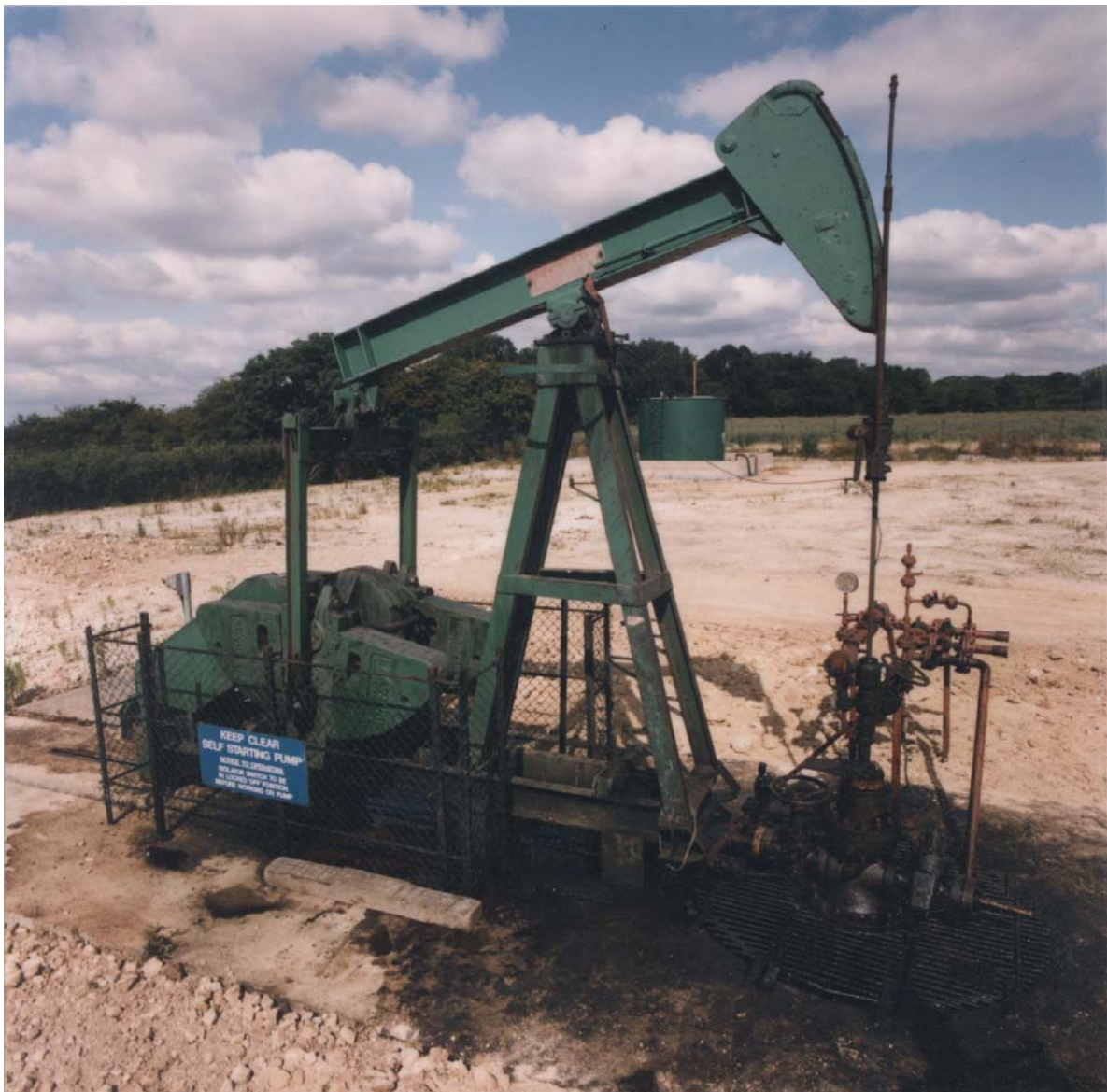

Chapter 13

Oil, Coalbed Methane and Mine Gas



A beam pump or 'Nodding Donkey' at Kirklington

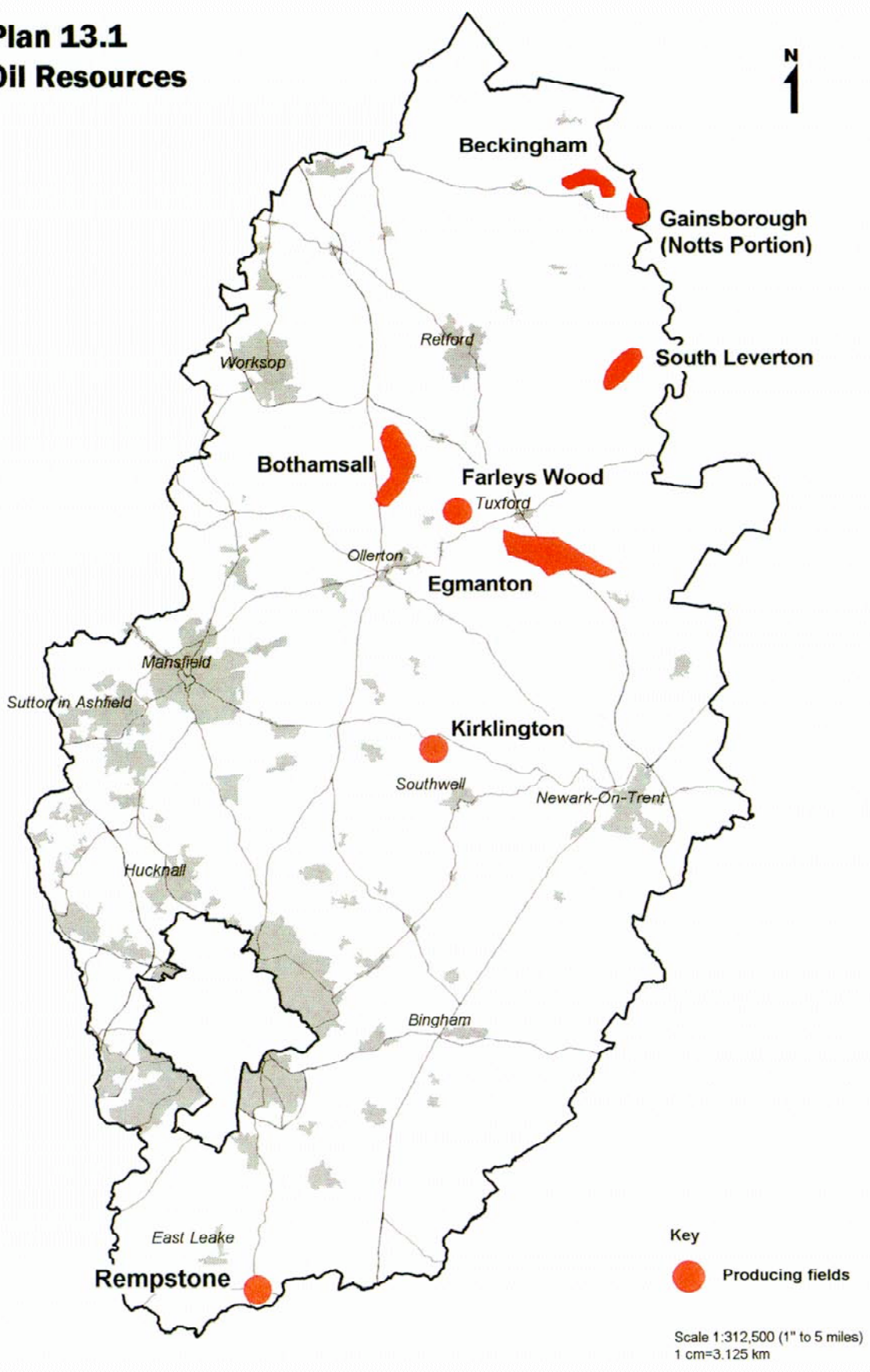
Introduction

- 13.1 Oil exploration in Nottinghamshire began prior to the Second World War when possible oil reservoirs in Carboniferous sandstones were identified. These sandstones occur at great depth and underlie much of Nottinghamshire. They are porous and permit the passage of oil and gas which, being lighter than water, tend to migrate upwards. Overlying impermeable rocks or some other geological feature such as a fault may act as a trap creating potential oil fields.
- 13.2 The oil recovered in Nottinghamshire is of high quality, and mainly used in the plastics and chemical industries, rather than as a fuel. Nottinghamshire's producing oil fields are shown on Plan 13.1. The majority of oil is taken by rail from the central collecting station at Gainsborough to refineries at Immingham, Humberside.
- 13.3 Although no economic quantities of natural gas have been discovered in Nottinghamshire, there has been an increasing interest in recovering methane gas from coal seams. To date proposals have been limited to the extraction of methane naturally seeping out of old mine shafts, but the technology to extract methane directly from undisturbed coal seams now exists.

Future Requirements

