

Minerals Planning Guidance 15: Provision of silica sand in England

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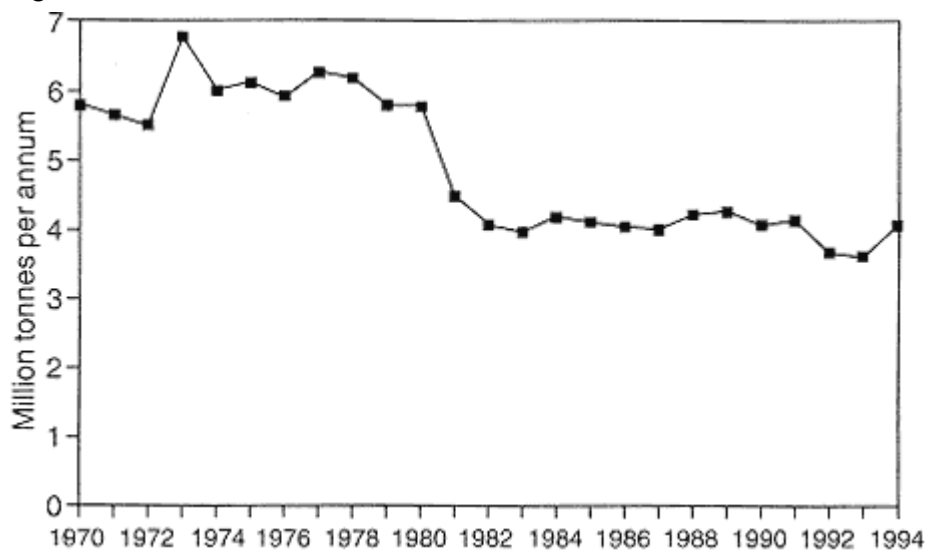
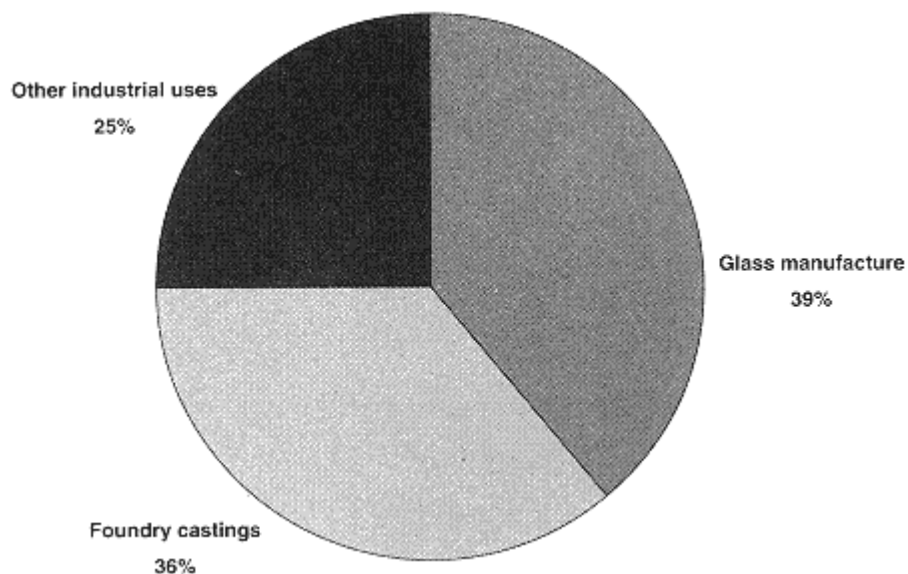


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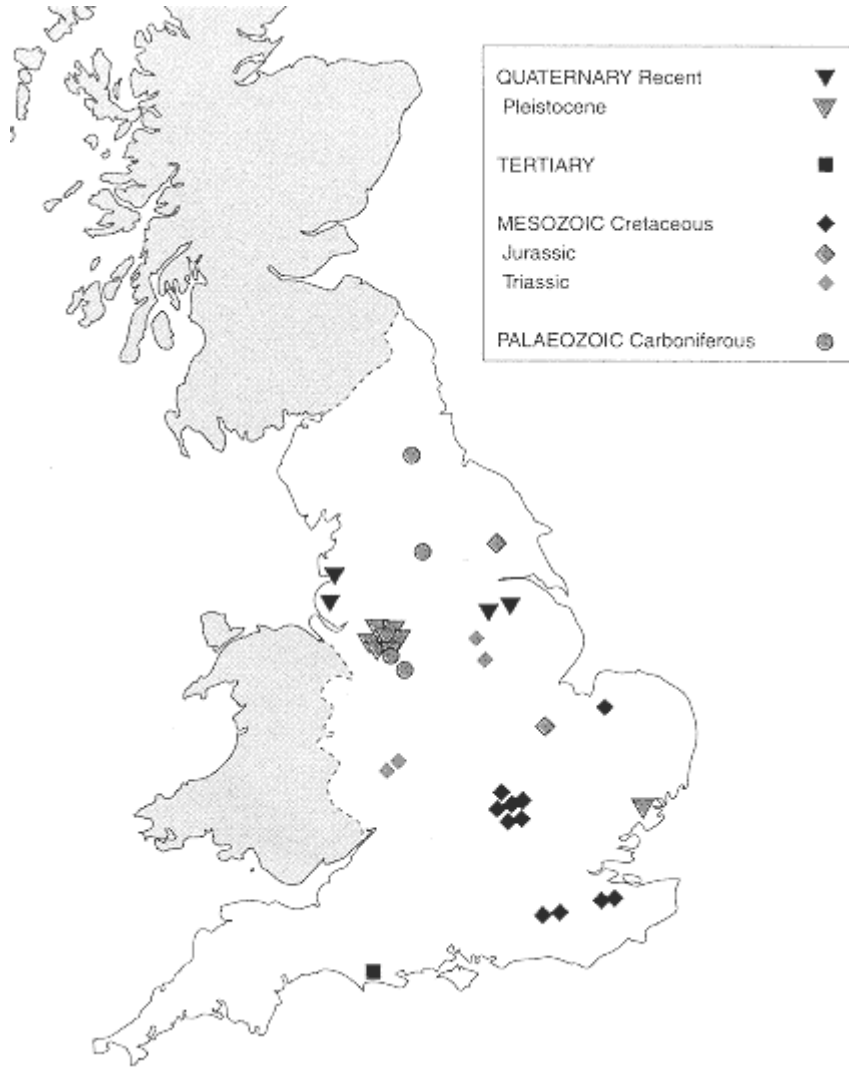
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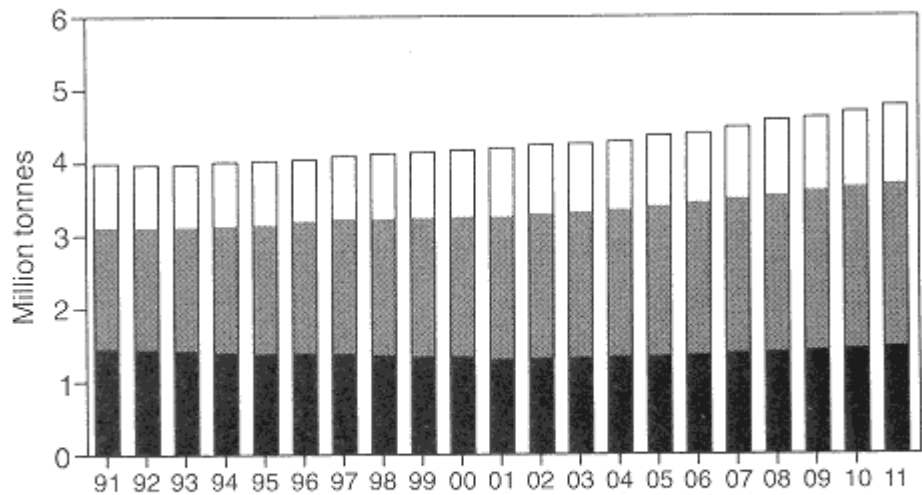
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Overview

Minerals Planning Guidance Notes set out the Government's policies on different aspects of minerals planning. Minerals planning authorities must take their content into account in preparing their development plans. The guidance may also be material to individual planning applications and appeals. This MPG replaces the guidance given in DOE Circular 24/85 which is hereby cancelled.

