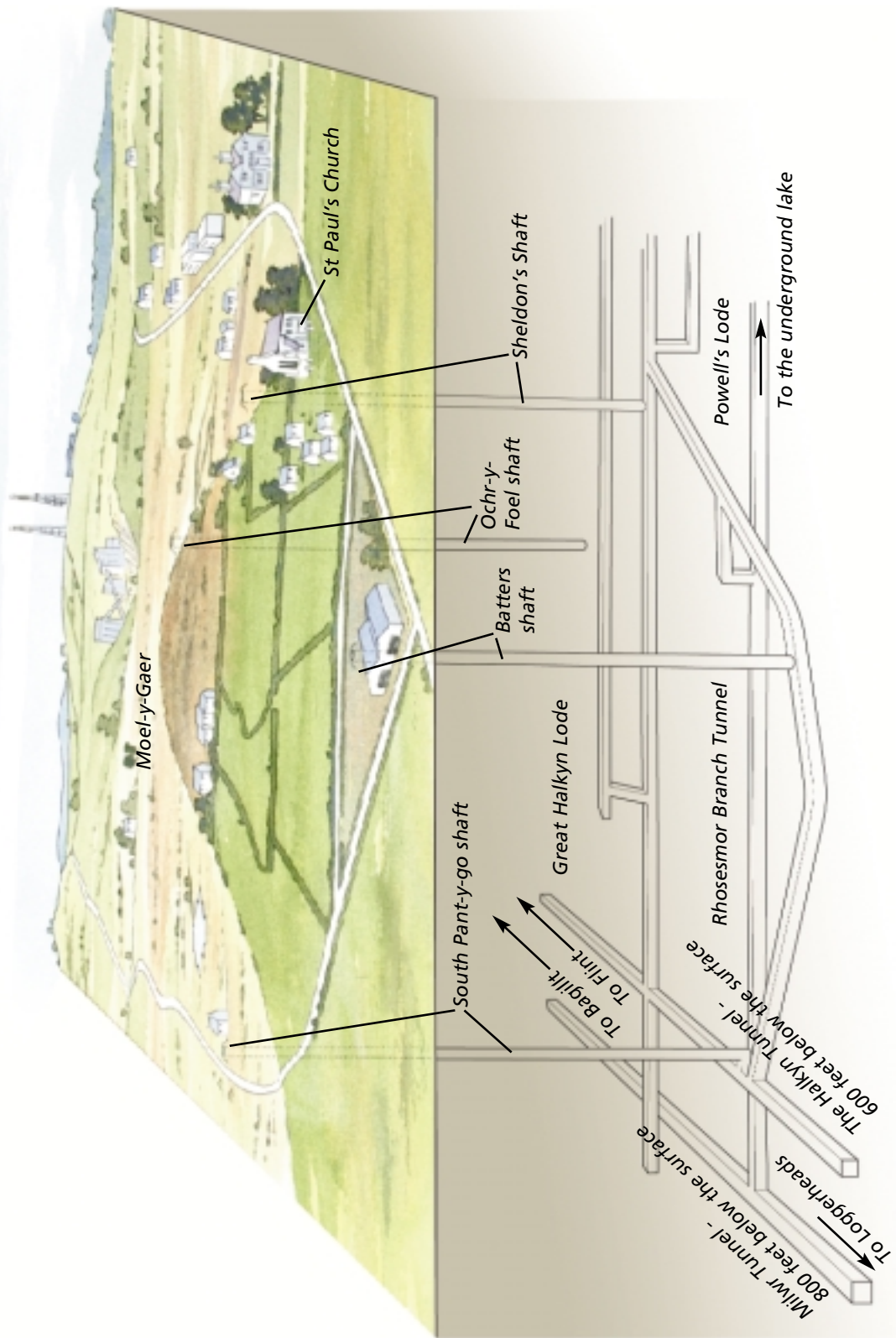
Chris Ebb 2004





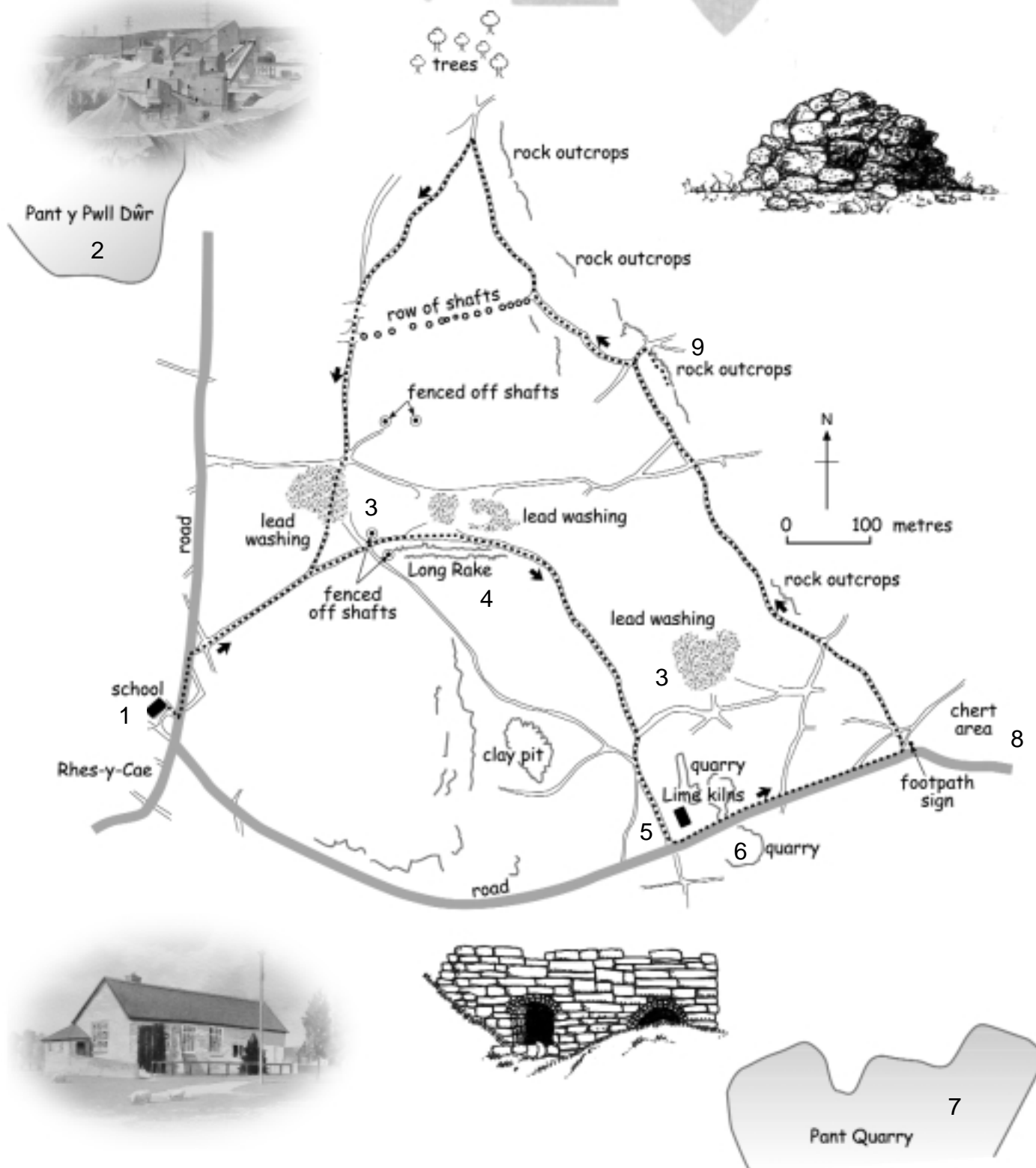
Under Your Feet in Rhosesmor!

Below the surface of Halkyn Mountain lie a maze of tunnels, shafts and caverns. These include two long drainage tunnels. The earlier Halkyn tunnel lies 180m below the surface whereas the later Milwr Tunnel lies much deeper, at sea level.





# Halkyn Mountain Discovery Trail







## Teachers' Background Notes: Halkyn Mountain Discovery Trail

This short walk, approximately 3km/ 2 miles, is ideal for introducing children to the mining and quarrying history, the geology and natural history of the mountain.

The suggested starting point is Rhes-y-Cae school but it could easily be accessed by walking from Halkyn village. Some specific features are numbered on the map and additional points to look for that are less localised are described overleaf.

*NB Do walk the route first to ensure you can find the features of interest and confident of finding your way, as the area is criss-crossed with small paths and the route itself is NOT MARKED on the ground. Please also do a risk assessment. Check carefully for glass and other dangerous items as fly-tipping has been known to occur. Take care near mine shafts. Please do not allow pupils to pick flowers or make individual collections of rocks and fossils. The whole of the Mountain is a Site of Special Scientific Interest which gives legal protection to its flora, fauna and geology.*

1. Rhes-y-Cae school was built on the site of the smithy that used to serve the nearby lead mine. It was rebuilt in 1846 with money provided by the landowner, the Duke of Westminster.
2. You may wish to detour to overlook the massive Pant y Pwll Dŵr limestone quarry.
3. Lead washing areas are very distinctive on the flat central area (see overleaf).
4. A Long Rake - this deep long hollow is where a lead vein that ran near the surface has been dug out.
5. Limekilns - these were used to burn crushed limestone to make lime for use as agricultural fertiliser and for making building mortar. The broken up stone was put in the top of the kiln with fuel and the fire was lit with brushwood from the bottom.
6. Old quarry and good views across to the working Pant limestone quarry. Contrast the scale of the old and new!
7. The large area of flat grass is the site of Pen y Bryn leadmine. A small metal hut is all that now remains of the buildings.
8. Chert area - contrast the yellowish-white rock with the grey limestone.
9. Limestone outcrops (the fallen rocks at the base are good for fossil-hunting but take care).