- 13.4 As stated in Chapter 12, it is not for the planning system to seek to set limits or targets for energy supply. As well as contributing to the local economy, the Government receives considerable revenues in the form of taxes and royalties from oil production. Despite the relative insignificance of onshore oil, it remains a cheap and economic resource to exploit when compared to its North Sea counterpart. As a result exploration in the pursuit of further oil resources in Nottinghamshire is likely to continue.
- 13.5 Extraction of coalbed methane and mine gas extraction is a relatively new venture in the UK. Reserves in Nottinghamshire are thought to be economically viable. It is anticipated that the number of schemes for this energy source will continue to grow. In addition Government policy is to ensure the maximum economic exploitation of oil and gas subject to measures to protect the environment.
- 13.6 Current Government guidance for the development of on-shore oil and gas resources is contained within Circular 2/85 which is to be replaced by a new minerals policy statement. A draft version of MPG 16 was published in 1999 which sets out the criteria against which County Councils should assess future proposals for oil and coalbed methane extraction. Final guidance is expected under the new minerals policy statement system.
- 13.7 The planning issues relating to oil and methane extraction are considered in turn below. Issues relating to boreholes in general and reclamation are considered at the end of the chapter.

**Plan 13.1
Oil Resources**



Oil

- 13.8 The exploration and production of oil is subject to the same planning controls applicable to any other mineral. However, oil companies must first obtain a licence issued by the Department of Trade and Industry, (DTI).
- 13.9 Since 1995, a single licence, the Petroleum Exploration and Development Licence (PEDL) has been issued to cover the three main stages of petroleum activity – exploration, appraisal and development.
1. Licences have an initial term of 6 years during which time a programme of exploration work agreed with DTI must be carried out;
 2. Licences can then be extended for a second term of 5 years to enable further activity of any kind to take place, including exploration subject to planning permission being obtained;
 3. The licence may be further extended for a third term of normally 20 years to allow for extraction.
- 13.10 Applications for licences are invited by the DTI in formal rounds for blocks based on 10 x 10km Ordnance Survey grid squares.

Method of Working and Environmental Impact

- 13.11 Before exercising any rights granted by their licence, the company must obtain the prior permission of owners and occupiers of any land they may wish to enter, and the prior approval of the County Council where necessary. Formal planning permission is required for the drilling of deep exploratory boreholes, but is not normally required for seismic surveys.