This guidance:

- emphasises that silica sand is an essential raw material for many industrial processes including the manufacture of glass, production of foundry castings and ceramics;
- advises that silica sand is geologically and geographically sparsely distributed and that, consequently, the mineral is a valuable resource of recognised national importance;
- advises that silica sand extraction, as with other minerals, has an impact on the environment which must be carefully balanced against the needs of the community for the mineral;
- provides advice to ensure that there is an adequate and steady supply of silica sand for the consuming industries;
- at the same time emphasises that supply must be maintained at the best balance of social, environmental and economic cost, whilst ensuring that extraction and development are consistent with the principles of sustainable development;
- sets out the policies with regard to extraction from environmentally sensitive areas;
- encourages efforts to recycle, to reduce the impact of extraction on the environment.

A: Introduction

Background

1 `Silica sand'(also known as `industrial sand') is sand which contains a high proportion of silica in the form of quartz and is marketed for purposes other than for direct use in the construction industry. It is produced from both unconsolidated sands and crushed sandstones, with processing to marketable form being of varying degrees of complexity depending on end-use. Silica sand is an essential raw material for the glass and foundry casting industries, as well as in other industries such as ceramics and chemicals manufacture and for water filtration purposes.

2 It is important that an adequate supply of silica sand is maintained from all sources. High quality silica sands are scarce, with extraction concentrated in a few areas in this country. The demand for land to be used for mineral extraction may lead to conflicts with other land use demands such as agricultural or amenity uses. There will therefore be a need to protect unworked silica sand deposits against sterilisation by other forms of development except where there are overriding planning reasons for releasing this land for other purposes. The general policy on the role of the planning system in safeguarding deposits is set out in paragraphs 36 to 39 of Minerals Planning Guidance Note 1 (MPG1).

3 The working of minerals has environmental implications for communities and landscapes and this must be carefully balanced against the need for the mineral. Extraction may be constrained by consideration of such matters as landscape, amenity, nature conservation, agriculture, and water interests.

4 The preparation of this Guidance Note, which applies only to England, has benefited from the aid of an Advisory Group which included representatives of the Minerals Planning Authorities (MPAs), silica sand producing and consuming industries, the British Geological Survey, and central Government. A survey of production, consumption and distribution was conducted by the Department of the Environment (DoE) in 1991.

B: Aims

5 The aims of this Guidance Note are:

- i. to provide guidance on how an adequate and steady supply of indigenous material to the silica sand consuming industries, at a national, regional and local level, may be maintained at the best balance of social, environmental and economic cost, through full consideration of the resources and the principles of sustainable development;
- ii. to provide a clear framework within which MPAs can develop policies for silica sand in development plans and carry out development control;
- iii. to serve as a national framework for the Secretary of State:
 - a. when formulating Regional Planning Guidance;
 - b. when exercising his functions under Town and Country Planning legislation in respect of development plans; and
 - c. when considering individual planning applications on appeal and any applications called in for determination;
- iv. to help to reduce the number of planning appeals; and
- v. to provide the basis for informed consideration at national, regional and local level of the implications for silica sand working of other policies.

C National Overview

Production and consumption

6 In 1994 the production of silica sand was approximately 4.0 million tonnes - see Table 1 and [Figure 1](#). Production in Great Britain is approximately in line with domestic consumption.

Table 1: Great Britain: Production of silica sand (000 tonnes)

Year	Production
1970	5782
1971	5645
1972	5478
1973	6775
1974	5990
1975	6139
1976	5901
1977	6283
1978	6224
1979	5829
1980	5708
1981	4451
1982	4123
1983	4026
1984	4328
1985	4178
1986	4108
1987	4029
1988	4340

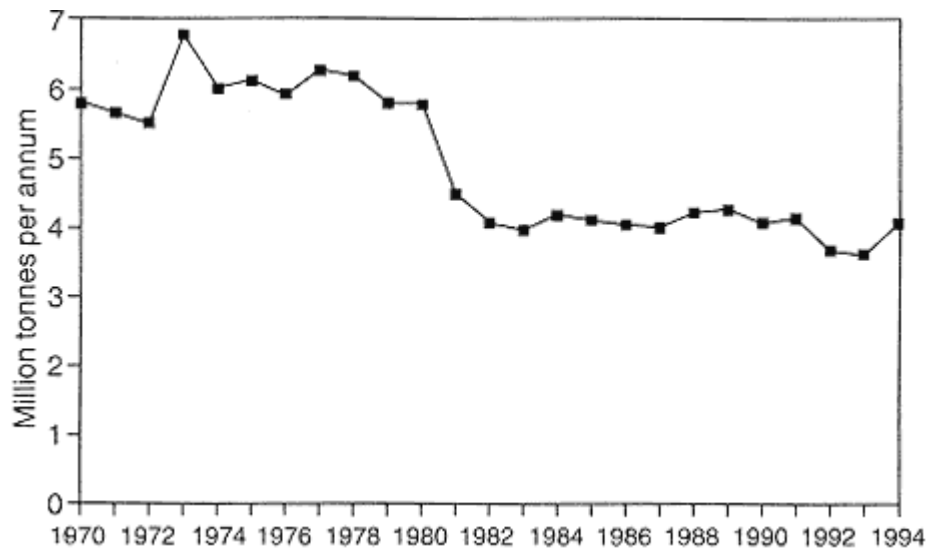
1989	4380
1990	4132
1991	4201
1992	3615
1993	3587
1994	4038

Source

1970 - 1993 - Business Monitor "Minerals"

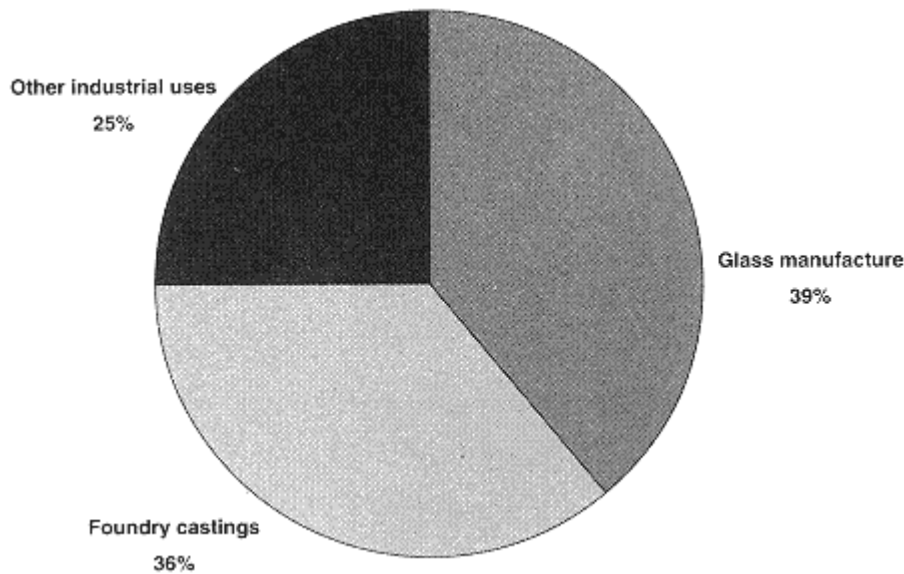
1994 - Business Monitor "Mineral Extraction in Great Britain"

Figure 1: Great Britain: Production of Silica Sand 1970 - 1994



7 The principal uses of silica sand are for glass manufacture (approximately 39%) and foundry castings (approximately 36%). Other uses (25%) include in the ceramics and chemicals industries and for water filtration purposes. The breakdown of production according to main end-uses is shown in Figure 2.

