

QUARRYING IN THE PEAK DISTRICT

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QUARRYING is an important industry in many areas of high scenic value in Britain: for example, slate is quarried in Snowdonia, and china clay in Cornwall and Devon near Dartmoor. We clearly need the rocks and minerals that are quarried. We use many products made from them, although we are often unaware of this fact. Did you know that china clay is probably on the paper you are holding as you read this *GeoActive*? Inevitably, in beautiful parts of the country, quarrying creates conflicts with other land uses and groups of people. These conflicts can even threaten the continuation or beginning of quarrying as an industrial activity. In this unit we explore the development of limestone quarrying and the different issues involved in Britain's most heavily visited national park – the Peak District (Figure 1).

Geological background

About 350 million years ago, most of the Peak District was under a shallow tropical sea. The fossilised remains of the plants, shellfish and corals in this sea have formed what is now the limestone that lies under the White Peak area of the Peak District National Park (Figure 2). Over the next few million years, sands, gravels and mud were deposited to form the Millstone grit and shale of the Dark Peak (Figure 2). Movements in the Earth's crust caused cracks in the limestone, and hot gases and liquids crystallised in these cracks to form veins of minerals. By this stage you will probably have studied limestone as a rock, and you should know about its

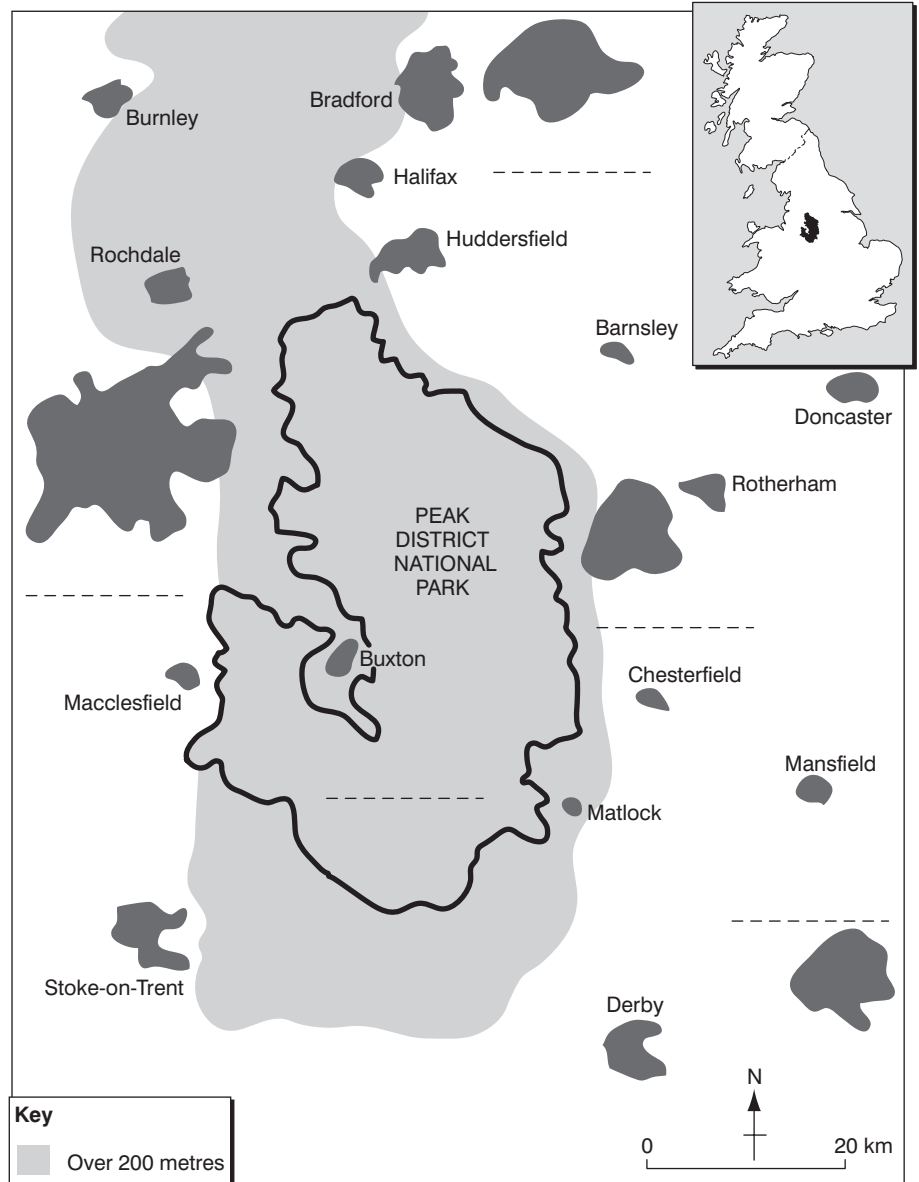


Figure 1: Location of the Peak District National Park

geological properties and remember that it is associated with a distinctive landscape and set of landforms. You might study the Peak District as a case study of a limestone landscape.

