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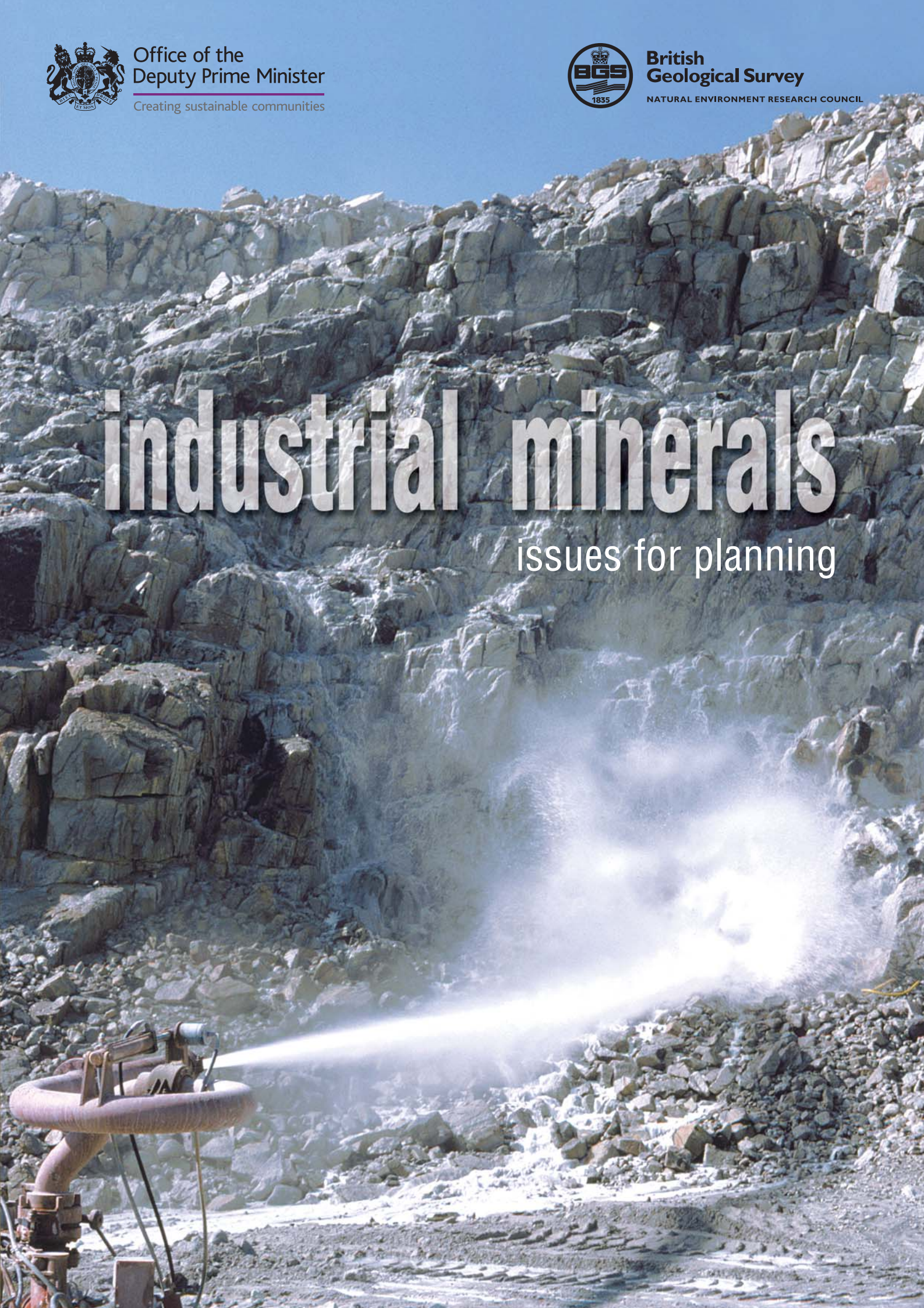


British
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NATURAL ENVIRONMENT RESEARCH COUNCIL

industrial minerals

issues for planning



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BRITISH GEOLOGICAL SURVEY

COMMISSIONED REPORT CR/04/076N

'Industrial Minerals': Issues for Planning

Review of Planning Issues relevant to some Non-Energy Minerals other than Aggregates in England

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Executive Summary

- 1** The United Kingdom is fortunate in being well endowed with a wide range of industrial minerals. Their extraction supports an important and diverse sector of the minerals industry, which makes a significant contribution to the national economy. The major part of this industry is located in England.
- 2** This report describes research commissioned by the Office of the Deputy Prime Minister (ODPM) on the planning issues associated with the provision of non-energy minerals other than aggregates in England. Throughout this report, these minerals are referred to as 'Industrial Minerals'.
- 3** Economic minerals included in the study are kaolin (china clay), ball clay, clay and shale (for cement manufacture only), limestone (limestone, chalk and dolomite for industrial purposes, including cement manufacture), silica sand, gypsum/ anhydrite, potash, salt, fuller's earth (bentonite), fluorspar, barytes, calcite, lead, zinc, other metals (tin, copper, gold), slate (industrial applications only), talc, serpentine and iron ore (hematite).

KEY CHARACTERISTICS

- 4** The industrial minerals sector in England is generally characterised by a small number of large businesses, with production of each mineral being dominated by one or a small number of companies. Many companies form part of major international groups. However, there are also a number of smaller producers, notably of industrial carbonates, silica sand and fluorspar, who are essentially single site operators.
- 5** Industrial minerals are widely distributed in England and occur in all Regions with the exception of London. However, the location of individual industrial minerals and their quality fundamentally reflects geology and many are highly restricted in their occurrence and, consequently, extraction. The restricted distribution of industrial minerals means that some are coincident with environmentally sensitive areas. Notable examples are fluorspar and potash, which are essentially confined to National Parks. Carboniferous limestones and the Cretaceous Chalk are the two principal limestone resources on which cement and industrial limestone production is based in England. These rocks also give rise to some of England's most attractive scenery and consequently extensive areas are covered by national landscape designations.
- 6** The pattern of consumption of industrial minerals by downstream industries is complex. Typically, individual industrial minerals are consumed in more than one sector and each market area requires a number of different minerals. The markets for industrial minerals are widely distributed throughout the country and are not confined to England, or even the UK.
- 7** There are marked differences in the geological occurrence, properties, markets, supply, demand and thus land-use planning implications of the extraction of the different industrial minerals. Diversity is a key feature that characterises the industrial minerals sector.

- 8 The geology of different industrial minerals greatly influences the size of a deposit and consequently, the amounts that can be produced and over what period. It will also dictate how a deposit is worked, notably by surface extraction or underground mining, as well as the way the industrial mineral has to be processed and the amount of associated waste that is generated. Geology, therefore, fundamentally influences the planning issues associated with the extraction of each mineral.
- 9 Industrial minerals are consumed in a wide range of end uses based on their diverse physical and/or chemical properties. Some industrial minerals are valued solely as sources of specific elements, or compounds, for example for use as chemical feedstocks, in cement-making or as plant nutrients.
- 10 The different markets for specific industrial minerals demand different combinations of properties. The same mineral will, therefore, be traded with different specifications depending on specific end use. Individual grades of industrial minerals are, therefore, often not interchangeable in use.
- 11 It is important to understand that industrial minerals are not like refined metals or chemicals, which are traded on the basis of purity and price; they are the products of natural processes. Subtle differences in their properties can make the performance of a specific industrial mineral quite different from one deposit to another. Consequently individual deposits may be aimed at particular products or markets and, as a result, some specifications for particular uses are written around specific deposits. In addition, whilst processing is capable of enhancing or modifying the properties of some industrial minerals, it cannot for example, fundamentally change the iron content, or whiteness, of limestone or dolomite, or the fluid properties of kaolin or ball clay.
- 12 Industrial minerals serve as essential raw materials that underpin many sectors of manufacturing industry, where the added value can be several times the cost of the mineral used. Indeed some industrial mineral producers are also major manufacturers and of the total production of industrial minerals (approximately 40 million tonnes) about 50% is not sold on the open market but used 'captively' in the manufacture of value-added products.
- 13 The fact that industrial minerals are valued for their physical and/or chemical properties, means that opportunities for substitution and recycling are variable and, often, complex.
- 14 Movement of the industrial minerals to market is by road, rail and sea, the latter to serve export markets, although some coastal movement of rock salt and agricultural dolomite to Scotland also takes place. Of the total marketable output of industrial minerals of 40 million tonnes it is estimated that over 25% is transferred by rail or ship, a much higher proportion than for aggregates.

ECONOMIC IMPORTANCE

- 15 The industrial minerals sector accounts for a relatively small proportion of Gross Value Added (GVA) in the UK economy (an estimated £788 million). However, it is important to consider the spatial dimension of where the GVA is created. Of the 69 main producing sites in the UK industrial minerals sector, 54 (78%) are located in either remote rural or accessible rural locations.
- 16 Employment figures for the industrial mineral sector are not that high (under 15 000 direct, indirect and induced). However, again it is important

to give consideration to where employment in the industry is distributed, with the sector making a significant contribution to employment in rural areas. The industrial minerals sector also makes an important contribution to maintaining a diversified rural skill base, a necessary requisite of a well-structured rural economy. Given the higher level of earnings paid by the sector than rival sectors in the rural economy, it can be argued that the industrial minerals sector contributes to raising the level of productivity in rural areas of the UK.

- 17** The importance of industrial minerals to the UK economy is not attributable solely to the value of production and the number of people who are directly or indirectly employed. They are also essential inputs to a wide range of downstream industries which make a much larger contribution to wealth creation in the UK.

PLANNING ISSUES

- 18** The planning context of industrial mineral provision at national, regional and local levels is examined in the report. Planning issues common to all industrial minerals include geological scarcity, level of demand, permitted reserves and sterilisation of mineral resources by planning controls, as are planning implications associated with extensions and new sites.
- 19** Planning issues important for some industrial minerals include factors such as mineral waste disposal, underground mining (including impacts of surface development and subsidence), longevity of operations, 'landbanks' and continuity of supply, along with the importance of maintaining supplies of a variety of mineral qualities. Other issues in this category include the planning response to restoration and dereliction from earlier operations.
- 20** There are a number of 'thematic' issues associated with planning for industrial minerals. One of the most important of these themes is the examination of the 'need' for industrial minerals and how they contribute to wealth creation at the local, regional and national scale. These issues require an appropriate planning response.
- 21** Another important theme is the environmental effects of mineral working. This includes issues such as transport, landscape, wildlife and heritage. The planning system also has a role in applying the principles of sustainable development with regard to industrial minerals. This includes factors such as best use of the resource (safeguarding from sterilisation, avoiding inappropriate end uses and better use of poorer quality minerals) and reduction in demand through substitution, reuse and recycling.

CONCLUSIONS

- 22** The recurring and central concern expressed by the industrial minerals sector is the need for assurance of a continuity of supply. This is the key to sustaining the UK industries which depend on these minerals as essential raw materials and from which wealth flows. Consequently, MPAs need to pay more attention to the downstream economic consequences of decisions on planning applications for industrial minerals. There is also concern about the increase in the number and extent of landscape, nature conservation and other designations, and the impact these may have on future supply options. This is particularly the case for minerals that are scarce and geographically restricted. However, it should be recognised by MPAs, industry and the public that there is no absolute prohibition on mineral working in these areas.

23 At the same time the messages about the environmental impacts of working industrial minerals are also clear. Here the requirement is for clarification of the circumstances when environmental constraints (which would be sufficient to deny the working of more ubiquitous minerals) might be overridden by the economic importance of a specific industrial mineral. In the absence of such advice, MPAs follow normal planning practice in resisting mineral development which would unduly damage protected areas and recognised environmental interests. Proposals for working industrial minerals in National Parks raise the most profound conflicts of interest. As well as concern about the impact of working in protected areas designated for a variety of purposes, there is substantial concern about the damaging impacts of the transport of minerals by road.

24 We are not convinced that 'more policy' from central Government will address these issues. There is a need for more policy on particular matters, set out below, but the more fundamental requirement is for more and better information on the economic importance of individual industrial minerals and their contribution to the UK economy.

Recommendation 1: Provide high quality, consistent and up-to-date information to assist the planning process.

25 We suggest that the Mineral Planning Factsheets which accompany this report could form the Technical Annex of any forthcoming *Mineral Policy Statements*. It is proposed that they be kept up-to-date, in terms of statistics and developments in the industry, so that they can provide a continuing source of reference for a wide audience. However, MPAs may require additional information on the economic importance of each mineral. This would require more detailed studies.

Recommendation 2: Improve guidance to Mineral Planning Authorities on the evaluation of the economic importance of industrial minerals.

26 MPAs are already well experienced at addressing the environmental aspects of mineral working proposals, but they have received little advice on the way in which they should address economic issues. A 'checklist' for MPAs for assessing the economic case for individual planning proposals is proposed.

Recommendation 3: Develop policy on integrated long term planning.

27 There is a need to establish a modus operandi which offers greater peace of mind for everyone, and positive planning for the benefit of both industries and the areas they affect. We consider this could be far better achieved by establishing in principle a commitment to sustain industrial minerals production (if required) in designated 'industrial minerals areas'. In designated areas, the principle of mineral working at some future date would be the priority issue when taking land use decisions in that area. Each industrial mineral benefiting from such a designation would be more assured of a continuity of supply than it is now, though there should not be an assumption that each industrial mineral must necessarily have its own designated area(s). From an environmental point of view, the purpose of the designation would be to prioritise local environmental benefit in return for recognising the commitment to future working. This would involve a commitment by the industrial minerals industries to long term planning, with investment in the movement of mineral by rail, waterway and pipeline rather than by road, so far as practicable. This would be justified by the investment in plant which itself could be guaranteed to be sustained with a supply of minerals. Likewise, to address foreseeable environmental and amenity concerns, there would be an expectation of forward planning for environmental mitigation and enhancement. This might involve the planting of screening woodlands (to mature before

mineral needed to be worked) and the creation of new habitat adjacent to existing habitat in order to allow colonisation and the creation of a more robust wildlife network within the area prioritised for working. 'Industrial minerals areas' would therefore not be 'sacrifice areas' but land within which a positive commitment by the planning authority and industry to long term environmental land management could be given proper effect. Because of different geology and the problem of defining the limits of some resources, it is unlikely that this approach would be appropriate in all cases. However, the procedure has to some extent already been adopted for ball clay in South Devon and may be beneficial elsewhere.

Recommendation 4: Broad end use controls should be formally established, where necessary, to ensure sustainable use of mineral resources.

- 28** Current mineral planning guidance (MPG1) aims '...to encourage efficient use of materials, including appropriate use of high quality materials...' Economic forces will in many cases support this principle of sustainable development, but cannot always be relied upon to do so and there have been cases where industrial minerals have been used for less than best purposes. Many development plan policies encourage end use controls, and conditions on individual developments have in some cases been imposed, or legal agreements reached, which achieve this purpose. Operators need flexibility in order to respond to changes in the market. As such, formal end-use controls should only be imposed with care. However, there remains uncertainty in national policy on the steps which MPAs can take to apply the principle. Clarification is needed that end use controls may be imposed by condition. In the unlikely event of any legal impediment being identified, the Government is recommended to take the necessary steps to overcome it.

Recommendation 5: Mineral planning guidance should encourage, where practicable, the use of lower quality resources, both to conserve higher quality resources and widen supply options.

- 29** It is a principle of sustainable development that lower quality resources should be used where practicable. This is, first, to conserve higher quality resources for those applications which can be served by no other reasonable means. Second, this is intended to widen the supply options and may reduce the pressure to work areas where there are significant conflicts of interest. The research indicated cases where this has clearly been achieved, usually through blending and additional processing by producers, but also by the end-user adapting to a lower quality (and lower cost) material.
- 30** The use of lower quality resources is a complex issue and the opportunities for using lower quality resources will depend on very specific and local circumstances. Guidance cannot be prescriptive, so the policy approach should encourage mineral companies and their customers to consider actively the scope available to them to make greater use of lower quality resources. It is unlikely that this would create significant difficulties for industrial mineral producers, many of whom are already using resources appropriately. National policy should invite MPAs to have regard to this issue when considering planning applications for working industrial minerals.

1 Introduction

- 1.1** This report describes a research project commissioned by the Office of the Deputy Prime Minister (ODPM) on the **Review of Planning Issues Relevant to some Non-Energy Minerals other than Aggregates in England** (Research Contract MP0711). Throughout this report these minerals are referred to as 'Industrial Minerals,' although it is recognised that cement raw materials are strictly construction minerals. The research was undertaken by the British Geological Survey, in association with Green Balance Planning and Environmental Services and DTZ Pieda Consulting, Economics.
- 1.2** The report provides information on the nature and economic importance of the industrial minerals sector and an analysis of the current planning response to the provision of these minerals. Where necessary, it also makes recommendations on alternative policy options. The research involved extensive information gathering and wide consultation with mineral planning authorities, industry and a range of other stakeholders. The interpretation of the resulting information, the summary of views and the conclusions and recommendations expressed in the report are those of the research team and do not necessarily represent the views of Government or of individual members of the Steering Group.
- 1.3** Economic minerals included in the study are as follows:
- Kaolin (china clay)
 - Ball clay
 - Fuller's earth (bentonite)
 - Cement raw materials (limestone, clay and clay/mudstone)
 - Limestone, including chalk, and dolomite for industrial purposes
 - Silica sand
 - Salt
 - Potash
 - Gypsum/anhydrite
 - Fluorspar, barytes and calcite
 - Miscellaneous minerals (iron ore/hematite, other metalliferous minerals, slate for industrial applications, serpentine and talc)

Background and objectives

- 1.4** Current Mineral Planning Guidance Note 1 (MPG1) *General considerations and the development plan system* makes only brief mention of industrial minerals, although specific detailed guidance on provision of cement raw materials and silica sand is set out in MPGs 10 and 15 respectively. It is likely that any future core guidance will be more general in nature, with specific minerals covered in associated generic documents, either dealing with specific minerals, or groups of minerals. This report has a dual role in informing the development of any new guidance by providing authoritative background information on the sector and by providing policy advice.

1.5 The report begins by providing an overview of the industrial minerals sector in England. This overview sets out the key characteristics of industrial minerals as they relate to land-use planning, along with the structure of the industry and the distribution of resources. It includes a series of maps which display the broad distribution of specific industrial mineral resources, together with other important information. This section also describes the context and importance of industrial minerals within the UK economy. The main body of the report deals with the planning context of industrial minerals provision. It examines issues common to all minerals, and identifies and analyses issues relevant to groups or individual industrial minerals. It also examines planning issues by theme (economic, social and environmental) and how the principles of sustainable development might be applied. The final section of the main report sets out conclusions and recommendations. The main Technical Annex (Annex A) consists of a series of '*Mineral Planning Factsheets*'. This series provides an overview of each economically important industrial mineral, excluding aggregates, which is extracted in England. It is primarily intended to inform the land-use planning process. Annex B sets out current mineral planning guidance as it pertains to industrial minerals. Annex C is the text of a paper on the '*Economic Importance of Industrial Minerals for Planning Applications*' produced by the Department of Trade and Industry in November 2003 as a contribution to this research.

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1.6 This research has greatly benefited from the co-operation and help of many organisations and individuals. The authors gratefully acknowledge the invaluable advice and assistance given during this research by a large number of individuals and companies in the industrial minerals industry, civil servants in central government, regional and local planning officers, and a number of trade associations and environmental organisations.

The research was guided and peer-reviewed by members of an independent Steering Group appointed by the Office of the Deputy Prime Minister.

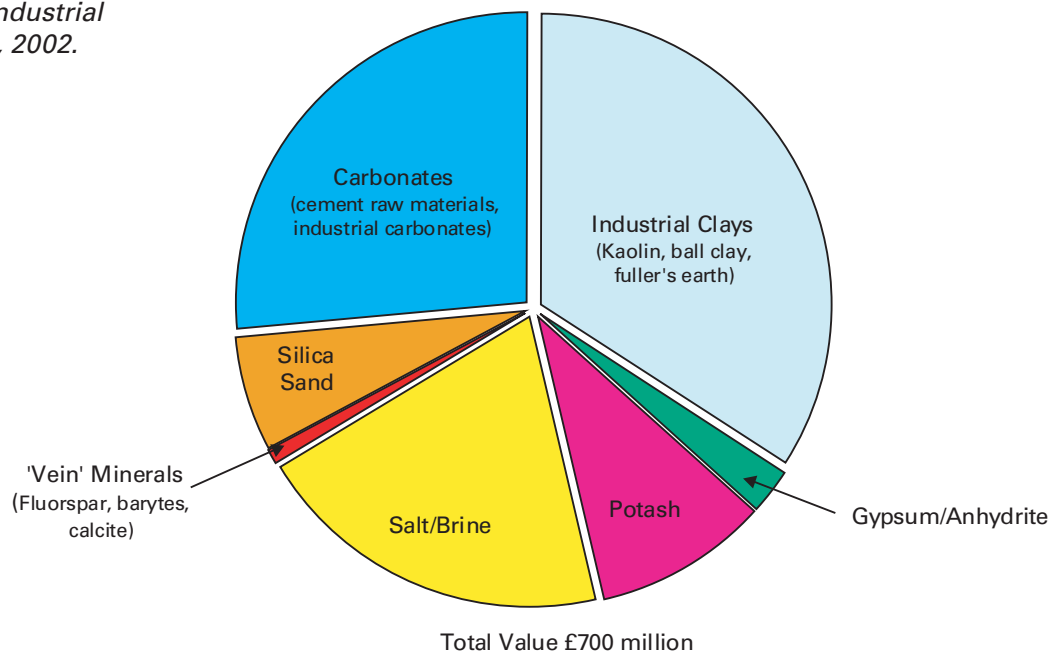
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2 Overview of the Industrial Minerals Sector

2.1 The United Kingdom is fortunate in being well endowed with a wide range of industrial minerals the extraction of which supports an important and diverse sector of the minerals industry. This sector makes a significant contribution to the national economy. The major part of this industry is located in England. In 2002, the sector had an estimated total output of 40 million tonnes of saleable, or usable product, with an ex-works value of about £700 million (see Table 1). This value is largely dominated by the industrial clays, mainly kaolin, and the carbonate minerals, limestone, chalk and dolomite (Figure 1). By comparison, the total output of primary aggregates (sand and gravel, and crushed rock) in England was about 159 million tonnes in 2002, with a value at about £1 000 million.

Figure 1 Value of industrial minerals in England, 2002.



2.2 The value of industrial minerals on an ex-works sales basis does not truly reflect their overall importance to the UK economy. This is discussed further below.

STRUCTURE OF THE INDUSTRY

2.3 The industry is generally characterised by a small number of large businesses, with production of each mineral being dominated by one or a small number of companies (Figure 2). Many companies now form part of major international groups (see Table 2). However, there are also a number of smaller producers, notably of industrial carbonates, silica sand and fluorspar, who are essentially single site operators.

Table 1 Production and value of industrial minerals in England, 2002.

Source: United Kingdom Minerals Yearbook, British Geological Survey
N/A not available

INDUSTRIAL MINERAL	THOUSAND TONNES	VALUE EMILLION
Cement raw materials (limestone & chalk) (GB)	15 192	220
Cement raw materials (common clay & shale)	2 194	
Limestone/dolomite/chalk (Industrial use) (GB)	8 915	
Limestone/dolomite/chalk (Agricultural use) (GB)	1 639	
Gypsum, natural	1 700	17
Brine/Rock salt	5 500	140
Potash (refined potassium chloride)	900	68
Silica (Industrial) sands	3 349	46
Kaolin (China clay)	2 163	192
Ball clay	921	44
Fluorspar	53	5
Calcspars	N/A	N/A
Barytes	10	<1
Fuller's earth	44	5
Lead concentrate (metal content)	<1	N/A
Iron ore	1	
China stone	1.5	
TOTAL (estimated for England)	40 000	700
TOTAL AGGREGATES (England)	158 967	1 065

DISTRIBUTION OF RESOURCES

2.4 Industrial minerals are widely distributed in England and occur in all regions with the exception of London. However, the location of individual industrial minerals and their quality fundamentally reflects geology and many are highly restricted in their occurrence and, consequently, extraction. For example, potash is produced at only one site, the Boulby Mine in the North York Moors National Park. Kaolin and ball clay are confined to the South West (Cornwall, Devon and Dorset), fluorspar, barytes and calcite to the East Midlands (mainly the Peak District National Park), and salt essentially to the North West (Cheshire). Gypsum is produced in four regions, North West, East Midlands, West Midlands and the South East, whilst silica sand and industrial carbonates are more widely distributed. However, the North West dominates output of silica sand and industrial carbonates are worked principally in the East Midlands (Derbyshire and the Peak District National Park) (see Table 3 and maps).

2.5 The restricted distribution of industrial minerals means that some are coincident with environmentally sensitive areas. Notable examples are fluorspar and potash, extraction of which is essentially confined to National Parks. Carboniferous limestones and the Cretaceous Chalk are the two principal limestone resources on which cement and industrial limestone production is based in England. These rocks also give rise to some of England's most attractive scenery and consequently extensive areas are covered by national landscape designations. In addition, these calcareous rocks give rise to areas of considerable nature-conservation interest. The extent of the conflict between industrial mineral resources and designations can be seen on the map.



Above Fluorspar vein hosted in Carboniferous limestone being worked at Longstone Edge in the Peak District National Park.

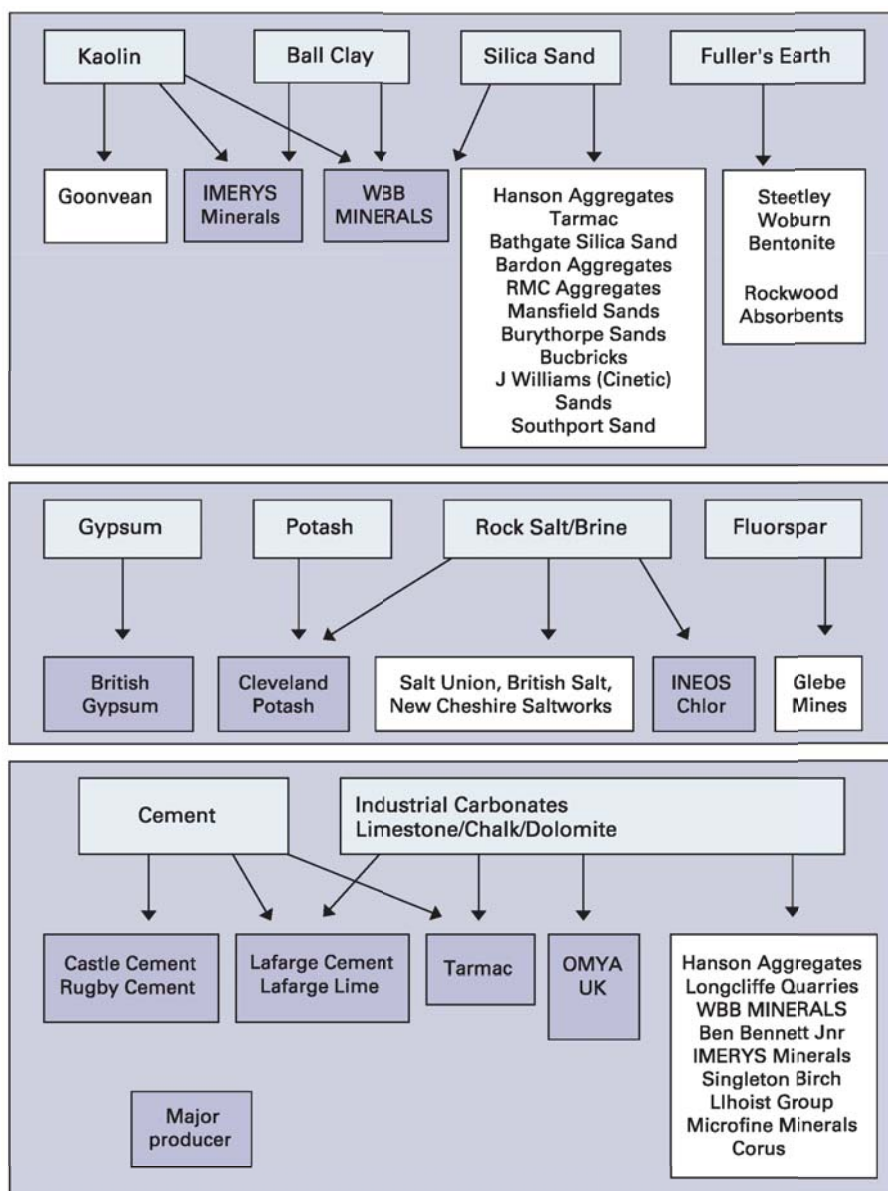
Right High purity limestone suitable for industrial use can also form areas of attractive upland scenery. Bee Low Limestone (Carboniferous) at Chee Dale in the Peak District National Park.

COMPANY MINERAL	PARENT COMPANY	COMMENTS
IMERYS Minerals <i>Kaolin</i> <i>Ball clay</i> <i>Industrial carbonates</i>	IMERYS GROUP of France (Privately-owned company)	World's leading producer of kaolin - 25% of world market. Also a leading world producer of calcium carbonates
WBB MINERALS <i>Silica sand</i> <i>Ball clay</i> <i>Kaolin</i>	SCR Sibelco of Belgium (privately-owned company)	World's leading producer of high quality ball clay and silica sand.
Rockwood Absorbents (Baulking) <i>Fuller's earth</i>	Rockwood Specialities Inc. of the US	Company created when Kohlberg Kravis Roberts & Co acquired several divisions of UK-based Laporte PLC in November 2000
Steetley Bentonite and Absorbents <i>Fuller's earth</i>	Tolsa SA of Spain	Also produces bentonite in Spain and Morocco
INEOS Chlor <i>Brine</i>	INEOS (privately-owned)	INEOS is a global manufacturer of speciality and intermediate chemicals. Company formed in 1998 and acquired ICI's chlorine and fluorine businesses in 2001.
British Salt <i>Brine/white salt</i>	US Salt Holdings	
Salt Union <i>Rock salt/white salt</i>	Compass Minerals International of the US	
Cleveland Potash <i>Potash/Rock salt</i>	Israel Chemicals	Europe's second largest potash producer and the world's fifth.
British Gypsum <i>Gypsum/anhydrite</i>	BPB Industries of the UK	World's leading producer of gypsum building products
Lafarge Cement UK/Lafarge Aggregates <i>Cement</i> <i>Industrial limestone/dolomite</i>	Lafarge Group of France	World's leading producer of cement. Major producer of aggregates in the UK
Castle Cement <i>Cement</i>	Heidelberg Cement Group of Germany	Heidelberg is one of the world's largest cement producers
Rugby Cement <i>Cement</i> <i>Silica sand</i>	RMC Aggregates	Major aggregates producer in the UK
Tarmac Central <i>Industrial limestone</i> <i>Cement</i> <i>Silica sand</i>	Anglo American	Anglo American is a UK-based and one of the world's leading mining companies. The Tarmac Group is part of the company's industrial minerals business and the UK's leading producer of aggregates.
Hanson Aggregates <i>Industrial limestone</i> <i>Silica sand</i>	Hanson Group	World's leading producer of aggregates
OMYA UK <i>Industrial carbonates</i>	OMYA Group of Switzerland	World's largest producer of industrial carbonates
Glebe Mines <i>Fluorspar/barytes/lead</i>	Privately-owned	Formed in 1999 through the acquisition of most of Laporte Minerals' fluorspar assets. Only UK-producer of fluorspar.

Table 2 Ownership of the major industrial minerals producers in England, 2003.



Figure 2 Major producers of industrial minerals in England.



MARKETS

2.6 A classification of industrial minerals in terms of the downstream industries in which they are consumed serves to illustrate their close links with important sectors of the economy (see Figure 3). Typically, individual industrial minerals are consumed in more than one market sector and each market sector requires a number of different minerals. For example, a number of industrial minerals are essential raw materials for the inorganic chemicals, ceramic and glass industries. Salt, in the form of brine, is an essential raw material for the manufacture of the heavy inorganic chemicals — chlorine and caustic soda (NaOH), and limestone and brine are used to manufacture soda ash (Na_2O_3). These chemicals are, in turn, basic feedstocks for a wide range of other industries. For example, chlorine is an essential intermediate in the production of plastics and polymers, such as PVC and nylon. Soda ash is an essential constituent of most commercial glasses, such as bottles and jars (containers) and flat glass (windows and automobile glazing). Similarly fluorspar, the only significant source of the element fluorine, is the feedstock for the production of hydrofluoric acid (HF), which is a key intermediate in the manufacture of all fluorine-bearing chemicals, as well as being an important product in its own right. Kaolin, ball clay and silica sand are all important raw materials

INDUSTRIAL MINERAL	LOCATION (MPA)	REGION
KAOLIN	Cornwall Devon	South West South West
BALL CLAY	Devon Dorset	South West South West
FULLER'S EARTH	Bedfordshire Oxfordshire	East of England South East
POTASH	North York Moors NP	Yorkshire & the Humber
SALT/BRINE	CheshireP North York Moors N	North West Yorkshire & the Humber
GYPSUM	Leicestershire Nottinghamshire Staffordshire Cumbria East Sussex	East Midlands East Midlands West Midlands North West South East
FLUORSPAR/BARYTES/CALCITE	Peak District NP Derbyshire	East Midlands East Midlands
SILICA SAND	Cheshire Sefton Norfolk Bedfordshire Essex Staffordshire Worcestershire Surrey Kent North Lincolnshire North Yorkshire	North West North West East of England East of England East of England West Midlands West Midlands South East South East Yorkshire & the Humber Yorkshire & the Humber
CEMENT RAW MATERIALS	Peak District NP Derbyshire Rutland Kent North Lincolnshire West Midlands Lancashire Bedfordshire Cambridgeshire Essex Wiltshire	East Midlands East Midlands East Midlands South East Yorkshire & the Humber Staffordshire North West East of England East of England East of England South West
INDUSTRIAL CARBONATES	Derbyshire Peak District NP Durham Cumbria North Yorkshire North Lincolnshire East Riding of Yorkshire Doncaster Cambridgeshire Kent Wiltshire Somerset	East Midlands East Midlands North East North West Yorkshire & the Humber Yorkshire & the Humber Yorkshire & the Humber Yorkshire & the Humber East of England South East South West South West

Table 3 Location of major industrial mineral operations.

used in the manufacture of high quality ceramic whiteware. However, the major markets for kaolin, accounting for over 80% of output, are as fillers and pigments, mainly in papermaking, but also as fillers in paints, rubber and plastics. Ground calcium carbonates compete with kaolin in these markets, in addition to having a wide range of other uses. The uses of limestone are many and diverse and it is often claimed to be the world's most versatile mineral. They include cement-making, lime manufacture (itself having many uses as diverse as steelmaking, chemicals feedstock, water and effluent treatment, and sugar refining), a flux in ironmaking, for flue gas desulphurisation and for a range of filler applications.