Figure 2: Silica Sand Production in 1994



8 A survey of production and reserves conducted by DoE showed that 34 output units operated by 20 companies were productive in England in 1990. Of these, less than half produced more than 85% of the total output. In addition, 6 further units did not produce silica sand in 1990, but had permitted reserves. These figures reflect changes that have occurred and are continuing to occur within the industry. The market requirement for higher quality processed sands is tending to focus attention on fewer sites with high quality raw materials and more sophisticated processing plant. The suitability of some of the currently permitted reserves for industrial applications may be neither economically nor practically viable in the future.

9 The silica sand industry has been characterised by changes in the relative importance of the consuming sector. The biggest historical consumer has been the foundry industry, but consumption by this sector in recent years has been exceeded by that for glass manufacture. The consumer industries are changing fundamentally in response to different external pressures, including environmental legislation, competition and pressure to recycle and reduce energy consumption.

Future need for silica sand

10 The need for silica sand can be related to the demands of the consuming industries. Demand through the 1980s was between 4 and 4.4 million tonnes per annum (mtpa). A long term projection to 2011 produced in 1992 is presented in Annex A. This shows that demand is projected to rise only very slightly from recent levels.

11 This projection is not a target for production, nor can it be used to denote the level of demand over the short term, in any one year or a small group of years; neither can it be used for forecasting future landbank requirements (see paragraphs 43-52). Care should therefore be exercised when comparing actual production data against the projected demand.

Trade

12 International trade in silica sand is small. Data for exports and imports for the years 1988-94 are shown in [Table 2](#). Imports are mainly from Belgium and the Netherlands and, to a lesser extent,

from France and Germany. Exports consist mainly of resincoated sands, glass sands, and sands for silicon carbide manufacture and for water filtration purposes, and are mainly to the Irish Republic, Sweden and Norway, although small quantities of filter sands may be shipped worldwide. Some sand is shipped to the Far East and Australia for use in paint manufacture. Silica sand products, including silica flour and cristobalite (a value-added product based on calcined sand), are also exported to the USA, Japan and Malaysia. These products are used as fillers and for investment casting in dentistry and jewellery.

Table 2: United Kingdom: Exports and imports of silica sand^(a) (000 tonnes)

Year	Exports	Imports
1988	25.2	58.6
1989	43.6	49.9
1990	44.5	43.7
1991	57.6	25.6
1992	53.9	18.2
1993 ^(b)	74.8	51.6
1994	67.8	119.8

Footnotes

(a) Silica sand including quartz sands

(b) Following the introduction of the Single Market on 1 January 1993 different data collection systems have been used and subsequent data are not directly comparable with 1992 and previous years.

Source: 1988 - 1992 - Business Monitor MA20 "The Overseas Trade Statistics of the UK"

1993 - 1994 - Business Monitor MM20 "Overseas Trade of the UK (extra-EC)"

-Business Monitor MQ20" Overseas Trade of the UK (intra-EC)"

Regional position

13 Extraction of silica sand in England is concentrated in some areas more than others (Map 1). Production of silica sand by place of origin and end-use for 1994 is shown in [Table 3](#). A breakdown of total sales by county is given in [Table 4](#).

Map 1: Locations of silica sand quarries in England, active in 1990, according to geological age of extracted deposit

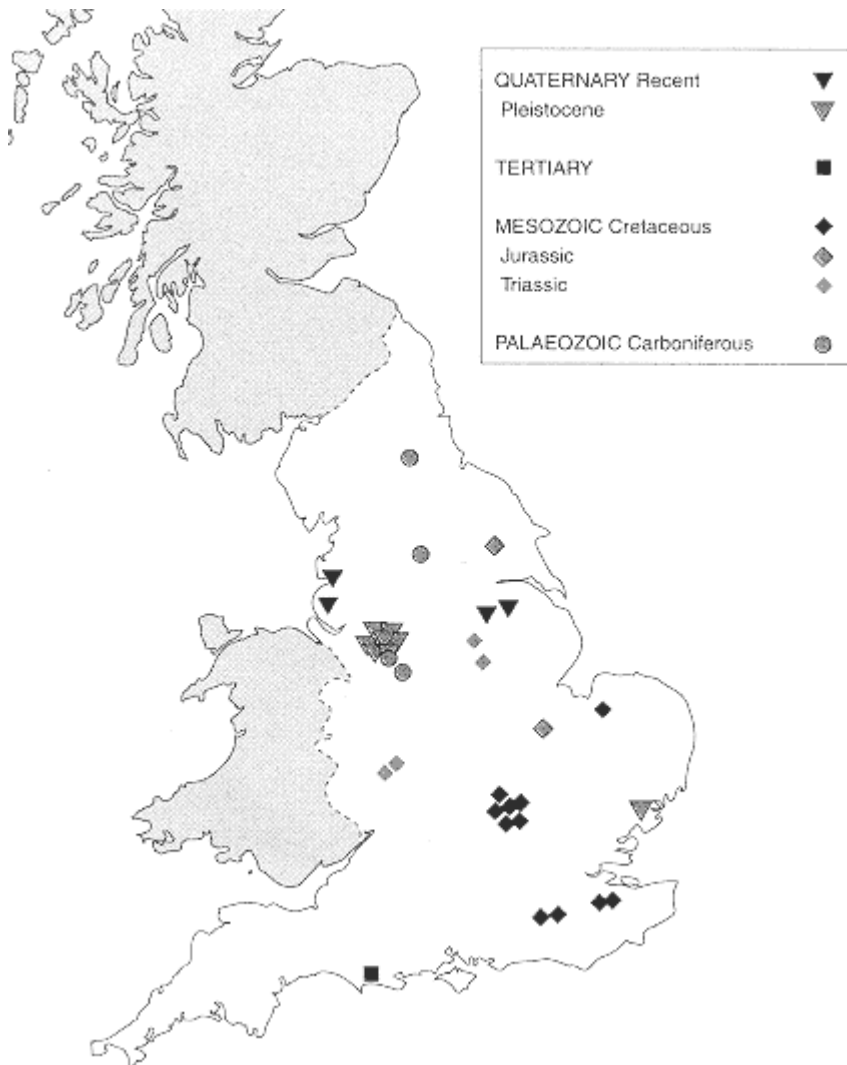


Table 3: England: Silica sand production by end-use and place of origin in 1994 (000 tonnes)

Foundry		Other	Glass	Other Industrial	Total
Naturally bonded					
North	2	-	-	8	10
Yorks & Humb	-	*	*	*	124
N. West	-	914	*	*	1635
W. Midlands	*	-	*	*	*
E. Midlands	*	*	-	*	*
E. Anglia	*	*	*	*	*

S. East	*	*	*	292	778
S. West	-	*	-	*	
Total	156	1263	*	*	3477

Footnote

* withheld to avoid disclosure of confidential data

- nil or less than half the final digit shown

Source: Business Monitor "Minerals Extraction in Great Britain" 1994

Table 4: England: Extractor's sales of silica sand by place of origin in 1994 (000 tonnes)

England County	Total Sales
Durham	10
North Yorkshire) Humberside)	124
Lancashire) Merseyside) Cheshire)	1635
Staffordshire	*
Hereford/ Worcester	26
Nottinghamshire	*
Cambridgeshire	3
Norfolk	*
Suffolk	*
Essex	*
Bedfordshire	*
Surrey	*
Kent	*
Dorset	*
Cornwall	*

Note:

* withheld to avoid disclosure of confidential data

Source:

Business Monitor: "Minerals Extraction in Great Britain" 1994

14 A DoE survey of production and reserves in Great Britain in 1990 (unpublished data - DoE, 1991) demonstrated that production was chiefly concentrated in the following areas: Scotland, Cheshire, Merseyside, Staffordshire, North Yorkshire, Humberside, Nottinghamshire, Surrey, Kent, Bedfordshire, and Norfolk. In terms of planning regions, NW England was the largest producer of silica sand in 1994, nearly a half of total British output being from this region.