Limestone quarrying in the Peak District

Mineral extraction (quarrying and mining) has been an important

industry in the Peak District for hundreds of years. As early as Roman times, limestone was quarried in the Peak District to use as building stone and in making mortar and cement. Much of the limestone in this area is very pure (high in calcium carbonate) and it has many uses. It was used in agriculture, and mention of limeburning for use on

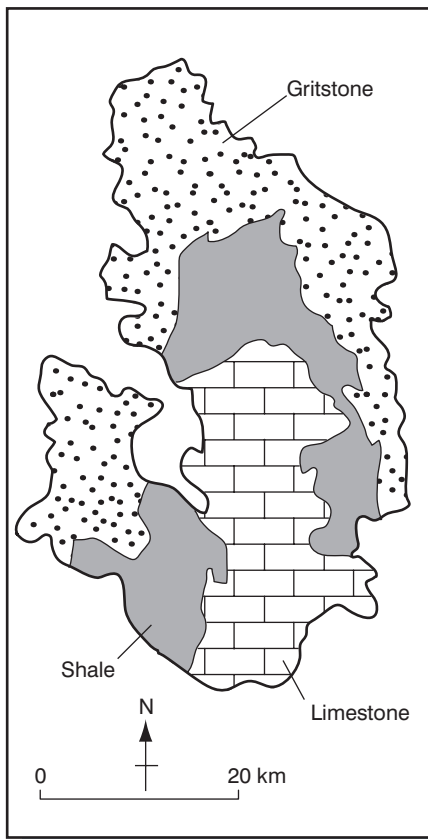


Figure 2: General geology of the Peak District National Park

the land was made in 1521. Lime kilns (for burning limestone) were a familiar sight in the Peak District. Lime was also used in lead smelting. The cutting of canals, and later the opening of the Cromford and High Peak

Railway, helped the movement of lime out of the area, to be used in building and other industries.

One of the main areas of quarrying is around Castleton, where there are two large quarries, and near to the village is the large Hope cement works (Figure 3). Castleton is at the heart of a very popular area for day visitors and tourists. The village is surrounded by spectacular scenery and the area is well known for its limestone features, including a large gorge called the Winnat's Pass and a number of cave systems which are open to the public.

During the 20th century, the amount of limestone quarried from the Peak District gradually increased (from 1.5 million tonnes in 1951 to 8.2 million tonnes in 1991) as more aggregate (crushed stone) was needed for buildings and for road-making. During the 1980s, limestone was increasingly used as aggregate; other uses are shown in Figure 4. The feeling has grown that this may be an extravagant use of a product from a national park, and after reaching a peak in 1991, the production of limestone has been reduced (4.7 million tonnes in 1999/2000).