Single limekiln



## Points to look for:

### Mining remains

The last lead mine closed in 1987 and all surface machinery was removed. But, if you know what to look for, you can still find evidence of the massive lead mining industry that was once here.

### What to look for:

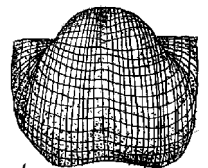
- Shaft craters: Conical depressions in the ground marking a collapsed or filled shaft.
- Shaft tips: Circular mounds of waste rock created when excavating shafts.
- Large spoil tips: Some larger mines left extensive areas of waste rock.
- Surface lead veins: A few veins were trenched out, along the surface i.e. at Long Rake, Rhes-y-Cae. Old miners called these veins, rakes or grooves.
- Capped shafts: Many dangerous open shafts were sealed in the 1980's with stone and cement 'bee-hive' caps. Others are fenced off or have metal frames around them.
- The direction of an underground vein: In many places the numerous shafts form a line across the landscape. They follow the line of the lead vein that the miners sought.
- Horse-whim circles: Before mechanisation, buckets (kibbles) of ore were raised to surface by a horse tethered to the rotating arm of a windlass. Look for flat circles with a central depression for the pivot. They are only found close to a shaft.
- Patches of rough land where the vegetation is sparse and yellow may be lead washing areas. Few plants grow here due to the lead residues.
- Miners footpaths: The area is criss-crossed with footpaths - far more than most other areas of the UK. Most were created by miners walking to work over many generations.



*Early mining*

### Geology

- Look for typical limestone features - rocky outcrops including small areas of limestone pavement and small cliffs.
- Look carefully amongst the stones of any shaft tip and you may find pieces of galena (lead ore), calcite (a white mineral often found with galena) or fossils (found in limestone rock). Surprisingly there is very little galena left, perhaps because the lead spoil heaps were re-worked several times. It is easily identifiable due to its heavy weight.
- Look for fossils in the limestone. Brachiopods and crinoids are particularly common in the Halkyn limestone.
- Look for the yellowish-white chert as you near the Halkyn road.



*Brachiopods*

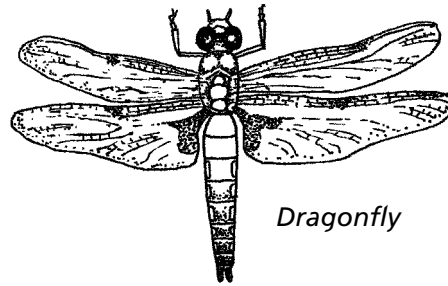


## Wildlife

- Snails - are often common in limestone areas as they need calcium carbonate to make their shells. The children will find lots of empty snail shells.

- Rabbits are abundant and there are plenty of droppings, digging and holes.

- Dragonflies and damselflies - look for these brightly coloured insects darting or hovering above boggy areas and ponds.



*Dragonfly*

## Birds

- Kestrels - commonly seen hovering above the rough grassland, hunting for mice and voles.

- Buzzards - commonly seen circling overhead. Rabbits are a favourite food for these large birds of prey.



*Buzzard*



*Meadow pipit*

During summer the Mountain is alive with bird song and small birds flit between the gorse bushes and dart to catch insects. You may notice:

- Meadow Pipits - small brown birds but very noticeable during the summer, as they flutter into the sky singing and gliding slowly back down. (Skylarks are also found but are rarer nowadays. They are larger and rise several hundred feet into the air delivering their musical song.)

- Stonechats - listen for their distinctive call - like two stones being banged together.

## Plants

- Spring sandwort - a small delicate plant with white star-shaped flowers. This nationally rare flower is common on the lead washing areas. Flowers May - August but most visible in June and July when in full flower.



*Spring Sandwort*

- Carline or Stemless Thistle - a low growing thistle with orange tinged thistle-like flowers. It is easily spotted dotted amongst the short grass.

- Wild thyme - very common on the short cropped grass but also grows on the lead washing areas.

- Eyebright - a tiny white bell-shaped flower that is common on the short cropped grass. Do not confuse with Sandwort as it also grows on the lead washing areas.

- Harebells - these delicate blue flowers are in flower from July to September.

- Gorse - there are two types on the mountain, Common & Western, which has more rigid spines. You can usually find gorse in flower whatever time of year but Common Gorse peaks in May, when its strong coconut scent is very noticeable, and Western Gorse in July - September.