15 Production of silica sand for use in glass manufacture is concentrated predominantly in Scotland, Cheshire, Staffordshire, North Yorkshire, Humberside, Norfolk, Surrey and Kent. Silica sand for foundry uses is chiefly from Cheshire, but also from the West Midlands, Nottinghamshire, Yorkshire, Humberside, Norfolk, Bedfordshire, Surrey, Kent and Scotland.

16 Historically, the extraction and consuming industries have to some extent been located fairly close to each other. However, in recent years, transport infrastructure and regional economic changes have meant that producers may be located at considerable distances from their customers. Glass for containers is manufactured chiefly in West and South Yorkshire, Central Scotland, and to a lesser extent in Essex; and that used for crystal glassware is manufactured mainly in the West Midlands. Flat glass is produced largely in Merseyside. The foundry industry is concentrated predominantly in the West Midlands, but plants are also located in the East Midlands, South Yorkshire/Humberside, the Stoke-on-Trent area, North West England including the Manchester area, North East England, and the Glasgow-Edinburgh area of Scotland. The ceramics industry is concentrated in the Potteries of the Stoke-on-Trent area.

17 The above description indicates the general location of silica sand deposits and the industry. MPAs in other areas should also take account of this guidance in drawing up minerals local plans.

Special features of silica sand and the location of the industry

18 It is important to recognise some fundamental differences between the silica sand and construction sand industries. These differences may give rise to a variety of planning issues which need to be addressed.

19 In common with all minerals, silica sand can be extracted only where the mineral occurs. But owing to the small number of deposits containing sand suitable for use specifically as silica sand, there is only a limited number of locations where extraction is economically feasible. To be considered potentially suitable for extraction, deposits must be capable of being worked economically and be available in sufficient quantity to justify the capital investment required. Where plant is required to process and treat silica sands to the necessary specification, it may be complex and costly, and the physical size of the plant may mean that screening is both difficult and expensive. While the level of investment will depend on the nature of the deposit and market to be supplied, the cost of establishing production on a greenfield site can range from £5m to £25m and up to £50m where a site produces value added products. In practice this has led to the establishment of a limited number of extraction units, most of which have been in existence for many years and which often will have a long term future. It should also be noted that replacing old or developing new process lines at existing sites also involves major investment. Furthermore the investment proposals of the raw material end-user industries are greatly influenced by the essential need for long term availability of indigenous materials.

20 Plant required to process silica sand sometimes needs to operate for 24 hours a day and delivery of sands may also need to take place round the clock. Dried foundry sand must be delivered within a certain temperature range or its setting time in the foundry plant may be affected. Glass manufacturing factories usually operate round the clock. Consequently, transport of sands may be necessary 24 hours per day.

21 Some types of sand, notably colourless glass sand, may require chemical treatment, while sands for foundry purposes require drying and some undergo a special resin coating process. Therefore, heavy capital investment is a factor for consideration at the start of a new operation and from time to time during the life of the working, when replacement or uprating of plant is proposed. While the general distribution of silica sand resources is relatively well known, detailed information on their suitability for particular end-uses or detailed information on their physical and chemical characteristics and on the nature and extent of processing which would be required to make them suitable for specific uses is not generally available whilst they are in the ground. The future supply of silica sand is likely to depend on the increasing use of processing techniques to upgrade sands to the required specifications. Plant required to upgrade sands may be costly. These points should be addressed in any consideration of the length of any permission which may be granted.

22 The high capital cost of investment in the silica sand industry means that, in the short term at least, investment in new capacity may take the form of the uprating of existing plant or the creation of additional capacity at such plant. However, in recent years, increases in capacity, particularly for the supply of glass sand, have also been on greenfield sites, where companies have identified deposits which can be competitively worked.

23 The locations of active silica sand quarries in England according to the geological age of the extracted deposit, are shown in [Map 1](#). Further detailed information on the geological and technical aspects of silica sand extraction and its utilisation are provided in Annex B.

24 Silica sand-bearing deposits may be overlain or interbedded with inferior grade sands that are not capable of beneficiation for use in industrial applications and hence are only suitable for construction uses. The use of such sands for construction aggregate would maximise recovery and thus ensure the efficient use of the total resource, in line with the principles of sustainable development. The amount of construction sand as a proportion of total production from a site varies greatly and will depend on several factors including the geology of the deposit. In applying this Guidance Note, planning authorities will need to distinguish between those operations which essentially produce construction sand but, in addition, produce small amounts of silica sand, and those operations which are essentially for silica sand, but which, mainly as a consequence of the geology, produce a proportion of material which is only suitable as a construction aggregate and would be used as such in order to avoid wastage. MPAs will therefore need to recognise the importance of the quality of silica sand whatever element of the overall output it constitutes and exercise some degree of flexibility in applying this Guidance Note.

25 There may be potential environmental impacts arising from the consuming industries' demands for higher specification sands. These impacts may take the form of more sophisticated processing with increased energy consumption and problems of waste disposal, and/or more extensive quarrying of the deposit in order to produce a balanced plant feed from the often complex geology of the deposit. The latter may result in larger areas of quarrying rather than smaller confined workings.

26 The impact of complex geology, changing end-user specification, relatively low volume of output, lack of alternatives and national importance of silica sand clearly distinguish the material from construction sands. These factors should be fully reflected in the future planning of silica sand resources.

D National Policy Framework

General considerations

27 Minerals Planning Guidance Note 1 (MPG1) gives guidance on general considerations and the development plan system applying to all minerals development.

Supply

28 The Government believes that for the economic well-being of the country it is essential that the silica sand consuming industries continue to receive an adequate and steady supply of indigenous raw material so that they can continue to meet the needs of the community for products which use silica sand in their manufacture. It is important that supplies to the manufacturing sector should be provided in the most environmentally acceptable way and with regard to the principles of sustainable development.

Sustainable development

29 The Government White Paper "This Common Inheritance"(Cm 1200) stresses the importance of combining economic growth with care for the environment in order to attain sustainable development. The policy considerations for minerals planning in terms of sustainable development are described in paragraph 35 of MPG1.

30 For silica sand, this means that the planning system should ensure that the best and most efficient use will be made of the available resources, so that the extraction of new reserves is limited to what is necessary to meet the needs of the current generation; and that the overall quality of the environment affected by silica sand extraction should be maintained or improved over time. 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. It is desirable that high grade silica sands should as far as possible be conserved for use where they are required.

Use of materials

31 It is important that silica sand resources should be used as efficiently as possible and that unnecessary wastage of resources should be avoided. Within the general definition of silica sand, there are certain high grade materials which, 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 high grade silica sand should not be wasted and that its use in the construction industry should be minimised. However, it would normally be appropriate to utilise as construction sand certain amounts of lower grade silica sand found within a silica sand deposit, which would otherwise be wasted. In some cases, such materials may be returned to the quarry during site restoration. To a large extent the scarcity and high value of the various grades ensure that the market operates to meet the right end-uses. At planning application stage, it will be up to the operator to indicate in broad terms the likely markets by proportion of the deposits.

Recycling

32 Recycling and re-use of silica sand, and products manufactured from silica sand, may afford considerable savings not only of the sand itself, but also of other raw materials and energy, as well

as reducing the impact of extraction on the environment. Further environmental advantages of re-use/recycling are that the landfill requirement for wastes can be reduced and, with regard to the foundry industry, the need for transport can be reduced by the re-use of locally reclaimed sand. MPAs and the extracting and consuming industries should therefore consider what steps they can take to encourage re-use/recycling where there are environmental benefits to be gained. There would be clear advantages in the extraction industry co-operating in efforts to encourage recycling since increased recycling would extend the life of mineral assets as well as maintaining the principles of sustainable development.

33 In recent years, the glass and foundry industries have made efforts to recycle, both to save sand and to reduce energy consumption. The Government wishes to encourage this and looks to the consumer industries to monitor the amounts of their products which are re-used or recycled and, where appropriate, to set targets for increased re-use/recycling.