2.7 The markets for industrial minerals are widely distributed throughout the country and are not confined to England. The inorganic chemicals industry is mainly located in Cheshire in the North West and in relative proximity to its main raw materials, brine (sodium chloride), limestone and

Right Salt-in-brine from the Cheshire saltfield and high purity limestone from Derbyshire are essential ingredients in the manufacture of soda ash (sodium carbonate) at Northwich in Cheshire. Soda ash is a vital feedstock for the glass and chemical industries.



fluorspar. The chemicals industry is considered to be of strategic importance to the North West by the North West Development Agency. Ceramic whiteware production, which is dependent on kaolin, ball clay and silica sand, is largely located in the Stoke-on-Trent area and is very important for local employment. Similarly the glass container industry is mainly located in South Yorkshire and the important flat glass industry in St Helens and North Lincolnshire. The foundry industry is widely distributed but with a marked concentration in the West Midlands, Yorkshire and the East Midlands. Other important consumers of industrial minerals are the integrated iron and steelworks on Teesside, at Scunthorpe and Port Talbot in South Wales and the flue gas desulphurisation plants at the coal-fired power stations at Drax, near Selby and at Ratcliffe-on-Soar and West Burton in Nottinghamshire. The distribution of the main consumers of industrial minerals is shown on the maps in this section. Kaolin, ball clay and potash are also major exports.

KEY CHARACTERISTICS

2.8 There are marked differences in the geological occurrence, properties, markets, and supply and demand for industrial minerals, all of which have different land-use planning implications for the extraction of these minerals. **Diversity** is thus a key feature that characterises the industrial minerals sector. Some of these characteristics are summarised in Table 4 and considered in greater detail below in relation to land-use planning issues.

Table 4 Key characteristics of industrial minerals.

DIVERSITY OF GEOLOGY INFLUENCES
<ul style="list-style-type: none"> ● the size of a deposit; ● the method of extraction (quarrying or underground mining); and ● the processing methods used and amount of waste produced
DIVERSITY OF PROPERTIES INFLUENCES
<ul style="list-style-type: none"> ● the range of markets served based on different physical and/or chemical properties; ● the consequent need to meet a wide range of specifications; ● the need to be traded on the basis of specific properties, sometimes to meet a particular customer's requirements; ● the fact that individual qualities are often not interchangeable in use; and ● the need for producers to have close relationships with their customers.

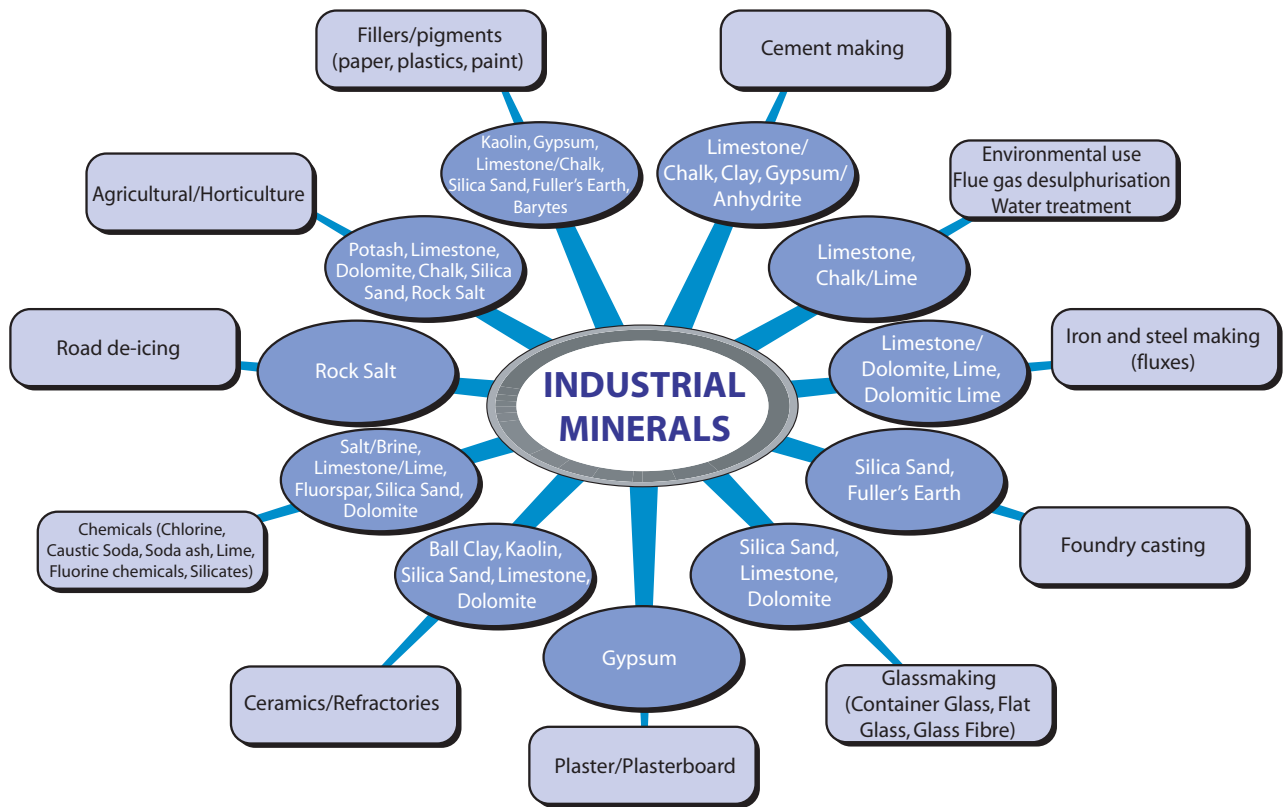


Figure 3 Classification of the use of Industrial minerals by major market sectors.

Geology

2.9

The geological mode of occurrence of the different industrial minerals, for example as thick flat-lying beds of limestone or as narrow linear mineral veins, greatly influences the size of a deposit and consequently the amounts that can be produced and over what period. It also dictates how a deposit is worked, notably by surface extraction or underground mining, the way the industrial mineral is processed and the amount of associated waste that is generated (Table 5). It also effects how a site can be restored. Geology, therefore, fundamentally influences the planning issues associated with the extraction of each mineral.



Left High purity limestone quarried at Shapfell in Cumbria feeds kilns which supply lime to a number of iron and steel plants in England and Wales.

Right Resources of fuller's earth such as those, formerly worked at Clophill in Bedfordshire are now very restricted.



2.10 With the exception of the 'vein' minerals — fluorspar, barytes and calcite — and kaolin, all the industrial minerals are sedimentary rocks that occur as bedded deposits in strata ranging from the Carboniferous to Recent in age (345 million to <10 000 years ago). Structurally, these deposits are comparatively simple and mostly occur in relatively flat-lying beds, which range in thickness from about 2 m (or less) to several tens of metres (some salt-bearing strata may be 200 m or more in thickness). Some deposits, like limestone and chalk, occur as essentially monomineralic rocks that are very extensive. However, ball clay and, notably, fuller's earth are scarce minerals and are very restricted in their geographical extent, a fact related to the unusual geological conditions required for their formation.

2.11 The evaporite minerals — salt, potash and gypsum/anhydrite — were all deposited from the evaporation of seawater. Consequently, all are soluble in water, with salt and potash particularly so. As a result they do not crop out at the surface in the UK because of solution by groundwater and can, therefore, only be worked by underground mining. The high solubility of salt means that solution mining can, in addition to conventional mining, also be used for extraction and indeed most (70%) salt is extracted as brine. The salt is extracted by injecting water into thick salt beds and



Right Brine is produced by solution mining of salt below this wellhead at Holford in Cheshire.



Above High pressure water is used to wash kaolin (china clay) from altered (kaolinised) granite in the St Austell area of Cornwall.

pumping out the resulting brine from specially designed underground cavities consistent with ground stability. Gypsum is slightly soluble, but it is formed by the hydration of anhydrite at, or near, surface. It is also produced mainly by underground mining. In contrast to minerals worked by surface methods, the underground extraction of evaporite minerals involves limited visual impact.

2.12 In sharp contrast, the kaolin (china clay) deposits of South-West England were formed by the *in situ* alteration of the feldspar component of the granites. Extraction is in very large open pits and subsequent processing involves separating the fine kaolinite particles from the coarser impurities present in granite (mainly quartz, unaltered feldspar and mica) by wet refining methods. The extraction and processing of kaolin thus involves the production of very large quantities of mineral waste, the disposal of which is a major planning issue.



Left Chalk and Gault clay are blended to make cement at Ferriby in North Lincolnshire.

MINERAL	GEOLOGY	EXTRACTION METHOD	PROCESSING WASTE
Salt	Sedimentary	Underground – rock salt mining and solution mining	Minor – returned to the solution cavities
Potash	Sedimentary	Underground mining	Soluble waste to sea; insoluble waste now being returned for disposal underground
Gypsum/anhydrite	Sedimentary	Mainly mining/one opencast	No mining or processing waste. Overburden is used for restoration.
Kaolin	Primary alteration	Surface open pit	Large volumes of extraction and processing waste stored in surface tips and in lagoons. Some is backfilled; increasing amounts of granular mineral waste being sold as aggregate.
Ball clay	Sedimentary	Surface quarries. Underground mining ceased in 1999 and is unlikely to resume.	Some extraction waste, including overburden and interburden. Some sand sold as secondary aggregate, other mineral waste backfilled to surface tips. No processing waste.
Fuller's earth	Sedimentary	Surface quarries	Overburden backfilled for restoration. No processing waste
Fluorspar	Vein	Surface open pits One small operating mine	Some processing mineral waste (limestone) sold as aggregate. Fines used for restoration or to waste lagoon
Silica sand	Sedimentary	Surface quarries	Very small amounts of mineral waste to lagoons. Overburden used in restoration
Cement raw materials	Sedimentary	Large surface quarries	Little waste, used in restoration.
Industrial carbonates	Sedimentary	Surface quarries. One operating mine	Little waste, lower quality material sold as aggregate

Table 5 Summary of the basic geology and extraction methods for industrial minerals.

2.13 The extraction of limestone, chalk and dolomite for industrial use and cement-making is by conventional surface quarrying methods, with the notable exception of the Middleton limestone mine in Derbyshire. Some of these operations, particularly those producing cement raw materials, are very large with outputs in excess of 1 million t/y and, exceptionally, 5 million t/y. However, some industrial chalk operations are relatively small with outputs of less than 100 000 t/y. The processing plants associated with these operations are generally large and require high capital investment, particularly for cement and lime manufacture. Similarly silica sand is produced by conventional quarrying, and the production of

glass and foundry sands also requires extensive and costly processing facilities.

2.14 ‘Vein’ minerals, principally fluorspar, occur mainly as infillings in faults that cut limestones of Carboniferous age. Fluorspar is always associated with other minerals, the most important being barytes and galena (PbS — lead sulphide) and indeed the only source of these minerals in England is as a by-product of fluorspar processing. The nature of fluorspar-barytes mineralisation (as narrow < 10 m, sub-vertical veins and associated replacement deposits in limestone) means that individual deposits tend to be relatively small. These range from 5 000 tonnes up to 1 million tonnes in size. Extraction thus tends to be short-lived. Consequently several deposits are required to supply a centralised processing plant and a continuous programme of exploration is required to identify new resources and to progress them through the planning system. This is in marked contrast to other industrial minerals operations, which are generally relatively long lived (sometimes measured in decades).

Properties

2.15 Industrial minerals are consumed in a wide range of end uses based on their diverse physical and/or chemical properties. Some industrial minerals are valued solely as sources of specific elements, or compounds, for example for use as chemical feedstocks, in cement-making or as plant nutrients. Examples include potash (K), fluorspar (F), salt (Cl and Na₂O) and limestone (CaO). For others it is a combination of physical properties, such as particle size and shape, natural and fired brightness (whiteness), plasticity, viscosity in suspension and density, that form the basis for commercial exploitation. However, in many cases it is a combination of physical and chemical properties that is desired. Silica sand is valued for its high silica content and low levels of impurities, notably of iron and refractory minerals such as chromite. In addition, specific particle sizes and, sometimes, grain shape are also required. Similarly ball clays are valued for their plasticity and unfired strength, which are related to particle size and

INDUSTRIAL MINERAL	PHYSICAL PROPERTIES
Kaolin	Whiteness, fine particle size, rheology
Ball clay	Plasticity, unfired strength, white-firing
Fuller’s earth	Plasticity, bonding strength
Ground calcium carbonates	Whiteness, fine particle size, rheology
Barytes	High density, relative inertness and non-abrasiveness
Silica sand	Particle size and shape
Gypsum	Whiteness
	CHEMICAL PROPERTIES
Salt (NaCl)	Source of chlorine (Cl) and soda (Na ₂ O)
Potash (KCl)	Source of potassium (K)
Gypsum (CaSO ₄ .2H ₂ O)	Rehydration properties
Limestone (CaCO ₃)	Source of lime (CaO) and carbon dioxide (CO ₂)
Dolomite (CaCO ₃ .MgCO ₃)	Source of magnesia (MgO)
Fluorspar	Source of fluorine (F)
Kaolin and ball clays	Low iron content
Silica sand	Source of silica (SiO ₂)
Fuller’s earth	Cation-exchange capacity, chemically active surfaces

Table 6 Some important properties of industrial minerals.

1 A high density aqueous suspension of insoluble solids.

Right Ball clay products for the ceramics industry require careful selective mining and blending.



mineralogical composition. Some are also valued for their ability to readily disperse in water to produce fluids slips¹. However, they are also required to fire to a light or near-white colour, which is largely a function of low iron and titania (TiO_2) contents. Some of the important properties of industrial minerals are listed in Table 6.

- 2.16** Different markets for specific industrial minerals demand different combinations of properties. The same mineral may, therefore, be traded with several different specifications, each depending on specific end use. Individual grades of industrial minerals are, therefore, often not interchangeable in use. For example, silica sand sold for coloured container glass manufacture has an iron content of 0.25% Fe_2O_3 , whereas for colourless containers the requirement is for less than 0.035% Fe_2O_3 . These two grades cannot, therefore, replace one another, although both are classed as 'silica sand'.
- 2.17** Unlike refined metals and chemicals, which are traded on the basis of purity and price, industrial minerals are the products of natural processes. Subtle differences in their properties can make the performance of a specific industrial mineral quite different from one deposit to another. Consequently individual deposits may be aimed at particular products or markets and, as a result, some specifications for particular uses are written around specific deposits. Whilst processing is capable of enhancing or modifying the properties of some industrial minerals, it cannot for example, fundamentally change the iron content, or whiteness, of limestone or dolomite, or the fluid properties of kaolin or ball clay. The valuable, if not unique, combination of properties of certain qualities of ball clay occurring in the Bovey Basin of Devon has meant that about 50% of the world's production of sanitaryware contains English ball clay as an essential ingredient. In addition to price, therefore, quality may also be an important factor that determines whether a mineral is sourced domestically or from overseas.
- 2.18** A distinction can be made between the **grade** of an industrial mineral (the amount of useful mineral it contains) and its **quality** (suitability for a specific application). Both can markedly affect the economic importance of a particular mineral resource. For example, England has large resources of high chemical grade limestone, which are valuable for a wide range of chemical uses. However, despite their chemical purity, they are of relatively poor quality with respect to brightness (whiteness) and are, thus, unsuitable for important applications in papermaking. It is quality that ultimately defines the suitability of a mineral for a particular use.



Above Thin, but extensive spreads of wind-blown silica sand are worked at Messingham in North Lincolnshire for use in a range of products including container glass.

Grade and quality can be defined as follows.

- **Grade** — the amount of useful material a deposit or sample contains e.g. calcium fluoride (CaF_2), potassium chloride (KCl) or kaolinite content.
- **Quality** — the physical and/or chemical properties that determine the suitability of the material for specific end uses, e.g. whiteness of kaolin and calcium carbonate for use in paper, rheological (fluid) properties of ball clay for use in sanitaryware, and also the level of impurities such as arsenic in fluorspar or iron and chromite in silica sand.

2.19 Modern manufacturing technology is placing increasingly stringent demands on raw material quality. Variations in the properties of an industrial mineral beyond specified limits cannot be tolerated as it may result in increased production losses. This could have a major effect on the economics of a downstream manufacturing process and threaten its viability. Production losses also waste resources, both mineral and energy. Quality thus also implies raw materials with **consistent** and **predictable** properties, in terms of both composition and performance. Indeed the consistency of a property, such as the iron content of a glass sand, may be more important than its precise value, as variations are difficult to control in the manufacturing process. Whilst consistency of quality is important for all consumers, it is a particular concern for some businesses when sourcing minerals from distant global locations where quality is more difficult to monitor.

2.20 The success of any business depends on its meeting customer requirements in terms of quality and price. In the case of industrial minerals this ultimately depends on the quality and price of the end product whether it be flat glass, cement or a ceramic product.

Captive use

2.21 Industrial minerals serve as essential raw materials that underpin many sectors of manufacturing industry, where the added value can be several times the cost of the mineral used. Indeed some industrial mineral producers are also major manufacturers and of the total production of industrial minerals (approximately 40 million tonnes) about 50% is not

sold on the open market but used 'captive' in the manufacture of value-added products. The most important 'captive' use is limestone and chalk for cement manufacture. However, a selection of others is shown in Table 7 together with the value of the sales of the principal products that are based on these raw materials. The value of cement sales (Table 7) exceeds that of the total value of all other industrial minerals production. In addition, cement is only at the start of the supply chain, being an essential constituent of concrete and mortar, which are vital, and essentially irreplaceable, materials for the UK construction industry.

INDUSTRIAL MINERAL	INITIAL MANUFACTURED PRODUCT	PRODUCT SALES (£MILLION)
Limestone/chalk/clay	Cement	755
Limestone/dolomite	Lime/dolomitic lime	64
Natural Gypsum	Plaster	118
Brine (Salt- NaCl)	Chlorine and caustic soda	200 (e)

Table 7 UK: Sales of selected products based on captive production of industrial minerals, 2002.

(e) BGS estimate

Source: ProdCom, Office for National Statistics

Place value

2.22

Transport costs are a major component of the delivered price of many minerals and the lower the value of a mineral, the more profound are the effects of transport costs on the economics of an operation. Proximity to the market can, therefore, be very important and it applies a 'place value' to a mineral deposit. A mineral with a *high place value* is one that commands a low price and is expensive to transport. Minerals with *low place values* are those that have a higher monetary value and may be internationally traded. Gold has a very low place value and a deposit of adequate size and grade can be worked almost anywhere with virtually no restriction on distance to market. Some industrial minerals command relatively high prices and are internationally traded, e.g. kaolin, fluorspar and ball clay. However, proximity to a seaport may also be important because of the high cost of overland transport. In contrast, limestone/ chalk for cement manufacture has a high

Right Cement is an essential constituent of concrete and mortar. Both are vital materials used by the building and civil engineering industries.



Right Kaolin (china clay) is one of many industrial minerals which require sophisticated, capital-intensive processing. Superconducting magnets are used to improve the whiteness of some kaolin from Cornwall by removing small quantities of iron-bearing minerals.



place value, which means that cements plants are mainly located in close proximity to their raw materials. Limestone could not be imported for cement manufacture. Thus without adequate reserves of cement raw materials to maintain domestic production the alternative would be to import manufactured cement. The result would be the associated loss of the value added by the cement manufacturing process (£371 million in 2001).

Added value

2.23 An important element of sustainable development is maximising the benefits derived from a resource and its subsequent use. This means 'doing more with less,' using resources efficiently and increasing added value. The industrial minerals sector is, by definition, supplying materials that are demanded by 'industry.' There are considerable opportunities for increasing the value of the minerals produced and it makes sound business sense for companies to increase the value derived from their mineral assets. Indeed adding value by upgrading the quality of a mineral will, in many cases, be a prerequisite if the mineral is to be sold for specific applications. A company's ability to take advantage of value-added opportunities depends on a number of factors, including the quality of its deposit, its processing technology, its marketing capabilities and the competitiveness of the market. Value added may be increased by;

- producer processing, e.g.:
 - particle size reduction (fine grinding, micronising);
 - increasing purity or grade (flotation, acid treatment, magnetic separation);
 - additional property modification (blending, calcination, surface coating).
- downstream manufacturing processes, e.g.:
 - manufacture of cement, lime, plaster, inorganic chemicals.

Price

2.24 A direct consequence of the costs of extraction and the degree of processing that an industrial mineral undergoes is that different minerals, grades and qualities may have markedly different prices. Some typical prices of industrial minerals are shown in Table 8. Compared with metals, industrial minerals generally show low price volatility.

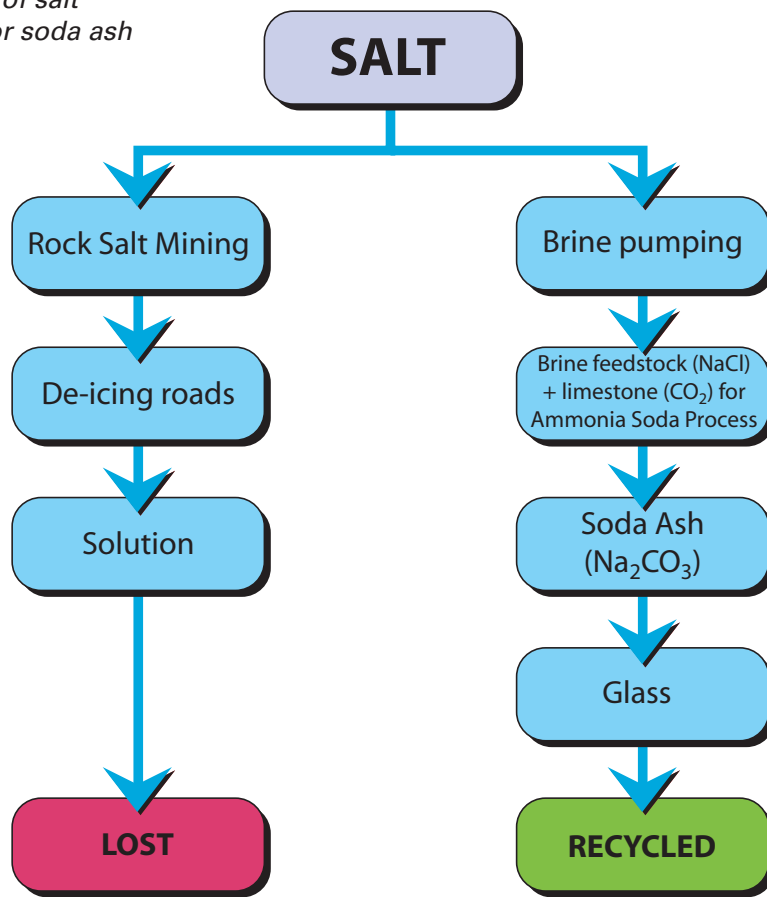
Table 8 Typical prices of selected industrial minerals (2003).

MINERAL	PRICE RANGE
Kaolin	£60–£150/tonne, exceptionally £300/tonne
Ball clay	£15–£80/tonne, exceptionally £200/tonne
Fuller's earth	£100–£115/tonne
Silica sand	£10–£17/tonne, exceptionally £50–£150/tonne
Fluorspar	£120/tonne
Chalk, filler	£30–£50/tonne
Limestone	<£10/tonne
Cement	Approx £50/tonne

SUBSTITUTION/RECYCLING

- 2.25** The fact that industrial minerals are valued for their physical and/or chemical properties, means that opportunities for substitution and recycling are variable and, often, complex. As a general rule it is the physical properties of materials that can be more readily recycled. In the case of metals, for example, it is properties such as strength, hardness, thermal and electrical conductivity, and lightness that are of economic value. These properties remain intact in use and thus metals are available for recycling, often without loss of quality. Similarly with aggregate minerals physical properties, such as strength and abrasion resistance, are not changed irreversibly in use and can often be recovered, for example, in construction and demolition waste.
- 2.26** The life cycle of industrial minerals is often more complex. Foundry sands, which are valued for their particle size and shape, as well as chemical composition, can be recovered and, in part, re-used. However, other physical properties such as plasticity and viscosity in suspension, for example in ceramic clays, are either changed irreversibly in use (for example during firing) or dispersed and not readily recoverable in their original form. Minerals that are valued for their softness, whiteness and fine particle size, such as fine ground calcium carbonate and kaolin, may replace one another, notably in papermaking. If it were a case of straight substitution on the basis of cost alone then ground calcium carbonate would be used every time. However, calcium carbonate does not provide the same gloss and printability as kaolin. Substitution is thus often a compromise between cost and functional performance.
- 2.27** Minerals that are valued for their chemical properties alone are generally more difficult to recycle or replace. There is no alternative to potassium-bearing minerals as plant nutrients or salt as a source of both soda (Na_2O) and chlorine. Similarly, other than limestone/chalk there are no sources of lime (CaO) that are of sufficient abundance to be used for cement manufacture. Alternative sources of silica and alumina for cement-making are available and include by-products from other processes, such as pulverised fuel ash, a by-product of burning coal at power stations, and cement clinker kiln dust. In addition, there are also materials, referred to as additions, that partially replace the cement clinker or Portland cement. These additions thus reduce the amount of cement used per unit of concrete produced. The use of blended cements is increasing and these may contain, singly or in combination, a proportion of pulverised fuel ash, blastfurnace slag (a by-product of ironmaking) and limestone. The partial replacement of energy intensive clinker by an industrial by-product or a naturally occurring material not only has economic and environmental advantages but has the potential to produce concrete with improved technical properties, including improved long term strength and durability.

Figure 4 Life cycle of salt from de-icing and for soda ash manufacture.



Raw Materials for Glasses

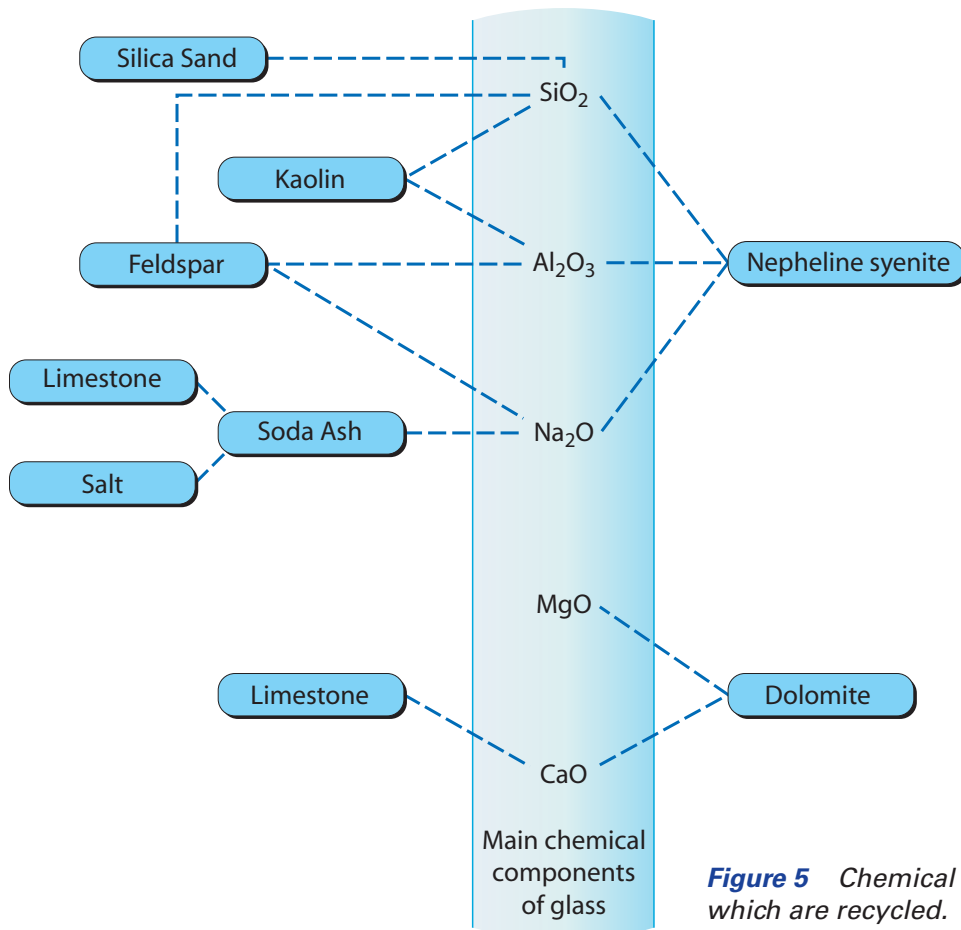


Figure 5 Chemical components of glass which are recycled.

- 2.28** Recycling of some industrial minerals valued for their chemical properties is impossible. A good example is rock salt used for de-icing roads where the mineral is dissolved and dispersed and thus not recoverable (see Figure 4). However, there are important exceptions. Silica sand is valued as a glassmaking raw material because of its silica content, which is typically >98% SiO₂. Most commercial glasses, such as glass containers, consist of soda-lime-silica glass containing between 70–74% SiO₂, the ultimate source of which is silica sand. Recycling of waste glass (known as cullet) is increasingly being used in making new glass, not only reducing the demand for new silica sand but also, because cullet melts more readily, saving energy and thus reducing emissions. Other industrial materials used in glassmaking, such as limestone, dolomite and soda ash, are also effectively recycled. Some, like nepheline syenite, which is valued for its alumina and soda contents, are imported (see Figure 5). In a similar way increased recycling of steel scrap will also reduce, in part, the need for limestone/ dolomite as flux. Calcium carbonate used as lime for sugar beet refining is ultimately recovered and sold as a soil conditioner.
- 2.29** The use of an alternative, such as an industrial by-product, for a naturally-occurring mineral may itself create a demand for another mineral. This is well illustrated by the calcium sulphate mineral gypsum, which in its natural form is mainly produced by underground mining. However, calcium sulphate is also derived as a by-product of certain industrial processes, the most important being flue gas desulphurisation (FGD). This process removes sulphur dioxide from the flue gases at some coal-burning power stations thus preventing 'acid' rain. The process involves absorbing the acidic sulphur dioxide in a water-based slurry of finely ground, high-purity limestone, which is ultimately converted into a product known as desulphogypsum. In England, this material is now a very important supplement to the supply of natural gypsum with some one million tonnes being produced in 2003 and additional quantities becoming available in 2004. Desulphogypsum is of higher purity than most natural gypsum produced in England and has almost entirely replaced domestically mined natural gypsum in the manufacture of plasterboard. (See Factsheet on Gypsum).
- 2.30** FGD requires large quantities of high purity limestone and approximately 0.7 tonnes are consumed per tonne of desulphogypsum recovered. Thus a mineral worked by surface quarrying has replaced one worked by underground mining with, arguably, a lower environmental impact. However, the real environmental gain is, of course, a reduction in sulphur dioxide emissions in line with Government targets.

TRANSPORT

- 2.31** Movement of industrial minerals to market is by road, rail and sea, the latter to serve export markets, although some coastal movement of rock salt and agricultural dolomite to Scotland also takes place. Of the total marketable output of industrial minerals of 40 million tonnes (Table 1) it is estimated that over 25% is transferred by rail or ship, a much higher proportion than for aggregates. Rail connected industrial mineral sites are shown in Table 9; some of the major mineral flows are shown on maps in this section. Although many companies would wish to increase industrial mineral movement by rail there remain significant economic and practical disincentives, not least network capacity. In addition, the Freight Facilities Grant Scheme, which assisted companies to invest in freight facilities such as rail sidings, has been suspended. A decision on re-opening the scheme has not yet been made.

Table 9
Industrial mineral sites with rail (including disused) rail links.