1991	
Aggregates (roadstone etc)	66%
Cement	29%
Agriculture	3%
Building stone	0.02%
Other	2%

Figure 4: Uses of limestone from the Peak District National Park in 1999

Source: Peak District National Park Authority

Stages in quarrying limestone

- The site is prepared – assuming that planning permission has been granted, heavy equipment is brought in to remove the overlying vegetation and soil and this is piled up to form a large heap.
- The limestone is extracted – holes are drilled into the rock and explosives placed in them. Many tonnes of rock are blasted into smaller fragments which are then collected by huge diggers.
- Treating the rock – huge crushing machines break the blocks into smaller pieces. These smaller fragments are screened and sorted before being transported by road or rail to a market.
- When extracting at a site is completed it should be landscaped. The quarry can be filled in, soil laid down and land may be returned to farming. Sometimes quarries are landscaped and then used for recreation. Near to urban areas quarries form useful locations as landfill sites for rubbish. In the Peak District some redundant quarries have been used for caravan sites, water-based recreation and nature conservation.

Issues raised by quarrying

Quarrying often causes a conflict between the economic advantage of extracting the valuable raw material (and providing local jobs), and the destruction of the landscape – visually, and through noise, dust and extra traffic.

Benefits of limestone quarrying

- Limestone is needed locally as a building stone. Many local buildings are made of limestone