34 There are some technical and economic obstacles to glass recycling. For example, mixed cullet (broken glass), which forms an increasing proportion of returned glass (owing to the inclusion of significant amounts of glass from elsewhere in Europe), cannot at present be used in the manufacture of clear glass. It should also be borne in mind that the increasing use of bottle bank cullet as a proportion of the furnace melt in glass manufacture may mean that the processed sand portion added to the cullet needs to be of a higher specification to offset the inconsistency of the cullet. This could create an increase in the demand for high grade silica sands. The costs of transportation from collection centres to glass manufacturing plants may also limit the growth of recycling.

35 However, glass manufacturers already recycle large quantities of cullet. The Government's strategy for sustainable waste management "Making Waste Work"(Cm 3040 1995) records that over 500,000 tonnes of cullet glass from bottle banks and industrial sources went into new container production in 1993, representing a recycling rate of some 29%. By the end of 1994, some 17,000 bottle banks had been set up and as the use of bottle banks spreads and sorting is done increasingly by the public, recycling will increase further. The glass industry aims to achieve 58% recycling of container glass by the year 2000. The Government welcomes this and encourages the industry to make efforts to reach these targets.

36 At present, levels of recycling of foundry sand vary from 50% to 80% depending on the nature of the operation. Recycling of foundry sand is constrained by technology and costs. In the manufacture of castings, much foundry sand is recovered for re-use, although there is degradation in sand quality after several castings. More sand is recovered from greensand operations than those using resin. In the latter, reclamation of sand is far less efficient and more expensive. Present recovery systems are also unable to produce the high quality sand required for all parts of the casting process. Techniques for recycling of foundry sand continue to develop and the amount recovered can be expected to increase.

37 The Government encourages greensand operations to aim as far as possible to achieve a high level of recycling. In the case of resin sand operations, the Government encourages industry to strive for technological advances which will increase the amount of recycling of this type of sand.

38 Government grants to the glass and foundry industries made under the Environmental Technology Innovation Scheme (ETIS) operated by the Department of Trade and Industry and DoE until late 1993 ([see endnote 1](#)) have been used to research new methods of recycling cullet to make glass, to seek other uses of cullet outside the glass industry and to research methods of recycling

foundry sand. The consumer industries are encouraged to explore further the scope for such innovation, including technology which would enable the quantities of silica sand required to be reduced further.

Endnotes

1 The ETIS scheme was a programme of grant assistance operated for a limited period for pre-competitive industrial research in the environmental field. The main aims were to encourage technical innovation in order to improve environmental standards and help users and suppliers of environmental technology to become more competitive.

PPG15 below have been made available in *Adobe Acrobat* format for [downloading](#). The *Adobe Acrobat Reader* can be freely downloaded.

Viewers with visual difficulties may find it useful to investigate services provided to improve the accessibility of Acrobat documents -- <http://access.adobe.com>

E Development Plans

General considerations

39 Planning Policy Guidance Note 12 (PPG12) on Development Plans and Regional Planning Guidance provides advice on the preparation of development plans. Guidance on the operation of the development plan system in relation to minerals is given in MPG1.

Silica sand provision in development plans

40 In carrying out their development plan functions, local authorities in areas which have historically produced silica sand, or are known to contain silica sand deposits, should take into account the policies contained in this MPG. They should recognise the material scarcity of silica sand and also aim to make provision in their development plans for an appropriate level of production which takes account not only of recent production levels in the area, but also of regional and national needs, through the identification of specific sites and the inclusion of preferred areas or areas of search. Areas of search offer a prudent approach to balancing the needs of the industry and local concerns about possible blight in respect of at least a proportion of the provision to be made. Further advice is given in MPG1 . Early discussion with the minerals industry in the preparation of the plan is strongly encouraged.

41 To ensure that the areas identified in the development plan can be translated into workable reserves, MPAs should make reasonable efforts to satisfy themselves that the land is:

- i. underlain by potentially economically workable deposits of mineral; and
- ii. likely to become available to the minerals industry within the plan period.

Where these points cannot be resolved satisfactorily, development plans should be sufficiently flexible to make allowance for any uncertainty. Plans must be clear and unambiguously expressed in accordance with PPG 12 .

42 A summary of projected future demand for silica sand by the glass, foundry and other industries is at Annex A. MPAs may find it helpful to use the information given to assist them in identifying the need for specific sites, preferred areas or areas of search which may contribute to meeting these needs. In order to assist in the delineation of these areas in development plans, the silica sand industry should co-operate with MPAs wherever possible by providing information about the location of mineral resources in their areas. Discussions with individual operators about their longer term intentions may also be helpful in establishing the provisions which should be made in the plan for silica sand.

Landbanks

43 A landbank is a stock of planning permissions for the winning and working of minerals. Policies providing for the maintenance of landbanks are an important feature of minerals planning. Landbanks are necessary to enable the minerals supply industries to respond speedily to

fluctuations in demand. The period of the landbank reflects the lead times that may be involved in obtaining planning permission and bringing a site into full production. Landbanks enable the MPAs and the minerals industry to take a long term view of the needs of the consumer industries and of the planning and environmental implications of meeting those needs.

44 The system used to ensure a continuing flow of aggregate materials to industry cannot readily be applied to silica sand because of the special features of the silica sand industry (paras 18 - 26 above) and the wide range of grades of material required to meet a range of specialist end-uses.

45 However, 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.

46 Because of the relatively small number of quarries producing silica sand, and the range of types of silica sand required for different end-uses, reserves to meet the needs of the different consuming industries are bound to fluctuate widely at the local level, depending on the timing and size of individual planning applications.

47 Due to the national need for silica sand, it is important that each production site is adequately 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, in operating this policy, MPAs will also need to consider the Government's general policy of encouraging competition. 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. Care and flexibility will be needed in addressing these issues. In practice, there may be difficulties as production data may be confidential at site level, but it may be difficult to calculate landbanks or to make specific provision in mineral local plans without this information. It will therefore be in both the MPAs and industry's interests to maintain a dialogue and informed analysis of actual need and supply.

48 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.

49 The Department's survey of production and reserves found that total permitted reserves at silica sand sites in Great Britain at 1 January 1990 were sufficient for approximately 33 years, at recent extraction levels. However, approximately 27% of the total reserves tonnage is sand which operators consider to be suitable only for construction purposes. Taking this into account, the reserves for silica sand for industrial purposes would reduce to approximately 25 years. In 1990, permitted reserves suitable for use in glass manufacture were sufficient for approximately 23 years at recent extraction rates, and for foundry purposes (excluding naturally-bonded sands), for approximately 48 years. These figures need to be taken as very broad approximations. They conceal a range of reserves for the range of different types of sand required, and also conceal very widely ranging landbanks at individual sites and for different geographical areas.

50 Many small output units (those producing less than 50,000 tonnes per year) have large landbanks in excess of 30 years, while most large sites (those producing more than 100,000 tonnes per year) have landbanks below this level and, in some cases, below 10 years.

51 Caution and flexibility will be needed in using these figures. 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.

52 The landbank requirement should be calculated by multiplying the average of the last 3 years' production for which figures are available by the appropriate number of years or by reference to levels of provision set out in the development plan. The calculations should have regard to the quality of sand and the use to which the material is to be put.

Safeguarding

53 Silica sand is a scarce resource and MPAs should, as far as possible and in co-operation with other planning authorities, 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.

54 It is essential to consider the need for silica sand over a longer period than for most other land use planning issues. When considering the need to extract the mineral as opposed to letting surface development proceed, it will be necessary to consider the timescales and scale of investment of the proposed mineral working in order to prevent undue delay. Where it is possible to extract silica sand prior to some other more permanent form of development this should be encouraged unless there are good planning reasons for not doing so. MPAs may define Mineral Consultation Areas (MCAs) in their plans. These enable county and district councils to liaise where surface development would be likely to affect or be affected by the winning and working of minerals. MPG 1 (paragraphs 36-39) provides further advice on MCAs.