*Harebell*





## Mapping Exercise: How has Halkyn Mountain Changed?

Enclosed are two A3 extracts from the 1869-1895 and the 1938 editions of the O.S. maps covering the central area of the Mountain between Rhes y Cae and Halkyn. This includes the area covered by the Discovery Trail.

The maps contain good evidence of the changes in both settlement and land-use during the late 19th and 20th centuries. Comparison of the two maps and a modern day map of the same area shows some dramatic changes. Fieldwork to look at the current landscape and record with fieldsketches, photography etc would further enhance the comparison.

For example, the land near Catch, to the west of Halkyn village has undergone great change.

1869-1895 map	1938 map	2004 map / present day view
Medium sized quarry and limekilns.	Medium sized quarry and limekilns. Additional quarry to the south of the mine.	Enormous quarry, expanded 6 fold. No limekilns remain.
Dotted lead mine shafts but no large mine.	Huge New Halkyn Lead Mine (known locally as Pen y Bryn mine).	Lead mine closed and demolished. Flat area of reclaimed grassland in front of quarry and a small tin shack are all that remain to indicate the mine's position.



## Teachers' Background Notes: Stone Mining & Quarrying on Halkyn Mountain

### Introduction

At one time there were many quarries on or around Halkyn Mountain which extracted a range of minerals. These included three types of limestone, chert, fireclay, sand & gravel, silica and even 'fairie's butter'. Extraction in the early days was a very small-scale affair. Most stone was taken by local people for home building or for grinding into a powder to spread on the land as a fertiliser. Quarries only began to extract large quantities of stone after 1950 when companies took full advantage of modern mechanisation. Today, the three remaining quarries extract around a million tons a year each, and are unrecognisable when compared with the small quarries of long ago.

### 'Quarrying the Stone' - past and present

For many years local stone quarries were worked entirely by hand without the use of gunpowder or other explosives. This was due to the fact that most were only very shallow quarries where the rock lay close to the surface and was exposed to changes in temperature and pressure causing it to crack and fracture. Stone could therefore be removed by the use of simple crow-bars, hammers and wedges. Many quarries exploited these fractures which extended to depths of around 5 metres. Below this depth, rock became difficult to remove by hand and explosives then became necessary. Once slabs of rock had been freed from the surrounding stone, it would be dragged by ropes and pulleys to be lifted by tripod onto a horse and cart to transport it from the quarry. In the days before mechanisation, the whole process would have been slow, annual production commonly being in the order of a few hundred tons. Today a multiple explosive charge can free hundreds of tons of rock in a moment. All other handling, crushing or coating processes are heavily automated to maximise production, which results in a constant convoy of large haulage waggons driving down on to the nearby A55 enroute to waiting customers across North West England and Wales.

### Minerals quarried

#### **Limestone type 1: Carboniferous limestone**

In medieval times, local stone was extracted from small quarries for the construction of castles and churches. Thereafter, most of the early quarrying was carried out by commoners who were entitled to take stone for personal use such as building their own homes or liming their land which became popular from the 17th century. Increased use of this stone for agriculture resulted in the building of many of the mountains lime kilns. Today local limestone is chiefly used for road building, the construction industry, for cement manufacture, as agricultural fertiliser and in the production of bitumen.

Limestone has been used for many other purposes over the years. Some of the more interesting include: as an abrasive in toothpaste, as a flame suppressant in collieries, as a flux in steel smelting, for glass manufacture, as a filler in cosmetics and drugs (esp. tablets), in the fermentation industry,



for sugar refining, an ingredient in aerosols, for printing, water purification and even sewage effluent treatment. A versatile mineral indeed!

Local limestone was used for such local buildings as the new church in Rhosesmor in 1874; to enlarge Rhosesmor school in 1879; to build Bethel Chapel in Rhosesmor in 1911.

Limestone annual production figures for North-east Wales:

1900 300,000 tons

1952 1,400,000 tons

1973 6,500,000 tons

1989 9,500,000 tons

1998-2004 The three remaining quarries total 3,000,000 tons.

### **Limestone type 2: Aberdo (or 'Hydraulic') limestone**

A few local quarries produced a type of limestone with unusual properties. When used to create cement, it had the ability to set under water. This made it invaluable in the construction of docks, piers, bridge foundations etc.

*"On the west side of Celyn Rake is a deep grey limestone which when calcined and mixed with common lime, makes an excellent cement for use underwater".* (Pennant 1796).

### **Limestone type 3: Halkyn 'Marble'**

Other local quarries provided a limestone that could be highly polished, in a similar fashion to real marble. This was a bluish-black stone containing masses of fossil shells and was much sought after.

### **Chert (or chertstone)**

Chert is an opaque stone similar to flint in chemical composition. It has been suggested that it may have been quarried for use as stone-age tools but there is no evidence to support this.