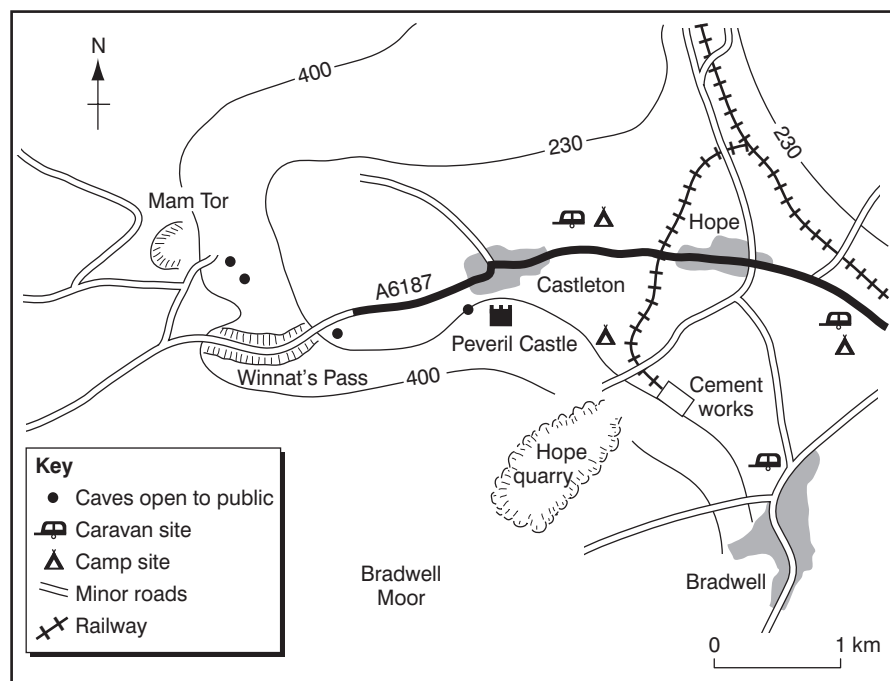


Figure 3: Limestone quarry and the Hope cement works near Castleton

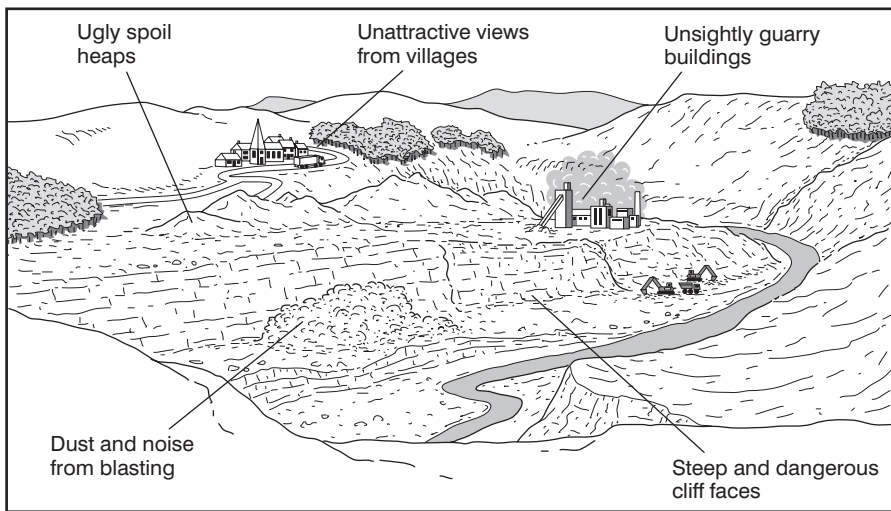


Figure 5: Some of the problems associated with limestone quarrying

and the rock has traditionally been used to make drystone walls around fields. On the wider scale, limestone is used to make cement and roadstone.

- Jobs are created in areas where there are generally few employment opportunities. In national parks, apart from farming most jobs are related to the tourist industry and as such are often seasonal – any permanent jobs are therefore much needed. The Hope quarry and cement works is the largest single employer in the area around Castleton in the Peak District.
- Some settlements have been encouraged to grow because of the local importance of quarrying. Those people employed in quarrying or related activities will spend some of their wages locally, they may attend local churches and their children may go to local schools.

Problems of limestone quarrying

- The quarries form large, unsightly scars in the landscape. They are often very obtrusive and spoil areas for tourists and conservationists, particularly those areas with spectacular scenery. The quarry site can also include ugly buildings and spoil heaps.
- The development of a new quarry will inevitably involve loss of plants and wildlife habitats in the area taken up by the site.
- Dust may be carried by winds over fields and any nearby villages.

- Quarry traffic causes congestion in villages, heavy lorries damage the roads and vibrations affect the foundations of village buildings. Heavy vehicles can also make life harder for farmers who may want to move farm animals across or along narrow country roads.
- Noise pollution is created by heavy lorries and also by the blasting of the limestone rock.

Some of these problems are depicted in Figure 5.

The way forward ...

The need for limestone and other rocks for various uses is obvious. Unfortunately commercially valuable rocks are often found in areas of outstanding scenic quality and value for tourism and recreation, and these are often in national parks. National park authorities take steps to minimise the impact and ensure that the quarrying really is necessary in a particular area. For example, in the Peak District National Park the Authority insists that landscape schemes for screening and restoration of the quarry site are undertaken as part of the process of extracting rock or minerals. Any new proposals are judged against the following criteria:

- The national and local need for the mineral.
- The lack of practicable alternative available sources.

- The extent to which the proposal would affect the landscape and environment of the Peak District National Park.

A sustainable approach does not involve abandoning quarrying altogether. Sustainable management may involve:

- controlling the size and extent of existing quarries
- restricting further extraction
- by careful management, controlling the impact of existing quarrying activities on the environment to minimise noise disturbance and dust
- landscaping existing quarry sites, perhaps masking them with trees
- trying to keep heavy vehicles away from rural villages, possibly using railways to move limestone instead of road vehicles
- restoring old quarry workings and removing spoil heaps.

Somehow we need to balance the demand against the pressures from quarrying on the environment and the people living near such activities, both now and in the future.

Activities

1 (a) Complete Figure 1 by shading the land over 200 metres in light brown and the lower land in light green.

(b) Name the large cities near the edge of the National Park. Mark on the name of the hills in which the Park is located.

2 As part of your general background knowledge, find out the difference between a **rock** and a **mineral**. Try to develop a separate definition for each term.

3 Draw a flow diagram summarising the stages in quarrying limestone.

4 (a) Complete a pie diagram based on Figure 4. Remember to start from the vertical – the largest sector should come first then progressively smaller sectors working round clockwise.

(b) Colour each sector – it is not necessary to mark on the values in degrees, but each sector should be labelled and the finished pie diagram should be given an appropriate title.