Extensions

55 It may be generally preferable, as a means of minimising environmental disturbance, and bearing in mind the scale of investment required to open new silica sand works, to adopt a policy of allowing extensions to existing mineral workings in order to extract all available reserves at an existing site, rather than allowing mineral workings at new greenfield sites. However, this will not always be the case as some existing mineral workings may be unsuitably located and it may do less environmental harm to open a new mineral working than to grant a permission for an extension. A general preference for extensions to existing workings should not be construed as a policy for protecting existing suppliers and a constraint on competition. Each case will need to be considered on its own merits.

National Parks, the Broads, the New Forest and Areas of Outstanding Natural Beauty (AONBs)

56 The Government's planning policies for all forms of development in National Parks, the Broads and AONBs are set out in Planning Policy Guidance Note 7 -"The Countryside and the Rural Economy"(PPG7). Further guidance for mineral development in these areas, including New Forests, is given in paragraphs 70 and 71 of MPG6 -"Guidance for Aggregates Provision in England".

Green Belt

57 The Government's planning policies for development in green belts is set out in Planning Policy Guidance Note 2 - "Green Belts"(PPG2).

Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Special Protection Areas, Special Areas of Conservation and Ramsar Sites

58 The Government's policy for development within these areas is set out in Planning Policy Guidance Note 9 - "Nature Conservation"(PPG9).

Other environmentally important areas

59 Paragraph 49 of MPG1 describes how planning authorities should deal with proposals for development in these areas.

Archaeology, listed buildings and the historic environment

60 The Government's policy for development in these areas is set out in Planning Policy Guidance Note 16 - "Archaeology and Planning"(PPG16) and Planning Policy Guidance Note 15 - "Planning and the Historic Environment"(PPG15) (*Adobe Acrobat - 267kb*).

Agricultural land

61 The Government's policy on the use of agricultural land is set out in Planning Policy Guidance Note 7 - "The Countryside and the Rural Economy"(PPG7).

62 Because of limited availability of resources of suitable quality, it may be necessary to consider working such resources even where they occur beneath areas of the best and most versatile agricultural land. But this should only be considered where alternative resources are not available either beneath lower quality land or below best and most versatile land capable of being restored to its original pre-working agricultural potential.

F Considering Individual Planning Applications

General

63 Planning applications should be determined in accordance with the development plan unless material considerations indicate otherwise. MPAs will need to consider in detail matters such as the economic, environmental, nature conservation, agricultural, landscape, traffic, site restoration and other effects of the proposal that are relevant to the planning decision. For its part, the industry will need to demonstrate that it has considered the potential effects when preparing planning applications and has sought to mitigate them as appropriate.

Assessment of need and supply

64 The Government's policy on ensuring supplies of minerals is set out in paragraph 40 of MPG1 . As far as silica sand is concerned, authorities should have regard to the balance of real need and real supply. But landbank calculations and estimates of real supply can seldom be exact and decisions on individual applications should not be determined on an over-precise calculation of whether supply matches the landbank requirement.

65 In considering applications, consideration should be given to the position in respect of permitted reserves and whether the particular nature and qualities of the silica sand, such as suitability for particular end-use not met by other available sources in the area or region, in itself justifies granting permission.

66 It is important to draw a distinction between the reasons for a landbank as discussed in paragraphs 43-52 above and the need for the size of a particular permission to reflect the levels of capital investment required at specific sites. Some quarrying operations involve simple methods of working and processing which do not involve major capital expenditure. Others necessitate a lengthy period of planning and development work, plus a high investment in plant and equipment, which requires a long operating life to provide a return on investment. Proposals which involve extraction over a long period may be related to phased schemes for reclamation and restoration.

67 It should be noted that the general commitment to maintain a landbank does not remove the discretion of a mineral planning authority, or the Secretary of State, to refuse planning permission should there be serious, overriding objections.

Environmental effects

68 Mineral development can have a considerable impact upon the environment. For example, visual intrusion of a site, any permanent changes to the landscape, noise, vibration and dust, both from the workings and any associated heavy lorry traffic, can give rise to objections by local communities.

69 The silica sand industry should demonstrate that it is taking all practicable steps to satisfy the environmental concerns on site operation and restoration. Any environmental damage or loss of amenity caused by mineral working should be kept to a minimum. Ancillary operations, such as crushing, grading and screening, and sand drying, may require authorization under Part 1 of the Environmental Protection Act 1990 . More guidance is contained in paragraphs 59 and 60 of MPG1.

Operators' proposals

70 In considering proposals for minerals development, authorities will wish to satisfy themselves that the operator's proposals for managing the site, and for restoration and aftercare, will achieve high standards of operating and reclamation practice in accordance with modern planning requirements. Operators may therefore wish to call attention to, and authorities will wish to consider, any evidence as to how their proposed methods of site management, restoration and aftercare are likely to work out in practice. This might be done by providing evidence about the way a similar site is currently being managed, or how restoration and aftercare have been achieved on a similar site. MPAs should thus have regard to the practicality of the proposal before them.

71 The Code of Environmental Practice prepared by the Silica and Moulding Sands Association (SAMSA) provides useful information about the environmental standards the member companies have agreed to follow. The Government encourages the use of such codes and welcomes the steps taken by the trade association in preparing this. It would be helpful if results of environmental audits by operators were made available to MPAs and other interested parties.

Environmental Assessment

72 Paragraphs 59 and 60 of MPG1 and paragraphs 38 and 39 of PPG9 set out the Government's guidance on consideration of environmental impacts and sources of advice for MPAs and operators. DoE Circular 15/88 explains the provisions of the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 and gives advice on their implementation. Further advice is given in DoE's "Environmental Assessment: A Guide to the Procedures"(HMSO 1989).

Transport

73 The relative scarcity of silica sands and their distance from major centres of consumption means that transport is a major item in the delivered cost of the mineral.

74 As indicated in paragraph 20, dried foundry sand must be delivered within a certain temperature range or its setting time in the foundry plant may be affected, and many glass manufacturing plants operate round the clock necessitating 24 hours transport operations. These factors have implications for the preferred transport mode. Generally, road haulage is often considered more flexible and better able to guarantee the timed delivery service demanded by the majority of the silica sand industry's customers. Rail may, however, in some cases offer an environmentally advantageous alternative, particularly for delivering large quantities of sand to limited numbers of customers, eg glass manufacturers. There may be more potential for rail transport over long distances. Planning authorities should, individually or collectively, have regard to these factors when drawing up policies in their development plans on such matters as transport modes, routing and the safeguarding of freight depots.

75 Discussions should take place with MPAs at an early stage on how traffic generated by the proposal will be managed to minimise environmental disturbance. Advice on access and road safety considerations is given in paragraphs 30 to 33 and 76 to 79 of MPG2. The report "The Environmental Effects of Surface Mineral Workings"(HMSO 1991) also provides advice on traffic. General advice on transport and planning is given in PPG13. DoE has commissioned further research to assess the environmental effects resulting from on-site and off-site traffic.

76 Grants remain available to assist with the capital cost of constructing rail freight facilities. Grants under Section 8 of the Railways Act 1974 have, in the past, been used effectively to reduce the movement of aggregates by road. The grant scheme is administered by the Department of Transport (DoT). Since 1 April 1996 these grants have been enhanced under the powers in section 139 of the Railways Act 1993. Similarly, in the former Transport Act, section 36 grants (for movement of freight by inland waterway) have been replaced by grants under section 140 of the 1993 Act. The main change is the inclusion of wider and social benefits of lorry removal through the addition of motorways and dual carriageway trunk roads in environmental assessments. Additional assistance has also been made available from 1 April 1994 with the introduction of a new Track Access Grant to assist rail freight operators in meeting charges levied by Railtrack for access to the track. This may help mineral producers contracting for rail haulage where the cost of rail would otherwise be unfavourable when compared with road transport. The grant will be administered centrally by DoT.