Chert occurs on Halkyn Mountain as a broad band running north-west to south-east. The lower beds were blue and white but the yellow and brown variety was preferred.

It was much used as a building stone and from 1790 to 1900. Local quarries supplied chert to the Minton and Wedgwood factories in Staffordshire for use in grinding. In 1822 thousands of tons a year were supplied. Chert has a high silica content and is extremely hard.

Its quality varied considerably, the poorer stone at times producing 90% wastage resulting in huge waste tips. These tips were taken for the refractory industry from 1919.

It appears that this stone was taken to Bagillt or Flint for transport by sea. It is probable that it was taken up the Mersey into the canal system en route to Staffordshire.

In 1827 a survey by Crown commissioners lists nine chert quarries on the mountain varying in size from 2 to 21 acres.

### **Sand and gravel**

Several sand quarries form a line along the Wheeler Valley between Bodfari, Rhydymwyn and Rhosesmor which have been claimed to form the deepest and most extensive deposits in Britain.

Sand and gravel was supplied chiefly for the building industry.

The quarry at Rhosesmor was known as Parc Bychan Pit and was started in the 1930s.





### **Fairie's butter**

In Pennant's "History of the Parishes of Whiteford & Holywell" of 1796, he describes another mineral as 'rock-oil'; *"a greasy substance with an agreeable smell found in the limestone strata. Known locally as "y menin tylwith teg" or fairie's butter, it is esteemed serviceable in rheumatic cases"*.

Another reference on fairy folk lore describes 'fairy butter' as *"a butter-resembling substance found at great depths in the crevices of limestone rocks, in sinking for lead ore"*.

### **The big working quarries**

#### **Pant y Pwll Dŵr Limestone Quarry (also known locally as Henshall's Quarry).**

Situated just west of Pentre Halkyn village.

Pant y Pwll Dŵr translated means 'pool in the hollow'.

Quarrying began here perhaps as early as the 1600s. However the first references to the quarry mention a Samuel Edwards who had worked the quarry from the 1840s. He is mentioned in Slater's Trade Directory of 1856 as "Lime Burner & Stone Merchant". The family continued to quarry here until 1954 when it was taken over by John Henshall (Quarries) Ltd. who dramatically increased production. It was later worked by North West Aggregates who dramatically increased production again and who diverted away from producing dressed stone and lime to aggregates. The current operators are RMC Roadstone Limited who took over the quarry in 1973. They supply limestone for use in the construction industry and as aggregate. They also supply a little as agricultural lime and for the production again of concrete blocks and Tarmac.

During the 1960s & 70s limestone dust was supplied to collieries in the North West as a flame suppressant to minimise the effect of any explosions. The quarry supplies an area which extends south to Stoke-on-Trent and includes Manchester, North Wales, Cheshire and Merseyside. East of the M6 motorway, limestone is supplied by the quarries of Derbyshire.

The quarry currently employs about 30 people but just prior to mechanisation the number was close to 100.

#### **Pant Limestone Quarry (also known as Bryn-y-Garreglwyd).**

Situated between Moel-y-Crio and Halkyn.

In 1853 the Crown granted a licence to Thomas Davies a 'lime burner'. He advertised his range of products in 1870 as including building stone, tomb headstones, land rollers, engine beds and gateposts. His son continued here until 1885. Peter Williams of Berthddu took over from 1891 until 1902 followed by the Grosvenor Estate until 1911. Flintshire County Council ran the quarry from 1920 until the Second World War. The large Wimpey quarrying company took over from 1965 and as a result of major expansion, forced Halkyn Cricket Club, who had played beneath the kilns and quarry since 1912, to move.

Supplies aggregate for road building plus other uses similar to Pant y Pwll Dŵr Quarry



### **Hendre Limestone Quarry**

Hendre Quarry began after the opening of the Mold to Denbigh railway in 1869. In 1872 a fifty year lease was granted for 418 acres at an annual rent of £350. This was a huge venture for the time but having rail sidings direct to the kilns gave it a big advantage over the quarries on the mountain. Iron and chemical works were also demanding large quantities of lime at this time. In modern times McAlpines have dramatically extended production.

Supplies aggregate for road building plus other uses similar to Pant y Pwll Dŵr Quarry.

### **A selection of old disused quarries**

#### **Bryn Blewog Quarry (Halkyn 'marble')**

Beside the road just to the north of Pant y Pwll Dŵr and one of the mountain's main sources of Halkyn 'Marble'.

The earliest reference is in the will of John Salisbury from Windmill in 1837, in which he left "the marble quarry" to his sons. The next reference comes in 1859 when Samuel Edwards was granted a licence to the quarry. Samuel was followed by his son Edward who was the master mason in the building of the new church in Halkyn in 1878. The church now exhibits fine polished blue pillars from this quarry.