INDUSTRIAL MINERAL	RAIL CONNECTED INDUSTRIAL MINERAL SITES
Potash:	Boulby, North York Moors National Park
Silica sand:	Leziate, Norfolk Moneystone, Staffordshire (not in used for many years)
Gypsum:	Robertsbridge, East Sussex (import of desulphogypsum and natural gypsum) East Leake, Nottinghamshire (occasional import of desulphogypsum)
Cement:	Tunstead/Old Moor, Derbyshire/Peak District Hope, Peak District (50%) Barrington, Cambridgeshire (imports of coal/petroleum coke only) Ketton, Leicestershire (17%) Westbury, Wiltshire (15% in 1989, says MPG 10) Ribblesdale, Lancashire (sales ceased 1992, coal imports)
High purity limestone:	Shapfell, Cumbria Tunstead/Old Moor, Derbyshire/Peak District Dowlow, Derbyshire Quidhampton, Wiltshire Melton, East Riding (recently connected)
Dolomite:	Thrislington, Durham Whitwell, Derbyshire (not in use)
Ball clay:	Heathfield in S. Devon. Some other sites are rail linked but not used.
Kaolin:	Rail is used to transfer kaolin to Fowey for export and to serve some long distance markets in the UK and Europe

Cement

2.32 Cement raw materials are produced in the largest tonnages (Table 1). These are almost always supplied from quarries adjacent to cement plants to avoid the costs of transporting large quantities of a low cost raw material. The main exception is the Rugby cement plant in Warwickshire where chalk slurry is supplied by pipeline from the Kensworth quarry in Bedfordshire, a distance of 77 km. Clay is also transported 14 km by road from Southam. A pipeline is also used to transfer clay slurry from a site in Essex under the River Thames to the Northfleet cement works. However, the Northfleet plant will close in 2008 due to the exhaustion of chalk reserves. It is unlikely that pipelines will be used in the future to transport cement raw materials over long distances. This is due to their high cost and the economic disadvantages of cement manufacture using the wet or semi-wet process, which slurring in water entails. Of the 11 cement plants in England, four have rail links to supply dedicated terminals elsewhere in the UK. A further rail-linked works is proposed (Medway, Kent). Obtaining planning permissions for cement terminals is a planning issue in itself.

Industrial carbonates

2.33 Major rail flows of crushed chemical grade limestone go from the large Tunstead Quarry in Derbyshire to FGD plants at Drax, Ratcliffe-on-Soar and West Burton coal-fired power stations. Another important flow (about 900 000 t/y) is from Tunstead to Brunner Mond's two soda ash plants at Lostock and Winnington in Cheshire. Some soda ash is transported to markets in Scotland by rail. Seasonal dispatches of crushed limestone are also sent by rail to East Anglia to be used by the British Sugar Corporation in sugar beet refining. Limestone is also transferred the short distance to Hindlow Quarry for lime burning. As a result some 40–45% of the 5 Mt/y output of Tunstead Quarry is dispatched by rail.

2.34 Lime from Corus' Shapfell Quarry in Cumbria is transferred by rail to the Redcar and Scunthorpe steel plants. Chalk slurry is moved by rail tank wagons from Quidhampton in Wiltshire to Workington, Mossend and Irvine for papermaking.

2.35 Most industrial dolomite is transported by road and only Thrislington Quarry in Durham is rail linked and in use. Dolomite flux is transferred to Port Talbot steelworks in South Wales by rail.

Gypsum

2.36 Plaster and plasterboard plants are normally located in close proximity to the gypsum mine and these products are then delivered by road. Gypsum/anhydrite for cement manufacture is now delivered by road. However, desulphogypsum has now replaced domestic natural gypsum in plasterboard manufacture. Rail containers transfer this material from the Drax power station to plasterboard plants at Kirkby Thore in Cumbria, East Leake in Nottinghamshire and, occasionally, Robertsbridge in East Sussex. The latter plant is also supplied by rail using imported gypsum through Southampton. Desulphogypsum from the West Burton power station in Nottinghamshire has recently started being transported by rail. Other plasterboard plants located on the coast are supplied by imports by sea.

Silica sand

2.37 Silica sand is mainly supplied by lorry and bulk tanker. However, rail is used to transport colourless glass sand from Leziate, near King's Lynn to container glass plants in South Yorkshire and Nottinghamshire, and to a new flat glass plant near Goole. The total tonnage supplied by rail is about 400 000 t/y.

Salt/brine

2.38 About 70% of the salt extracted in England is in the form of brine, which is then fed by pipeline for use directly in the manufacture of inorganic chemicals, or to produce white salt. Rock salt for de-icing roads is delivered by road. A small amount is subsequently sent by rail from Trafford Park in Manchester to Scotland. By-product rock salt at the Boulby Potash Mine is removed from the mine site by rail for onward transfer by road and ship from Tees Dock. For the rehabilitation of old brine filled salt mines beneath Northwich, some 900 000 tonnes of brine is to be removed and transferred by rail to British Salt's white salt plant at Middlewich. The void created will be filled with pulverised fuel ash to stabilise the site.

Potash

2.39 Nearly 90% of the potash produced at the Boulby Mine is transferred by rail to Tees Dock for export by sea or onward transfer in the UK by road. Approximately 1.4 M t/y of potash and rock salt from the mine are transferred by rail.

Right Most of the potash and rock salt produced at Boulby Mine in North Yorkshire is transported from the site by rail.



Right Significant quantities of ball clay are exported by sea from a number of ports in south west England.



Kaolin

2.40 Most of the production of kaolin is exported through the ports of Par and Fowey, the latter port being supplied by rail, both from the St Austell and Devon operations. Overall some 77% is transported by sea, 13% by rail and 10% by road transport. UK transfers by rail include clay slurry to paper mills in Scotland. About 50 000 t/y kaolin is also sent by rail to Cliffe Vale in Stoke on Trent which serves the ceramics industry and other clay users in the north west. About 30 000 t/y is also moved through the Channel Tunnel to markets in northern Italy.

Ball clay

2.41 The majority of ball clay sales (> 80%) are exported mainly through the ports of Teignmouth, Bideford and Poole, which are, for economic reasons, supplied by road. Sales of ball clay in the UK are mainly transferred by road, although some is transported by rail from Heathfield in the Bovey Basin.

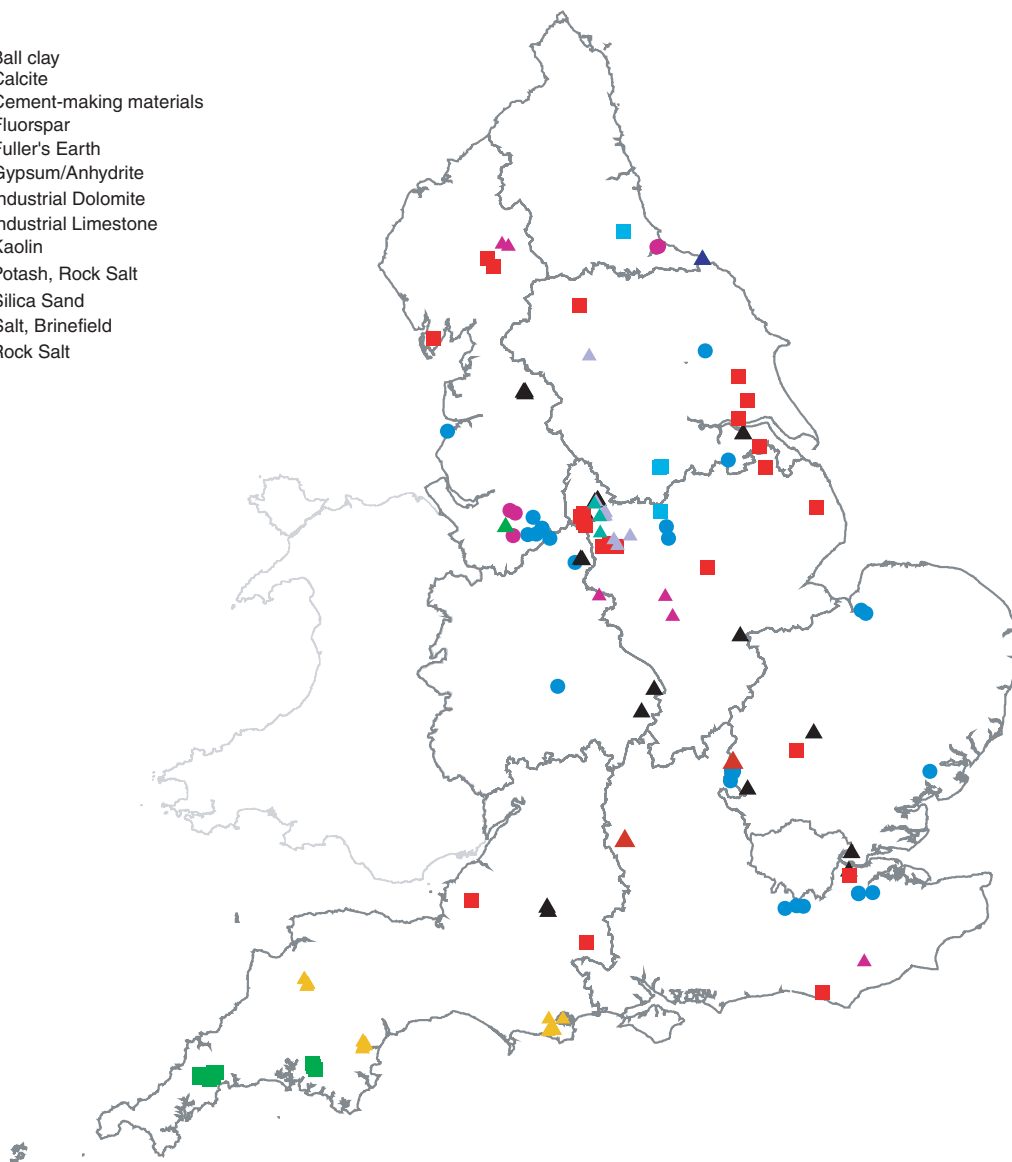
MAPS

2.42 This sub section contains a series of maps which display the broad distribution of specific industrial minerals resources (see Mineral Planning Factsheets), together with the sites where they are worked and consumed, transport links and their relationship with a range of environmental designations.

2.43 The maps are derived from a Geographic Information System (GIS) which was designed as part of the project to facilitate the integration and analysis of spatially-related datasets relevant to industrial minerals in England. It is proposed that this be kept up-to-date to support any revision of the Mineral Planning Factsheets, as well as a resource for MPAs and the minerals industry.












Distribution of Principal Industrial Mineral Workings

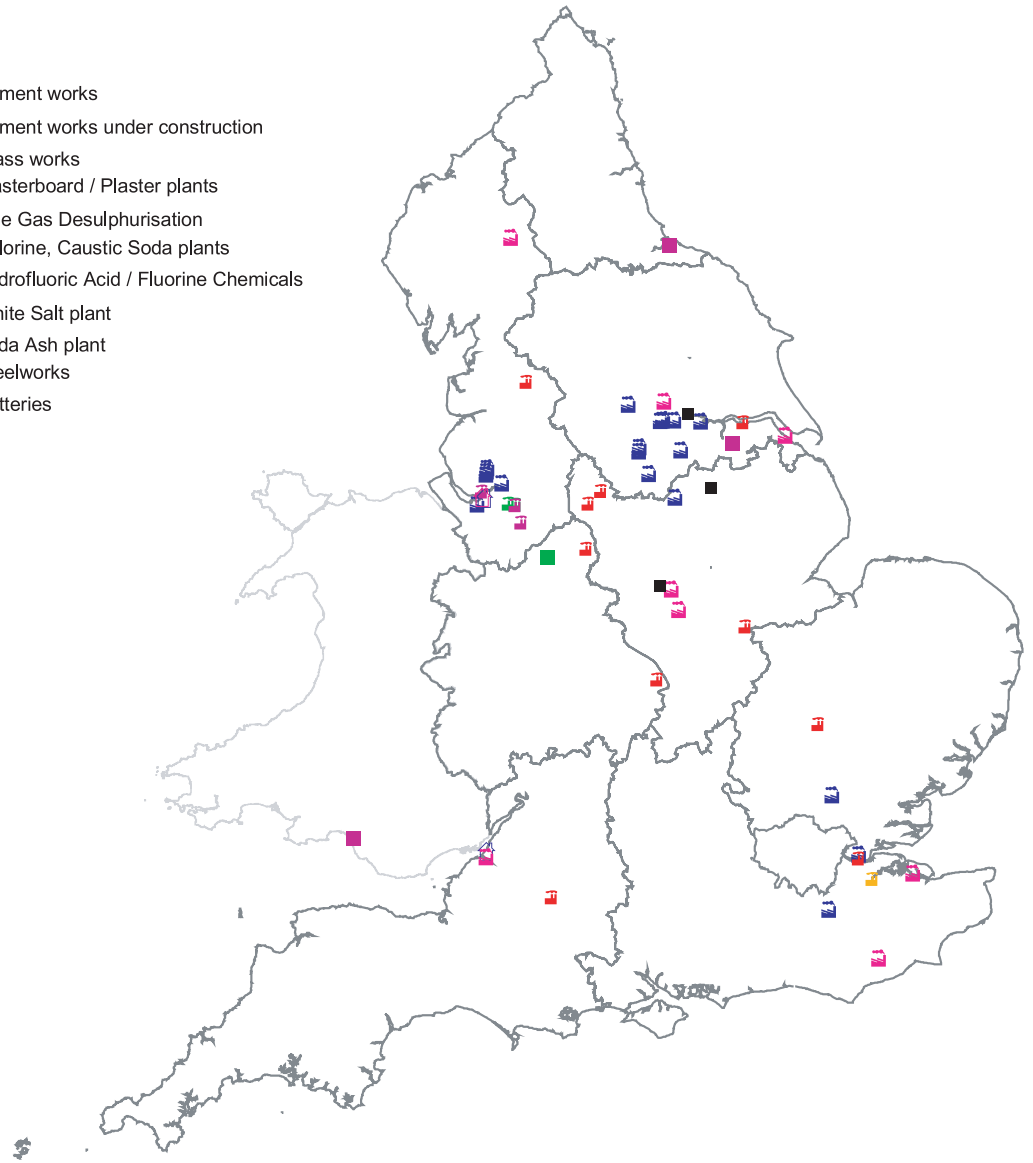
- ▲ Ball clay
- ▲ Calcite
- ▲ Cement-making materials
- ▲ Fluorspar
- ▲ Fuller's Earth
- ▲ Gypsum/Anhydrite
- Industrial Dolomite
- Industrial Limestone
- Kaolin
- ▲ Potash, Rock Salt
- Silica Sand
- Salt, Brinefield
- ▲ Rock Salt



Map 1

Distribution of Principal Industrial Mineral Processes

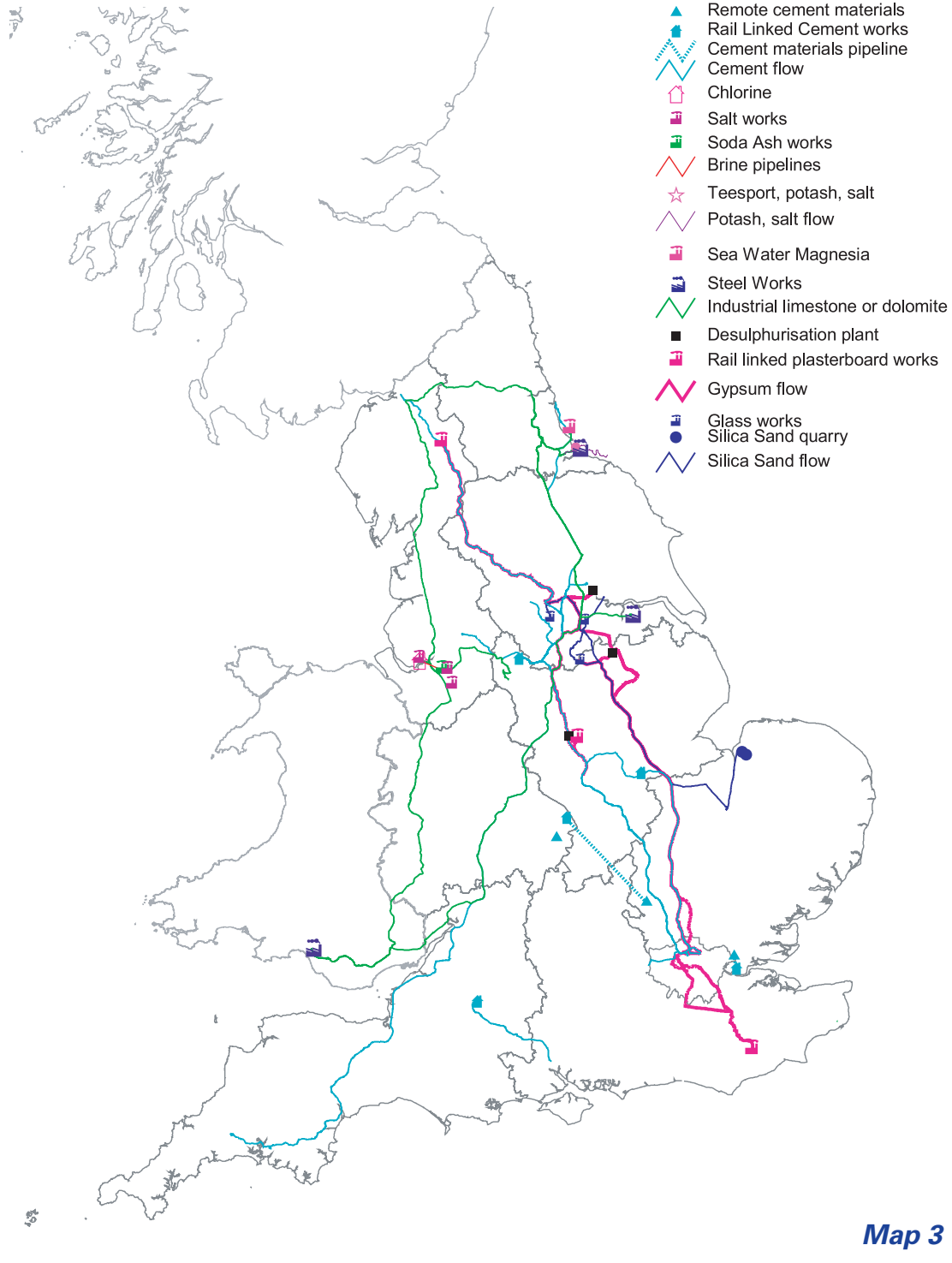
-  Cement works
-  Cement works under construction
-  Glass works
-  Plasterboard / Plaster plants
-  Flue Gas Desulphurisation
-  Chlorine, Caustic Soda plants
-  Hydrofluoric Acid / Fluorine Chemicals
-  White Salt plant
-  Soda Ash plant
-  Steelworks
-  Potteries



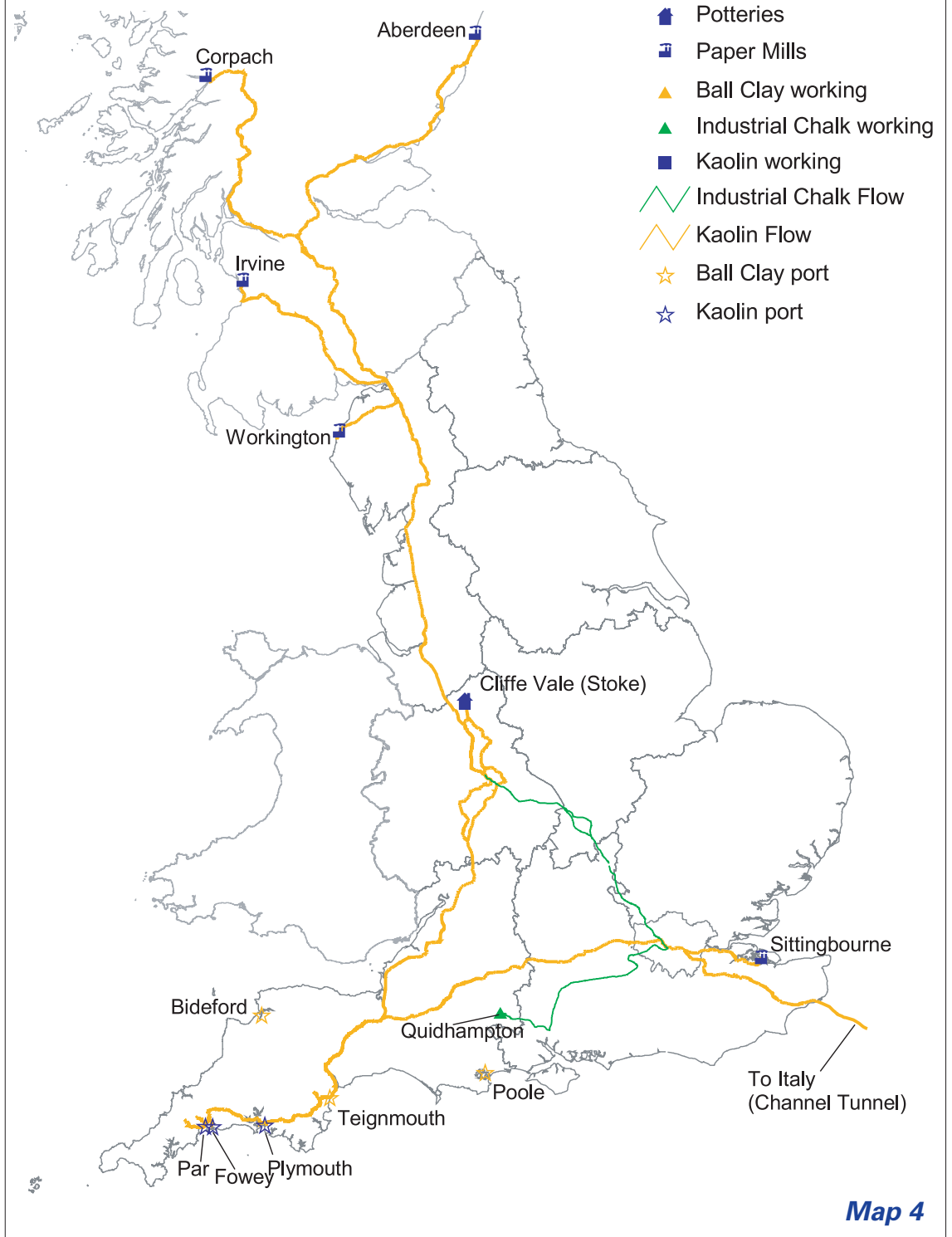
Map 2

Distribution of Principal Industrial Mineral Rail Links.





1 - Cement, Glass Sand, Gypsum, Industrial Carbonate and Salt

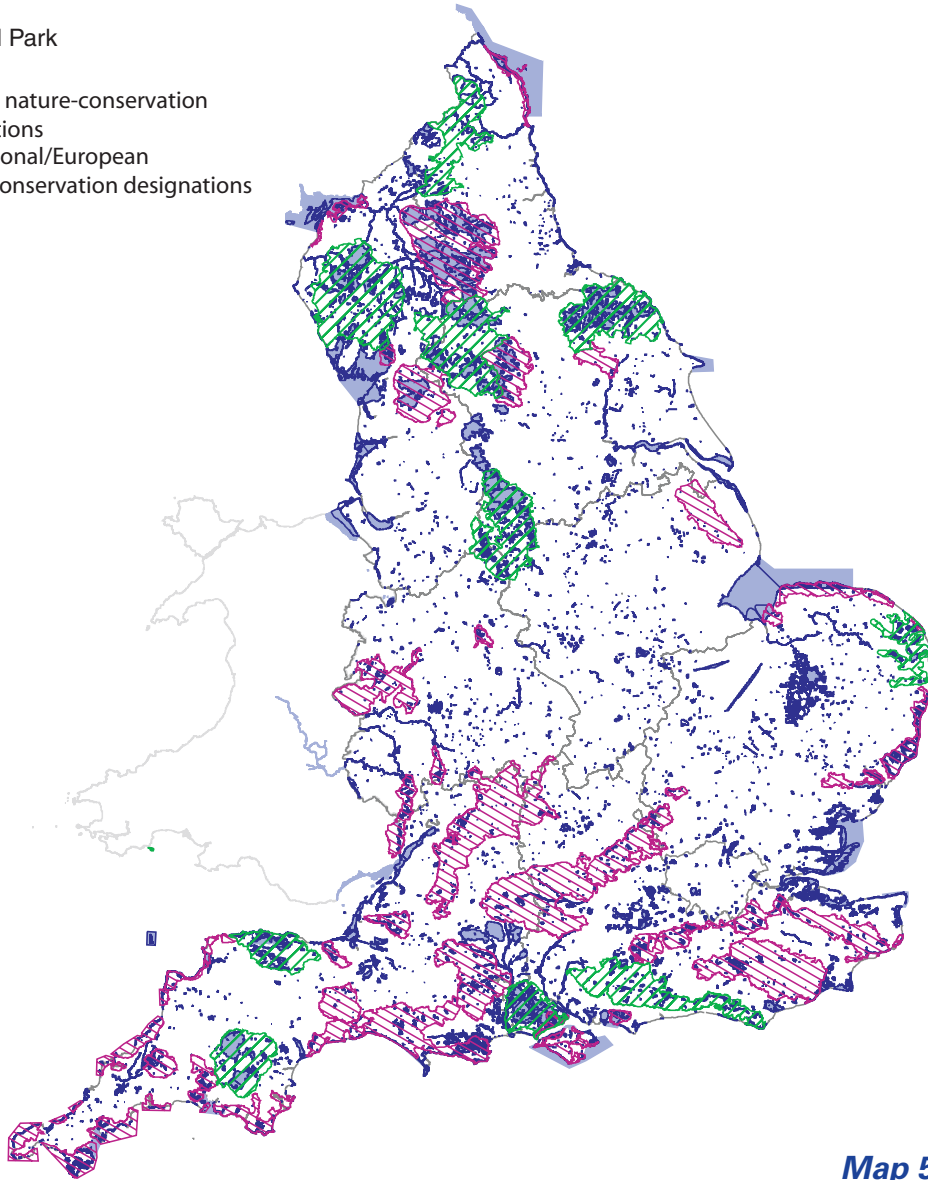


Distribution of Principal Industrial Mineral Rail Links Sea Links. 2 - Ball Clay, China Clay, Industrial Chalk



Extent of the major landscape and nature-conservation designations

-  National Park
-  AONB
-  National nature-conservation designations
-  International/European nature-conservation designations



Map 5

3 Economic Importance of Industrial Minerals

3.1 An essential element of formulating planning policy for industrial minerals, as well as evaluating individual planning applications, is to gain a better understanding of their contribution to the UK economy. In addition to presenting information on the broad value of industrial mineral sales (see Figure 1 and Table 1), the sector has also been analysed against a number of economic indicators. Where relevant its performance is benchmarked against other sectors chosen either on the basis of their characteristics or geographic location. This has helped to illustrate the relative performance of the sector and hence give an indication of its relative economic importance. The economic indicators considered are:

- Gross value added
- Employment
- Productivity
- Contribution to down-stream industries

GROSS VALUE ADDED (GVA)

3.2 The importance of individual industries, including the extractive industries, to the national economy may be measured by their contribution to Gross Value Added (GVA). This is a key indicator of economic performance, which refers to an increase in ability to produce goods and services. Value Added is defined as the difference between the value of an output (e.g. revenue) and the cost of the bought-in inputs used to produce it (e.g. fuel and other raw materials, but not labour). In other words, it represents the enhancement in value added to a product or service by a company before the product is offered to customers. GVA is, therefore, different from the value of sales (or notional sales) revenues generated by the industrial minerals sector that is presented in Table 1. However, as minerals are at the start of the supply chain they are generally associated with a high value added. The GVA in an industry is simply the aggregation of all the values added by individual companies in that industry. The industry is measured in terms of contribution to GVA rather than GDP because the calculation of GVA measures the contribution of a firm or sector to national wealth before it is redistributed via taxes and subsidies.

3.3 The GVA of the minerals extractive industry as a whole is included in national accounts under the heading 'Mining and Quarrying,' which includes oil and gas extraction. Mining and Quarrying contributed £25 531 million to GVA in 2002 (Table 10). In 2002, Gross Value Added in the 'Other Mining and Quarrying' sector (essentially non-energy minerals, which includes the Industrial Minerals sector) was £2 251 million², of which approximately 35% is accounted for by the industrial minerals sector. This equates to £788 million³. Assessing the level of value added that

² Source: Office for National Statistics National Accounts — GVA at current basic prices: by industry.

³ Estimate provided by BGS.

Table 10
Gross Value Added of 'Mining and Quarrying' at current basic prices in 2002 by industry.

SECTOR	£MILLION
MINING AND QUARRYING:	
of which: Mining of coal	539
Extraction of mineral oil and natural gas	22 743
Other mining and quarrying	2 251
(Industrial Minerals)	(788) (e)
Total mining and quarrying	25 531

Source: National Accounts, Office for National Statistics
(e) estimated

Note: The sub-sectors comprising 'Other Mining & Quarrying' (SIC 14) do not entirely coincide with the industrial minerals covered in this study. Consequently figures for the industry turnover have been estimated from data published in the BGS United Kingdom Minerals Yearbook.

the industrial minerals industry creates demonstrates, in part, the sector's contribution to net economic wealth (i.e. wealth creation).

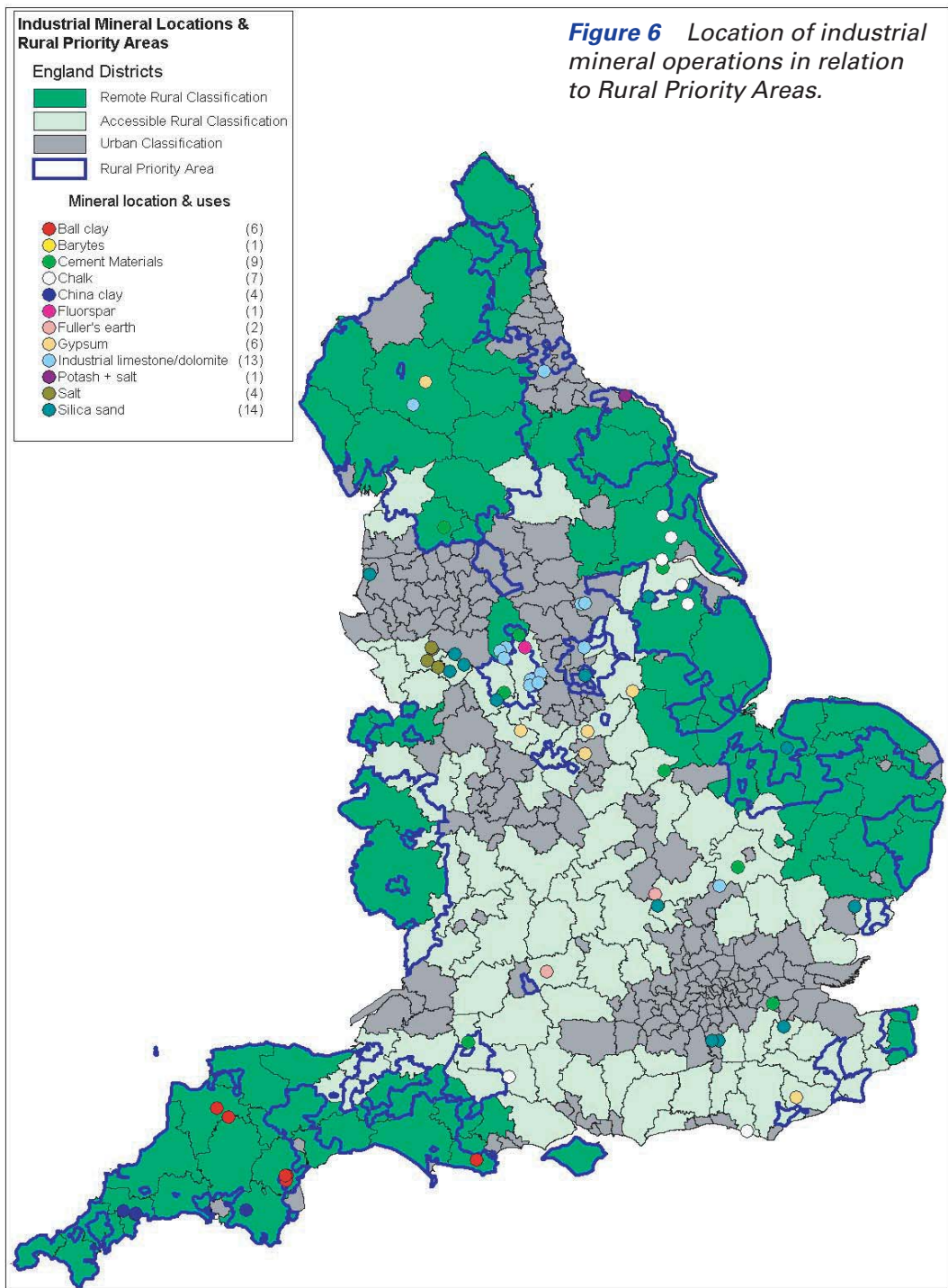
3.4 The industrial minerals sector accounts for only 3% of the total national GVA created by the Mining and Quarrying sector (all energy and minerals extraction) in the UK. This contribution must, however, be set in context due to the fact that nearly 90% of the total Mining and Quarrying sector's GVA is accounted for by the very high value added sector of UK Oil and Natural Gas production (Table 10).

3.5 The industrial minerals sector, therefore, accounts for a relatively small amount of Gross Value Added in the economy. However, it is important to consider the spatial dimension of where this GVA is created. This spatial dimension issue is important and relevant to nearly all the economic indicators under consideration. Figure 6 shows that of the 69 main producing sites in the UK industrial minerals sector, 54 (78%) are located in either **remote rural** or **accessible rural** locations.

3.6 Rural areas are classified as either accessible or remote. In general, accessible rural areas are located closer to urban centres in the UK and therefore benefit from some degree of spill-over of economic activity, which manifests itself in a greater diversity of sectors. Remote rural locations, by definition, do not benefit from this spill-over effect to the same extent and therefore have more limited sectoral diversity.



