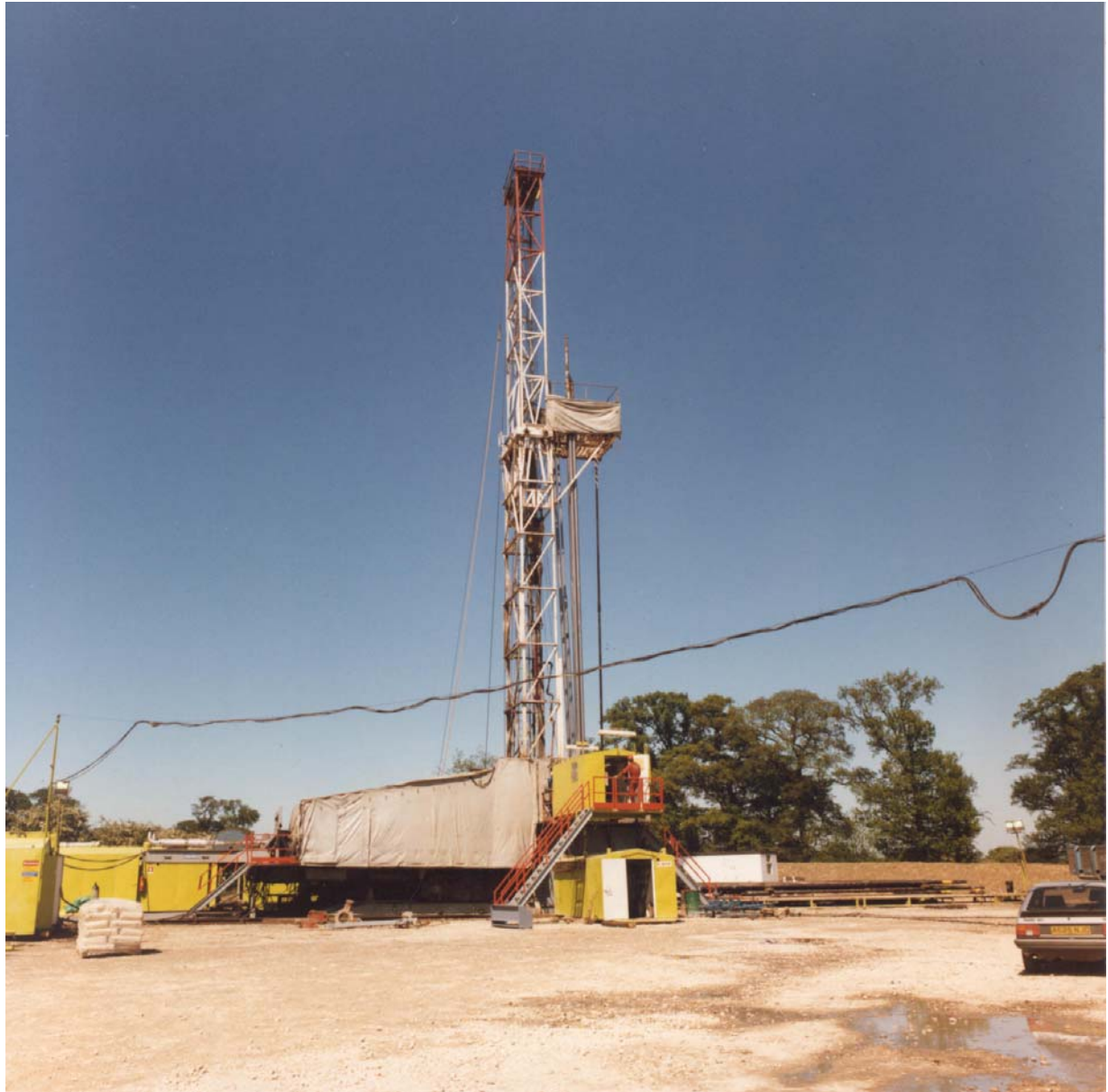


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# Chapter 5

# Mineral Exploration

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*Borehole exploration for oil*

## Introduction

- 5.1 Exploration is essential to prove the existence and extent of mineral resources. Prior to development, it is necessary to ensure that a resource is economically viable and to determine how it can be worked. Although exploration is a temporary activity, safeguards may still be needed to minimise its environmental impact.
- 5.2 There are three main methods of mineral exploration – geophysical surveys, trial pits and boreholes:

## Geophysical Surveys

- 5.3 Seismic surveys are the most common type of geophysical survey, especially in the exploration of coal and oil. Whilst these surveys can provide useful information about the underlying geological structure, they do not prove the existence of mineral resources.
- 5.4 In summary the procedure is to initiate a shock wave in the ground, the pulse from which is detected by instruments called seismometers. The resulting signals are then translated into a seismograph which can be interpreted to reveal rock structures.
- 5.5 Seismic surveys are carried out using various methods, such as ‘vibroseis’ (using vehicles with vibrator pads) and shot hole surveys (using small charges of dynamite in shallow boreholes). Other devices such as land airguns and hydraulic rams can also be used.
- 5.6 Most seismic surveys have little environmental impact. However noise and vibration can raise concerns when carried out in sensitive areas. This is especially the case when explosives are used and/ or where surveys are carried out over a prolonged period. A particular concern is the interference to archaeological remains and operators are encouraged to contact the County Council’s archaeologists prior to undertaking a survey.
- 5.7 Although most seismic surveys have permitted development rights, there are several exceptions relating to sensitive areas, proximity to buildings, and size of explosive charge and duration of operation. In these cases planning permission is needed. Operators are, in any event, encouraged to notify local residents at an early stage to allay concerns and unnecessary fears. It also allows time for steps to be taken to protect various interests.