The stone was in demand for mantelpieces and a 20 feet square block was used at the Grosvenors residence at Eaton Hall, Eccleston in 1891 as a plinth for the Eaton obelisk.

#### **Pant y Pwll Dŵr Chert Quarry**

Also called Prince Patrick Chert Quarry.

This was situated a few hundred metres to the north-east of Pant y Pwll Dŵr Limestone Quarry, beside the Rhes-y-Cae to Halkyn road.

Story 1: In 1845 the Crown Agent reported Thomas Ellis of Halkyn for taking chert from this quarry. Despite Ellis's claims that the mountain was open property and that he had been given permission in 1835, he was fined £10 and had to acknowledge the Crown's rights to the quarry.

Despite this, Ellis later took out leases and became a prominent local quarryman.

Story 2: In 1895 the land was also the site of the Prince Patrick mine which was extracting lead from a vein lying beneath the chert quarry. The rights to quarry stone were owned by The Crown, but rights to mine lead were owned by Grosvenor Estate. A legal argument resulted which decided that the owners of the mine had the right to use a shaft through any upper stratum to communicate with the mine below, although the space occupied by the shaft was owned by the quarry, who had the right to take away part or all of the upper stratum through which the shaft ran, as long as communications with the mine remained unimpeded.

This chert quarry closed in 1901 and the site was eventually filled in the 1950s by the neighbouring Pant y Pwll Dŵr limestone quarry.



### **Pen-y-Garreg Quarry (chert)**

One of the oldest quarries on the mountain, being shown on maps as a quarry in 1738. Leased by William Bishop of Staffordshire who renewed his lease in 1831 for a term of 30 years during which time he paid the Crown 2 shillings for every ton quarried.

### **Pen-yr-Henblas Quarry(chert)**

Just to the south of Pen-y-Garreg.

A local man John Lloyd took out a lease in 1838 for 21 years.

### **Pant-y-Pydw Quarry (Aberdo limestone)**

The main Aberdo quarry on the mountain was Pant-y-Pydw where an impressive block of five kilns still remains. It appears to have been worked from the first half of the 1800s by a John Lloyd. There was intense activity here between 1860 and 1890, the lime being in demand for the great docks at Liverpool, Birkenhead and Belfast. Some also went for the bridge building at Menai and Runcorn.

The quarry declined from 1890 and closed in 1914. A little further work continued from 1947.

## **Underground quarrying**

Quarrying was not only carried out on or near the surface. High-grade limestone was quarried from deep underground. Limestone was extracted at two sites, the first being 250 metres below the surface near the base of Pen y Bryn Shaft, west of Halkyn village. Here there are several roomy chambers about 20 metres high.

The main site of underground limestone quarrying was north-east of Hendre village to the south of Halkyn Mountain. Here acres of vast, empty caverns extend into the mountain, most of which lie over 150 metres below the surface. Stone quarried here was taken by narrow-gauge trains along a half-mile passage eastwards to Olwyn Goch shaft, where it was raised to the surface to be crushed and loaded onto British Rail wagons at the mainline railway sidings.

Underground limestone extraction began here in 1939 under instructions from the Ministry of Agriculture and continued until about 1969. Originally the stone was used solely for agriculture but Pilkingtons of St. Helens began using the stone for glass making and they soon became the mine's main customer. I.C.I. at Runcorn were also supplied. Limestone quarrying kept production at Halkyn Mines healthy at a time when lead production was low or had stopped completely.

During the Second World War a series of about 40 chambers were excavated specifically to store vast quantities of TNT. These chambers were quarried at many sites throughout the extensive lead mines. Some were created under Rhosesmor, others at Hendre, all of them measured about 25 metres by 9 metres by 3 metres in height. Corrugated iron sheets were suspended from the ceilings and the TNT was stored on a timber floor to ensure it was kept dry. These chambers now lie empty and silent.





## A Case Study: Pant y Pwll Dŵr RMC Quarry

### Fact file

- Pant y Pwll Dŵr quarry extracts around 880 000 tonnes of limestone per year.
- The quarry has at least another 30 years of life and will become significantly deeper.
- Most of the stone from Pant y Pwll Dŵr quarry is used in North-east Wales, the Wirral, Cheshire and Merseyside. (Quarries in Derbyshire supply to the east of the M6.)
- Most of the employees are from the local area.

### The Modern Quarrying Process

1. Drilling the holes for inserting explosive (positions selected based on experience and earlier profiles)

2. Laser profiling of each hole to find the most suitable for blasting (greatly improves the safety and effectiveness of blasting)



*Drilling*

3. Charging the hole with fertiliser based explosive and detonating the explosive (Sirens clear the area prior to blasting)

4. Loading loosened rock using huge excavators and face loading shovels

5. Primary crushing (Large pieces of rock are broken down into more manageable sizes)

6. Secondary crushing (stone is further crushed between rollers)

NB Mobile crushers are used to process stone near the quarry face when demand is high.