Left Significant quantities of ball clay are produced from Petrockstow in the heart of rural North Devon.



DTZ Pidea Consulting, Economics
 Base map © Ordnance Survey 2000 and © Bartholomew 2000

- 3.7** This represents an important consideration in the economic case, given the current focus on the structure of rural economies highlighted by the recent upheavals in the rural economy caused by, amongst other things, the Foot and Mouth outbreak. The outbreak demonstrated that the economies of remote rural England had become heavily dependent on a limited number of sectors, primarily tourism and agriculture, and therefore the maintenance of a diverse industrial structure in these rural areas has become an important policy objective.
- 3.8** The Government's Rural White Paper aims to both maintain and further develop a 'working countryside' ensuring a diverse sectoral mix

in the rural economy. Many of the companies in the industrial minerals sector are located in Rural Priority Areas (RPAs) which are a key focus for both Regional Development Agency (RDA) and Countryside Agency funding and assistance. The majority of RPAs are located in remote rural areas.

- 3.9** A specific task of the RDAs is to help regenerate deprived rural areas, focusing currently on the RPAs – the most seriously deprived rural areas. The presence of 32 of the main operating sites (46% of the total number of sites) in the industrial minerals sector in the RPAs is thus of noteworthy consideration, due to their wealth- employment- and productivity- generating effects in these locations.

EMPLOYMENT

- 3.10** The industrial mineral sector's contribution to employment is measured in three ways, namely the amount of direct, indirect and induced employment created.

- Direct impacts are the income and employment effects of industrial mineral extraction and related processing activities in the UK.
- Indirect impacts are the income and employment effects generated amongst suppliers to the industrial minerals sector. Companies in the industrial minerals sector purchase goods and services from suppliers in the UK, who in turn make further purchases of goods and services from their suppliers in the UK. As a result of the initial purchases of goods and services, additional employment is generated across many sectors of the UK economy.
- Induced employment impacts are the additional income and employment effects in shops and services due to the re-spending of incomes generated by direct and indirect expenditures. The level of induced employment in the UK is calculated using an assumed consumption multiplier.

- 3.11** In terms of direct employment generated by the sector, the latest figures for total employment in the UK minerals industry (excluding oil and gas) for 2001 was 36 238⁴. (Note: The Annual Business Inquiry gives a figure of 31 000 for Other Mining and Quarrying [SIC 14] for 2002). For the minerals under consideration in this study the employment figure was 9 111 in 2001, or 25% of total sector employment. (It is important to note that these employment figures are likely to be an underestimate of the actual direct employment attributable to the industrial minerals sector. For example, they do not include employment in associated processing facilities, or back office/administrative functions).

- 3.12** It is standard practice to estimate indirect and induced employment by use of an employment multiplier. The multiplier is an estimate of the economic impact (jobs, expenditure and income) associated with additional

⁴ Employment. The figures in the BGS UK Minerals Yearbook are taken from the ONS Annual Minerals Raised Inquiry (AMRI). They specifically relate, at least for GB, to employees subject to the Mines and Quarries Acts 1954 and 1961. The question in the AMRI form states:

- Number of people on site for week ending 7th September (say) 2002 (or in nearest normal week). — some quarries are worked on a campaign basis.
- It includes all directly employed persons.
- All lorry drivers using the site, whether or not directly employed.
- Contractors used for drilling, blasting, plant installation or modification etc.
- Persons employed on any operation subject to the provisions the Factories Act 1961 are excluded.

knock-on effects within the local economy. In most economic impact assessments the employment generated through indirect and induced effects are not separated out due to the difficulties inherent in multiplier analysis, and that is the case in this study.

- 3.13** The likely indirect and induced multiplier has been estimated based on past experience in economic impact assessment and an empirical review of other employment impact studies⁵. Uncertainty surrounds the true value of the multiplier of the UK economy, with the more plausible recent estimates varying between 1.6 and 1.9. The scale of the multiplier effects will be influenced in particular by the extent of supply chain linkages in the area of analysis. The linkages vary substantially by sector and area. Income is also an important factor in the level of the multiplier estimate. Specifically, it is the proportion of additional income that is spent within the area of analysis that has an important bearing on the value of the multiplier. These estimates of multipliers do not, however, include employment in downstream industries, which are dependent on industrial minerals as essential inputs.
- 3.14** Reflecting the above factors and the predominantly rural distribution of the sector, a multiplier of 1.6 for the UK economy has been used for the purposes of this report. Thus for the 9 100 direct jobs in the industry, it is estimated that a 5 500 indirect and induced jobs are created in the UK economy. The overall employment attributable to the industry is thus estimated at 14 600.
- 3.15** Once again, whilst the magnitude of the employment figures is not that high (under 15 000 direct, indirect and induced), it is important to give consideration to where employment in the industry is distributed. As already discussed, 78% of firms in the sector are located in either remote rural or accessible rural locations and many of these are in Rural Priority Areas. Assuming that this same percentage can be applied to the amount of direct, indirect and induced employment created (i.e. 11 400), then the sector makes a significant contribution to employment in rural areas.
- 3.16** Furthermore, there is also the dimension of the skills associated with the sector. The sector is comprised of both manual and non-manual employment and therefore contains a diversity of skills. This will therefore make an important contribution to maintaining a diversified rural skill base, which is a necessary requisite of a well-structured rural economy.

PRODUCTIVITY

- 3.17** Productivity is defined as the amount of output per unit of input (labour, equipment, and capital) over a set period of time. A country/region's potential output depends on the productivity of its factors of production. The faster the rate of growth in productivity, the faster is likely to be the country's rate of economic growth. There are many different ways of measuring productivity. For example, in a factory productivity might be measured based on the number of hours it takes to produce a good, while in the service sector productivity might be measured based on the revenue generated by an employee divided by the salary received.

⁵ Most notably the study on *The economic importance of UK Ball Clay* which used a national economic multiplier of 1.8. Report prepared by SRK Consulting, DTZ Pieda Consulting, British Geological Survey and CERAM Research Ltd for the Kaolin and Ball Clay Association (KABCA) and DTI.

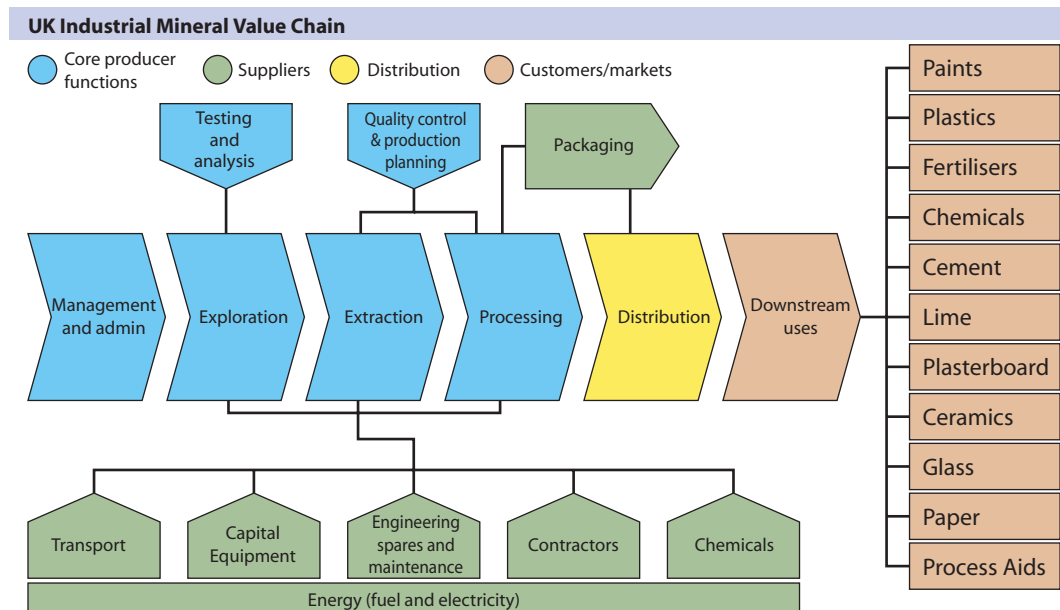
- 3.18** Improving the UK's performance in productivity is a key objective of the UK Government, arising from the UK's relatively poor performance in this economic measure against close competitors such as the US, France and Germany. According to HM Treasury, "*Increasing the sustainable rate of productivity growth and creating an enterprise culture across the UK is central to the Government's economic strategy.*" Productivity growth, coupled with high and stable levels of employment, is an important driver of long-term economic performance.
- 3.19** One of the standard approaches for measuring labour productivity is GVA per employee, which gives an indication of the level of output generated by one worker in an industry. Comparing the industrial minerals sector with other sectors classified as primary industries shows that the sector's productivity is high. Using the SIC classification of 'Other Mining and Quarrying', GVA per employee in the sector in 2002 was £47 290, compared with £19 895 in agriculture/forestry and £21 113 in fishing. The sector's GVA per employee figure was also significantly higher than that of the average for UK manufacturing in 2002 which was £39 045.
- 3.20** The Department for the Environment, Food and Rural Affairs (DEFRA) have recently developed proposals for the measurement of economic under performance in rural areas. The measure, in essence, uses the earnings of residents in an area divided by the number of people of working age, excluding those in education. This is regarded as being a proxy for productivity in rural areas. Further research into this measure is currently underway by DEFRA. However, for the purposes of this study we have discussed the potential contribution of the industrial minerals sector to this measure.
- 3.21** The average gross weekly earnings in the sector⁶ was £401 per week in April 2002, which was significantly above the average for other rural based sectors such as agriculture which had an average wage of £310. Using DEFRA's methodology as a proxy for productivity, given the higher level of earnings paid by the sector than rival sectors in the rural economy, it can be argued that the industrial minerals sector contributes to raising the level of productivity in rural areas of the UK.

CONTRIBUTION TO DOWNSTREAM INDUSTRIES

- 3.22** The importance of industrial minerals to the economy is not attributed solely to the value of production and the numbers of people who are directly and indirectly employed in their extraction and processing. Account also needs to be taken of their importance as essential inputs to a wide range of downstream industries, mainly within the manufacturing and construction sectors, but also in agriculture. Consideration thus needs to be given to;
- the importance of these downstream industries to the UK economy;
 - the importance of indigenously produced minerals to the competitiveness of these industries; and
 - the number of jobs that may be at risk if there were an interruption or termination in the supply of indigenously produced minerals.
- 3.23** The industrial minerals sector contributes to a wide range of downstream industries (see Figure 3). Figure 7 presents a value chain diagram of the UK industrial minerals sector. This diagram shows, at a broad industry

⁶ Full-time manual males on adult rates.

Figure 7
Industrial mineral value chain.



level, each stage of the process required to produce the end products and the various inputs that are required at each stage of production. It also highlights some of the main downstream uses for the industrial minerals extracted in the UK.

- 3.24** National Statistics datasets present only a broad coverage of the downstream industries that are supported by the industrial minerals under consideration in this study. Table 11 presents a summary of a selection of the immediate downstream sectors, the numbers of firms operating in each sector and how many people they employ and their values in terms of GVA.
- 3.25** According to the Annual Business Inquiry, there are approximately 2 000 firms in the immediate downstream industries that the industrial minerals sector serves, employing approximately 85 000 people, and generating an estimated £3 600 million in Gross Value Added in the UK economy. Clearly, not all these downstream companies will use minerals extracted in the UK. Equally, companies in the sector also export minerals overseas. However, these statistics serve to illustrate the magnitude of the potential domestic market that UK industrial mineral producers serve. Industrial minerals impact on many other sectors of the economy, for example as fillers in paper, plastics and rubber and as process aids in a range of industries, not least in the foundry castings industry. However, in these industries industrial minerals form only a minor, albeit essential, input. The value of these inputs are difficult to identify in official statistics.
- 3.26** The key issue relating to downstream industries is whether or not it is sustainable for these firms to source minerals from overseas suppliers in the long term and if they do to what extent that will affect their future competitive position. Two key assumptions underlie this issue. Firstly, security of supply has to be ensured. If supply of industrial minerals cannot be guaranteed from sources outside the UK, then there is a prima facie economic case for continuing to source from UK-based producers. Secondly, there are important quality issues associated with these minerals. In a previous study undertaken on the UK ball clay sector, it was found that only ball clay extracted and processed in the UK was of the

requisite quality for many downstream users, and that there were no substitutes for this without incurring substantial costs in altering the production processes.

3.27 Continued security of supply of minerals of the required qualities are fundamental assumptions and, if not met, will lead to an unsustainable situation for downstream companies who either will not be able to rely on the minerals to be delivered to meet their production schedules, or have to incur a cost to adjust their production processes to use minerals of a different or lesser quality.

STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODE	NUMBER OF FIRMS	NUMBER OF EMPLOYEES ('000)	GVA (£M) 2001
24			
24.13 Manufacture: Inorganic Chemicals	225	8	437
24.15 Manufacture: Fertilisers	89	3	167
24.30 Manufacture: Paints, Varnishes etc.	551	29	1,180
26			
26.11 Manufacture: Flat Glass (Stats. for 2000)	23	1	94
26.13 Manufacture: Hollow Glass	89	8	346
26.14 Manufacture: Glass Fibres	250	5	168
26.21 Manufacture: Ceramic Household Articles	366	17	290
26.22 Manufacture: Ceramic Sanitary Fixtures	57	6	231
26.23 Manufacture: Ceramic Insulators (1999 stats)	22	1	11
26.25 Manufacture: Other Ceramic Products	207	1	22
26.51 Manufacture: Cement	38	4	371
26.52 Manufacture: Lime (1999 stats)	10	NA	16
26.53 Manufacture: Plaster (1999 stats)	17	NA	9
26.62 Manufacture: Plaster for Construction	68	2	276
TOTAL	2,012	85	3,618

Source: Office for National Statistics Annual Business Inquiry 2001

Table 11 Number and Value of **selected** Immediate Downstream Enterprises 2001.

4 Planning Issues

PLANNING CONTEXT: CURRENT PLANNING POLICY FOR INDUSTRIAL MINERALS

- 4.1** Planning policy for industrial minerals can be considered at the national, regional and local level. The UK is signatory to a range of international agreements which could indirectly affect industrial minerals (such as agreements on wildlife) but there do not appear to be any affecting industrial minerals directly.

National policy

- 4.2** National policy for industrial minerals which affects the exercise of planning powers is set out primarily in Minerals Planning Guidance (MPG) notes issued by the Department of State with responsibility for the town and country planning system in England. This is currently the Office of the Deputy Prime Minister (ODPM). Policy can also be set out in other official documents such as White Papers, Planning Policy Guidance notes and good practice advice, each of which has a specific status and purpose.

Minerals Planning Guidance notes

- 4.3** Minerals Planning Guidance notes are issued at the discretion of the ODPM. None is required by law. The current set of MPG notes is listed in Annex B. The subjects covered range from themes across all minerals to aspects of planning procedure and to guidance on specific minerals. MPG 1 sets out overarching guidance on *General Considerations and the Development Plan System*. Just two of the MPGs deal with minerals relevant to the terms of reference of this project: MPG 10 on *Provision of Raw Material for the Cement Industry* and MPG 15 on *Provision of Silica Sand in England*. The other minerals in this project receive very little, if any, specific mention in MPGs. The references to them are more in the form of acknowledgements than policy advice. The statements are in MPG 1 Annex B which provides 'General Advice for Individual Minerals'. Relevant extracts are also reproduced in Annex B to the present report.

- 4.4** There is much advice in other MPGs which is as relevant to industrial minerals as it is to other minerals. This includes advice on the application of the principles of sustainable development to minerals and on the weight to be afforded to a range of competing interests for the use of land. Many of the main aspects of policy reside in MPG 1, but some aspects of broad policy are to be found in MPG 6.

Other official documents

- 4.5** The highest level of Government policy is the White Paper. There is no White Paper specifically devoted to minerals issues, though there are many which have a bearing on mineral planning generally and, to a degree, on planning for industrial minerals. For example, the 1999 White Paper *A better quality of life: A strategy for sustainable development for the UK* has a section on 'Minerals' as a resource management issue (pps.86–7) which has direct implications for the industry. Other policies in the White Paper have indirect consequences for minerals, such as support for reducing the materials intensity of goods and services, and for enhancing the recyclability and durability of goods (page 35).

- 4.6** Planning Policy Guidance (PPG) notes are a parallel series of Government policy alongside MPG notes. They likewise address planning themes, procedures and specific issues within planning. Some of them frequently have a bearing on mineral planning, notably PPG 7 on *The Countryside – Environmental Quality and Economic and Social Development* and PPG 9 on *Nature Conservation*. PPG 7 sets out policy advising local planning authorities how to evaluate development proposals which affect, amongst other things, National Parks, Areas of Outstanding Natural Beauty, landscape character and areas designated for their local landscape quality. Other PPGs may from time to time have relevance to specific minerals or sites, such as PPG 20 on *Coastal Planning*.
- 4.7** ‘Circulars’ from the ODPM and its predecessor Departments advise local authorities on how to apply various aspects of the law. Those relevant to industrial minerals include Circular 11/95 on the *Use of Conditions in Planning Permissions* and Circular 1/97 on *Planning Obligations*. Although interpretation of the law is ultimately a matter for the Courts, Circulars provide an indication of how the Government would like to see the law applied.
- 4.8** The Government also issues advice on latest research and good practice in many aspects of planning. These are advisory and have less endorsement from the Government than policy statements. Research reports are typically commissioned from independent consultants, whose views may or may not accord with those of the Government. These may be essentially good practice guidelines, such as the report on *Reclamation of Damaged Land for Nature Conservation* (HMSO, 1996), or reports with a policy recommendation element. Examples of the latter relevant to planning for industrial minerals include *Sustainable development issues for mineral extraction – the Wareham Basin of East Dorset* (British Geological Survey, 2002) and *Appraisal of High Purity Limestones in England and Wales* (Department of the Environment, 1990).
- 4.9** Research and advice may be issued simultaneously. For example, in 1996 the Department of the Environment issued a research report on *The Reclamation of Mineral Workings to Agriculture* together with *Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture*.

National policy overview

- 4.10** Taken together, therefore, there is potentially a very wide range of documents which can influence policy, plans and individual decisions relevant to industrial minerals. In practice, this advice is limited, being centred on the Minerals Planning Guidance notes for cement-making materials and silica sand. This project has provided an opportunity for the Government to reassess whether the existing range of planning advice on industrial minerals remains satisfactory or if any changes are now merited.

Regional policy

- 4.11** Regional planning policy relevant to minerals can be set out in two ways. Policy may be set down in Regional Planning Guidance (RPG) notes or as regional elements within national planning policy for minerals (i.e. within MPG notes). Both of these are issued by the ODPM (and its predecessors). As with all policies of these kinds, whether or not to have any policy, and if so what it says, are ultimately at the discretion of the Government.

Regional Planning Guidance

- 4.12** All Regional Planning Guidance notes mention industrial minerals. The level of guidance they contain is very small, mostly recognising the special minerals within their areas but offering little commentary on them. It is difficult to see what function this serves. There may be merit in a particular

region developing a policy on a particular industrial mineral in a way which offers advice to mineral planning authorities in that region. This might be appropriate for minerals which are entirely or principally confined to one region, such as kaolin and ball clay in the South West and salt in the North West. However, if this function cannot be served there would appear to be merit in RPGs ceasing to mention industrial minerals at all. Policy could then be left to the more suitable vehicles of MPG notes and individual local development plans.

Regional aspects of minerals planning guidance

- 4.13** Government policy may be specified at a regional level through MPG notes. By far the most significant development of policy at the regional level this way is for aggregate minerals. There are few other instances of such regional policy development, though MPG 10 on cement-making materials does include policy which has clear regional implications. In particular, a policy encouraging domestic production as a means of resisting imports has special implications for the South East region, which is the regional market most accessible to imports. MPG 15 on silica sand states that development plans should take account of regional as well as national needs for the mineral.

Regional policy overview

- 4.14** It is clear that most policy for industrial minerals planning omits any significant element at the regional level. There is modest policy at the national level and by far the most policy in development plans at the local level (discussed below). National policy for both cement-making materials and silica sand advocates site level supply policies which clearly omit intervention at the regional level.
- 4.15** There is a difference between regional policy which mentions industrial minerals because those minerals happen to be prominent in a particular region, and regional policy which aims to affect the supply and demand pattern in each region in relation to other regions. It is doubtful whether there are any minerals studied in this project, other than arguably cement-making materials, for which the latter kind of regional policy would be a practical proposition, due to their limited occurrence in England.

Local policy overview

- 4.16** There is extensive policy at the local level specific to industrial minerals. Local policy must be in accordance with higher level policy set out in national policy and in Regional Planning Guidance (if any is relevant). Local policy is set out in plans prepared by those authorities which are designated as Mineral Planning Authorities (MPAs). MPAs also decide planning applications for mineral working in their areas. MPAs comprise County Councils, National Park Authorities, London & Metropolitan Borough Councils, and unitary authorities created by local government reorganisation in the mid-to-late 1990s. For plan-making purposes, and therefore policy for industrial minerals, many of the new unitary authorities exercise their powers jointly with neighbouring authorities (often County Councils). As a result of the somewhat complex pattern of plan-making activity around England, local policy on minerals can be found variously in Structure Plans, in Unitary Development Plans [UDPs], in Minerals Local Plans [MLPs] (either in a two tier arrangement with a Structure Plan or in association with a Unitary Development Plan), and in National Park Local Plans.
- 4.17** The arrangement is therefore that plans containing policies relevant to industrial minerals may for the most part either be set out fully within single documents (e.g. the UDP for Doncaster MBC, the North Lincolnshire

Plan, and the East Riding of Yorkshire and Hull City Councils' Joint MLP), or in a pair of documents comprising a Structure Plan and a Minerals Local Plan covering the same areas (e.g. for Nottinghamshire, for Staffordshire & Stoke-on-Trent, and for Somerset & Exmoor National Park).

- 4.18** The breadth and detail of the commentary and policies on industrial minerals within any plan broadly reflects the perceived relative importance of these minerals to the planning of each area, although Minerals Local Plans will always be more detailed than any Structure Plan to which they are subsidiary. Most plans containing minerals policies set out for each industrial mineral at least an outline on its demand and supply prospects, the extent of permitted reserves, the issues most relevant to development control (e.g. transport, restoration, working methods, protection of amenities), arrangements to safeguard mineral deposits for possible future use, and, increasingly, how mineral resources could be managed more sustainably. Policies may be expressed on any of these matters or on other relevant issues. Plans are expected to provide sufficient policies and statements of objectives to explain the approach which MPAs will use when deciding planning applications for mineral working and when commenting on or deciding associated uses of mineral-bearing land (e.g. surface development proposals or after-uses of worked out sites).
- 4.19** Because local policies directly shape the likely uses of land they are subject not only to public involvement in their preparation but to assessment by an independent tribunal. In all cases except Structure Plans (which indicate broad land uses rather than identify uses for plots of land), anyone with an unresolved objection has a right in law for that objection to be examined by the independent tribunal. Coupled with legislation which gives primacy to policies in the development plan in shaping decisions on individual proposals, this confers on local policies in development plans considerable influence over the future uses of land.
- 4.20** This research included a study of all development plans affecting industrial minerals in England. Reference is made to the findings as relevant throughout this report and the accompanying Mineral Planning Factsheets.

PLANNING CONTEXT: REFORM OF THE PLANNING SYSTEM

- 4.21** The Planning and Compulsory Purchase Act 2004 received Royal Assent in May 2004. The Act introduces significant changes to the structure of policy making in planning, plus some amendments to the operation of the development control system. The Government is committed to the better integration of the planning system with other spheres of public policy, notably with the Community Strategies prepared by each local authority in England. This is accompanied by a new focus for the planning system to assist the delivery of 'sustainable development' and a new commitment to engage a wider range of public opinion in participatory procedures. Whilst much of the change will be in the implementation of legislation rather than in law itself, the Act creates a framework aimed at facilitating these changes.
- 4.22** The planning reform process includes the replacement of the series of PPG and MPG notes with Planning Policy Statements (PPSs) and Minerals Policy Statements (MPSs) respectively. The aim is to reduce the length of the existing documents by separating out from them (and publishing separately if necessary) the good practice guidance which has increasingly found its way into these documents. Those PPGs which the Government considers no longer necessary will be dropped without any replacement. The new PPSs and MPSs should therefore be more focused documents. The current expectation is for all draft PPSs to be consulted

upon, if not issued, by July 2005. As the revision of policy is an administrative matter it is not mentioned in the current Act.

PLANNING ISSUES COMMON TO ALL INDUSTRIAL MINERALS

Introduction

- 4.23** This section examines the basic features, which will determine the future potential for working each industrial mineral in England. Fundamentally the geology of the resource in relation to the requirements of the market establishes the maximum future potential of each industry. This section therefore begins with a review of the geological scarcity of each mineral, followed by an assessment of demand. Continuity of supply depends on the availability of land with workable deposits having planning permission for extraction. The study indicates where possible the approximate number of years for which each industry can continue operations based on existing planning permissions. The policy approach to future planning permissions is also noted, and the implications considered for finding new mineral to work, whether by extensions to existing sites or at completely new sites.
- 4.24** Planning for each mineral is deceptively difficult and complicated by matters such as the following:
- **Resource availability:** The location of a mineral deposit, together with its size and quality, is fundamentally determined by geology. If there are no resources of a specific mineral then there can clearly be no production. A number of industrial minerals have very restricted distributions in England, whilst others are much more widespread (see paragraphs 2.4–2.5 and individual Mineral Planning Factsheets in Annex A). This has implications for geological scarcity, the availability of alternative options and ultimately on continuity of supply.
 - **Quality:** The quality of an industrial mineral deposit in terms of its physical and/or chemical properties may vary significantly which affects its workability and the markets it serves (see paragraphs 2.15–2.20). This is an issue that affects all minerals to some extent. It is particularly important for industrial minerals such as ball clay, kaolin and silica sand where specific qualities are often only suitable for particular applications. Variations in properties also mean that it is desirable, for example in the case of ball clay, to have access to a



Right Ball clay typically occurs in thin seams, each of which has different technical properties.

range of different clays for blending purposes. This not only allows different markets to be served but also helps to smooth out the natural variations in the properties of the clays, allowing lower quality clay to be blended away and thus optimising the use of the resource.

- **Cost of production:** A mineral is only economically viable if it can be extracted, processed and sold at competitive prices compared with other sources both domestic and foreign (see paras 2.21–2.24). In the case of industrial minerals this price generally reflects the cost of production to marketable form. The more processing a mineral undergoes, in general, the higher the price. The ultimate price to the consumer will also depend on transport costs and any premium due to quality or scarcity. In a competitive economy there is always pressure to produce minerals at the cheapest prices. High cost methods of extraction, notably underground mining, which might be environmentally preferable to surface working, has consequently become uneconomic in the UK. For example, ball clay mining in Devon and Dorset ceased in 1999. In addition, there has also been a significant reduction in fluorspar mining, although this is mainly a reflection of the quality of the ore, which is particularly difficult to process, rather than the high cost of underground extraction.
- **Demand:** The requirements for industrial minerals depend on the requirements of the consuming industries. Demand for, and the production of, minerals are continually evolving due to changing economic, technical and environmental factors. For many of the industrial minerals under consideration there has been a decline in demand, for example for cement raw materials, industrial carbonates, kaolin and fluorspar. Ball clay is one of the few minerals where demand has increased appreciably and this has been driven by export markets whilst the domestic market has declined. Naturally bonded moulding sands have been replaced by washed foundry sands to which binders are added. However, demand for these has also declined significantly due to structural changes in the economy and the relative decline of UK manufacturing, notably the foundry and steel industries. In general these trends in demand have been gradual. Relatively few new, large markets have appeared, although notable examples include the use of high purity limestone in flue gas desulphurisation and the rise of horticultural applications for silica sand (see paras 2.6–2.7) and individual Mineral Planning Factsheets in Annex A).
- **Planning policy:** Planning policies themselves change over time, and in many respects have become more conservation-oriented in response to public pressure. Coupled with the increasing difficulty of finding sites suitable for working as the more acceptable ones are worked out, there is continuing pressure on the minerals industry to raise its standards.

4.25 These pressures of economics, geology, demand and planning policy rarely arise in isolation. Identifying which constraint is critical in shaping the opportunities available to the minerals industry can be difficult or impossible. Central to the difficulty facing the planning process is that planning policy constraints are the most obviously adjustable of them all. The planning system is continually under pressure to tighten or relent on its policies in the face of the more precise aspects of cost, geology and demand. The impact which this has had on the availability of otherwise workable mineral is briefly assessed in the subsection below.

4.26 However, the contribution of planning to the pattern of mineral supply is more complex. If a mineral site is refused permission for working, is this correctly viewed as the tight operation of planning policy? Might it better be viewed as a geological constraint (as such a satisfactory deposit was not available in a less constrained location)? Or is it an economic con-

straint (because a lower grade deposit in a more suitable location could not bear the extra costs to be worked)? Perhaps it is even a demand constraint (because the user had failed to establish a process which was capable of making use of different but more readily available minerals)?

Geological scarcity/level of demand/permitted reserves

- 4.27** The availability of the different industrial minerals reflects their geology. Some, such as limestone and chalk for cement manufacture, are very extensive. Others, and notably fluorspar and fuller's earth, are very restricted in their occurrence and both reserves and resources (see box for definitions) are limited. The geological scarcity of the various industrial minerals is summarised in Table 12 in broadly decreasing levels of abundance. However, there are difficulties with this approach. For example, kaolin and ball clay have a relatively restricted occurrence as a result of their geological origin, although permitted reserves are relatively large. In addition, the availability of tipping space for mineral waste is the key to being able to extract kaolin reserves. Furthermore, gross figures for ball clay include a wide range of qualities, with different properties, thus masking possible limited reserves of clay qualities that are essential for specific blends. In contrast, resources of limestone and chalk suitable for cement manufacture are very extensive, although permitted reserves at some sites could be limited.
- 4.28** The figures for permitted reserves (given variously in years' supply or million tonnes) must also be treated with great care. Gross figures for reserves mask the multiplicity of qualities in which industrial minerals are produced. Generally these are not interchangeable in use. Consequently permitted reserves at individual sites are the critical factor with respect to future supply. This is particularly the case with cement raw materials (limestone/chalk), where the reserve could only be utilised at the adjacent cement plant. Similarly site specific reserves of silica sand are often only suitable for a specific market.

Sterilisation of mineral resources by planning controls

- 4.29** Planning policy clearly has a significant impact on where minerals are worked. Refusal of a planning application for mineral working demonstrates

Resources and reserves

Mineral resources are natural concentrations of minerals, or bodies of rock that are, or may become, of potential interest as a basis for the economic extraction of a mineral product. They exhibit physical and/or chemical properties that make them suitable for specific uses and are present in sufficient quantity to be of intrinsic economic interest. The status of mineral resources in economic terms changes with time as markets decline or expand, product specifications change, recover technology is improved or more competitive (less costly) sources become available.

That part of a **mineral resource** which has been fully evaluated and is commercially viable to work is called a **mineral reserve**. The term **mineral reserve** should strictly be further limited to those minerals with legal access and for which a valid planning permission for extraction exists (i.e. **permitted reserves**). Without a valid planning consent, no mineral working can take place and consequently the inherent economic value of the mineral resource cannot be released and resulting wealth created. The ultimate fate of mineral reserves is to be either physically worked out or to be made non-viable by changing economic circumstances. Reserves, especially those with planning permission to work, are of crucial importance to a mineral company as they represent its future assets.

INDUSTRIAL MINERAL	DEMAND 2002 (THOUSAND TONNES)	PERMITTED RESERVES	RESOURCES	NOTES
Cement Raw Materials (Limestone/chalk)	15 200	11→40 years depending on site	Very extensive	Reserves at individual sites are the critical factor.
Salt	5 500	> 40 years	Very extensive	
Industrial limestone	9 000	Probably >40 years but will vary from site to site.	High-purity limestone resources are extensive	
Kaolin	2 200	>40 years	Restricted outside current permissions Availability of	Reserves exceed the life of current planning consents. tipping space is a key factor in extracting these reserves
Ball clay	920	74 Mt	58 Mt	Reserve/ resource are gross figures that take no account of the widely different ball clay qualities and the balance between the ball clay bearing basins
Gypsum	1 700	> 50 Mt	Relatively restricted	Data does not include supply of desulphogypsum which is increasing
Potash	900	Approximately 30 Mt	Extensive	Resources are not accessible from existing mine site. Economic viability unknown.
Industrial dolomite	1 100	10–15 years	Resources suitable for industrial use are restricted	Reserves vary from site to site. Some only suitable for a particular market.
Silica sand	3 400	11 Mt colourless glass sand 35 Mt foundry and other industrial sand	Restricted	Reserves vary from site to site. Some only suitable for a particular market. Resources of sand suitable for use in colourless glass are relatively scarce
Fluorspar	53	Approximately 0.3 Mt*	Very restricted	*Estimated contained fluorspar. Resources are scarce and highly localised. Individual deposits tend to be small
Fuller's earth	44	0.35 Mt	Very restricted 2 Mt	

Table 12 Reserves and resources of industrial minerals.

that other public interests have outweighed the commercial interest in developing a site. This is not surprising. It is the role of the planning system to steer development to the more suitable locations and away from the less suitable ones. The planning system must also maintain quality of life by seeking high standards, both operational and restoration, at mineral sites. There may be special requirements on mineral companies to achieve unusual standards in particular places. Rather than simply resist development in principle, planning therefore provides a more sophisticated regulatory system by indicating that working may well be acceptable if certain requirements are met, specific to a site or area.