Decision-making activity

5 (a) Study Figure 6, which shows a typical upland area and three proposed sites for a quarry. A is on a hillside which at present is quite heavily wooded, B is on a more exposed hillside, and C is on the hill in the distance in the sketch. The area is important for tourism, particularly around the lake in the middle of the sketch.

Hold a debate with pupils arguing either for or against each site. This could be just two pupils, one arguing for and one against all three sites. Or you may involve more pupils in groups, some for and others against each of the three sites. Alternatively pupils could adopt the roles of (i) a farmer, (ii) a local resident, (iii) a representative of the quarrying company, (iv) a national park officer, (v) a conservationist.

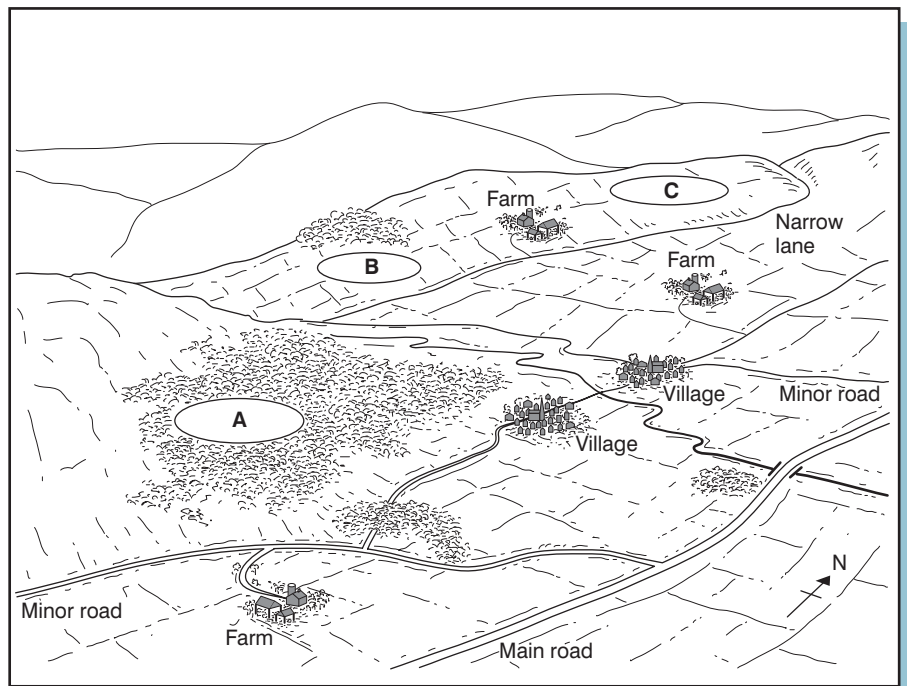


Figure 6: Proposed sites for a limestone quarry

	A	B	C
Jobs			
Noise			
Visual impact			
Dust – affecting farms, villages			
Traffic – vibration, disruption to farmers			
Access to main roads for lorries			
TOTAL			

Figure 7: Grid for Activity 6

(b) Take a vote at the end of the debate to see how many pupils support each site.

(c) Finally, summarise the arguments by writing up the debate.

6 (a) Fill in the grid in Figure 7 by scoring each factor on a scale of 1 to 5, 1 being worst/greatest impact and 5 being best/least impact. You do not necessarily need to use the extremes of the scale, and values can be used more than once for any factor.

(b) When you have finished, add up the values in each column and enter a total – the site with the lowest total should be the most appropriate site. Activities 6 (a) and (b) could be completed using a spreadsheet.

(c) Describe and explain the best and the worst sites. You can make

contrasts to avoid repetition. Don't forget to include any different points made in the debate if you completed Activity 5.

7 Try to think of at least three reasons why we should be concerned about the impact of activities like quarrying in our national parks or similar areas.

8 **Sustainability** is an important concept in Geography. It is an approach to development that attempts to minimise harmful impacts on the environment while also being economically and socially viable for people both now and in the future. Discuss in your class what planners would have to consider in order for the quarrying of limestone to be carried out in a sustainable way.