Exploration

- 13.12 The exploration phase of hydrocarbon operations encompasses both geological and seismic investigations, and the drilling of deep boreholes to assess prospects in more detail. These methods are discussed more fully in Chapter 5.
- 13.13 Whilst the mostly short-term impacts of exploration will need to be assessed against Policy M5.1, oil exploration boreholes also have long term implications. This is because, if oil is discovered, the same borehole site is likely to be used as the production well. It is therefore important that exploration proposals are also assessed against Policy M13.3 which considers oil production (see below). Identifying the most suitable location can be achieved by defining an 'area of search' within which boreholes can be drilled either vertically or directionally and still reach the subsurface targets, (see Policy M5.2).
- 13.14 Although substantially less costly than off-shore development, on-shore operations are still high cost and high risk ventures. Even when hydrocarbons are found, development will not necessarily follow. However, exploration is valuable in its own right as it extends the knowledge of the County's resource.

POLICY M13.1 OIL EXPLORATION

Where oil exploration boreholes are proposed in environmentally sensitive locations, the County Council will need to be satisfied that, within the 'area of search', the siting of the proposed development would have the least impact.

Appraisal

- 13.15 Should hydrocarbons be found as a result of drilling an exploration well, it will often be necessary to attempt to delineate the extent of the find by drilling further wells from other sites in the area. Until the extent of the oil field is known, it is difficult to evaluate the various options available and to assess the potential environmental effects of commercial exploitation.
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POLICY M13.2 OIL APPRAISAL

Where oil is discovered, proposals to appraise, drill and test the resource will be permitted provided that:

- (a) such proposals are consistent with an overall scheme for the appraisal and delineation of the oil resource; and**
 - (b) they do not give rise to any unacceptable impacts on the environment and residential amenity.**
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Production

- 13.16 In land-use terms, oil is very economical, and the environmental impacts are normally limited.
- 13.17 Oil wells comprise beam pumps known as 'nodding donkeys', which are 3-5 metres in height and are driven by small diesel or electric motors. A water injection system may be used to pump water into the reservoir to force oil from the rock. Where required, such development can normally be screened by soil mounds and tree planting. Once at the surface, oil is generally pumped to a small central collecting station and periodically removed from the site by road tanker.
- 13.18 Proposals for oil production need to demonstrate that they are consistent with an overall scheme that will enable the full development of the resource, taking account of any environmental issues which might constrain the development.

POLICY M13.3 OIL PRODUCTION

Proposals for the production, processing or transport of oil will be permitted provided that they are:

- (a) consistent with an overall scheme enabling the full development of the resources;**
 - (b) there are no unacceptable impacts on the environment and to residential amenity.**
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Coalbed Methane

- 13.19 Most coal seams buried at depth will contain significant quantities of methane trapped within pores. The coalbed methane industry offers a means of extracting gas directly from coal seams that might otherwise not be exploited by conventional methods. The industry is still in its infancy and as yet there are no schemes for coalbed methane extraction within the County. There is also growing interest in related activities of extracting methane from disused mines and this is considered later in the chapter.
- 13.20 As with oil a PEDL is required for coalbed methane extraction. Furthermore those wishing to gain access to coal for the purpose of extracting methane will require permission from the owner of the coal. In the vast majority of cases the owner is likely to be the Coal Authority, who have produced maps indicating areas where a licence for coalbed methane extraction would normally be refused or granted.

Method of Working and Environmental Impact

- 13.21 Coalbed methane is obtained by drilling into a coal seam, lowering the local pressure and collecting the gas that is released as a result. The gas extraction process does not detrimentally affect the physical properties of the coal or prejudice it being worked at some later date by conventional mining methods. Methane can be extracted from coal seams that would be unsuitable or uneconomic to mine. Alternatively, it can be used to remove gas before mining, helping to reduce methane hazards associated with coal mining. Unlike underground coal mining, extraction of the gas does not cause subsidence of the land surface.
- 13.22 Coalbed methane extraction can be contemplated at depths of 200 – 1500 metres. Any shallower and the coal is likely to have lost its gas by natural leakage, whilst at depths greater than 1500 metres the yield is unlikely to cover the cost of drilling.