77 Planning authorities should, as far as they reasonably can, safeguard existing rail head facilities and encourage new ones. It should be noted that the imposition of an obligation to use rail as part of the determination of a planning application will however mean that freight grant cannot be paid as road must be a practical alternative.

Water interests

78 MPAs and the industry should take into account the body of legislation in relation to water supply, pollution control and land drainage. These are discussed further in paragraphs 35, and 109 to 116 of MPG2, in MPG7 and in DoE Circular 25/85. The Environment Agency should be consulted about all new development proposals. Where working would take place below the natural water table applications will need to include proposals for a suitable aftercare. The Environment Agency's groundwater protection policy outlines the after-use constraints and opportunities which may apply in such circumstances, subject to site-specific technical appraisal.

Working practices, restoration, aftercare and after-use

79 Applications for extraction of minerals such as silica sand need to include information which demonstrates that the site will be restored satisfactorily. Advice on restoration and aftercare, including a general review of the essential technical requirements which need to be considered when planning conditions are drawn up, is given in Minerals Planning Guidance Note 7 - "The Reclamation of Mineral Workings"(MPG7).

80 One of the distinguishing features of the industry is the duration of its extraction operations. Planning applications should include comprehensive plans and statements as to how sites will be progressively worked with a view to achieving particular restoration enabling appropriate after-use to take place.

81 It is likely that longer term schemes prepared before extraction commences will require monitoring, updating and amendment during the lifetime of such working. Planning conditions may allow for this by requiring a general treatment scheme to be prepared and agreed before extraction starts, to be followed up by submission of detailed schemes for particular phases for landscaping, for reclamation and aftercare, and by setting a time limit for submission of the final reclamation plan which is commensurate with the duration of the mineral permission.

82 However, all planning applications should contain sufficient detail of working and restoration methods and programmes to allow an assessment to be reached on the viability of the application and of proposals to achieve the intended after-uses. Operators should therefore draw up Quarry Plans to accompany planning applications. Such plans are non-statutory and are not substitutes for environmental statements/assessments; but drawn up in consultation with the MPA they would provide the MPA's requirement for details of the screening and phasing of working, restoration and aftercare, and the longer term after-use of the site.

83 Where possible working and reclamation should be in a progressive manner. However, it is recognised that in some cases different grades of sand are worked from separate parts or levels of a single quarry. Varying rates of extraction, depending on the demand for particular grades of sand or volumes of each deposit, may hinder or even prevent progressive restoration and require the preparation of more complex working schemes than are usual for construction sand quarries. There may also be the need for facilities for mixing/blending the raw mineral at the quarry face and the need for settling lagoons. However, the aim should be to minimise the area open and disturbed at any one time and, where reasonably practicable, to secure progressive restoration of the site. Care should be taken to conserve all soil and soil-making materials suitable for use in restoration.

84 Silica sand deposits are often thick and may extend well below the natural water table, which may make restoration to agriculture impractical. There can be positive benefits of restoration to wet after-uses and regard should be had to the advice on such uses set out in MPG7 . Whether a wet after-use is acceptable will need to be considered alongside the policy on agricultural land set out at paragraphs 61-62 and in consultation with the Environment Agency.

85 MPAs and the industry should bear in mind opportunities for habitat creation and enhancement even where nature conservation may not be the primary end-use of a site.

86 Further advice on Quarry Plans in relation to working, restoration, aftercare and after-use is contained in Annex C.

G Implementation

87 This Guidance Note will provide the basic framework for the planning for provision of silica sand. It will be taken into account by the Secretary of State when considering development plans and individual planning applications which come before him for decision.

88 MPAs must take this Guidance Note into account when preparing development plans. Development plans should recognise the need to make provision for a continuing supply of silica sand in a manner compatible with environmental objectives. The plans should also provide guidance on these environmental objectives and the development control criteria which will be applied.

89 The silica sand industry has an important role to play in co-operating with, and contributing to, the development plan process. For example, the successful application of landbank policies depends upon the ready availability of information on reserves and production. The industry should endeavour to ensure that proposals for mineral development reflect this Guidance Note and that they are brought forward at the right time. The industry is also responsible for drawing up quarry plans, in consultation with the mineral planning authorities; for achieving a high standard of operation while the site is being worked; and for restoring the site when working has finished.

H Monitoring and Review

90 This Guidance Note has been based on the best information currently available. It will be kept under review and updated regularly to reflect changes in demand, technology and environmental standards, but the provision of up-to-date mineral local plans and landbanks will provide flexibility and continuity of supply.

91 A survey of silica sand operations carried out in 1979, and published in 1982 informed the 1985 guidelines (Circular 24/85). The DoE's 1991 survey, which has informed the production of this Guidance Note, provided information which was not available elsewhere.

92 The Secretary of State regards the continuing co-operation of the industry and mineral planning authorities as being valuable and helpful in the formulation of policies and their monitoring. Continuation of this co-operation in the future will facilitate regular updating of this Guidance Note.

93 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.

Annex A: Projection of Demand for Silica Sand

Background

A1 In practical terms, the need for silica sand can be established from the demands made by consuming industries. To provide guidance on the long term trend in demand for silica sand the Department employed independent consultants, ECOTEC Research and Consulting Ltd, to prepare a methodology to project demand for silica sand over the 20 year period to 2011. Based upon this methodology the consultants produced a range of projections of demand for the period 1991-2011. The consultants were advised by a sub-group of the Silica Sand Advisory Group, comprising representatives of the Silica sand producers, the main consuming industries, MPAs, the British Geological Society and central Government.

A2 The projections which have been produced by the consultants essentially represent trends in possible demand over the period of the guidance. They cannot be used to denote the level of demand over the short term or in any one year or a small group of years. Nor do they represent targets for production. It must also be recognised that as with all long term projections there will be greater uncertainty towards the end of the forecast period than at the beginning. Mineral planning authorities may wish to have regard to these projections when considering planning applications and in preparing development plans.

Methodology

A3 ECOTEC identified that the major determinants of the demand for silica sand were the levels of construction activity and vehicle production, reflecting consumption of flat glass (vehicles and construction), ceramics (construction), and castings (vehicles). Accordingly, long term forecasts of construction activity were commissioned from Cambridge Econometrics. These forecasts were then incorporated into the ECOTEC forecasting model which produced projections for future demand for silica sand.

Forecasts

A4 Cambridge Econometrics (CE) regularly produce long term forecasts for the British economy based on the Cambridge Multi-sectoral Dynamic Model (MDM). This is currently disaggregated into 43 sectors of British industry of which construction is one. The forecasts are normally published for 10 years ahead (presently to the year 2001), but the model has been extended to the year 2011, and forecasts to this horizon are produced for some subscribers.

A5 The forecasts of construction activity which CE produce are based upon a detailed examination of long term trends in economic activity combined with analyses of specific major factors influencing construction activity. This includes consideration of the national house building and road building programmes. Their forecasts are the result of a major "bottom-up" exercise combined with strategic judgements about the overall growth rate of the economy. This forecast of construction activity can be measured as construction output or construction investment. For the purposes of the present exercise it was decided to use construction investment (referred to as investment in buildings and works).

A6 CE were asked to produce 3 scenarios of construction activity. The base forecast represents their most likely estimate of growth. The two other CE scenarios are based on differences in policy

assumptions which lead to alternative long term economic growth rates; these are the high and low forecasts.

A7 The CE construction activity forecasts below were produced in February 1992. The average annual growth rates for the base forecast for investment in buildings and works are:

	1980-85	1985-90	1990-95	1995-2000	2000-05	2005-11
Investment in building and works	-0.4%	7.0%	-1.1%	3.7%	2.7%	2.8%

A8 The CE *high* growth scenario is broadly based on assumptions of higher world growth, particularly as a response to European integration; this leads to higher productivity in GB. This indicates that construction investment growth would be approximately 3.3 % above the base by 2011. The low scenario is derived from a deterioration in GB economic performance with a longer recovery period. This indicates construction investment at -5.2% below the base.