7. Screening and sizing



*Face shovel loading dumper truck*

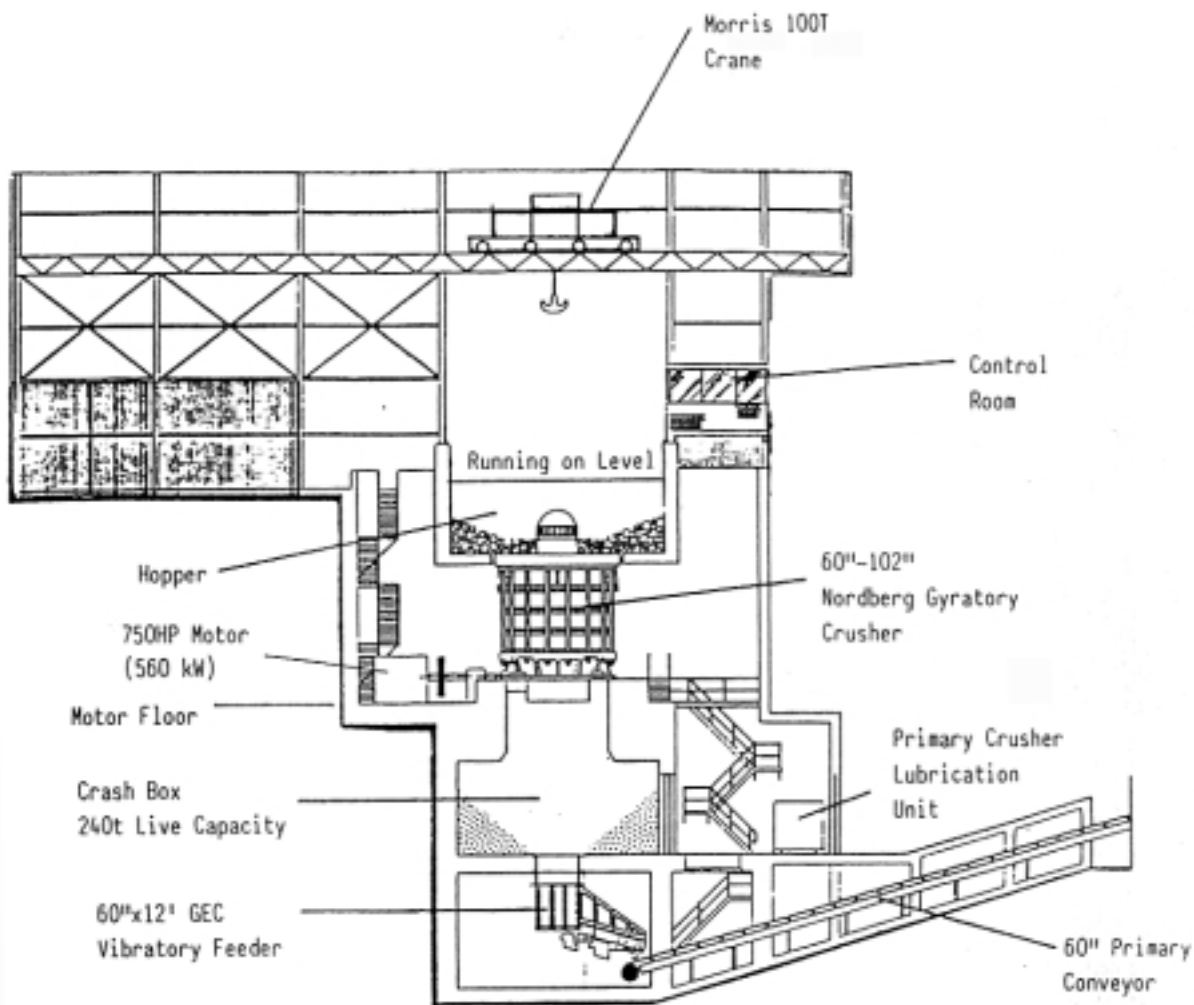


(the crushed stone is sorted into sizes using mesh screens)