- 13.23 The equipment used in coalbed methane extraction is similar to that for conventional gas reservoirs. The main difference is that coalbed methane wells have generally much lower flow rates than conventional wells and take some 6-12 months to build up to full production. The production of commercial volumes of gas requires networks of boreholes with associated pipelines. The usual spacing is one borehole every 500-1000 metres. More densely drilled sites cause additional pressure reduction and increase the desorption rate, thus supplying more free gas.
- 13.24 The principal environmental considerations associated with the extraction of coalbed methane are the impacts associated with the exploration, development, operation and closure of a well field. These are very similar to oil, although the wells may be more numerous and closely spread.
- 13.25 A further significant environmental issue is the impact of water produced during well stimulation. The main type of water pollution during the extraction of coalbed methane is a high concentration of dissolved salts, causing high salinity. The scope for dilution into groundwater and watercourses and the sensitivity of aquatic organisms will determine the viability of surface discharge options and the degree of pre-treatment necessary. The Environment Agency can provide expert advice in this area.
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POLICY M13.4 COALBED METHANE EXTRACTION

Proposals for the production and processing of gas from coal seams will be permitted provided that they are consistent with an overall scheme enabling the full development of the resources and there are no unacceptable impacts.

Mine Gas - Recovery

- 13.26 Coal seams exposed to the atmosphere during deep coal mining will usually start to release methane trapped within them. This methane, usually referred to as 'mine gas' is one of the main hazards during mining. If it is allowed to accumulate it can easily be ignited and explode. Once mining ceases and there is no longer any need to ventilate, methane may start to fill the mineshafts, other voids and escape to the surface. As a result of deep mine closures during the past 30 years there has been an increase, nationally, in the number of reported surface gas emissions. At best these are environmentally damaging, at their most serious they are a threat to health and safety in the locality.
- 13.27 The Coal Authority has installed strategically located mine vents to allow the mine gas to disperse to the atmosphere at known sites rather than build up pressure and be forced out of the ground at potentially dangerous points in the built environment.

- 13.28 In recent years technology has developed to recover this gas and use it as a fuel and convert it to electricity using on-site generators. The closure of so many mines has increased the opportunities for this type of development. At the start of 2002 three such schemes were operational in Nottinghamshire. This activity accords with the principles of sustainable development as it reduces the release of one of the most potent 'greenhouse gases' into the atmosphere and converts it into a useful fuel. This in turn reduces the demand for other finite fossil fuels.
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POLICY M13.5 EXTRACTION OF MINE GAS

Proposals for the collection and processing of mine gas will be permitted provided that there are no unacceptable impacts on the environment and residential amenity.

Impact of Boreholes upon other Mineral Resources

- 13.29 Boreholes often pass through other underground mineral resources, which can give rise to a number of problems. For example, steel casing left in abandoned boreholes could damage mining equipment, and mining operations must avoid active production wells. The latter results in mineral sterilisation, and, more significantly, may involve costly alterations to the mine development.
- 13.30 It is important that these issues are addressed at the planning application stage. Possible solutions include the use of fibreglass casings instead of steel, or to sterilise a small amount of mineral around the borehole. Special safety precautions may also be required when wells are abandoned in mining areas.
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POLICY M13.6 BOREHOLES – CONFLICTS WITH OTHER UNDERGROUND MINERAL RESOURCES

Where proposals for borehole exploration and production coincide with areas containing other underground mineral resources the County Council will need to be satisfied that their exploitation will not be unreasonably affected.

Reclamation and After-use

- 13.31 The County Council requires that sites be reinstated to their previous use at the earliest opportunity. In general the reclamation of abandoned exploration and production sites raises few issues. Once sites are no longer needed for exploration, appraisal or production it should normally be possible to rapidly reclaim the sites back to their previous state and use. This includes the removal of any temporary access and roadways, unless there are sufficient benefits for their retention for agricultural or other purposes.
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POLICY M13.7 RECLAMATION OF OIL AND METHANE SITES

Where planning permission for oil and methane development is granted, conditions will be imposed requiring the site to be restored back to its original use as soon as practical once the development is no longer required.