- 4.30** A hierarchy of designations is used to protect areas of important landscape, wildlife and other assets from the adverse effects of development. International obligations impose the strongest constraint, followed by nationally important constraints and then constraints of a more local nature. This is a loose grading system applied with discretion rather than by ticking boxes. The most well known national policy constraint in England, the Green Belt, is not particularly significant for mineral working. This is a tight constraint on most development, aimed at preventing urban sprawl. Most development here must demonstrate 'very special circumstances' to be allowed, with a 'presumption against' inappropriate development (the strongest constraint in planning). However, mineral working is considered a temporary activity in the Green Belt in planning terms. It is therefore not necessarily a challenge to the reasons for designating these areas, though a subsequent return to land uses compatible with the Green Belt would be expected. For mineral working, the constraints of much greater interest tend to be those associated with landscape, wildlife and heritage.
- 4.31** Also of increasing relevance is the understanding of local character: this is an approach which does not grade places in a hierarchy but values all places for their distinctiveness. It aims to nurture the differences between places which make each one special. This approach can be applied at any scale from the regional to the highly localised. A detailed description of the relationship between industrial minerals and landscape, wildlife and heritage designations can be found in paragraphs 4.125 to 4.147 and the Mineral Planning Factsheets (Annex A).
- 4.32** Actual or potential conflicts of interest between industrial mineral operations and land designated for a range of environmental purposes are not uncommon. It is difficult to gauge how effective the planning system has been at steering developers away from designated land in favour of environmentally less sensitive locations. However, there is evidence that, where mineral working is contemplated in or close to designated areas, the efforts by mineral companies and planning authorities to overcome the difficulties have been considerable and often effective. Many developments have been able to proceed within or adjacent to designated land on this basis. In other cases, genuine conflicts of interest remain, often because of the restricted geological occurrence of the industrial mineral concerned. In some cases, this has resulted in refusals of permission and in others, where the case for mineral working proceeding is sufficiently strong, approvals. Nevertheless, there is some concern in the industry about the cumulative impact of these constraints and the impacts these may have on future supply options.

Extensions and new sites: some planning implications

- 4.33** There has been an ongoing debate in mineral planning on the relative merits of extending existing sites or establishing new sites as the most appropriate means of gaining access to new mineral reserves. Extensions typically make use of existing plant, transport and other infrastructure, allow efficient phasing with existing workings, and possibly

make use of pre-existing environmental controls. New sites typically help avoid concentrating the impact of mineral working, ensure that earlier workings are completed when originally promised, reduce mineral movement between quarry and plant, and may allow environmentally more manageable sites to be worked. This is a debate which is often of less relevance to industrial minerals than to aggregate minerals. There are various reasons for this.

- The size and cost of the processing facilities needed for some industrial minerals is so great that moving it for amenity reasons (rather than obsolescence or exhaustion of mineral reserves) is a highly unattractive economic option. MPAs identified the large scale of processing and associated plant, more than any other issue, as a distinctive feature of many industrial minerals operations. Plant for processing most industrial minerals is in effect permanently fixed so long as mineral can be delivered to it for processing. In the case of fluorspar, if the country's only processing plant at Cavendish Mill in the Peak District were to close for any reason, this would likely be the end of the domestic fluorspar industry. This is because it is unlikely that sufficient reserves of fluorspar could be proved in advance to justify the scale of the investment required to commission a new plant.
- Very substantial areas have been permitted for the extraction of some minerals, notably kaolin in Cornwall and ball clay in Devon. These permissions have allowed the operating companies to work a number of sites simultaneously. Clays from a number of separate sites are blended at centralised plants to produce a range of products (see Mineral Planning Factsheets in Annex A). In this way, the companies can respond to changing market demands, and also optimise the use of the resource. Moreover, as the resource has a geographically restricted distribution, relocation of the industry is not possible. In the case of industrial limestone where resources are extensive, operations still tend to have a long term presence based on extensive permissions (such as the Tunstead/ Old Moor complex in Derbyshire and the Peak District). This is because the large investment in plant and transport infrastructure would make relocation difficult.
- The geology of some minerals dictates the choice between extensions or relocations of the industry when existing permitted reserves have been exhausted. Fuller's earth provides an extreme example. The industry was recently refused permission to extend a site in Bedfordshire into the only known remaining deposit in the county. In Surrey, the industry was refused permission to relocate to a pair of sites comprising the last known deposits in that county. The working of fuller's earth is now foreseeable at only one location in Oxfordshire, for which the industry has been granted planning permission. Fluorspar is an industrial mineral found in veins, where the choice is typically between extending development along a vein or relocating to another vein: though the veins can be close together, this is a mineral which in principle tends for geological reasons to encourage relocation to new sites as existing ones are worked out.
- The industrial minerals sector has to some extent mirrored the trend in much of the rest of the UK minerals industry towards concentration in fewer companies and at fewer sites, which tends to reinforce activity at existing large operations rather than at new sites (see Section on Structure of the Industry, para. 2.3). This is particularly evident in the cement industry, where many sites listed in MPG 10 (published in 1991) have now closed. There are also many fewer small scale 'tributors' supplying fluorspar ore to the Cavendish Mill from

small sites in the Peak District National Park than there were a decade ago. Only in the plasterboard industry have new firms appeared to supply plasterboard, but manufactured from imported raw materials or synthetic gypsum, rather than indigenous resources.

- 4.34** As a result, few major new industrial mineral operations have been commissioned on greenfield sites in recent years. The only large scale new proposal has been a cement plant at Snodland, Kent close to a pre-existing works (now closed), creating the first new cement site in England on a greenfield site for 30 years. There is also a notable relocation of silica sand processing plant from Redhill to a site at North Park Farm further east in Surrey at the foot of the North Downs.
- 4.35** This pattern of continuity and change in the supply of industrial minerals has important implications for future planning. Most industrial mineral plant sites are relatively long-lived, even in mineral planning terms. They pass through phases of seeking extensions to their working areas, into progressively more difficult sites which may be increasingly remote from the processing plant, and then experience an infrequent but somewhat traumatic need to relocate as geology or economics dictate. Long term planning could offer real benefits here, taking a positive role in identifying land for future working well in advance and finding sites to which the industry could relocate in due course.
- 4.36** The contribution of the mineral planning system to managing this process over the long term has been mixed. The tendency in mineral planning practice has been to ensure continuity of supply in the short to medium term, typically to provide a landbank of reserves with planning permission sufficient to last for the period of the plan and, usually, for a period thereafter. Details vary between minerals (especially according to the existence or otherwise of any Government policy on this point) and by mineral planning authority and site. This has resulted in proper consideration being given to continuity of supply on an 'as-needed' basis, but there has been little incentive to engage actively in long term planning.
- 4.37** There is little evidence of efforts to plan for enduring commitments to maintaining supplies to plant sites, or the environmental benefits which might be put in place in advance to ease the supply process in future. There appear to be no major forward planning exercises which set out firmly, but well in advance, when the working of sites will be required to cease. The statutory development plan system is not ideal for the purpose, though long term policies such as green belts and mineral consultation areas are well established and more could be done to assist long term land management for minerals. The Bovey Basin ball clay strategy in Devon is probably the best example of a systematic consideration of the needs of an industry over the long term, though wider terms of reference would allow more to be achieved.
- 4.38** The consequence of the current approach has been that decisions on individual mineral sites become all the more difficult when decisions can no longer be put off. The case for planning permission can become urgent, but runs into an environmental case to resist development that is all the more convincing for want of preparatory measures. When points of transition arrive in the industrial minerals industries they are particularly traumatic for everyone. This is well illustrated by the experience of the proposal for a new cement works at Snodland, Kent to replace the ageing works at Northfleet, Kent (see box).
- 4.39** The benefits of long term positive planning should not be seen in isolation. There is also a case for continuing with the present short to medium term approach. The demands for minerals may change, so

Planning for cement in north Kent

The Kent Minerals Local Plan (MLP) covering chalk and clay was adopted in 1997. It covered the period to 2011 and aimed to ensure that a landbank of permitted reserves for cement-making was available at the end of the plan period for a further 15 years. A slightly greater landbank would be needed for the Halling cement works as the site owner notified an intention to commission new plant there in 2008, (implying a need for minerals for a further 25 years working from then, in line with policy in MPG 10). Various sources of both chalk and clay were identified to meet these requirements, with some minor recognised deficiencies which the MPA and the industry agreed could be left for decision on a future review of the plan. The possibility of substituting elsewhere for the Northfleet cement works in due course was noted. A complicating factor was the uncertainty over the availability of chalk from Eastern Quarry. The plan included a policy to safeguard working areas here, in view of the considerable reserves available, but this was nevertheless a site where proposals for redevelopment for housing as part of the Thames Gateway might well in effect be given precedence over the interests of the cement industry.

Shortly after the MLP was adopted, an application was submitted by the owners of Northfleet cement works for a replacement cement works at Snodland in the Medway valley, close to the existing Halling works (owned by another company). The proposal straddled the boundary of Kent County Council and Medway Council, and was recommended for approval by the former and refusal by the latter. It was considered at public inquiries in 1999 and 2001.

The Inspector considered that the dominant impact of the cement works in the landscape "would render the proposals unacceptable in terms of the capacity of the landscape to absorb such dramatic change, unless other consideration were of such weight as to override the established policies safeguarding the countryside and the AONB." The conclusion of the Inspector from the first inquiry was that there had been an insufficient examination of alternative sites and that the possibility of suitable ones emerging could not be ruled out, so a sufficient case for development had not been proved. He recommended refusal primarily on these grounds. The Secretary of State reopened the inquiry for various reasons, and the Inspector returned to the issue of alternative sites. He criticised the applicants "who refuse to consider any alternative to Home Farm (Snodland) apart from a clinker import terminal..."

At the second inquiry, the Inspector considered timing of the solution to cement supply in South East England now to be the critical issue. There was pressure from the Thames Gateway strategy for the release of cement-related sites. Not only was Eastern Quarry required urgently for redevelopment, but so was the Swanscome peninsula (not mentioned in the MLP). This reversed his earlier view when he had considered there was time available to search for alternative solutions. A risk arose of a hiatus in cement production, not least because Halling cement works had closed by this time. If a permission was not given soon, there was a risk of the replacement of domestic production by clinker imports, contrary to MPG 10 which, if established, would effectively preclude investment in local production. Moving to the Halling site would add four years to the development process, and the applicant unsurprisingly considered that the economics of such a move were confidential.

This case illustrates on the one hand the almost complete failure of integrated long term planning (both the MLP and the planning application process), because there was inadequate consideration of alternative production sites and because a hiatus in production was nearly allowed to arise. On the other hand it illustrates the adaptability of last-minute decisions to politically more pressing priorities (in this case the Thames Gateway strategy).

efforts to secure long term supplies may be wasted. The closure of many cement works (not replaced locally) illustrates the risks. Postponing decisions as long as possible ensures that the most up to date information and political imperatives are given appropriate weight. The long term planning approach too should therefore aim to keep options open and plan for the possibility of future needs arising, while postponing so far as possible decisions which would be bound to damage other interests.

PLANNING ISSUES IMPORTANT FOR SOME INDUSTRIAL MINERALS

Mineral waste disposal

The main issues

- 4.40** Some industrial minerals generate significant quantities of mineral waste, during extraction and/or subsequent processing (see Mineral Planning Factsheets in Annex A). Kaolin is the principal producer of such wastes, both because the usable clay comprises on average about 10% of the material excavated and because of the high volume of kaolin output (> 2 Mt/y). Vein minerals too form only a proportion of the quarried material, although here the volumes involved are much smaller. Of the annual 350 000 to 400 000 tonnes ore that is processed about 25% is finally disposed of to a tailings lagoon. An equivalent tonnage is dewatered each year for use in site restoration.



Left Extraction and processing of kaolin (china clay) produces relatively large volumes of waste.

- 4.41** A number of other industrial minerals have associated waste comprising overburden/interburden. Ball clay, gypsum (one quarry) and fuller's earth are examples. The small amounts of waste from purifying salt brine is returned to completed salt cavities and some insoluble waste (mainly clays) from potash refining is now (from 2003) being disposed of into disused mine workings. The soluble waste, mainly comprising sodium chloride, is pumped out to sea.
- 4.42** Disposal of unwanted mineral waste can be at least as much of a concern to MPAs as the workings themselves. In the case of kaolin about 22 million tonnes of mineral waste requires disposal annually, and there is over 500 million tonnes of waste in engineered tips in the St Austell area alone, covering 1 700 hectares. Of the waste (sand and crushed rock) a small but increasing proportion (about 10%) is being sold for aggregate and this is being encouraged. Sales of secondary aggregates are, generally, derived from

waste currently produced. Some old mica residue dams are also being reprocessed to recover kaolin formerly discarded by old processing methods. Disposal of waste into kaolin pits is, in general, not possible, because kaolinisation continues at depth and consequently backfilling would sterilise future reserves. However, some disposal into abandoned pits is now taking place, where this will not affect reserves or the requirement for water holding facilities. As the surface extent of workings achieve their practical limits an increasing amount of backfilling is now becoming possible.

- 4.43** Unlike kaolin, all the waste associated with ball clay production is quarrying waste (overburden/interburden). Disposal of this has not proved to be a problem other than in the Bovey Basin where the volumes (0.9 million m³ a year) involved are much larger and above ground tipping has been required. This has also been necessary to prevent sterilisation of reserves in depth and to ensure that the range of production grades is available. However, the waste will ultimately be used in site restoration. Some of the sands associated with ball clay seams are being sold for aggregate.
- 4.44** The construction of tailing lagoons in the Peak District National Park for the disposal of fluorspar processing waste has been a contentious issue in the past. However, old tailings dams are being reprocessed to recover mineral formerly lost and the current tailings production is in balance with their subsequent use in site restoration. The permission for tungsten mining at Hemerdon, near Plymouth in Devon would, if developed, require the disposal of over 100 million tonnes of mineral waste and cover 175 ha of Crownhill Down and the lower slopes of Hooksbury Valley, which would be visually intrusive.

Some solutions

- 4.45** The problems of the disposal of mineral waste from industrial mineral operations is being gradually addressed although for some minerals, wastes cannot be entirely removed. Sales of sand and crushed rock derived from kaolin extraction and processing is exempt from the Aggregates Levy and has given further stimulus to the increased use of this resource. The problem is one of access to markets but shipments are being made to London and the South East and there are plans to increase shipments from the port of Par. Nevertheless access to new tipping areas will continue to be required. Sales of sand as secondary aggregates from the interburden to ball clay extraction are also exempt from the Aggregates Levy. Sand is being sold for aggregate and industrial purposes.
- 4.46** At the Boulby potash mine returning some of the insoluble waste material (mainly clays which contain traces of heavy metals) into disused mine workings started in 2003, thereby reducing discharges into the North Sea.
- 4.47** In the case of fluorspar tailings it was proposed in the early 1990s that they should be disposed of into the underground Milldam mine at Great Hucklow in the Peak District. However, the mine is no longer in operation and tailings are now being dewatered and used for site restoration such that the existing tailings lagoon at Blakedon Hollow near the Cavendish Mill will be able to be used continuously.

Conclusion

- 4.48** The industrial minerals which generate significant volumes of mineral waste each have distinctive characteristics, which reflect the geology of the deposits. The local consequences for mineral waste disposal are well understood and specific to each area. It is doubtful whether further national policy is required on this matter.

Underground mining: surface development and subsidence

- 4.49** Underground working of industrial minerals in England is dominated by the evaporite minerals — potash, salt and gypsum/anhydrite. High purity limestone is worked by underground methods at only the Middleton mine in Derbyshire and vein minerals are worked on a limited scale by underground methods only at the Watersaw mine in the Peak District. Small amounts of iron ore (hematite) are also extracted by underground methods in Cumbria. Ironstone was formerly mined in the East Midlands, and the last underground tin mine in Cornwall closed in 1998, although there are proposals to re-open it.
- 4.50** In all cases, the scale of surface development is only loosely tied to the amount of mineral extracted from below ground. Underground mining tends to have environmental advantages, which has resulted in MPAs often preferring this to surface working. However, the implications of underground mining operations are distinctive to each industry.
- 4.51** In the case of Boulby potash mine, there is a very substantial quantity of surface development, including a 47 m high and intrusive stack. However, the facility is to all intents fixed and unlikely to expand significantly even if underground operations are extended. Surface subsidence due to mining is minor due to the depth of working at over 900 m. However, there is concern amongst some parties that minor subsidence may exacerbate rates of coastal erosion. Research is currently being conducted on this issue by the University of Durham and Cleveland Potash to gain a better understanding of the natural and anthropomorphic influences on the coast.
- 4.52** Salt extraction falls into four categories, each with different implications for surface development:
- rock salt mining by room and pillar methods: crushing and other processing takes place underground, but there are still buildings and storage at the surface, plus a risk of wind-blown salt;
 - controlled brine pumping in which an underground cavity with carefully controlled features is created. This involves only minimal surface development in open countryside, (wellheads and pipelines);
 - natural brine pumping: this method of working is now only on a very small scale at one site and is unlikely to be approved in the future because of the risk of subsidence (and, in the only location in Cheshire, is resisted by Policy 50 of the Cheshire Replacement MLP 1999); and
 - salt mining as a subsidiary activity at Boulby potash mine (through which roadways are excavated): the surface consequences were noted above.
- 4.53** Subsidence is only a significant risk with natural brine pumping. There is a legacy of problems inherited from past operations of this kind. The zones of subsidence from natural brine pumping are unpredictable and can be considerable and dramatic (an experience particularly around Northwich in Cheshire and Droitwich in Worcestershire). With this in mind the MPA in Cheshire has indicated that for natural brine pumping it is:
- aiming to revoke old planning permissions;
 - encouraging cessation of natural brine pumping; and
 - supporting remedial measures to stabilise land affected by earlier mining.

4.54 Anhydrite is always excavated by underground methods and gypsum usually. The impacts of surface operations have not been a matter of major reported concern at the limited number of sites that have been worked by this method. Underground working is by room and pillar methods to avoid subsidence, though in some locations there are historic impacts of subsidence. For example, the Staffordshire and Stoke-on-Trent MLP notes there is a problem with ground instability associated with old gypsum workings (para. 3.98), e.g. in the old working areas of Fauld mine.

4.55 The industrial minerals worked by underground methods have features distinctive to each mineral, both in terms of surface development and subsidence implications. MPAs are familiar with the effects of developments in their localities, and we doubt that much additional assistance would be given to MPAs by additional national guidance.

Longevity of operations

4.56 There are essentially three aspects to this issue, the first two of which have been covered elsewhere:

- longevity due to the permanent nature of plant (e.g. Boulby, Cavendish Mill);
- longevity due to extensive planning permissions having been granted (e.g. kaolin, ball clay); and
- longevity due to granting more permissions for site landbanks.

Landbanks: a policy for continuity of supply

4.57 The Government's favoured policy for achieving continuity in the supply of minerals is the landbank of permitted reserves. The principle is that MPAs must grant sufficient permissions for future mineral working to ensure that the permitted reserves are adequate across a minerals industry within the authority's area to provide for at least a specified number of years' working. The size of the landbank (in years' supply) varies from one mineral to another. As the landbank is progressively depleted it is periodically replenished when further permissions are granted. The smaller the remaining landbank, the more the pressure on the MPA to grant planning applications when applied for.

4.58 Various safeguards are built into the interpretation of this policy. For example:

- the requirement to maintain a landbank is not absolute: environmental constraints and other interests do not have to be set aside if the landbank falls below the target minimum level, but the MPA will have to be clear where the mineral might reasonably be obtained;
- MPAs are not held responsible for unduly small landbanks if the industry has failed to submit sufficient applications in reasonable locations;
- there has to be pragmatism in the interpretation of landbank figures: for instance, large amounts of mineral providing for long term supply at a single site clearly do not contribute to the permissions readily available to the industry as a whole in the short term, and may therefore not assist continuity of supply.

Landbank policies for industrial minerals

4.59 Landbank policies are well established for aggregate minerals but are not standard in the industrial minerals sector. They have been introduced only for two groups of minerals: cement-making materials (in MPG 10)

and silica sand (in MPG 15). In both of these cases there is a very significant variation on the normal policy approach outlined above. For these minerals the landbank is on a site by site basis, not authority-wide, as is the case with aggregate minerals. The details are set out at some length in the two MPGs, but the key points are:

- “Mineral planning authorities should... maintain landbanks of permitted reserves of raw materials for cement plants, providing that the industry come forward with sufficient environmentally acceptable proposals. These landbanks should include the industry’s primary materials (chalk and limestone) and also secondary materials (clay and shale). There should be a landbank calculated for each site” (para. 57); and “The size of the cement industry’s landbank should be directly linked to the scale of capital investment envisaged at a site, for an important feature of the industry is the high cost of investment and the long amortisation periods this entails. Mineral planning authorities should normally aim to maintain cement plant with a stock of permitted reserves of at least 15 years” (para. 58).
- “MPAs in areas containing silica sand deposits need to make an appropriate contribution to national requirements and should therefore aim to maintain landbanks of silica sand permissions, as far as this is possible and realistic, provided that the industry comes forward with suitable applications” (para. 45); and “it is important that each production site is appropriately provided for, unless exceptional circumstances prevail. In practice this will mean that most sites will require a reasonable level of reserves. MPAs should aim therefore to ensure that landbanks of at least 10 years are maintained for individual sites. However, ...The need for the mineral must be balanced against environmental constraints and there may be overriding environmental reasons why the stock of permitted reserves at some sites may not be replenished as they are used up” (para. 47).

4.60 The policy of site-based landbanks is supplemented by policy to allow more long-lasting permissions in cases where significant investment is being made in new plant, which may only pay for itself over a longer period than a normal site landbank. The policies are:

- For cement-making materials: “Where significant new investment (such as a new kiln) is agreed with the mineral planning authority, the plant should be provided with a stock of permitted reserves to provide for at least 25 years. New plant on a greenfield site should be provided with a stock of permitted reserves lasting more than 25 years” (MPG 10, para. 58).
- For silica sand: “In the case of significant new capital investment by the industry in existing or new sites, it may be necessary for the plant to be provided with a stock of permitted reserves to provide for at least 15 years, or substantially longer than this, for greenfield sites, depending on the circumstances” (MPG 15, para. 48).

Implementation of landbank policies

4.61 A study of development plans and a survey of MPAs suggests that the national landbank policies for both cement-making materials and silica sand have been strikingly effective. MPAs have adopted policies committing themselves in most cases to providing at least the levels of permitted reserves specified in national policies. Many cement plants are already served by planning permissions which have reserves well in excess of the 15 years supply indicated in Government policy (see Mineral Planning Factsheet on Cement). In these locations the national

Right Cement manufacture requires very high levels of capital investment. Cement kilns at Hope in the Peak District.



stimulus to maintaining supplies has not yet been called-upon. However, MPAs have responded positively to the policy to maintain supplies to those cement plants with lesser reserves, and the same is true of the many more silica sand plants affected. The result has been many quarry-by-quarry policies, often addressing environmental and other difficulties associated with possible extensions (see box).

4.62 Some authorities were explicit in accepting that environmental standards would be compromised to fulfil landbank policies. Kent County Council, for example was prepared to accommodate silica sand working in the Kent Downs AONB and the adjacent county-based Area of Great Landscape Value, even though building sand proposals there would be unacceptable. Norfolk County Council similarly accepted that in practice it had issued a permission extending silica sand working as a departure from the landscape protection policies in its MLP. It is nevertheless clear in some cases that further extensions to sustain existing sites will be very problematic or unacceptable. For example, the Nottinghamshire Replacement MLP (Revised Deposit Draft May 2003) indicates that there are 3 million tonnes of silica sand remaining at a site at Ratcher Hill, providing the necessary landbank, but that reserves are likely to be exhausted by 2013 and that no further extensions are considered possible beyond existing permissions: Policy M7.6 states nevertheless that “Planning permission will be granted for silica sand extraction that seeks to maintain an appropriate landbank of permitted reserves provided they do not have an unacceptable environmental or amenity impact”

4.63 The results of cases decided at the national level in the last 15 years reinforce the emphasis of national policy. All proposals for cement-making materials and silica sand have been approved apart from a small silica sand proposal at Addington in Kent in 1996. Of the two other silica sand cases, one at Southport, Sefton decided in 2002 was a special case which turned on whether or not the proposal would adversely affect the integrity of an internationally important wildlife site in the inter-tidal zone. The second was a proposed extension to Buckland pit in Surrey, where in 1997 the Inspector’s decision placed considerable weight on the paucity of alternative supplies of the particular quality of glass sand in the site: he ruled that although there would be some harm to the Area of Great Landscape Value in which the site was situated, this would not be so significant as to preclude permission for the development. Two

major proposals for cement-making materials were decided. One was an extension to Grange Top Quarry, Rutland to serve Ketton cement works: the MPA wished to keep the cement works in operation, but were unable to persuade the Inspector that the other alternatives could supply the quantity of mineral required or have any less environmental impact. The other was a new cement works, and associated minerals, at Snodland in Kent, approved in 2001 after two inquiries. Kent County Council had actively supported the scheme as the best solution, despite its enormous impact, though it had been opposed by Medway Council, the other MPA for the site.

- 4.64** National policy on landbanks is driving the continuity of supply of cement-making materials and silica sand by ensuring that reserves with planning permission are replenished. By focusing on landbanks at the site level, this policy has encouraged extensions rather than new sites, so the latter are infrequent. The objective of continuity of supply has been met. Recent patterns of development have inevitably reinforced historic patterns of working, with some sites being sustained despite what are now viewed as significant adverse effects of working. It is possible, though not capable of being proved, that this has significantly delayed the move of these two industries to less damaging locations. A more positive approach to long term forward planning might be able to bring this about.
- 4.65** Landbank policies for cement and silica sand have worked effectively. However, it should be noted that the cement industry, in particular, considers that a landbank of 15 years for established works and 25 years for new works has not kept pace with the high capital costs of improving the technical and environmental performance of existing plant and building new plant. Continuing investment at existing plant can be several million pounds a year and a large modern plant can cost over £150 million (see Mineral Planning Factsheet on Cement). Landbanks for cement raw materials in England are low by international standards.

Maintaining a site-based landbank

The Staffordshire and Stoke-on-Trent MLP 1994-2006 notes that Moneystone Quarry, at Oakamoor had silica sand reserves of 5.19 million tonnes in July 1998 (sufficient for 13 years), indicating a shortfall in the landbank towards the end of the plan period. Policy 56 provides "The landbank for silica sand for use as a raw material at the Moneystone Processing Plant only will be 10 years", but 'given the environmental sensitivity of the local area', "the maintenance of the landbank will depend on the availability of sites capable of being worked without causing an unacceptable adverse impact" (para. 11.19). Because of the quarry's national importance, a 'Proposal 7' identifies land with proven reserves (5.1 million tonnes over 26.5 ha) to serve Moneystone, even though this is within a Special Landscape Area and has a number of environmental constraints. The land is termed an 'area of search' as there is some uncertainty over its availability. Planning applications would be required to satisfy the environmental criteria of Policy 57, which is again specific to Moneystone Quarry.

Maintaining supplies of a variety of mineral qualities

- 4.66** For some industrial minerals, a number of different qualities may need to be available simultaneously, either because a blend of different materials is required to meet a customer's specification, or because different qualities have different end uses (or a combination of the two). The main minerals for which this is a relevant issue are: silica sand, high purity limestone, dolomite, ball clay and kaolin.

4.67 Numerous ball clay and kaolin sites and working areas within sites are in production at the same time for blending purposes. This is properly recognised in the development plans affecting these scarce resources:

- In Cornwall in 1998 there were 17 active china clay pits and a greater number of related tips in the St Austell area. The MLP (1998) comments that these operational elements have “complex and changing interrelationships, the clay being brought to central collecting and refining plants for processing and blending. The quality and type of clay varies spatially, so production must be maintained at a large number of pits to guarantee this variety, needed for specific uses and blending” (para. 7.8);
- The Dorset Minerals and Waste Local Plan 1999 notes that 16 different grades of ball clay are used, explaining why so many sites need to be open simultaneously;
- The Devon MLP noted that distribution of the various ball clays within the Bovey Basin in Devon was not in proportion to their current rate of utilisation, adding to the planning difficulties (Proposed Modifications 2003, para. 8.13.7).

4.68 Silica sand is effectively a series of different sands with different properties. Different sands may be required for their chemical properties (particularly according to the quantity of different impurities present) or their physical properties (grain size, grain shape, consistency of size or shape), or both. There are many silica sand workings around England, but the need for different qualities of sand for different purposes means that different sites cannot necessarily substitute for each other. Government policy in MPG 15 notes that “It will be important to have regard to special factors, for example, some industrial consumers may necessarily be exclusively dependent on a single source of supply” (para. 51) due to the specific qualities of the deposit.

4.69 Silica sand is the one industrial mineral where the significance of different qualities of deposits is not always reflected in development plan policies. This does not necessarily mean that MPAs are unaware of the significance of different qualities, but lack of attention to variability in the mineral in detail may be a consequence of the more simple policy requirement to maintain a landbank at existing sites. Fortunately, there is recognition of quality issues in the plans for key supplying areas. Norfolk, Staffordshire and Kent have development plan policies which refer explicitly to the quality of mineral as a consideration and some other supplying MPAs mention quality issues in the supporting text of their plans. However, neither of the MLPs for Cheshire or Bedfordshire, both important supplying areas, mention qualities of sand. There is more discussion of silica sand qualities in the section reviewing the potential for end use control (see paragraphs 4.167–4.189).

4.70 High purity limestone is available in principle from substantial areas of the Carboniferous Limestone in northern England, and there are substantial permitted reserves in many localities. For one of the main producing areas, the Derby and Derbyshire MLP 2000 indicates the wide variety of end uses to which the mineral is put, quarry by quarry. However, it goes on to note that “because of the wide diversity of these markets and the chemical variability within some deposits, shortages in the availability of some particular qualities of mineral may occur, giving rise to needs which may not have been predicted and for which provision is made in Policy MP25.”

4.71 With the exception of silica sand in a few localities, there is generally a well-understood and formally recognised differentiation between different qualities within industrial mineral types. Where the minerals industry

or its customers are concerned that their demands for minerals having particular qualities may not be fully appreciated by MPAs, then they should take steps to remedy this appreciation. This does not appear to be a matter on which any further Government advice is required, though the point could be clarified more emphatically in general guidance on planning for industrial minerals.

Restoration issues

4.72 The section on mineral waste disposal noted the difficulty of restoring kaolin pits due to the risk of sterilising reserves at depth and also the need to maintain many sites open for blending purposes. Pits are released for infilling only infrequently, and tipping therefore takes place on other land. The enormity of the restoration problem in kaolin areas is difficult to convey: this is both an historic legacy problem (noted in the subsection below) and an ongoing problem. However, following on from the UK Biodiversity Action Plan, attention is now being given to lowland heath restoration through a joint venture — the Cornwall Heathland Project — involving the two kaolin producers, IMERYS and Goonvean, and English Nature, Cornwall County Council and the Heritage Lottery Fund. A Tipping and Restoration Strategy, which was a joint exercise carried out by the industry and the MPA, was principally to consider the long term issues associated with tipping requirements, landform and after-use. It now forms part of supplementary planning guidance and incorporates the above initiatives in its consideration of after-uses. Similarly in Devon, the intention is that in future the tip form and after-use would provide a positive benefit to the environment of the area (Devon MLP, Proposed Modifications 2003, para. 9.5C.3). Whilst the main part of the plan is quite reserved in its comments on restoration, the proposals accompanying the Inset Map for the kaolin area make some clear suggestions.

- “The MPA will pay particular attention to the need for high quality restoration and landscaping of the workings due to the scale of the operations and the proximity to the National Park.” Proposal: Inset 38.1
- “The MPA will encourage the increased use of the china clay sand as a source of secondary aggregate.” Proposal: Inset 38.5.
- “In considering any new proposals for the disposal of china clay waste, the MPA will encourage the backfilling of disused pits in order to reduce the impact of tipping above ground, and to secure the reclamation of disused pits or parts of pits, and where such backfilling does not sterilise mineral or otherwise prejudice their working.” Proposal: Inset 38.5.
- “The MPA will encourage the development of best practice for the design, construction, landscaping, restoration and aftercare of all china clay working and tipping sites, including the re-profiling of existing tips.” Proposal: Inset 38.7.

4.73 Comparable benefits for habitats and informal recreation are being sought where possible in the restoration of ball clay sites in Devon and Dorset. In Dorset, ball clay sites have been restored to heathland for a number of years, including experimental work on wet heathland restoration.