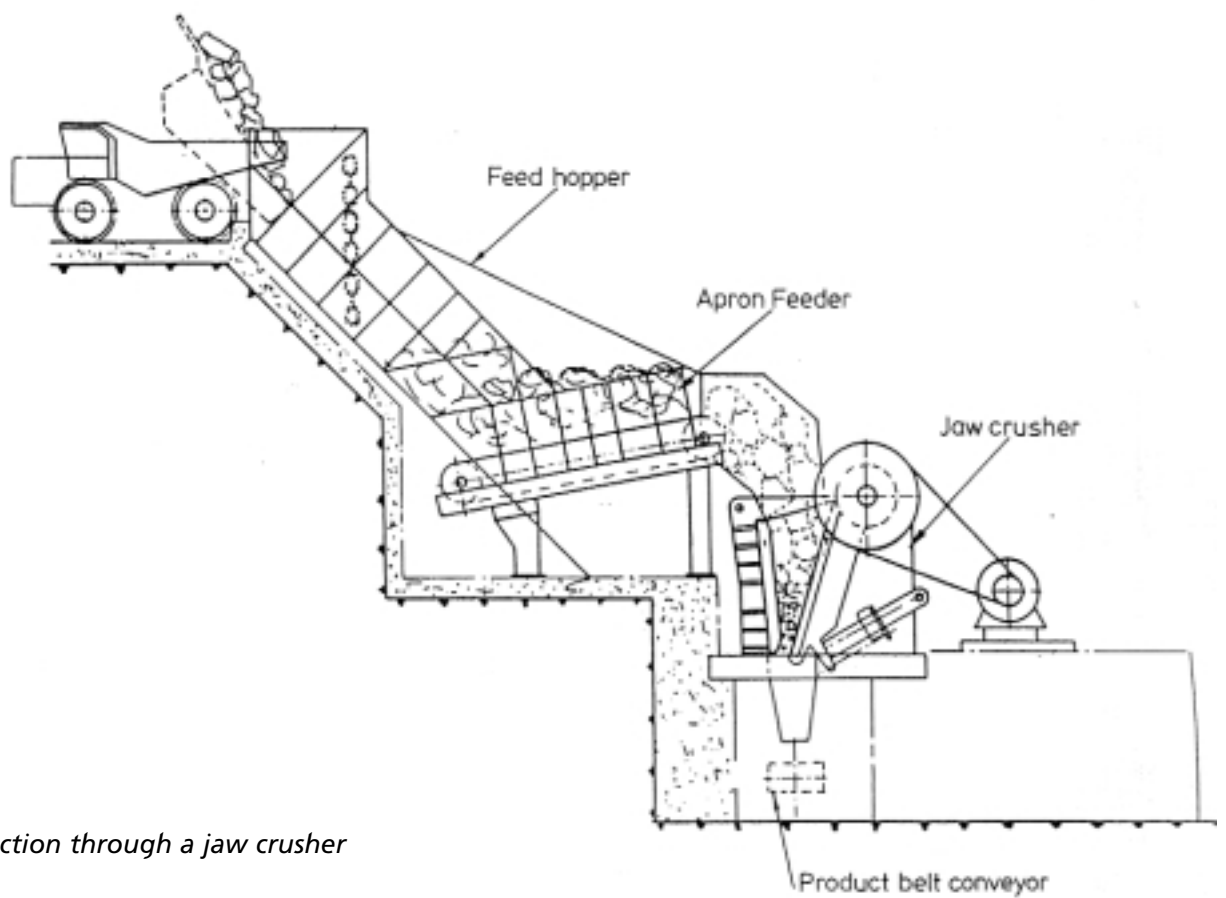
8. Finished stone is either

- 1) loaded onto wagons for transport to buyers
  - 2) stock piled until required
  - 3) moved to the coating plant to be mixed with bitumen for road surfacing
  - 4) mixed with cement to make ready-mixed concrete
- Dynamite and gelignite have been replaced by fertiliser-based explosive that is cheaper and safer as gelignite was very unstable.
  - Laser profiling to accurately locate the safest place to blast.
  - Increased mechanisation using larger excavators and loaders (100 people employed in 1970s; 30 people employed nowadays).

### Changing products



*Section through a large gyratory crusher*



*Section through a jaw crusher*



*Mobile crushers in action*



## Changes in quarrying

Limestone dust was used as a flame suppressant in coal mines and limestone was used as a flux to improve the efficiency of iron smelting

Ironworks and collieries have gone so those markets for limestone have been lost.

Agricultural lime was a major market from 19th to later part of 20th century (crushed limestone is oxidised by burning to produce lime that was used as a fertiliser to 'sweeten' acidic soils). Very little agricultural lime is now produced as farming practices have change.

Roadbuilding is still a major user of limestone. Larger stone is used for the lower layers and coated stone for surfacing. The demand for coated stone is decreasing as road building practices have changed and a thinner wearing course is needed.

Currently the greatest demand is for 20-5mm limestone for the construction industry and for ready-mixed concrete. A limited amount of building stone is still used but aggregates (crushed stone or dust mixed with sand and other materials to make cement and mortar) are the main market.



*Lime spreading truck*



What has limestone from Pant y P wll Dŵr been used for?



*The Metropolitan Cathedral, Liverpool*



*Ready Mix concrete lorry*



*Tennis court*



*School playground*



*Lime spreader truck*



*Polished Halkyn Black marble*