## Shallow Boreholes and Trial Pits

- 5.8 Shallow boreholes and trial pits are methods of surface mineral exploration which obtain data on the depth, extent and quality of the mineral, the make up of overburden, and hydrological data. Shallow boreholes use small rigs that are capable of sinking a number of boreholes in a day. Trial pits are mostly used in assessing shallow deposits, in particular sand and gravel. After the information is recorded the pits are backfilled and reinstated. Again concerns are raised by the impact that digging shallow pits may have on the archaeology. However, these pits also provide an ideal opportunity to evaluate the site's archaeology at an early stage and operators are encouraged to involve archaeologists during this exploration phase.
- 5.9 Due to the short duration of these operations only rarely does the MPA have to be notified, or planning permission be obtained. Exceptions include operations in close proximity to buildings and operations in environmentally sensitive areas. There are also limits on intensity of drilling, the use of explosives and heights of rigs. Consultation with the County Council is advised where there are doubts over the planning situation.

## Deep Boreholes

- 5.10 In Nottinghamshire deep boreholes, which may be sunk to depths of over 1000 metres, are used mainly in the exploration of coal and oil. A typical exploration site covers half a hectare and rigs can be 40 metres high. Drilling may occur 24 hours a day for several months. A hard base, normally comprising crushed limestone, is required for the drilling rig and associated equipment. Supporting equipment includes mud pits, pipe racks, pumps and cabins. The environmental implications of deep borehole drilling are therefore much greater than those for the other exploration methods noted above.

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### POLICY M5.1 MINERAL EXPLORATION

**Proposals for mineral exploration will be permitted, subject to satisfactory environmental, amenity and reclamation safeguards.**

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- 5.11 The main planning issues associated with deep boreholes are as follows:

#### Visual Impact

- 5.12 Although sites can be very visible, this rarely causes conflict since activities are temporary. Spot lighting make sites more visible at night than in the day, and may inadvertently light up nearby buildings. Locating sites next to housing should therefore be avoided.

## **Noise**

- 5.13 Where drilling rigs are close to property, noise is likely to be the most significant environmental concern, especially at night. The rig is the main source of noise which usually comprises a low frequency hum from the generator and intermittent high frequency sounds from the brake and handling of casing. Noise generated from traffic servicing the site at night can also cause disturbance.
- 5.14 Borehole sites should therefore be located away from sensitive areas. Where this is not possible the noise control measures given in Policy M3.5 are applicable. Although rigs often necessarily operate 24 hours a day, it may be possible to restrict the number of vehicles entering and leaving the site during the night. Cladding around the generator is effective since this is the main noise source. Different rigs emit varying levels of noise. In sensitive areas only the quieter rigs may be acceptable.
- 5.15 Accurate noise prediction is essential since boreholes are normally temporary, and measures to rectify inaccuracies may take longer than the duration of the development. 'Noise footprints' are available for most rigs, and are particularly useful for predicting the noise impact on nearby properties.

## **Access**

- 5.16 Although short lived, traffic generation is substantial. It is likely to include 2-300 lorry loads of hardcore, up to 30 loads of construction equipment, and 35-40 articulated lorry loads of drilling rig. This traffic can place severe constraints on site selection in rural areas served only by narrow roads. The potential impact can be minimised by appropriate management measures such as agreements on lorry routeing and temporary signposting. The parish council can have an important role in advising on these measures.

## **Water Pollution**

- 5.17 During drilling, fluid termed 'drilling mud' is circulated to support the borehole, cool and lubricate the drilling bit, and remove rock cuttings from the borehole. The sinking of a 1,500 metre borehole can require the use of up to 500,000 litres of drilling mud. Care must be taken to protect both surface and groundwater vulnerability from contamination and to avoid damage to aquifers. This can be achieved by keeping a reasonable distance from drinking water abstraction points and underground springs, and ensuring careful control of operations. Developers are advised to contact the Environment Agency who hold groundwater maps showing Source Protection Zones, which protect groundwater sources which are known to be particularly at risk from contamination. The Environment Agency can also advise on other requirements such as the need to comply with Groundwater Regulations and Waste Disposal Regulations. Where artesian discharges of water occur, boreholes must be sealed on completion of survey.

## **Directional Drilling**

- 5.18 Ideally most boreholes are sunk vertically for speed and economy. However, where the optimum borehole location coincides with an environmentally sensitive area, directional drilling can be used to reach the same target from a different location. Within this context, 'environmentally sensitive areas' include features such as SSSIs or archaeological sites which could be damaged by mineral exploration, and residential and other buildings where drilling would create an unacceptable level of disturbance. This method is particularly relevant for oil, where production wells are likely to be developed on the same exploration sites thus giving rise to long term implications. This aspect is covered further in Chapter 13.
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### **POLICY M5.2 DEEP BOREHOLES IN SENSITIVE AREAS**

**Planning permission for exploratory deep boreholes located in environmentally sensitive areas will only be granted where there is satisfactory evidence that exploration could not be achieved from more acceptable sites.**

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## **Reclamation**

- 5.19 Reclamation involves the removal of the hardcore foundation, and the respreading of soils. Normally this is carried out quickly and effectively with little visible sign of the activity remaining. Whilst farmers are often keen to retain sections of haul road or hard standing, the County Council does not normally wish to allow unnecessary evidence of mineral exploration in the countryside.
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### **POLICY M5.3 RETENTION OF HAUL ROADS AND HARD STANDING**

**Proposals to retain sections of haul road and hard standing following exploratory drilling will not be permitted except where they provide clear agricultural or other benefits.**

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