4.74 Controlled solution mining of salt produces an underground cavity which may be used for storage. These cavities may also be designed for natural gas storage. This form of ‘restoration’ or after-use may have damaging environmental consequences because of the amount of associated development at the surface. The forthcoming Secretary of State decision at Holford is likely to comment on the weight which should attach to the

use of solution cavities for gas storage. National policy should clarify when, in principle, gas storage is an acceptable afteruse of cavities created by controlled brine pumping. Solution cavities in salt may also be required for gas storage in areas where there is no market for the salt/brine (see Mineral Planning Factsheet on Salt).⁷

- 4.75** Quarrying for carbonates is often on a very large scale and creates substantial difficulties for the restoration of the large voids left behind. There are various initiatives to address the problem. The Peak District National Park Structure Plan 1994 (para. 8.11) refers to investigations into how rock blasting techniques can be adapted to leave final rock faces in a form which will merge more readily into the landscape and simulate as closely as possible the natural rock faces which are typical of limestone dales. The problems faced in restoring these quarries are the same as those faced when restoring the more numerous aggregates quarries in carbonate rocks: there is nothing specific to industrial minerals to which attention should be drawn, significant though the issue is.
- 4.76** A selection of other restoration problems at specific sites and in specific localities are noted for each of the industrial minerals, but these do not suggest themes which require national advice in addition to the attention already being given to them locally by MPAs. In addition, the industry has made, and continues to make, real improvements in restoration standards. It is therefore concluded that, important though the restoration difficulties are which face a number of industrial minerals, national policy would be likely to add little to local understanding of the issues in most cases. Only in respect of the acceptability of gas storage in salt cavities created by controlled brine pumping would a commentary be helpful.

Dereliction from earlier operations

- 4.77** The main problems facing MPAs arising from industrial mineral activities in the past concern kaolin, ball clay, metalliferous minerals, salt (natural brine pumping), and to a much lesser extent gypsum. The impacts of natural brine pumping on restoration were outlined in the section on 'underground mining: surface development and subsidence'. Likewise, most of the restoration problems associated with mining for gypsum/anhydrite are associated with historical subsidence and were noted in the same section. However, the Replacement Nottinghamshire MLP (Revised Deposit Draft 2003) notes also a problem with inherited ugly overburden spoil heaps, of a kind not now allowed (para. 10.7).
- 4.78** The Cornwall MLP acknowledges that extensive areas of former derelict kaolin workings have contributed to a degraded landscape. Restoration has historically been tackled piecemeal. The legacy of old permissions with no or inadequate restoration conditions can now be tackled through the legislation covering the review of old mining permissions, but even so the previously described characteristics of the industry's operation preclude simple solutions. Few pits have been exhausted and made available for backfilling. Furthermore, there has also been intensification of the use of many existing tipping areas, which has led to steep slopes and, with the sterile nature of the materials, severe conditions for establishing vegetation and after-uses. The Devon MLP (Proposed

⁷ In May 2004 the First Secretary of State and the Secretary of State for Trade and Industry decided to grant planning permission to Scottish Power UK PLC and Scottish Power Gas Ltd to create underground cavities for natural gas storage and associated infrastructure at Holford Brinefield. In making their decision, the Secretaries of State considered that the proposed development is supported by national energy policy as it provides for a type of gas storage, which will add to the security of supply, and have a beneficial impact on the traded market for gas. The decision is now the subject of a claim before the High Court.

Modifications 2003) are equally clear that the overall effect of historic tipping has had an extensive influence on the moorland landscape: "Although the stark appearance of the tips does mellow with time, they are generally an intrusive part of the landscape with incongruous slope textures and footprints" (para. 9.8.7). The problems caused by ball clay workings are not as severe.

- 4.79** There are estimated to be 3 900 ha of metalliferous spoil heaps in Cornwall (Cornwall MLP para. 11.4). A Cornwall Land Reclamation Strategy has been prepared to tackle them (para. 11.15), but the problem is daunting. Some of the many abandoned tin mines in Cornwall continue to have adverse impacts on the environment, sometimes spectacularly (e.g. with the well known discharge of mine water from Wheal Jane mine in 1992). Some spoil heaps in Cornwall and elsewhere have biodiversity and archaeological interest and may be designated as such. There is similar interest in former lead mining sites in the Peak District.
- 4.80** Inherited dereliction remains, in varying degrees, a reminder of the poor operational standards of earlier mining activity. The legacy from working industrial minerals is well appreciated, even if the solutions are sometimes remote. However, it is questionable whether further policy would assist the management of this issue.

PLANNING ISSUES BY THEME

The 'need' for minerals: creating wealth

- 4.81** Minerals play a fundamental role in underpinning growth in the economy and contributing to the UK's high standard of living. Continuing supplies are thus essential for the sustainable development of a modern economy. The Department of Trade and Industry (DTI) has responsibility within Government for the sponsorship of energy and non-energy minerals, including the industrial minerals sector. The role of the DTI in these areas is to seek to enhance the productivity and competitiveness of UK industry in order to maximise wealth creation and promote continuing sustainable economic development and investment, regionally and nationally.
- 4.82** The Department have stated that the concept of 'national need' which has historically been advanced to underpin local and national policy for industrial minerals extraction, is ambiguous and does not fit with the current policy framework. Minerals, like other goods and finished products, may be traded globally and there are no subsidies (except for deep-mined coal through Investment Grant Aid) or national stockpiles to support indigenous production. The UK has a large demand for industrial minerals that underpins a broader manufacturing industry, both in the UK and elsewhere (see paragraphs 3.1–3.27). Indeed in some cases consuming industries would be at a competitive disadvantage or disappear (close or relocate abroad) if they could not source mineral locally in the UK. Thus mineral operations create economic and social benefits for the local and wider community in line with wider sustainable development practice. The DTI considers that there should be a presumption in favour of granting planning consent for mineral extraction in most cases, unless the relevant environmental impact cannot be mitigated satisfactorily. Planning decisions on the extraction of industrial minerals should be based on a careful consideration of the economic importance of the proposed development including the investment decisions of consuming industries.
- 4.83** Wealth creation and productivity are increasingly being placed at the centre of political attention. The EU is currently carrying out preparatory work for a quantitative assessment of the competitiveness of the EU

non-energy minerals extractive industry. It is hoped that the results will help to identify policies and actions which would contribute to enhancing the competitiveness of the industry.

4.84 The extraction of industrial minerals inevitably leads to some adverse environmental impacts. These impacts will vary depending on the mineral being worked and its location, but in all cases will need to be minimised. The costs of mitigating these impacts and ensuring that satisfactory restoration takes place rightly falls on the mineral operator. This is in line with Government and EU policy on producer responsibility. However, it is rarely possible to mitigate all the adverse impacts of extraction, such as visual intrusion and transport; even the most innovative (and costly) restoration scheme cannot return a site to its original condition. This does mean, therefore, that there will be occasions when the environmental impacts of mineral extraction are not outweighed by the economic advantages. It is the role of the planning system, through the Mineral Planning Authorities, to attempt to balance the competing demands of development and environmental protection.

4.85 In considering the wealth creation issues of mineral extraction in cases where the environmental impact cannot be mitigated satisfactorily, the DTI have suggested a checklist, which MPAs should consider in assessing planning applications for industrial minerals (see Annex C). These are;

- (i) Will the development make use of the existing extraction infrastructure for example processing facilities?
- (ii) To what extent will the project add value to the local economy relative to alternative employment opportunities? Will new jobs be created, or others safeguarded? Will business opportunities for local firms (e.g. supply of contract services) be generated that otherwise would not arise?
- (iii) What is the impact on customer industry sectors in the UK and elsewhere e.g. how critical is the particular quality/properties of the materials being extracted, will it enable users to operate in the UK resulting in additional wealth creation opportunities for the UK.

Implications for mineral planning

4.86 Mineral planning authorities are experienced at sustainability appraisal and assessing the environmental impacts of mineral development proposals, but have not generally examined the economic merits in as much detail as is proposed here. If assessment of economic issues is to be improved, then MPAs will need information and advice. The applicant can provide some of this, but independent input will also be required. In order to assist in this process, the criteria set out above can be refined and 'local economic effects' and 'wider economic effects'.

- (i) Local economic effects

4.87 The following economic questions are local matters which the MPA is well placed to answer:

- What is the structure of the local economy?
- To what extent will the project benefit employment in the local area?
- Will local businesses benefit from the activities of the mineral extractor?
- Will the development make use of existing extraction infrastructure?

- 4.88** These questions are more detailed than would typically be asked of other kinds of developer (such as house builders and commercial developers). They also elevate the importance of the localness of economic benefit. This is generally more relevant in rural areas than in urban areas. In rural areas the choice will often be simply between a development proceeding or not proceeding, whereas in most urban areas there will be alternatives for the use of land if one particular development does not proceed.
- 4.89** MPAs' responses to the answers to the groups of 'local' questions will be affected by the likely choice of alternative locations for similar development. The adverse economic effects of resisting a development which would otherwise not happen at all would be different from the adverse effects of resisting a development which would otherwise in all probability come forward at an alternative rural location.
- 4.90** A study of development plans and a survey of MPAs demonstrated that they are likely to examine carefully the main local economic issues raised by mineral proposals. The following examples illustrate the importance attached to the maintenance of local industrial minerals activities:
- The enormous importance of the kaolin industry to Cornwall (one of England's most economically depressed counties) and to a lesser extent to Devon is emphasised in development plans. The Cornwall MLP 1998 notes that this industry contributes about £250 M/y to the balance of payments and £130 M/y to the local economy (para. 7.3). The Devon Structure Plan First Review comments that over half the 1,650 people employed in the minerals industry in Devon are in the china and ball clay industries (para. 8.155). An estimate of their contribution to the local economies of Devon and Cornwall is c£150 million in 1997 (para. 9.6.2) — suggesting c£20 M/y attributable to Devon.
 - The report *The Economic Importance of UK Ball Clay* indicates that direct employment in the ball clay industry is 470, with a further 480 jobs generated indirectly.
 - The East Sussex and Brighton & Hove Structure Plan 1999 identifies the importance of the various gypsum-related operations around Mountfield, which employ about 200 people and form one of the largest industries in the plan area (para. 6.7);
 - The North York Moors Local Plan Review 2003 comments on Boulby potash mine that "With the very large number of people employed at the mine [over 800] any refusal would potentially have a serious effect on the local economy and this is also a matter which national guidance states should be taken in to account" (in support of Policy M1).
 - The Kent MLP for Chalk and Clay/Oil and Gas 1997 noted that the Rochester and Northfleet cement works were the two largest in the South East region and the industry as a whole employed over 900 people.
 - The County Durham MLP 2000 accepts that where it is important to maintain employment there may be a justification for extensions to existing quarrying operations even if there is no established local need (para. 4.15). This was perhaps reflected in the extension given to Eastgate Quarry, even though the Weardale cement works which it served closed only two years later.
- 4.91** Some MPAs have positively aimed to attract new mineral development as a means of creating employment and local wealth. In particular, the Cumbria Minerals and Waste Local Plan 1996–2006 (2000) notes that solution mining of a salt deposit below the Walney Channel took place at

the end of the 19th century. Although there is currently no salt working in Cumbria, the MPA strongly supports the recovery of this salt, mainly because this would create about 100 jobs directly and more indirectly (para. 5.17.2). Policy 47 supports the establishment of salt mining in this location.

4.92 An MPA's treatment of the answers to these 'local' groups of questions will necessarily be influenced strongly by the size of the development. For example, the local employment effects of refusing a development which causes a major local employer to cease trading will obviously weigh more heavily than if only a modest number of jobs would be lost. Again, the likelihood of those jobs being replaced by investment in a similar operation within commuting distance of the operation threatened with closure would also be a consideration. The location of an operation in a rural area where alternative employment opportunities may be poor may also be relevant. There are plenty of examples of mineral operations being refused on environmental and other grounds, including on appeal, when the local economic benefits have been found to be modest and therefore did not weigh especially heavily in the decision. A notable example was the Secretary of State's decision to refuse permission for the extension of fuller's earth working at South Wavendon Heath in Bedfordshire in 2002. The Inspector took the view that local employment (at 27) was not a significant issue (paras. 7.78–81), and the matter did not feature as a determining issue in the Secretary of State's decision.

4.93 So far as the continued use of local infrastructure is concerned, there has been a well-established interest in mineral planning in maintaining continuity of mineral supplies to existing plant where practicable. Processing plant is not only often expensive to move, but may sometimes have associated transport infrastructure which it would also be undesirable to lose (though equally there are some sites with established but very poor transport links). The merits of extensions to existing mineral operations compared with relocation to new sites, including this topic, were discussed in an earlier section.

4.94 Some MPAs have policies devoted specifically to sustaining existing investment in plant. For example, the Norfolk MLP 1996 includes Policy MIN 30 on silica sand, which provides that "In the Leziate area... the County Council will seek to maintain an adequate level of reserves to supply the industrial plant on the site where this is appropriate in environmental terms. Extensions to the working will only be approved where they are part of a phased development, restoration and after-use programme for the quarry complex." The mineral operations in the area also help sustain the local railway line, which has social value beyond its economic merits for distributing silica sand.

(ii) Wider economic effects on downstream industries

4.95 In addition to the local economic importance of industrial minerals, consideration must also be given to their importance as essential raw materials for a wide range of downstream industries, including manufacturing, construction and power generation, and also specialist process aids. Important considerations are:

- the importance of these downstream industries to the UK economy;
- the importance of indigenously produced minerals to the competitiveness of these industries; and
- the number of jobs that may be at risk if there were interruption or termination in the supply of indigenously produced minerals.

- 4.96** For most proposals for industrial minerals, these issues will be at least as important as the local ones, and probably much more so.
- 4.97** MPAs are likely to have considerable difficulty trying to answer some of the subsidiary questions posed for any particular industrial mineral proposal, such as:
- What is the impact on customer industry sectors in the UK and elsewhere?
 - How critical is the particular quality/properties of the materials being extracted?
 - Will it enable them to operate in the UK resulting in additional wealth creation opportunities for the UK?
- 4.98** These difficult questions are some of the most important which MPAs will need to address on the demand side. The theme that underlies them is the case for a reliable continuity of supply of the qualities of minerals which industries need. Clearly the best which MPAs can do for the industrial minerals industries is to grant the planning permissions applied for. The greater difficulty is in appreciating the consequences if permission is refused. MPAs must therefore have a reasonably clear answer to the question 'what will happen if a particular proposal is refused'? This issue might best be addressed by breaking it down into the following questions:
- Would another site be used or proposed instead, and if so is that environmentally better or worse than the current proposal?
 - Would the mineral be imported from overseas?
 - Would the consuming industry use a different mineral specification instead?
 - Would the manufacture of mineral products cease or relocate overseas (as well as the mineral supply)?
 - If permission was granted, what would be the likelihood of these alternative arrangements coming about in any event – in other words, to what extent are planning decisions critical to the future of industry?
- 4.99** MPAs will need to appreciate the position of a proposed mineral operation within the framework of the downstream industries which it serves. This kind of study, like the study of local economic effects, is more detailed than planning authorities generally would expect to undertake for other major development proposals. In practice, the applicant will wish to make the economic case for development and so present much of the information which an MPA needs. The MPA will need to have or to obtain the expertise necessary to analyse this economic information.
- 4.100** The information presented in the accompanying Mineral Planning Factsheets (see Annex A) include an overview of the economic importance of each mineral and how they relate to downstream industries. It is proposed that these Factsheets be kept up-to-date so that they provide a continuing source of reference. However, more detailed studies on the economic importance of each mineral may also be necessary. These might be on the lines of the report on *The economic importance of UK ball clay*, which was produced in 2001 on behalf of the DTI and Kaolin and Ball Clay Association.
- 4.101** On the criteria presented above, greater weight would generally be given to sustaining those businesses (mineral suppliers and consumers) which

contribute most to the economy. However, it is smaller businesses which are likely to be better placed to show that denying them a particular source of mineral will damage or even eliminate their viability. It would then be the planning system rather than the marginal viability of an industry which may be held to have taken the business to the edge (or over it). The message from the economic criteria we have adopted is that that would be an unfair analysis. The planning system is not a back-door social handout to weak industries: the Government has other means of stimulating business sectors it considers important, without compromising the planning system.

Other economic considerations

The costs of planning regulation to mineral companies

- 4.102** A number of firms have indicated that the real economic difficulty they face in obtaining planning permission is the cost of preparing supporting material for planning applications and, if necessary, appearing at public inquiries. Improved information would enable a more cogently argued judgement to be made by the MPA.
- 4.103** The House of Commons Select Committee on the ODPM has recently examined the economic impacts of the planning system on business and recognised that there can be a real problem for small businesses, especially occasional users of the planning system who are unfamiliar with it. The Committee recommended “that the Government should place particular emphasis on supporting small businesses’ interaction with the planning system, as there seems to have been little consideration given to the needs of such businesses. This is an area where the Small Business Service could promote proactive measures” (*Planning, Productivity and Competitiveness*, January 2003, para. 30). The Government agreed, and a guidance booklet for small businesses has been revised, but none of the other steps taken or in prospect will have any significant bearing on the compliance costs of mineral companies with planning regulations.
- 4.104** It would be quite wrong to compromise the even-handedness of planning requirements in response to the difficulties faced by small mineral businesses. To the extent that the Government considers it appropriate to alleviate the difficulties of the regulatory compliance costs these firms face, assistance should be provided by other mechanisms. One possibility might be to have lower planning fees to accompany planning applications submitted by smaller businesses, unless this would fall foul of rules on economic assistance to businesses. However, there is currently no precedent for this in the planning process. There is also a risk that small businesses might subsequently be taken over by larger ones, so the benefits originally intended for small businesses would accrue to larger ones. If the Government considered that small mineral companies contribute disproportionately to a wider national interest, and that this should be formally appreciated, then a way of effecting assistance in a legally admissible and reliably effective manner would need to be found.

Planning for competitiveness

- 4.105** The planning system concerns itself with the broad economic effects of development, but not with the specific interests of individual firms. It could not legitimately grant permission for a development specifically to improve the competitive position of any particular business. The credibility of the system depends on even-handedness and on consistent application of policy relevant to the use of land. This means that claims by mineral companies that adverse planning decisions will threaten their business will have a bearing insofar as matters such as local employment and local/downstream economic activity are concerned, but not

insofar as an individual company's viability is concerned. A general support for competitiveness in British industry does not inevitably mean that monopolies should be prevented by the planning system.

- 4.106** Competition issues were argued at a public inquiry into a proposed ball clay operation at Newbridge, Devon, decided by the Secretary of State in 1998. The suggestion was made that, if permission was not given, one firm would be forced out of the locality, leaving the market to another supplier who would be in a dominant position. The Inspector dismissed these arguments. First, planning policy in PPG1 was quite clear that the planning system does not exist to protect the interests of one individual or a group of individuals over those of another. In addition there was no compelling evidence that refusal would cause the appellant to cease operating or, if it did, that another firm could not win the resource on the appeal site, and fill the gap left in the market. There would be no inevitable loss or sterilisation of the ball clay resource in this case if permission was refused.
- 4.107** The Inspector secondly drew the reverse conclusion from the arguments presented by the appellants. Competition between the main suppliers in the area, (the appellants and another firm), was indeed holding down prices. However, this limited the on-costs which could economically be borne by ball clay working (e.g. to overcome environmental difficulties). Furthermore, although the risk of a dominant supplier appearing might argue for permission to be granted, a dominant supplier's ability to raise prices would be controlled by the import price, and the implications for British industry on a wider scale would be unlikely to be marked. The Secretary of State 'fully agreed' with this analysis.
- 4.108** The third aspect of the Inspector's conclusions noted that there was an agreement in force between the two local suppliers such that where there was a mutual interest the companies would co-operate to maximise the winning of a resource. Following an analysis of the effects of the agreement insofar as it impinged on the proposed site for development, the Inspector concluded that "having regard to the greater emphasis placed on safeguarding the environment and ecology today, I do not think it is acceptable to continue sanctioning the ad hoc arrangement that currently exists, and which involves fuelling the competitive element of two companies at the expense of the historic environment." The Secretary of State did not comment on this point, as he did not consider it a 'main argument'.
- 4.109** These arguments are significant as the consolidation of the minerals industry into progressively fewer companies continues. In effect, the Competition Commission will aim to prevent the creation of monopolies by takeover, but the planning system has other issues to take into account when considering planning applications which may result in local monopolies emerging. The competition issue need not necessarily be the determining one for the planning system.

Maintaining 'strategic' reserves

- 4.110** The concept of 'strategic minerals' originated in the era of the Cold War. They were defined as minerals and metals that were both critical to a manufacturing sector and vulnerable to interruptions in supply. Military requirements were relevant but not dominant. By definition they were minerals for which there was no domestic supply and had to be imported. None of the industrial minerals considered here are, therefore, strategic minerals. This is not the case in other countries and the US Defense National Stockpile still contains 250 000 tonnes of fluorspar, in which the US is deficient. The UK maintained a small stockpile — about three months' supply — of a number of strategic metals (as both metal ores

and refined metal) from 1983 until 1996, during which period they were progressively sold off.

- 4.111** Since the global market is assumed to be able to supply minerals to customers without significant risk of any interruption due to political factors, the idea of 'strategic minerals' is no longer considered appropriate by government. Nevertheless supply shortages could arise for other than 'political' reasons. For example, China has for several years dominated the world supply of a number of metals and industrial minerals, such as tungsten, magnesium, fluorspar and barytes. Any curtailment of exports of these materials caused by rising domestic demand driven by China's high rate of growth could significantly disrupt world markets. This is illustrated by the decrease in Chinese exports of fluorspar in recent years that has put upward pressure on prices.
- 4.112** However, security of supply issues are not solely confined to overseas sources of minerals and some consumers of domestically produced minerals do have concerns about continuity of supply. The term 'strategic' has, therefore, also been applied to indigenous minerals, the supply of which is deemed to be of vital importance to a particular sector of UK industry. Fluorspar for the fluorine chemicals industry and industrial dolomite for steelmaking are examples. However, as stated earlier, the concept of 'national need' and 'strategic' minerals does not fit with the current policy framework. This is not to say that in some cases a mineral might be of strategic value to a company, as opposed to the nation as a whole. In the past there were many examples of manufacturing companies having their own indigenous source of supply to provide a degree of security. However, this is far less common today as companies seek to confine their interest to 'core' activities.
- 4.113** One suggestion that has been proposed is that mineral should be kept in the ground as insurance against some perceived, but as yet undefined, future shortage. The proposal has mainly been made in respect of fluorspar. Such a proposal is ill-conceived because of the difficulty and cost (who would pay?) that proving sufficiently large deposits would entail with no guarantee that a future market would be available. In addition markets for minerals evolve and demand changes. There are many examples of minerals, for example iron ore, coal, and naturally-bonded moulding sand, where if this approach had been adopted the investment made would have been wasted.
- 4.114** Whilst there is no case for maintaining a strategic reserve of key minerals, it is important to stress that this is significantly different from keeping future options open by safeguarding possible deposits and by long term planning. Maintaining a strategic reserve involves at the very least the identification of a known workable deposit, requiring significant upfront investment. Safeguarding, on the other hand, involves far less preemptive expenditure and aims to postpone rather than take strategic decisions (see paragraphs 4.151–4.166).

Balance of payments

- 4.115** The contribution of domestic minerals to the balance of payments, either directly by exports or indirectly by moderating the need for imports, has historically been an important issue in planning for industrial minerals. It has been a material consideration weighing quite clearly in the balance when decisions have on some occasions been taken to approve mineral working despite damaging environmental consequences.
- 4.116** This view no longer prevails in Government and contribution to the balance of payments is no longer considered to be relevant. Under current economic thinking it is the creation of wealth in the UK which is the key

issue. This is best served by using the cheapest source of minerals of the required quality rather than necessarily a domestic source.

THE ENVIRONMENTAL EFFECTS OF MINERAL WORKING

Transport

- 4.117** A recurring theme amongst MPAs affected by industrial minerals operations is the desirability they attach to replacing road movement of minerals by waterway, pipeline and, above all, rail. Some of the most serious impacts of mineral working arise from mineral transport, particularly from the processing plant to customer, but also in some cases from quarry to processing plant. Rail, waterway and pipeline are attractive in principle when large volumes of mineral are to be moved from a point source to a point destination on an ongoing basis. Mineral companies supplying large numbers of customers with small quantities of mineral, or on an intermittent basis, may find road transport the only realistic option. So far as railways are concerned, establishing a railhead at the processing plant site is clearly a necessary first step, but equally it is necessary for customers or suppliers to be also rail-connected.

Current use of non-road transport

- 4.118** Waterways are not generally used to transport industrial minerals, though Northfleet cement works on the Thames Estuary has the facility to import and export by sea. Chalk slurry is moved by pipeline from Kensworth Quarry in Bedfordshire to Rugby cement works in Warwickshire and clay slurry is pumped beneath the Thames from a site in Essex to the Northfleet cement works.
- 4.119** A number of industrial minerals sites are rail-connected and the current position is summarised in paragraphs 2.31–2.41. The experience of recent years is a net reduction in the number of sites using this mode. Government policy encourages the use of rail transport for cement: “The industry should keep under review the options for using rail transport and use it in preference to road transport wherever it is cost effective to do so...” (MPG 10, para. 53). However, rail-connected cement works have closed at Masons, Suffolk; Rochester, Kent; and Weardale, Durham. Others have ceased using their rail connections (e.g. Ribblesdale, Lancashire). Conversely, there has been interest in connecting Cauldon, Staffordshire to the rail network.
- 4.120** MPG 15 on silica sand also offers qualified support for encouraging a switch of silica sand from road to rail (paras. 73–77). However, only the King’s Lynn site is directly rail connected, and there remain strong economic, as well as practical disincentives to a greater move to rail. Two quarries in the Yorkshire Dales National Park capable of selling limestone for its high purity are already rail-connected, at Swinden and Horton.
- 4.121** Two industries make minimum use of road transport: potash and kaolin. Potash movement by road is limited by condition to 150 000 t/y. In fact 90% of the potash output (1 Mt) is being sent by rail to Tees Dock for either export or final delivery to customers in the UK by road. For the kaolin industry, there is a modern arrangement of pipelines, railways, internal haul roads, and conveyors as well as use of public roads. The Cornwall MLP (2000) comments that “Given the enormous quantities of materials extracted and moved within the area, a surprisingly small proportion finds its way onto the public highway” (para. 7.17). Nevertheless, a significant volume of clay-related traffic still uses the public road network. This includes not only employees, maintenance, supplies and equipment, but increasingly the haulage of china clay waste to supply

aggregates to the local building and construction industry (para. 7.19). In addition, china clay waste is being moved by sea to markets in the South East. Disused railways lines might be reopened in future, so both they and lines for road improvement and railway realignment are safeguarded, by Policy CC7.

Prospects for rail transport

4.122 Many MPAs have development plans which express an encouragement in principle for minerals movement by rail, waterway, pipeline or conveyor, but few have taken a proactive approach to the issue. Real interest has, however, been expressed in a few cases:

- The Staffordshire and Stoke-on-Trent MLP 1994–2006 indicates that any increase in output at Moneystone Quarry above 400 000 t/y “may necessitate further highway improvements and/or the utilisation of nearby rail facilities. The transportation of materials by rail should in any event be fully investigated prior to any further applications for extensions or increased output at the quarry. This should include an independent assessment of the viability of rail use, to be commissioned by the quarry operator” (para. 11.25).
- Cumbria County Council’s supports in Policy 45 of its MLP (2000) a quarry at Stamp Hill if there is an insufficient supply of desulphogypsum: there was a larger permission from 1991 here which lapsed, but the new permission would be conditional on transport by conveyor to the Kirkby Thore plasterboard works.
- The East Sussex and Brighton & Hove Structure Plan 1999 Policy MIN12(c) states: “the import of desulphogypsum by rail for processing at Robertsbridge Works will be supported where the need is demonstrated.” Policy 28 of the East Sussex and Brighton & Hove MLP 1999 “supports the retention of the rail link to the Robertsbridge Works and wishes to encourage its fullest use for all appropriate importing and exporting operations associated with mining and production activities.” This seems to be aimed particularly at rail transport of the gypsum products, which currently all leave by road even though the railway used to supply Thameside cement plants (para. 6.9).

4.123 A strategy to improve the transport planning of the whole of a minerals industry has been put forward for ball clay in Devon. Most movement of quarried ball clay for processing and processed material to market or export is by road, and the MPA recognises the importance of continued road transportation. However, Devon County Council is seeking through its MLP (Proposed Modifications 2003):

- movement of ball clay by rail to UK destinations (Statement of Intent S9);
- safeguarding of disused rail heads and existing rail links (para. 8.14.15);
- road improvements, notably construction of a realigned B3193 (Statement of Intent S10);
- consideration of ball clay transport by conveyor systems (Policy MP32);
- encouraging industries which use ball clay to locate in or adjacent to the Bovey Basin (para. 8.14.16);
- continued use of Teignmouth Docks for export (as ball clay provides half the port’s business), including investigating a new railhead at the docks (para. 8.14.16).

- 4.124** Some MPAs are working to improve the prospects for non-road transport of industrial minerals, and many more would like this switch to happen but feel constrained by the realities of the market. This appears to us to be an area where long term planning could offer realistic opportunities for improvement.

Landscape

- 4.125** National policy giving recognition to special landscapes is expressed through the designation of National Parks and Areas of Outstanding Natural Beauty (AONBs). National Park designation confers the highest status of protection as far as landscape and scenic beauty is concerned. However, National Parks have a more all-embracing environmental standing, with PPG 7 stating that “Conservation of the natural beauty of the countryside, and of its wildlife and cultural heritage, should be given great weight in planning policies and development control decisions in the National Parks, the Broads and the New Forest Heritage Area” (para. 4.5). The paragraph goes on to state, with particular relevance to working industrial minerals, “Special considerations apply to major development proposals, which are more national than local in character. Major development should not take place in the National Parks, the Broads and the New Forest Heritage Area save in exceptional circumstances.” Matters to be assessed are then listed.
- 4.126** The primary objective for the designation of Areas of Outstanding Natural Beauty is conservation of the natural beauty of the landscape. PPG 7 again sets out national policies to be applied in these areas, stating that “It would normally be inconsistent with the aims of designation to permit the siting of major industrial or commercial development in these areas. Only proven national interest and lack of alternative sites can justify an exception” (para. 4.8). In relation to major projects this has been amplified by an announcement by the Secretary of State that the assessment required by PPG 7 para. 4.5 in respect of National Parks will also apply in AONBs (Parliamentary Written Answer on June 13, 2000). PPG 7 goes on to say that “Applications for new mineral workings, or extensions to existing works, in AONBs must be subject to the most rigorous examination...” (para. 4.9), the same approach as applied to the means of assessing major developments in National Parks.
- 4.127** The main local designations of valuable landscapes are made at the county level, but may also be included in the plans prepared by unitary authorities (outside the shire counties). These are typically described as ‘special landscape areas’ or ‘areas of great landscape value’. They indicate relative merit at the subregional scale, and can assume a disproportionate significance as a measure of value in those parts of the country without National Parks or AONBs.
- 4.128** Industrial minerals are found and indeed worked in these designated areas. Table 13 summarises the main occurrences.
- 4.129** Table 13 shows that the one potash mine, all vein mineral workings and — most significant in terms of area and quantity of mineral extracted — many high purity limestone sites are located in National Parks. Other minerals may be found occasionally in or close to National Parks and Areas of Outstanding Natural Beauty, and further sites are within areas designated for their local landscape importance.
- 4.130** The designation of a landscape in any of the categories listed is an expression of the importance to be attached to them in planning decisions. All the landscapes are ‘lived-in’ rather than wilderness or remote places, and economic and social issues are relevant within them as much as in other rural

INDUSTRIAL MINERAL	NATIONAL PARKS	AONBS	COUNTY LANDSCAPE AREAS	NOTES
Cement Raw Materials (Limestone/ chalk)	Peak District (<i>Hope</i>)	Chilterns (<i>Kensworth</i>)	Kent Downs (<i>Halling, Snodland</i>)	Proximity to Peak District NP (<i>Tunstead, Cauldon</i>); Proximity to North Wessex Downs AONB – Wiltshire (<i>Westbury</i>) Proximity to Forest of Bowland AONB (<i>Ribblesdale</i>)
Salt	North York Moors (<i>Boulby</i>)			
High purity limestone	Peak District, (<i>Old Moor, Ballidon</i>); Lake District (<i>Shap Beck</i>)	South Downs – East Sussex (<i>Tarring Neville</i>) Lincolnshire Wolds (<i>Mansgate, South Thoresby</i>) adjacent to: Mendip Hills – Somerset (<i>Battscombe</i>)		Proximity to Peak District NP (<i>Tunstead, Dowlow, Grangemill</i>); Proximity to North Wessex Downs AONB – Wiltshire (<i>Quidhampton</i>)
Kaolin				Proximity to Dartmoor NP (<i>Lee Moor, Headdon Shaugh Moor</i>)
Ball clay		Dorset (<i>Povington, Arne, Dorey's, Furzeyground</i>)		
Gypsum & anhydrite		High Weald AONB – East Sussex (<i>Brightling</i>)	Staffordshire (<i>Fauld</i> : proposed area of search for an extension)	
Potash	North York Moors (<i>Boulby</i>)			
Silica sand		Nidderdale Moors (<i>Blubberhouses</i>)		Proximity to Surrey Hills AONB – Surrey (<i>Buckland, North Park Farm, Mercers Farm</i>) Proximity to Kent Downs AONB (<i>Addington, Aylesford</i>)
Fluorspar	Peak District (all sites)			
Fuller's earth			Bedfordshire: (<i>Wavendon Heath</i>)	
Tungsten				Proximity to Dartmoor NP
Slate				Proximity North Cornwall AONB (<i>Delabole</i>)

Table 13 Industrial mineral operations affecting designated landscapes.

areas. Designation does not preclude industrial mineral working. Rather, the case for working these minerals must meet progressively stiffer tests the more highly valued the landscape within which it falls. Particularly in locally designated areas, the emphasis is likely to be on the extent to which mineral working would damage purely the visual qualities for which those areas were designated: the concern is not to have an in principle objection to quarrying, but to ensure that development within the designated area does not compromise visual quality. The fact that many industrial mineral sites are located within designated areas, including National Parks, and that large numbers of planning permissions have been issued since these areas were designated, demonstrates the flexibility of the system. The fundamental issue is whether a proposed mineral development has taken sufficient steps to avoid or overcome landscape damage in these areas and, if it has, if the remaining impacts can be justified by the strength of the case for proceeding with mineral operations.

- 4.131** Landscape characterisation has become an established facet of our understanding of place. The Countryside Agency has published a complete map of England showing Countryside Character Areas, and many County Councils have tackled the more detailed process of refining this to smaller character areas at the local level. The special qualities of each locality can inform the way in which mineral workings are carried out and, in particular, how they are restored to reinforce the qualities of their location. Interest in landscape character assessment has recently been reinforced by the Council of Europe's European Landscape Convention, which emphasises the merit of identifying the uniqueness of all natural and cultural landscapes, urban as well as rural, and creating and managing landscapes as well as protecting them. This Convention has been ratified by sufficient member States to come into effect, though the UK has not yet ratified it for application here. The impact of the Convention in the UK, if ratified, will be as much as the Government allows it to be, since its implementation is entirely a domestic issue without either enforcement or resources from the Council for Europe.

Wildlife

- 4.132** There is a sophisticated system of protection for wildlife, both of habitats and of species, from the international scale to the local level. This reflects not only a more established global environmental movement in the wildlife sector, but also the imperative of protecting species which migrate across international boundaries.
- 4.133** The principal international agreements on wildlife to which the UK is party are:
- the Ramsar Convention on Wetlands of International Importance especially as Wildfowl Habitat: the UK holds an internationally significant number of 'Ramsar sites';
 - the Birds Directive (EC Council Directive on the Conservation of Wild Birds): the UK has a large number of Special Protection Areas (SPAs) of European importance designated under this Directive; and
 - the Habitats Directive (EC Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna): the UK again has a large number of Special Areas of Conservation (SACs) of European importance designated under this Directive.
- 4.134** The European Directives have been transposed into UK law. They include remarkably strict rules, enforceable ultimately through the European Court of Justice, to ensure protection of key wildlife sites

from inappropriate development. Broadly speaking, wildlife takes precedence in these designated areas. The Government has indicated that it will treat potential SPAs and candidate SACs as if the sites had been formally designated.

- 4.135** Primary exemplar wildlife sites of national importance are managed as National Nature Reserves, but far more extensive and significant in planning terms are Sites of Special Scientific Interest (SSSIs). All sites designated under international agreements are SSSIs, but so also are many other sites not of supra-national significance. To a large degree the SSSI designation is an expression simply of wildlife value. Although planning decisions are expected to pay careful attention to them as material considerations, there are limited powers to enforce the proper management of designated sites or to remedy or prevent damaging activities. As a result, the International Union for the Conservation of Nature (IUCN) has excluded SSSIs altogether from its lists of protected areas: only National and Marine Nature Reserves are included, as are National Parks as protected landscapes. The strengthened protection for SSSIs under the Countryside and Rights of Way Act 2000 may be sufficient to lift SSSIs *en bloc* into the IUCN lists.
- 4.136** The planning system is nevertheless one of SSSIs' key lines of defence, and appropriate regard must be had to the wildlife interests they contain when deciding planning applications for mineral working. Furthermore, regard is also to be had to proposals within predetermined 'consultation areas' around SSSIs, which may extend 2 km from a site, in order to ensure that development near a designated site does not have adverse effects within it (e.g. by changing groundwater levels or allowing changes in water quality to migrate into a site). Applications for mineral working "in or likely to affect SSSIs should be the subject of the most rigorous examination" states PPG 9 para. 40, using terminology familiar from the approach to National Parks and AONBs.
- 4.137** The designation of wildlife sites at the local level mirrors that at the national level. Local Nature Reserves are managed for their local wildlife value, but a much larger range of 'Sites of Importance for Nature Conservation' (or comparably named designations) is identified for its local wildlife value. Such sites are often included on maps in Local Plans and Unitary Development Plans, and depend for their protection substantially on the planning system. These sites do not attract the level of protection afforded to nationally or internationally important sites, but nevertheless express local qualities which should not lightly be overruled.
- 4.138** Beyond this, the Government is anxious to ensure that wildlife outside designated areas is not neglected: a robust wildlife heritage depends on the totality of habitats and not simply on oases of special value. With this in mind, English Nature has identified 'Natural Areas' of distinctive wildlife character which, like the Countryside Agency's counterpart Countryside Character Areas, cover the whole of England. Liaison between the bodies has ensured that the two kinds of character areas have compatible boundaries (though there is a greater differentiation of areas for Nature Conservation than for landscape).
- 4.139** As with designated landscapes, so with designated wildlife sites, mineral workings are to be found located in and adjacent to places special for wildlife. Table 14 lists the main locations. The identification of 'Natural Areas' does not appear to have had any significant impact to date on proposals for the supply of industrial minerals.

4.140 Table 14 shows that there are some significant interactions between industrial minerals supply and wildlife sites. Probably the most pressing conflict affects ball clay, especially on the Arne peninsula in Dorset. A site permitted here on appeal in 1977 has subsequently been designated as falling within five internationally important wildlife sites, and there are highly significant constraints on further workings in the Dorset ball clay area due to wildlife interests. Some 65% of the ball clay resource area in Dorset is affected by environmental designations, mainly for wildlife⁸. A further ball clay site at Newbridge in Devon was rejected on appeal due to the adverse impact on an SSSI. The most high profile consideration of industrial minerals supply in relation to wildlife interests since the designation of internationally important site arose at Southport, Sefton. Here a planning application to continue removal of silica sand from a foreshore designated for its international wildlife importance was determined in 2002 following an inquiry. The Secretary of State agreed with his Inspector that there was a sufficient degree of certainty that the integrity of the wildlife site would not be adversely affected (though had it been, the application would have been refused).

Table 14
Industrial mineral operations affecting designated wildlife sites.

INDUSTRIAL MINERAL	INTERNATIONAL SITES	OTHER SSSIs	COUNTY WILDLIFE SITES	NOTES
Cement Raw Materials (Limestone/chalk)	Tunstead (cSAC) Wiltshire: preferred area in SPA/SAC	Cauldon Bellman Quarry (to supply Ribblesdale): geological SSSI	Bellman Quarry (to supply Ribblesdale)	
High purity limestone	Old Moor (cSAC)			
Industrial dolomite		Thrislington		
Kaolin				Extensive 'Areas of Special Environmental Concert' within china clay zone
Ball clay	Furzeyground (cSAC) Arne, Povington, Dorey's (SPAs, cSACs, Ramsar)			
Gypsum & anhydrite		Fauld (proposed area of search for an extension)		
Silica sand	Southport (SPA/cSAC/Ramsar)		Moneystone	Moneystone (adjacent SSSI); Ratcher Hill (adjacent SSSI); Ardleigh (Essex) (adjacent SSSI)
Fluorspar	Peak District — many sites (cSAC)			
Fuller's earth			Wavendon Heath	

⁸ Highley, D E, Bristow, C R, Cowley, J F and Webb, N R. 2002. Sustainable development issues for mineral extraction — the Wareham Basin of east Dorset. *British Geological Survey Commissioned Report*, CR/01/137N.

4.141 Also of interest is the approach taken by the Secretary of State and Inspectors at planning inquiries where industrial mineral working proposals would affect designated wildlife sites of local importance only. Proposals for fuller's earth working at Wavendon Heath South, Bedfordshire were rejected on appeal in 2002 because of adverse impacts on locally designated wildlife and landscape areas: the Secretary of State was not satisfied that there would definitely be no alternatives if permission was refused (whether other sources or synthetic products), even though the applicant had argued that the mineral in the site was unique. In effect an extremely high hurdle was placed in the way of the applicant even though the environmental interests at risk were locally rather than nationally or internationally important. In contrast to this decision, however, the Secretary of State has approved vein mineral workings at Cop Mine in the Peak District National Park in 2000 despite conflict of the proposals with a cSAC and with the most heavily protected 'Natural Zone' of the Park, citing 'exceptional circumstances' based on the need to identify the extent of the mineral deposit.

Heritage

4.142 There is increasing attention to heritage issues at an international level. The World Heritage Convention is one of the oldest international environmental agreements, adopted in 1972. Its full title, the Convention Concerning the Protection of the World Cultural and Natural Heritage, is indicative of its aim to promote co-operation amongst nations to conserve natural and cultural heritage of 'outstanding universal value'. 721 sites were listed by the end of 2001 amongst the 167 States party to it, of which 24 are in the UK (15 in England). More sites are continually being proposed for designation, and, since 1992, a category of 'cultural landscapes' has been created, recognising the interrelation between man and nature. The World Heritage Convention is acting as a driver in this sphere, with the UK responding by proposing to designate the Lake District and the New Forest in this category. World Heritage Site designation carries with it the expectation of strict protection. Although no sites in England at present have any significant impact on the potential to exploit mineral resources, it is possible that they could in future, particularly in any cultural landscape. Interestingly, the heritage of metal mining and processing in Cornwall is inspiring the preparation of a bid for World Heritage Site status.

4.143 The European Landscape Convention similarly reflects the interaction between man and nature in its recognition of cultural landscapes, in what amounts to an integrated environmental approach to the appreciation of place. This Convention follows the earlier Council of Europe Convention on Archaeological Heritage (adopted in 1969, revised in 1992).

4.144 The heritage designations at a national level in England are wide-ranging in type and numerous, though for the most part restricted to sites rather than substantial areas:

- individual buildings may be registered as Listed Buildings of architectural or historic importance (in one of three grades), and protection extends to their settings as well as the buildings themselves;
- archaeological sites may be scheduled as Ancient Monuments;
- areas of historic or architectural importance may be designated as Conservation Areas (primarily but not exclusively in built-up areas), with regard to be had to views in and out of these Areas;
- historic parks and gardens may also be registered, though these are non-statutory;

- areas of archaeological importance are another non-statutory designation.

4.145 Proposals for working industrial minerals do not often raise conflicts of interest with designated heritage sites. The two potential conflicts most frequently noted are with the setting of listed buildings and with archaeology. The setting of listed buildings has occasionally been an issue in industrial minerals development proposals such as for an extension to Grange Top Quarry, Rutland to serve Ketton cement works. The development was permitted despite some adverse impact (partially mitigated). More frequent are actual or potential threats to archaeological sites. The main threat to archaeology from industrial mineral working is probably from the tipping of kaolin waste in both Cornwall and Devon, which is expected to damage sites of at least local importance. Shaugh Moor and Crownhill Down on the edge of Dartmoor National Park have exceptionally well preserved archaeological landscapes. On a lesser scale there is archaeological interest in the land above the Fauld mine in Staffordshire which is proposed as an Area of Search for an extension.

4.146 Archaeological interests are recognised as legitimate matters which must be investigated in advance of any mineral working which might affect historic remains, and which must be respected if finds arise during working. Industrial minerals are no different from others in this respect. There are various reports of actual or potential conflicts of interest arising, but these appeared largely to be occasional rather than systematic problems. Only in respect of kaolin was archaeology identified as a major issue of concern. The Devon MLP (Proposed Modifications 2003) records that “There is substantial and sensitive archaeological and industrial archaeological interest throughout the Mineral Site. Shaugh Moor and Crownhill Down have exceptionally well preserved archaeological landscapes.” Proposal: Inset 38.2 states “The MPA will ensure that a comprehensive scheme of archaeological survey evaluation will be required in advance of the consideration of any future proposal”; and Inset 38.8 states “The MPA will establish and implement a comprehensive extraction and restoration programme to reduce conflicts with significant environmental, archaeological and historic landscape interests.” This is also presented as a strategic objective for kaolin policy. The Cornwall MLP also indicates that tipping may need to take place on areas of county or local importance for archaeology (para. 7.41). There will be some scope to mitigate impacts of operations through reviews of old mining permissions particularly in ‘Areas of Special Environmental Concern’ where there are extensive planning permissions.

4.147 Identifying the possible need for any further advice on how to protect archaeological interests within the kaolin working areas has been beyond the capacity of this study. If any additional policy is required it will clearly be specific to this mineral industry. The Government, English Heritage, the minerals industry, the MPAs and other interested parties should consider together whether further attention is needed to this issue, and if so what that should be.

Other environmental effects

4.148 Research identified a wide variety of environmental impacts from actual or potential industrial mineral workings not covered under previous headings. These included:

- the desirability of avoiding working in particularly sensitive cultural landscapes (such as the South Downs — for high purity chalk, and Bodmin Moor — for kaolin);

- the adverse impacts of reworking waste tips from previous vein mineral workings (in Derbyshire and the Peak District National Park);
- problems of pollution control at many cement plants, which had implications for both land use and environmental regulations;
- impacts on the best and most versatile (BMV) agricultural land (noted at silica sand workings in Cheshire and Essex).

4.149 A few sites involve a wide range of environmental issues. For instance, Battscombe Quarry in Somerset, which is worked for industrial limestone, has a significant visual impact, has issues relating to traffic, access, and blasting, is in an AONB, abuts an SSSI, is in the Cheddar Springs Groundwater Source Protection Area, and close to several Scheduled Ancient Monuments.

4.150 The other issues are already covered by general mineral planning policy (such as impacts on BMV land), or are matters largely for local policy. None of the additional environmental issues noted appears to be specific to industrial minerals beyond the local level, and should therefore need not be addressed in Government policy.

APPLYING THE PRINCIPLES OF SUSTAINABLE DEVELOPMENT

Best use of the resource: safeguarding from sterilisation

Current practice

4.151 Government policy on the safeguarding of industrial minerals from sterilisation by development on the land surface is clear. Both industrial minerals with MPGs (cement and silica sand) have their own mineral-specific safeguarding policies, including the following:

- “.. local authorities should make every effort to safeguard in their development plans, and through development control, those deposits which are of economic importance against other types of development which would be a serious hindrance to their extraction... (MPG 10 para. 38);
- “silica sand deposits should not be sterilised by other forms of development which would make them unavailable for use by future generations without good land use planning reasons” (para. 30); “Silica sand is a scarce resource and MPAs should... safeguard deposits which are, or may become, of economic importance against other types of development or other constraints which would be a serious hindrance to their extraction” (MPG 15 para. 53).

4.152 A survey of MPAs showed that almost all had general policies to safeguard mineral deposits in the long term from sterilisation by inappropriate surface development. In shire areas, policies were frequently included in both the Structure Plan and the Minerals Local Plan. Many MPAs had safeguarding policies specific to the industrial minerals within their areas. The wording of policies inevitably varied from one MPA to another, but most made clear that the intention was to protect:

- potential deposits as well as known deposits;
- land which, if developed, could compromise mineral working or processing on adjacent land;
- land which might be needed for mineral transport, mineral processing, or the tipping of mineral waste, as appropriate.

- 4.153** Many policies made clear that the constraint on surface development was by no means absolute. The case for surface development might be more important than safeguarding mineral. In some cases specific reference was made to 'prior extraction' where practicable, i.e. taking out the mineral in advance of necessary surface development.
- 4.154** There are two ways in which these aspirational safeguarding policies were likely to be compromised in practice. First, some authorities added qualifications to their safeguarding policies which allowed a risk to continue of some deposits being sterilised. For example, the Oxfordshire Structure Plan 2011 (1998) has general Policy M6 which states: "The County Council will object to development where it would sterilise important mineral resources which could be worked under current development plan policies." 'Current development plan policies' for fuller's earth do not identify any land for working or searching for fuller's earth, even though the Oxfordshire Minerals and Waste Local Plan 1996 identifies deposits west of Baulking and north of Uffington (para. 2.34).
- 4.155** The second and more widespread limitation was that general safeguarding policies were not always given effect by comprehensive 'Mineral Consultation Areas (MCAs)', wherein planning applications for surface development would need to be referred to the MPA for comment. Without consultation areas, there would be a risk that surface developments capable of sterilising mineral might simply not be referred to the MPA. This risk is much reduced in unitary authorities which are responsible for deciding both minerals issues and surface development issues, though there still needs to be an effective internal arrangement for mineral planners to be consulted on surface development proposals. Practice varied considerably. There have been long established Mineral Consultation procedures, based on extensive MCAs for the kaolin and ball clay resource areas since the 1950s. Some MPAs had numerous MCAs, extending over many minerals and wide areas (e.g. in Cornwall). Some included industrial minerals which were not currently worked within the MPA area (e.g. celestite in South Gloucestershire, and tin and tungsten in Devon). Many of the minerals studied in this research were the subject of MCAs.
- 4.156** Elsewhere there were limitations:
- some authorities did not have MCAs, while others had not completed the process of identifying MCAs: plans in Cheshire and Cambridgeshire recognised the need for MCAs for industrial minerals and made commitments to prepare them, but had not done so at the time (for salt and silica sand in Cheshire [Cheshire Replacement MLP 1999] and for cement-making materials in Cambridgeshire [Cambridgeshire Structure Plan December 1995]);
 - some development plans had safeguarding policies with consultation areas for certain industrial minerals but not others. For example, the North Lincolnshire Local Plan 2003 has a specific Policy M18 to safeguard silica sand resources, but does not have a similar policy for cement-making materials. Likewise, Surrey County Council has an MCA for fuller's earth but not for silica sand.
 - in some MPAs the MCAs were closely defined in ways which left a proportion of the resource at risk of sterilisation, particularly by limiting the MCAs to the likely future extent of specific existing quarries rather than covering the full extent of the known or likely deposit. This applied for example to Battscombe in Somerset, Thrislington in County Durham, Quidhampton in Wiltshire and the Marbleagis mine in Nottinghamshire). In the last of these cases, Policy M10.2 in the Replacement Nottinghamshire Minerals Local

Plan Deposit Draft 2002 specifically safeguarded 124 hectares west of Costock for underground gypsum mining, both in terms of sterilisation and as a phasing policy. As limited an area as this barely qualifies as safeguarding the resource.

4.157 Mixed views on the efficacy of sterilisation policies were expressed by MPAs in response to the survey. There was some belief that the policies worked well but equally a view that they did not add much to the planning process. Many authorities considered that the large landbanks they had for industrial minerals diminished the importance of safeguarding policies, and it was clear that significant surface developments in areas which authorities were monitoring were few. In environmentally sensitive areas there was little likelihood of permissions being granted for major surface development in any event. None of those who considered that the MCA system was working well elaborated on how this was achieved or on the sterilisation that had been avoided. Taken together, the evidence available and the MPAs' responses fell short of a ringing endorsement of current practice.

Commentary

4.158 In the large majority of MPAs, safeguarding mineral resources for possible future working is a reactive process, in which the prospective developer or user of the land surface comes forward with proposals requiring planning permission in just the same way as would happen outside a safeguarded area. Once the MPA has identified a safeguarded area on a map then, when a prospective surface developer comes forward, the onus is on the authority and industry to demonstrate that the deposit is likely to be required within the foreseeable future.

4.159 This is fundamentally unsatisfactory, for a range of reasons. Additional steps should be considered. First, the purpose of designating safeguarded areas should be to assert the primacy in principle of protection of any mineral resources for the long term. The onus should be placed on the intending surface developer or user to demonstrate that there is no mineral on the site or nearby which could be sterilised by the surface activity. Intending developers already expect to establish in advance of greenfield activities whether there are archaeological remains, wildlife of interest or other qualities in a site which might have a bearing on whether planning permission is granted or how the development is carried out. It should therefore be the norm for prospective surface users also to establish at their own expense whether there is industrial mineral in a site, based on independent investigations. Some mineral planning authorities already require this, but they are few (see box).

4.160 Second, the expectation should be that, if mineral deposits of even modest quality are found beneath a proposed site of surface development, then any surface development must be arranged in such a way as to give primacy to retaining the future availability of that mineral from the site if needed (e.g. by granting only temporary permissions). There should be no requirement on the industrial minerals industries to demonstrate an intention to work the site in the short or medium term. It is fundamental to the concept of sustainability that a long term view is taken about the potential use of scarce mineral resources. Unnecessary impediments should not be put in the way of future working by creating a future requirement for mineral companies to buy out surface developers (or, more likely, suffer sterilisation of the deposit).

4.161 It was established in the section above on the prospects for extensions to existing sites and the establishment of new ones that there has been no significant long term planning for continuity of supply. The conflicts of inter-

est between the demand for industrial minerals and the impacts of working them are likely to become more intense rather than less intense over time. This is not only as the more accessible sites are worked out, but also if concern for the protection of the environment continues to increase. The third step to improve safeguarding would therefore be to integrate this protection with long term planning of mineral supply. There is a case for safeguarded areas for industrial minerals to take on a higher status. For the scarce minerals in particular, safeguarded areas should identify the entirety of the known or likely resource. Consideration should also be given to certain areas within them being more emphatically identified as preferred locations for future working well beyond the period of any existing development plan. This is only a modest step forward from the system of 'preferred areas' which most mineral planning authorities already identify.

Safeguarding minerals in Staffordshire and Leicestershire

The Staffordshire and Stoke-on-Trent MLP 1999 Policy 5 refers to existing Mineral Consultation Areas and to a requirement that "Where the proposed development falls within the Mineral Consultation Areas and may have a significant impact on mineral resources then the responsibility rests with the prospective developer to prove the existence or otherwise, quantity and quality of the mineral prior to the determination of the planning application." The text clarifies that "this may involve site investigations and/or drilling" (para. 3.17).

The Leicestershire MLP Review 1995 Policy 34 states that, of applications for surface development within mineral consultation areas, "Where reserves are believed to exist but are not proven, the CC may request the DC to obtain information from the developer information in respect of the existence or otherwise of the mineral deposit before any application for development is determined."

- 4.162** The perception of minerals as scarce resources will increase as the environmental constraints on supply become tighter. This applies both in England and internationally. It is increasingly difficult to find environmentally acceptable sites for mineral working, even where there are extensive resources (such as cement raw materials and industrial limestone). The options for some other industrial minerals are much less because resources are geologically restricted and therefore there is a limited choice of workable sites. A demand-led supply pattern into the indefinite future is not sustainable. A fourth step for the reform of safeguarding would therefore be a progressively stronger need for a more positive contribution from the planning system to establish where mineral working can and, just as important, cannot be expected to take place into the longer term. It is entirely foreseeable that parts, at least, of safeguarded areas will eventually become more definitive locations for mineral working. Here, the terms and conditions for mineral development are increasingly defined in advance of proposals coming forward. This will in effect assert the role of integrated planning above what has hitherto been a greater primacy of the market in dictating the location of mineral activities. With the location of long term working sites largely fixed, mineral companies would simply need to assess whether deposits were workable economically and, if so, whether their competitive position enabled them to acquire the mineral rights. Legislation already exists through the Mines (Working Facilities and Support) Act 1966 to allow an operator to explore for and work minerals in the national interest if the mineral rights owner would otherwise be unwilling to co-operate. However, there is an apparent conflict here between legislation and the current DTI view on 'national need' (see paragraph 4.82).

- 4.163** If this more assertive role for safeguarding were to arise, the end state would in effect be a new designation of 'mineral working areas'. These could be designated locally, nationally, or even internationally, just like wildlife and landscape designations. The purpose of designation would be to assure the long term future of mineral working, though of course not without the possibility of compromise in individual cases. It is anticipated that those minerals for which England is a globally important source, notably kaolin and ball clay, would command particular importance when weighing up the balance of competing economic and environmental interests. A more reliable and therefore sustainable pattern of industrial mineral supply internationally would become practicable through an international agreement on locations for the supply of scarcer minerals.
- 4.164** 'Industrial minerals areas' would be safeguarded to allow future mineral development. This would be a more proactive activity than typical under the existing arrangements for avoiding the sterilisation of mineral. The onus would be placed on prospective surface developers to show that there was no potentially workable mineral beneath the surface activity or likely to be affected by it. If there was such mineral, the development would be time-limited in order to allow mineral working at a future date (though the temporary period could be decades, and therefore cover the life of a typical commercial building). Development plans would encourage activities and developments which in relation to mineral planning activities were only temporary. There would be no expectation that mineral identified beneath a site would have to be worked in the short term, and the safeguarding could extend to mineral deposits of lower grade than currently worked, if appropriate. Mineral companies would be expected to take a more proactive role in acquiring property in sensitive locations, and perhaps reselling it on short or medium term leases as appropriate.
- 4.165** There would be many parallels between areas designated for their environmental qualities and 'industrial minerals areas'. The presumption of protection of the designated area for the purpose identified would not be absolute, but would recognise that in special circumstances another interest might take priority. As with the existing policies which set out the criteria which have to be met before mineral working can be justified in National Parks or in European wildlife sites, for instance, so there would be stiff criteria in 'industrial minerals areas' which would have to be satisfied before other interests were held to be more important than protecting the mineral.
- 4.166** The very considerable advantages of 'industrial minerals areas' would not appear overnight but would have to be planned. Difficult decisions would have to be taken as there are many competing interests. For the most part 'industrial minerals areas' would extend across the known resource, moderated by settlements and other highly selected overriding constraints. In the case of National Parks and other constraints, decisions would have to be taken essentially in favour of either mineral working or environmental protection principally on the basis of which of the resources was most readily replaceable. However, by prioritising development within particular parts of 'industrial minerals areas', the aim would be for the most difficult decisions to be put off as long as possible. Under the proposed system, working ball clay in the Arne peninsula near Wareham in Dorset would clearly be one of the last resorts, not one of the first, in view of the international wildlife designations affecting the area. Similar fundamental decisions will be needed, for vein minerals, which arise almost exclusively in workable quantities in the Peak District National Park. Whilst it is not for us to offer policy judgements on such issues, the framework for reaching decisions has

broadly been supplied by the pre-existing environmental criteria for mineral working in National Parks, AONBs and International Wildlife Designations and by the economic criteria identified above. The weight to give to each of those factors is a political decision rather than a matter for research.

Best use of the resource: avoiding inappropriate end uses

Sustainability principles

- 4.167** There is a widely recognised desire to keep high quality minerals for those end uses which require their special properties. National policy sets out sustainable objectives for mineral planning which include “to encourage efficient use of materials, including appropriate use of high quality materials” (MPG 1, para. 35). National policy on silica sand states “high grade materials..., wherever possible, should be reserved for industrial end uses which require such sand and for which there is no readily available alternative. It is in the national interest that such high grade sand should not be wasted and that its use in the construction industry should be minimised” (MPG 15, para. 31). Also, paragraph 30 states “high grade silica sands should as far as possible be conserved for use where they are required”
- 4.168** The central assumptions in this policy approach are that high quality minerals are scarce or difficult to replace and that there are low grade alternative uses to which they may be put. Using such minerals for less demanding applications increases the problem over time of finding new high quality mineral. As the pressure grows to work the remaining deposits, environmental constraints on development increasingly have to be compromised. There are therefore direct consequential environmental effects of allowing high quality mineral to be used for lower grade end uses. Defining ‘high quality’ is however, problematic. From the company’s perspective, the best use of a mineral is that which makes the most money. In strictly economic terms, it is not the use to which a mineral is put, but the revenue arising from its production and use which defines the most desirable end use. Economic forces will in most cases support the principles of sustainable development, but this may not always be the case.
- 4.169** The assumption that higher quality equates with scarcity is broadly correct, though the relationship is complex and stronger for some minerals than others. High quality limestone is not a scarce resource in England. One complication is that the quality of some minerals is not exclusively a continuum from low to high and widespread to scarce. It is more differentiated, with different deposits each exhibiting a range of characteristics which are attractive for specific end uses. This particularly applies to silica sand, where different quarries supply glass-making sands for colourless glass containers, flat glass (windows) and television tubes, for example. Further quarries supply sands for water filtration and for making foundry moulds. Alongside this differentiation there are also some qualities that are clearly lower than others: sands for making coloured glass have more impurities (iron) than sands for making colourless glass, for example. High purity limestone for some end uses is widely available, but for uses requiring especially high chemical purity or specific qualities only one or two quarries may be suitable: the relevance of reserving ‘high quality’ minerals for ‘high grade’ end uses can therefore vary and will depend on very specific and local circumstances.
- 4.170** There has been particular concern about the use of high purity limestone and silica sand for aggregate, although this is partly a function of the large resources of high quality limestone in England. Although the

highest qualities of silica sand are generally unsuitable for aggregate use (a function of grain size distribution), lower quality silica sands (such as some of those used in the manufacture of coloured glass) may be equally suitable for aggregate use.

- 4.171** The other industrial mineral which has been of interest for its potential use in a low grade end use is fuller's earth. Fuller's earth not only has high quality uses such as in bonding foundry sand and papermaking, but has in the past been used for pet litter. In recent years, producers have been keen to distance themselves from using extremely scarce deposits of fuller's earth for this purpose. The Secretary of State has also stated that it is not necessary to meet UK demand for this end use from UK sources. In his decision on a fuller's earth proposal at Waterhouse Farm, Bletchingley, Surrey in 1989 he stated in the same paragraph of his decision letter that wherever practicable, scarce resources of high grade mineral should be reserved for the most appropriate use.
- 4.172** There is clear evidence of high quality mineral being used for low grade purposes. Large permissions were granted in the Yorkshire Dales National Park for limestone quarries to serve primarily the steel and chemical industries, but almost all this mineral is now used for aggregates. After two public inquiries, a decision was made in 1987 to extend Coolscar Quarry in Wharfedale. Permission was granted because of the need to serve the seawater magnesia plant at Hartlepool, but no end use condition was imposed. However, the mineral company subsequently lost the contract and the mineral was sold as aggregate until the site's closure. That the customer found an alternative supplier within the Park gives cause for concern on the adequacy of the analysis of the need for the Coolscar extension. More significantly in planning terms the case illustrates how easily the best of intentions can be set aside for pragmatic reasons.
- 4.173** The loss of a market for a quarry's high grade product is typically the event which triggers concern about end use control, as the cases above illustrate. This has occurred on many other occasions too, as the following examples illustrate.
- When the Shoreham cement works in West Sussex closed, the absence of an end use restriction on Upper Beeding chalk quarry, which served it, meant that the chalk quarry could continue in operation serving other markets. This was despite the environmental objections to working the quarry, which would not normally have been justified by end uses such as construction and agriculture.
 - In contrast, when Weardale cement works closed in 2002 this triggered the closure too of Eastgate Quarry serving it. This was because a condition had been placed by Durham County Council on an extension to Eastgate Quarry in 2000 which tied the output exclusively to use in the adjoining cement works.
 - In Kent, the closure of Ryarsh Brickworks threatened Nepicar Sand Quarry, whose output was tied to the brickworks. In 1999 the MPA permitted alternative silica sand end uses to be served by the quarry.
 - In Cheshire, permission was given for the working silica sand at Newplatt Wood for making coloured glass containers, but when the contract was lost the mineral was used in brickmaking.
- 4.174** Quarries capable of supplying high quality minerals are normally expected to supply specialist purposes because of the economic incentive to sell premium products at premium prices. In theory, lower grade uses of such mineral should therefore be infrequent. Allowance should also be made for the likelihood of any quarry producing material with a range of

qualities. Often lower quality material may necessarily be excavated in the act of reaching higher quality material, whether as a function of the geology of the site or of the excavation and processing method. As a result, only a proportion of the output of a site may be suited to high grade end uses. The principle of sustainable development would argue for each grade of mineral produced being used for the highest grade purpose to which it is suited. Selling a proportion of an industrial mineral site's output as aggregate may well be consistent with the sustainable use of the resource.

- 4.175** In applying the principle of sustainable development, an MPA will wish to be assured that an unduly large proportion of mineral from an industrial mineral site is not in reality being sold into low grade markets. Aggregates too can be a profitable market. There are particular complications in the vein minerals industry, where deep, narrow veins within a limestone host rock may encourage mineral companies to work the adjacent limestone to gain safe access to deeper vein minerals, but just as possibly for the valuable aggregate by-product. There have been concerns that aggregates sales may become the principal driver for some of these operations.

Current practice

- 4.176** Many development plans contain policies or text emphasising a generalised statement of intent to reserve high quality minerals for high grade end uses (e.g. in Bedfordshire, Durham, Essex, Norfolk, North Yorkshire and Sefton). As might be expected, it is policies for the supply of silica sand and carbonates in which these statements feature most frequently. Those MPAs which have policies to control end use generally express them in terms of the issues which will determine the grant of permission. For example:

- “An application for the winning and working of minerals will not be permitted where it would involve the use of high quality minerals for low grade purposes” (Cheshire Replacement MLP 1999 Policy 5): the supporting text adds that “the County Council will require applicants to indicate the likely markets by proportion of the deposit” (para. 2.17);
- “Proposals for high quality limestone will only be permitted where there is a demonstrable national or regional need and it will be used primarily for non aggregate uses or where significant benefits would accrue to local communities or the environment”; (Cumbria MWLP 1996-2006 (2000) Policy 36);
- “Proposals to extract ‘industrial’ limestone will not be permitted unless: (1) they are required to meet a proven need for materials with particular specifications which would otherwise be met, and the development is designed to maximise the recovery of the particular materials required to supply the need...”; (Derby and Derbyshire MLP 2000, Policy MP25);
- “Extraction of limestone of a high chemical purity will not normally be permitted, except where the limestone produced is intended primarily for purposes for which high chemical purity limestone is essential” (Peak District National Park Structure Plan 1994, Policy M6);
- “the appropriate use of high quality minerals” will be encouraged where practicable (Staffordshire and Stoke-on-Trent Structure Planning 1996-2011 Policy MW3): the supporting text indicates that “nationally important reserves of silica sand will not be allocated in order to meet a shortfall in the landbank for sand and gravel” (para. 12.12);

- new permissions for silica sand working are likely in prospect areas “where the authority are satisfied that the primary purpose of extraction is to obtain specialist sand for industrial applications requiring particular physical/chemical characteristics” (Surrey MLP 1993 Policy 14).

- 4.177** Development plan commentary on how these policies will be implemented after permission has been granted is distinctly weaker. Surrey County Council indicates that in order to discourage inappropriate end uses “the Authority will seek to limit the extent of areas consented for working whilst having regard to the need of the industry for adequate reserves” (MLP 1993 para. 4.96). Cheshire County Council suggests retribution rather than prevention for misuse of resources: “The County Council will continue to monitor production and markets and the information will be assessed regularly and where appropriate will be considered in the determination of future applications” (MLP 1999 para. 2.17). This is comparable to the Government’s policy which encourages a company’s restoration record to be taken into account when considering subsequent mineral planning applications: see MPG 6 para. 89. Bedfordshire County Council sets out the difficulties it feels it faces “It is considered that these high grade industrial sands should only be used for the most appropriate high grade end use rather than for aggregate purposes, although it is recognised that this would be impossible to monitor and enforce” (MWLP 1996, para. 2.1.12).
- 4.178** The study of development plans was supplemented by a questionnaire to MPAs. MPAs were asked whether they planned for industrial minerals in any particular way according to the local, regional or national importance of operations in their areas, or if they monitored mineral conservation in the way industrial minerals were developed and used. Most MPAs took no action on end use issues at all. Those few who did express some concern argued either that there was no effective regulatory mechanism available to them or that regulations would be difficult to implement. This confirms the significant division between the effort which MPAs put into limiting grants of permission for working high grade mineral to sites where it will be used for high grade end uses, and the dearth of practical enforcement. The policies on end use constraint in development plans are therefore to some extent aspirational rather than working tools for mineral planning.
- 4.179** A number of sites have been identified where the MPA had effected control over the end uses of the minerals quarried. In particular, a legal agreement at Ballidon Quarry in the Peak District National Park requires 40% of the output to be used for non-aggregates purposes. Ballidon Quarry provides limestone primarily for industrial use in fillers and powders. At Shapfell in Cumbria, the MPA imposed a condition on the planning permission in 1993 requiring at least 80% of the quarry’s output to “be used in the manufacture of lime and limestone products at the Shapfell works for use in the manufacture of steel”. The use of a condition overcomes the possibility of a mineral company refusing to enter into a legal agreement. The output of the limestone quarry serving Hope Cement Works in the Peak District National Park is similarly tied to use in the cement works by condition.
- 4.180** Taken together, the experiences of MPAs offer mixed messages. Against a background of a widespread interest in constraining the use of high grade minerals to high quality end uses, most effort is focused on giving planning permissions only for sites when this objective appears to be met. For the most part little is done to monitor whether the mineral is, in fact, used for the intended purposes, and there is often a marked reticence to try to enforce the principle. On the other hand, a small number of authorities had specifically tried to tie down the outputs of individual

sites to specific kinds of use or even specific customers. Some had used legal agreements, but others had simply imposed conditions. These acts of intervention suggest that a stronger regulatory opportunity is available to MPAs if they wished to use it.

Commentary

- 4.181** Current practice at the local level is unsatisfactory. There is a willingness on the part of MPAs to apply the principle of sustainable development that high quality minerals should be used for high grade end uses, and a number of them specifically asked for Government policy in support of this. The principle is broadly supported by the industrial minerals industries too, but is not matched by effective action in most authorities. Although this is broadly supported by the industrial minerals industry, it is not matched by effective action in most authorities. There is interest in requiring applicants to show that mineral will be used for a special end use before planning permission is granted (especially in sensitive locations), but little action is taken after permission has been granted. Many MPAs seem unclear whether the powers are available to them to impose end use conditions, and whether these would be enforceable in any event. This matter has been reviewed elsewhere⁹.
- 4.182** There are a number of key points which demonstrate that sufficient powers are already available to MPAs. The first is that the Government itself imposes end use conditions from time to time on planning permissions for industrial mineral workings where permission would not have been granted for supplying aggregates or other lower grade end uses. In particular in 1985 the Secretary of State permitted the working of high quality silica sand at Blubberhouses Quarry, North Yorkshire, with the condition that:
- “except with the prior agreement of the Mineral Planning Authority no mineral or other materials except silica sand for the production of colourless glass, ceramics, chemicals, high grade fillers and miscellaneous uses requiring similar specifications shall be extracted, produced or transported from the site” (ref. M/5069/42/6).
- 4.183** End use control already exists in one specific area of planning law, again confirming that the principle is sound. There is a special concession to allow mineral working on farms for their own agricultural use without the need to obtain planning permission. The *General Permitted Development Order 1995*, Schedule 2, Part 6C allows as ‘permitted development’ “The winning and working on land held or occupied with land used for the purposes of agriculture of any minerals reasonably necessary for agricultural purposes [i.e. an end use] within the agricultural unit [i.e. confined to a location] of which it forms a part.”
- 4.184** MPAs were unforthcoming about the reasons for their belief that applying end use controls might be difficult, but one concern is known to be the problem of exercising control over minerals once they have left the mineral site. There is a normal expectation that conditions cannot control activities outside the area for which permission has been granted. The end use conditions above suggest that conditions can be worded to overcome this problem, but, even if that were to be shown to be wrong in law, there are alternative solutions.

⁹ See: Green Balance, 1993, *Natural Assets: mineral working in National Parks*, Council for National Parks, pps. 134–140, and Bate, R., 1998, Controls over mineral end uses: a contribution to sustainability, in ‘Mineral Planning in a European Context’, eds. B. van der Moolen, A. Richardson and H Voogd, pps. 229–238.

- 4.185** The second argument for the sufficiency of existing powers is that planning authorities, and not least mineral planning authorities controlling quarries, are well used to making arrangements to tackle off-site problems which need to be resolved before a development can proceed (e.g. site accesses and road improvements). The established principle is that permission cannot be granted until a means has been found of resolving the problem. There may need to be a legal agreement between the applicant and the authority to address these. In effect, although it is not lawful to impose a condition requiring a legal agreement to be signed, no permission will be forthcoming without one if there is no other means of resolving the difficulty. It is clear from the examples above that some MPAs have found this a preferable route to take to regulate end uses.
- 4.186** The remaining key issue is whether end use controls are enforceable in practice. The principal controls must be supplemented by regulations to monitor sales. Details are required of quantities, mineral grades and customers/end uses. Weighbridge and other sales records would have to be made available. Conditions can be imposed on permissions requiring the provision of this information. Enforcement of the controls should be made as easy as possible by careful drafting of the monitoring arrangements, so that any failure on the part of the mineral company is identified rapidly and corrective action taken (or convincing explanation provided). Detection may be difficult in the worst cases, but it will never be impossible. Enforcement staff could, technically, follow lorries to their customers. In the same way as hours of operation are technically controllable by having enforcement staff on site morning and night, but are enforced in practice by occasional visits and by responding to complaints from residents, so with end use controls workable solutions can readily be found.
- 4.187** It can be concluded that there is at present no legal or practical impediment to MPAs exercising end use controls by the straightforward imposition of conditions. However, in view of the uncertainty which has dogged this issue for many years, it is recommended that the Government clarifies this in policy. In the unlikely event of any legal impediment being identified, it is recommended that the Government takes the necessary steps to overcome it. It is unacceptable to continue with an arrangement in which all responsible parties agree that high quality minerals should be reserved for high grade purposes but many regulatory authorities are reluctant to give this proper effect.
- 4.188** The findings of this research reinforce the case for end use control of minerals previously advanced in the Report of the National Parks Review Panel *Fit for the Future* under the chairmanship of Professor Ron Edwards in 1991. The Report recommended "To conserve the special mineral resource and to minimise working, we consider that minerals planning authorities (which are the national park authorities in national parks) should be able to impose conditions to specify the range of uses to which the mineral is put, so preventing the sale of low-grade material beyond that produced in immediate association with the special product, and should be given the information necessary to ensure that the conditions are kept. We are concerned to ensure that high-grade mineral (the reason for the permission in the first place) is not used for a variety of purposes requiring only low-grade material that could be obtained elsewhere" (page 79).
- 4.189** In view of the evidence and analysis presented here, this research report recommends that broad end-use controls should be formally established in mineral planning. However, the minerals industry take the view that end-use controls are unnecessary and inappropriate. The industry representatives on

the project Steering Group have asked us to add the following text. "Although end use controls may only be used where necessary or exceptionally, the circumstances where this would be appropriate are considered to be very limited and should not be used in normal circumstances. The examples of such controls or where they might apply are relatively few, applying to specific examples in areas of national constraint and particular need and they may not in those cases even have resulted in any real change in outcome. There is no evidence that the market generally fails to ensure that minerals are used for purposes that they are best suited, since the normal economics of relatively scarce supply and demand for industrial minerals ensures this is the case. The planning system does not intervene to such a degree in any other area and to contemplate such market intervention would place an additional burden on authorities and producers which in the main cannot be justified by the vast majority of normal practice and operation."

Best use of the resource: better use of poorer quality minerals

- 4.190** Some MPAs are alert to the scope for trying to make the best use of lower quality industrial minerals, firstly as a means of conserving the higher quality resources and secondly to widen supply options which may reduce pressure to work areas where there are significant conflicts of interest. The main options are to encourage additional mineral processing either by the mineral company to upgrade the mineral or by the consumer to find a way of using lower quality products. A few examples of each have been reported.
- 4.191** Efforts by a mineral company to make use of lower quality sands was a consideration in the grant of permission in 1996 for an extension to silica sand operations at Martells Quarry, Ardleigh, Essex. An earlier application had been refused in 1995 partly on need grounds, but an otherwise very similar application in 1996 proposed to make more use of the sand for silica sand products. The proportion of the output to be used for silica sand was increased to 54% by this means, with correspondingly less being used for aggregates.
- 4.192** The Cumbria Minerals and Waste Local Plan 1996–2006 (2000) identified that permitted reserves at Shapfell Quarry were expected to last only 8–10 years (from 1996). However, an extension here was not possible due to geological and environmental constraints. The plan reports that British Steel (as it then was) was considering a number of options, amongst them the feasibility of altering its lime quality parameters to enable lower purity limestone to be used (para. 5.12.5).
- 4.193** Processing industrial minerals either to improve their grade (useful mineral content) or quality (properties) is established practice in the industry. The extent that this is feasible depends on the individual mineral. In the case of silica sand, for example, a hot acid leach can be used to remove iron to enable some sands to be sold for making colourless glass. There are, however, technical and economic limitations on the amount of processing that can be carried out. Processing cannot be used to lower the iron content of industrial carbonates but is used to ensure that a product with a uniform iron content is produced. That iron content depends on the inherent quality of the deposit worked. In contrast, although lowering the iron content of some sands may be technically feasible, the cost would be prohibitively expensive. The silica sand operation at Blubberhouses in North Yorkshire is currently mothballed, due to the difficulties and cost of processing the sand to marketable form.
- 4.194** Economic responses of this kind illustrate that the relation between geology and the market for industrial minerals is not fixed but influenced by

price. That there may be scope to reduce the demand for high grade industrial minerals by better use of raw materials or by changing production processes argues for the creation of incentives for mineral companies and consumers to search out these opportunities more diligently.

- 4.195** From a mineral planning perspective, there is at present only modest scope for MPAs to drive forward the principle of sustainable development that lower grade deposits should be used where practicable and desirable. Furthermore, there are three complications which MPAs will need to take into account:
- the upgrading of lower quality minerals may in itself have or risk an adverse environmental impact, such as hot acid leaching of silica sand, so a decision will be needed on the balance of advantages in any individual case;
 - more quarries may need to be open at any one time if each serves specific end uses than would be needed if a smaller number of higher quality sources supplied all the markets (including some lower quality ones): this can create a conflict of interest between resource management and local amenities;
 - sites containing lower quality minerals can be just as constrained by other environmental interests as can sites containing higher quality minerals, perhaps more so. Each site must therefore be considered individually. However, the expectation is that, by creating a wider choice of potentially suitable sites (with lower quality minerals), that acceptable sites for working will more readily be found.
- 4.196** Planning guidance is required on industrial minerals inviting MPAs to have regard to the attention given by applicants for mineral planning permission to using lower quality deposits. This would encourage mineral companies and their customers to consider seriously and in each case the scope for making greater use of these minerals. The concept of a 'lower quality' deposit can be extended to those which underlie greater depths of overburden or which for other reasons entail greater working costs.
- 4.197** The use of lower quality resources is a complex issue and opportunities will depend on very specific and local circumstances. Guidance cannot be prescriptive, so the policy approach should encourage mineral companies and their customers to consider the scope for making greater use of lower quality resources.
- 4.198** As the economic aspects of using lower quality minerals are of prime importance in affecting how 'sustainably' they are used, consideration could be given to using financial incentives in support of planning policies.

Reducing the demand: reuse and recycling

- 4.199** The principle of mineral recycling is now well-established in the aggregates sector, and there is clearly potential for increased reuse and recycling of industrial minerals and the products derived from industrial minerals. The life cycle of an industrial mineral is complex. Although the properties for which industrial minerals are valued are often altered or irreversibly changed in use, some, such as silica sand used in foundry moulding sand, can be reused and recycled (see paras 2.25 to 2.30 and individual Mineral Planning Factsheets in Annex A).
- 4.200** More opportunity exists to reuse and recycle the products. Amongst these, a distinction should be drawn between those mineral products which can substitute for the original mineral product (e.g. a refilled glass

bottle or a recycled glass jar) and those which substitute for a different mineral product (e.g. glass cullet being used as an aggregate in asphalt, rather than being used to make new glass products). Only the former group are relevant to this study.

- 4.201** The main opportunities for mineral product reuse and recycling lie with gypsum and silica sand. The principle use of gypsum is in making plasterboard. The technology and incentive for recycling of plasterboard scrap (and possibly demolition waste) is now at a point where substitution for raw materials is becoming practicable. There is a real opportunity for the mineral planning system to force the pace of recycling in this industry, just as it did for aggregates recycling. The only action being taken formally at present is through the East Sussex and Brighton & Hove MLP. This plan indicates that further permissions for the tipping of waste plasterboard will be unlikely. In Policy 29 the MPA discourages landfill “and would support the introduction of recycling processes or other appropriate means of dealing with this [plasterboard] waste at the site at the earliest opportunity.” Perhaps surprisingly, no other MPA appears to have addressed this issue to date. However, the recent introduction of the EU Landfill Directive, which limits the amount of calcium sulphate that can be incorporated into landfill, will provide considerable incentive for more recycling of this material.
- 4.202** Considerable opportunities exist for the reuse and recycling of silica sand products. Government policy in MPG 15 establishes a responsibility for reuse and recycling to be pursued as an issue relevant to mineral planning by MPAs, mineral suppliers and their customers: “MPAs and the consuming industries should.... consider what steps they can take to encourage re-use/recycling where there are environmental benefits to be gained...” (para. 32, and see paras. 33–38); “The Government looks to the silica sand extracting and consuming industries to consider how they can increase re-use and recycling of silica sand and products made from silica sand, and how such efforts can be monitored” (para. 93).
- 4.203** The survey of MPAs suggested that authorities had taken no active role at all in response to this policy, although the container glass and flat glass industries had been more active in this area (see Silica Sand Factsheet Annex A).

Reducing the demand: substitution

- 4.204** Substituting alternative materials is a practical proposition for some of the industrial minerals, at least to some extent and for some end uses (see paragraphs 2.25–2.30 and individual Mineral Planning Factsheets in Annex A).
- 4.205** A number of plans refer explicitly to substitution. The Bournemouth, Dorset and Poole Structure Plan 2000 says: “it is important that the use of Dorset’s mineral resources is managed so that they do not run out *before acceptable substitutes become available*. The sustainable approach is one where a supply of minerals is maintained but not at a level over and above society’s real needs. A supply beyond these needs would inevitably lead to profligate and wasteful use of primary minerals” (para. 9.2) emphasis added.
- 4.206** Staffordshire and Stoke-on-Trent SP 1996–2011 Policy MW3 ‘The Efficient Use and Recycling of Minerals’ provides a general statement: “The Mineral Planning Authority will encourage the efficient use of finite mineral resources and alternative materials, where practicable, by (a) the appropriate use of high quality minerals; (b) minimising the production of mineral waste; (c) the reuse and recycling minerals and their products; (d) the use of alternative lower quality or waste materials...”

4.207 Wiltshire and Swindon MLP 2001 mentions substitution of Portland cement by pulverised fuel ash (PFA) in paras. 6.4.1 and 6.4.7. MPG 10 also refers to PFA in para. 74:

“The cement industry can make a contribution to the objective of sustainable development. For example, through the use of pulverised fuel ash (PFA), a waste material produced by power stations. Although it has no hydraulic properties of its own it can be combined with Portland cement to produce a factory-made cement or added as a partial replacement for Portland cement at the concrete mixer. In addition there is potential, in a few cases, for PFA to replace clay as a raw material for cement production. Where the PFA contains a portion of unburnt carbon its use in the cement manufacturing process would help to conserve energy. The use of PFA will depend upon the quality and consistency of its chemical composition, the location of its source, and the cost and reliability of supply. Industry will continue to look for other such opportunities.

The cement industry can also use ground granulated blast-furnace slag, a by-production of iron production, in a similar manner to PFA as an additive to the cement or concrete mix. This material does have some inherent hydraulic properties and can be used at higher replacement levels than PFA.”

4.208 The British Cement Association has been actively facilitating a sustainable development strategy for the cement, concrete and concrete construction sector. The study team’s Interim Report in February 2003 sets out progress being made throughout the lifecycle of cement and commits the industry to further action. (See Mineral Planning Factsheet on Cement).

4.209 There is remarkably little on desulphogypsum around the plans. East Sussex and Brighton & Hove Structure Plan 1999 Policy MIN12(c) states: “the import of desulphogypsum by rail for processing at Robertsbridge Works will be supported where the need is demonstrated.” Rail-imported desulphogypsum “may continue to be a feature of the industry locally in the future” (para. 12.33). East Sussex and Brighton & Hove MLP 1999 notes that these imports were permitted in 1994 but reflects the industry view that desulphogypsum will not have a major impact on the mining of gypsum in the longer term (para. 6.6). This is because the locally mined gypsum is used in cement manufacture.

THE SCOPE OF POLICY INTERVENTION

4.210 This review section considers what Government policy may be needed to assist MPAs in planning for industrial minerals and the form this might take. The existing situation is one of very limited guidance for most industrial minerals but more detailed consideration of cement-making materials and silica sand.

Continuity of supply

4.211 A key aim of policy should be clarity about continuity of supply. There will be more certainty for everyone if the Government can decide in principle the degree of commitment to domestic production of each mineral. This commitment of course varies between minerals at present and can be expected to do so in future; for example, England is a major net exporter of kaolin, ball clay and potash (despite imports). It is also a net importer of cement, gypsum and fluorspar. For the other industrial minerals trade is broadly in balance or is modest in comparison to total output.

4.212 Policy cannot be unduly prescriptive in this arena. Domestic extraction will be influenced by the level of demand for a mineral and by the relative

cost of domestic and other sources of supply and by resource availability. The best that the planning system can do is ensure that planning permissions will be forthcoming sufficient to meet the anticipated level of supply consistent with demand.

- 4.213** Policies in MPG 10 and 15 press MPAs to allow the long term continuation of the existing broad pattern of supply (for cement-making materials and silica sand) had been highly effective. The requirement for maintaining site-based landbanks, subject to exceptional constraints, had worked well. In both cases MPAs' policies have adopted this approach as a means of sustaining domestic supplies for domestic end users.
- 4.214** Although some of these two groups of minerals were traded internationally, most was produced and consumed domestically. However, in the case of cement-making materials, the policy objective of competing effectively with imports, as a means of sustaining industrial activity within England, was much more clearly stated as an objective in its own right. As early as paragraph 3, MPG 10 states: "The Government places great importance on reducing the level of imports of building and construction material, and wishes to encourage domestic production to counter the rising import trend and to provide employment.... The Government therefore looks to mineral planning authorities to make provision for adequate supplies of raw material for the industry as it endeavours to meet future domestic demand". This is a theme throughout the MPG: for example, paragraph 63 states that "the Government takes the view that it is in the national interest to maintain and increase cement production, and to increase the scope for competition." However, MPG 10 was published in 1991 and a great deal of policy has changed since then.
- 4.215** By making available land with planning permission for cement-making materials, the planning system has made the contribution requested of it, including major extensions to quarries, supporting major new investment at some sites, and providing a major new greenfield site to replace the large but ageing Northfleet works in Kent. Despite this, the original objective of keeping out imports has not been achieved: imports have continued and account for about 10% of the UK market. Many cement works in England have closed since MPG 10 was published: Masons, Plymstock, Southam, Chinnor, Rochester and Weardale. The new permission at Snodland, Kent has not yet been implemented. The industry is clearly concentrating its operations onto a smaller number of sites. However, the loss of so many cement works in the South East especially (together with Shoreham and Pitstone cement works shortly prior to MPG 10) has to be seen in the context of a more international pattern of supply, in which multinational companies such as Lafarge take strategic decisions about how to serve particular markets. With import terminals available in the South East, there can be no certainty that the market will take up the opportunities for domestic production of cement-making materials for which the planning system has provided.
- 4.216** The experience of the cement industry suggests that little purpose is served by the Government using planning policy to try to drive wider economic aims: planning can offer only a modest contribution to such objectives, not take a determining role. Under currently expressed economic policies, the objective of resisting imports would not be a policy intention in any event. It is concluded that planning for continuity of supply can be a sensible objective for certain minerals through the planning system, though the Government should be cautious about attaching to this wider economic aspirations.

Annex A Mineral Planning Factsheets

A.1 The purpose of these factsheets is to provide an overview of industrial minerals. The series describes economically-important industrial minerals, excluding aggregates, that are extracted in England and is primarily intended to inform the land-use planning process. The factsheets describe each mineral under a standard set of headings. These are:

- Demand
- Supply
- Trade
- Consumption
- Economic importance
- Structure of the industry
- Resources
- Reserves
- Relationship to environmental designations
- Extraction and processing
- By-products
- Alternatives/recycling
- Effects of economic instruments
- Planning issues

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Annex B Minerals Planning Guidance Notes

MPG 1	1996	General Considerations and the Development Plan System
MPG 2	1998	Applications, Permissions and Conditions
MPG 3	1999	Coal Mining and Colliery Spoil Disposal
MPG 4	1997	Revocation, Modification, Discontinuance, Prohibition and Suspension Orders – Town and Country Planning (Compensation for Restrictions on Mineral Working and Mineral Waste Depositing) Regulations 1997
MPG 5	2000	Stability in Surface Mineral Workings and Tips
MPG 6	1994	Guidelines for Aggregates Provision in England [with partial 2003 revisions]
MPG 7	1996	The Reclamation of Mineral Workings
MPG 8	1991	Planning and Compensation Act 1991: Interim Development Order Permissions (IDOs) – Statutory Provisions and Procedures
MPG 9	1992	Planning and Compensation Act 1991: Interim Development Order Permissions (IDOs) – Conditions
MPG 10	1991	Provision of Raw Material for the Cement Industry
MPG 11	1993	The Control of Noise at Surface Mineral Workings
MPG 12	1994	Treatment of Disused Mine Openings and Availability of Information on Mined Ground
MPG 13	1995	Guidelines for Peat Provision in England including the place of alternative materials
MPG 14	1995	Environment Act 1995: Review of Mineral Planning Permissions
MPG 15	1996	Provision of Silica Sand in England

The following is an extract from the relevant paragraphs

‘MPG 1 Annex B: General Advice for Individual Minerals

B.1 The following paragraphs provide advice and general information on the main minerals which mineral planning authorities (MPAs) may have to consider.

Non-aggregate Minerals

B.7 In preparing their development plans MPAs will wish to recognise the importance of maintaining a continuing supply of these materials (see below) and of the particular policy considerations that may arise in each case.

(i) *Construction minerals*

Slate

B.10 Slate is used for roofing, cladding and decorative materials and also for powders and granules for specialised applications, eg fillers, reconstituted slate tiles. Slate is quarried from geological formations which may be very restricted in occurrence.

B.11 Modern activity is often intermixed with structures and remains of activities from previous generations. The industry is concentrated in small

areas and employment may be very significant locally. Requirements for traditional slate types or colours are common and they play an important role in the maintenance of local building character. Historically only roofing quality slate was worth processing for sale, and vast tips of waste slate were deposited. Today, producers aim to market as much slate and slate products as possible. Some producers sell slate wastes for use as bulkfill and in some cases construction aggregates, and in the production of slate powder and granules. The use for construction aggregates however, constitutes only a small proportion of annual arisings. Like dimension stone, working of slate may continue for very long periods.

Gypsum and Anhydrite

- B.12** Gypsum is a naturally occurring form of hydrated calcium sulphate. It is an important raw material for the building industry, being used principally in the manufacture of plaster and plasterboard.
- B.13** Anhydrite (the water-free form of calcium sulphate) occurs extensively in Britain, but there is only a small demand for the pure mineral for specialised uses. However a natural mixture of gypsum/anhydrite is used at the milling stage of cement manufacture to control the setting time, and for other specialised uses. It is an important mineral where high strength cements are required. Efforts should be made to safeguard mineral deposits which are, or may become, of economic importance against other types of development which would be a serious hindrance to their extraction.

Cement Minerals

- B.15** The Government's policy on cement is set out in Minerals Planning Guidance Note 10 "Provision of Raw Material for the Cement Industry":

(ii) Non-construction minerals

- B.16** Non-aggregate minerals, which are not used for construction purposes, include china clay, ball clay, potash, silica sand, salt, barytes, fluorspar, celestite, anhydrite, fireclay, dolomite and fuller's earth. These minerals are often in great demand but of limited occurrence and these factors have to be recognised in drawing up specific policies for their working in development plans.

China and Ball Clay

- B.17** The UK is a leading world producer and exporter of china clay and ball clay and the industries make an important contribution to the national balance of payments. Both minerals have a very limited occurrence and it is important that adequate reserves are maintained for long term use. In each case the national importance of the mineral has been recognised by the establishment of China and Ball Clay Consultation Areas designed to ensure that clay bearing land is not unnecessarily sterilized by other forms of development (see Minerals Planning Guidance Note 2 "Applications, Permissions and Conditions"). Further advice on mineral consultation areas is at paragraphs 36–39 and paragraphs A1–A2 of Annex A.
- B.18** The extraction of china clay results in a significant amount of waste - some 9 tonnes are produced for each tonne of clay - and most of the waste is deposited on land outside the confines of the pits. Some of the waste (mainly sand) is suitable for certain constructional purposes and Government policy is to encourage the maximum re-use of such waste. However major waste arisings will continue to be tipped and there are existing large areas of unrestored tips in the main china clay areas.

Silica Sand

- B.19** The Government's policy on silica sand is set out in DOE Circular 24/85 "Guidelines for the Provision of Silica Sand" [subsequently replaced by MPG 15].

Metalliferous Minerals

- B.22** Although the UK has to rely on imports of most of these minerals, either in unwrought metal or as concentrates, indigenous resources of metalliferous and other ores are not insignificant and the British Geological Survey (BGS) holds extensive information on areas with promising potential. MPAs should consult BGS, where necessary, and make provision in their development plan policies to safeguard such resources where they exist. As the extraction, processing and beneficiation of metalliferous minerals can cause environmental hazards and localised heavy metal pollution, MPAs should carefully balance the economic needs for these minerals against the environmental implications.

High Purity Limestone

- B.23** Limestones can be categorised on their chemical purity in relation to the industrial uses to which they may be put. However it is neither practical nor desirable to categorise limestone resources for planning purposes on the basis of their chemistry to the degree of accuracy possible for defining industrial uses of limestone. (See the report *Appraisal of high-purity limestones in England and Wales: A Study of resources, needs, uses and demands*, DOE, 1991.)
- B.24** For planning purposes, limestone resources with potential for use in high purity applications, a minimum calcium carbonate content of 97% is appropriate. However a single definition of high purity limestone should be used with caution as there are many different qualities of limestone, including physical properties and consistency, that need to be considered in determining what is fit for particular purposes. What is high purity to one user may be considered as ordinary grade by another user. In the excavation of high grade limestone, rock of all grades will necessarily be produced.

Fuller's Earth

- B.26** Fuller's earth is an important industrial mineral consisting essentially of the clay mineral calcium smectite. Smectite clays possess a unique combination of physical-chemical properties suiting them to a wide range of industrial applications. Fuller's earth has a very restricted geological occurrence in Britain and it is extremely unlikely that economically workable fuller's earth deposits exist outside areas of known resources.'

Annex C Text of DTI Paper on Economic Importance of Industrial Minerals for Planning Applications

Economic Importance of Industrial Minerals for Planning Applications

- C.1** The DTI strategy seeks to enhance the productivity and competitiveness of UK industry, including the industrial minerals sector, in order to maximise wealth creation and promote continuing sustainable economic development and investment, regionally and nationally. The concept of 'national need', which has historically been advanced to underpin local and national policy for industrial mineral extraction, is ambiguous and does not fit the current policy framework. There are no longer any national stockpiles of minerals, which, like other commodities, are mostly traded in a global marketplace. (In addition finished products from indigenous sources are traded internationally). However the UK has a demand for these materials that underpin broader manufacturing industry in the UK and elsewhere. Indeed in some cases user industries would be at a competitive disadvantage or disappear (i.e. relocate abroad) if they could not source these minerals locally in the UK. In addition while the deposits can be economically mined in the UK without subsidy, they create economic and social benefits for the local community in line with sustainable development practice. Therefore planning decisions should be based on careful consideration of the *'economic importance' of the proposed development, including inward investment decisions of consumer industries, in the context of HMG's sustainable development policy. Indeed the whole planning process should be as transparent as possible.*
- C.2** Economic theory normally indicates that the firm (in this case the mineral extractor) is the best judge of the economic benefit of its activities. In mineral extraction, there is the complication that extraction may have an adverse environmental impact on a location. This is clearly of importance to MPAs. Just which environmental impact costs planners consider relevant and why, will vary depending on a variety of location factors. It is not unreasonable to expect the minerals extractor to implement measures to mitigate these impacts but the extent to which this responsibility should fall on the extractor will vary according to the location in which the extraction is to take place and the type of extraction that is taking place.
- C.3** Applications should as a minimum include provision for an acceptable level of restoration of sites and other environmental obligations during site activity, closure and aftercare. This is in line with HMG and EU policy on producer responsibility. Therefore there should be a presumption in favour of granting planning consent for the extraction by the MPA in most cases unless relevant environmental impact cannot be mitigated

satisfactorily. In such cases the MPAs should clearly indicate where and to what extent the mitigation falls short of being satisfactory. MPAs should then consider what other compensatory measures could be taken by the developer to ensure an appropriate acceptable sustainable development balance is achieved upon the granting of planning permission. In these exceptional cases, as well as addressing environmental measures further consideration should be given to the importance of the level of existing activity/investment on the site and associated sites; existing infrastructure (e.g. processing facilities); impact on the local economy; impact on the customer sectors in the UK (and abroad), in particular their investment decisions; future plans the extractor and local authorities have for the region and other stakeholder views.

C.4 A checklist for MPAs to make decisions on Industrial Minerals applications should involve: -

Wealth Creation

- (i) Will the development make use of the existing extraction infrastructure, for example processing facilities?
- (ii) To what extent will the project add value to the local economy relative to alternative employment opportunities? Will new jobs be created, or others safeguarded? Will business opportunities for local firms (e.g. supply of contract services) be generated that otherwise would not arise?
- (iii) What is the impact on customer industry sectors in the UK and elsewhere e.g. how critical is the particular quality/properties of the materials being extracted, will it enable them to operate in the UK resulting in additional wealth creation opportunities for the UK.

Environmental Impact

- (i) Is the development a sustainable use of national resources?
- (ii) Can the impact on the local environment of the extraction operation be brought within acceptable levels i.e. dust creation, noise, water use, road movements etc?
- (iii) Are the proposed restoration/aftercare proposals acceptable?
- (iv) In relation to National Parks, an acceptable level for (ii) and (iii) is likely to be more critical than for other sites but should be agreed between the developers and approving authorities before the development takes place

C.5 As far as possible MPAs should protect unworked industrial mineral deposits against sterilisation by other forms of development except where there are overriding planning reasons for releasing this land for other purposes and the mineral cannot be worked prior to the alternative development taking place. Deposits, which are, or may become, of economic importance, should be safeguarded against other types of development by virtue of appropriate identification through planning policy.

C.6 The DTI recognises that in areas such as National Parks the MPAs may feel the environmental impact should take precedent over the wealth creation criteria. However in line with sustainable development practice an appropriate balance needs to be struck, and the DTI will work with all the relevant stakeholders to ensure this is achieved. To minimise the burden on business and indeed to ensure prudent use of public funds it would

seem sensible that permission should be granted for extensions to existing workings either above or below ground provided the level of previously agreed acceptable environmental impact is not going to increase significantly. The MPAs should make their reasoning as transparent as possible e.g. by making explicit estimates of any environmental impacts which would not be covered by remediation or restoration work and being prepared to negotiate any additional environmental mitigation.

- C.7** In addition, we like the idea of individual annexes for each industrial mineral as we believe that each industrial mineral has to a degree its own uniqueness and qualities. It may be that decisions on economic importance could be mineral specific and we would like to discuss this further when it is opportune.

DTI – Materials and Engineering Unit

14 November 2003



Kirkby Thore plasterboard plant, Cumbria.

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