Analysis

A9 ECOTEC's projection of long term demand for silica sand adopts a "top-down" approach, based largely on the projected demand for end-products (construction and vehicles), which is taken to determine the demand for intermediate products (castings, flat glass, ceramics), which in turn is taken to determine the demand for silica sand. ECOTEC found that for container glass, inspection of possible explanatory variables as a basis for forecasting trends in production failed to identify any valid statistical relationship. Consequently, the projected trend is an extrapolation of historical trends based on simple assumptions regarding future growth/decline in this sector.

A10 Qualitative judgements and statistical analysis including a regression model form the basis of the demand projections over the period 1991-2011 for the major end-products. These projections, with further qualitative judgements, in turn form the basis of demand projections for the most important intermediate products. Finally, these projected trends of demand for intermediate products are aggregated to project the demand for silica sand through the year 2011.

A11 In determining the trends in demand for intermediate products, account is taken of intensity of use of these products in final production. For example, intensity of use of silica sand in container glassmaking is expected to fall dramatically over the projection period because of the impact of increased recycling, while that in flat glass is expected to remain virtually unchanged.

A12 The end-products expected to have the most significant impact on the demand for silica sand through 2011 are cars and construction activity, as consumers of castings (cars), flat glass (cars and construction), ceramics (construction) and containers. Clearly, demand for these end-products is partially driven by prevailing economic conditions and other exogenous factors, and leads to uncertainty in the projected demand for silica sand. These uncertainties are reflected in low and high projections for total vehicle production and construction activity.

A13 ECOTEC produced a projected trend for car and commercial vehicle production varying between an annual average growth rate (1991-2011)(based on 1990 levels) of 3.5%(high forecast) and 2.6%(low forecast). This trend is based on data on new car production and total car stock

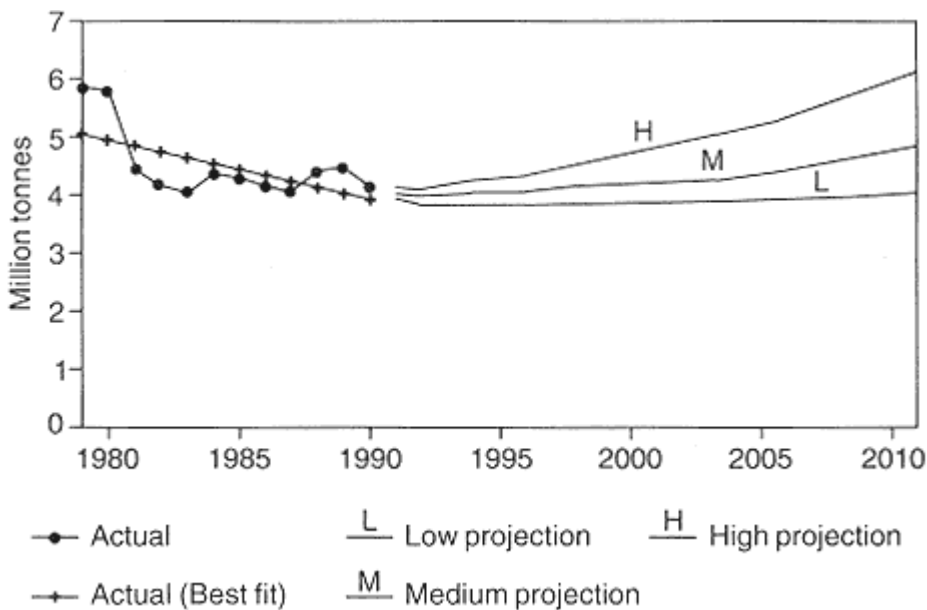
figures for the period 1974-1990, UK population statistics, projections of car ownership rates for the period 1991-2011, and the formulation of certain judgements about demand and economic conditions over the projection period due to a multiplicity of factors. ECOTEC concluded that total vehicle production would be closely related to UK new car production.

A14 The vehicle projections were used, together with those derived for construction investment by Cambridge Econometrics, to project demand for intermediate products, ie for iron castings, non-ferrous castings, flat glass, and "other"(including ceramics). Sensitivity analysis was used to apportion the construction and vehicle projections to the intermediate products, to explain the sensitivity of the projection for intermediate products to the projections of end products. Demand for container glass was projected on the basis of assumptions about the demand for its products.

The projections

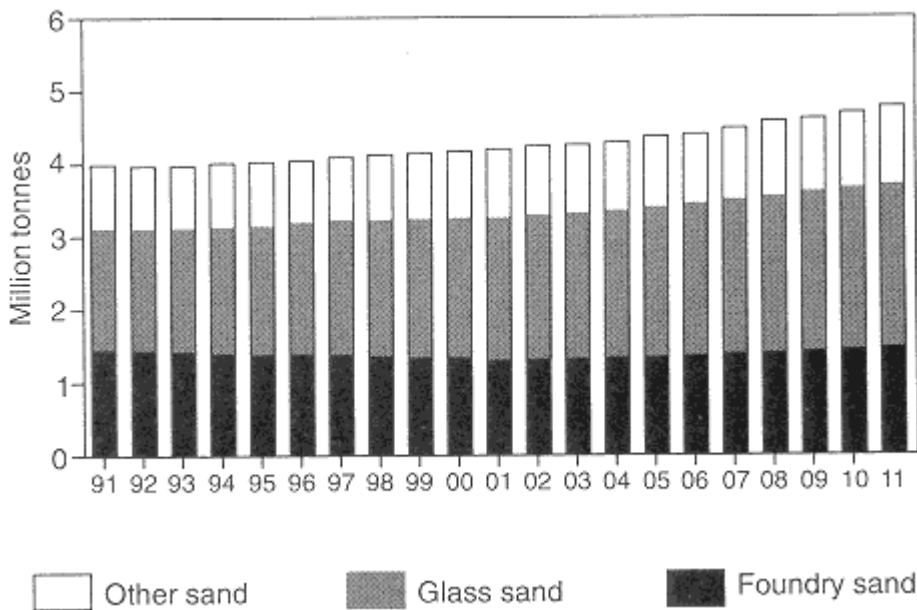
A15 The methodology outlined above was used to produce three scenarios with a range of projections of the long term trend in demand for silica sand. Separate forecasts of silica sand demand were generated for each intermediate product, then aggregated to produce low, medium and high projections for total silica sand. The results of the exercise are shown at Figures A1 and A2.

Figure A1: Great Britain: Total Silica Sand Consumption 1979 - 2011



Source: BSO/ECOTEC

Figure A2: Silica Sand Demand Projection by Category (Medium Projection)



Source: ECOTEC

Total demand: The total demand for silica sand is based on the sum of the individual components of demand, and is principally determined by the relative growth in consumption by glass manufacturers and the relative decline in consumption by the foundry industry. The projected annual average demand for silica sand (1991-2011) is as follows:

4.8 million tonnes (high projection)

4.2 million tonnes (medium projection)

3.8 million tonnes (low projection)

The projected trend in total demand for silica sand varies between an annual average growth rate, on 1990 levels, of between + 1.9%(high projection) and - 0.06%(low projection).

Foundries: The projected demand by foundries is a function of UK castings production, and relies on an assumption that intensity of use of silica sand per unit volume of castings will remain constant.

Glass: Demand for silica sand for flat glass is assumed to be directly proportional to UK flat glass production. It is assumed that demand for silica sand for container glass will be influenced by recycling, and the increasing substitution of recycled glass cullet. By 2011 it is projected that only 30% silica sand will be used in container glass.(Currently between 45 and 73% sand is used depending on whether the containers are coloured or colourless).

Ceramics and other applications: Demand for sand for ceramics manufacture is also assumed to be directly proportional to UK ceramics manufacture. In the projections, ceramics are included with "other" end uses, because their demand is projected from similar assumptions.

Monitoring and review

A16 It is proposed that the projections should be monitored and reviewed periodically. This will ensure that changes in assumptions can be considered.

A17 Copies of the consultants' reports used in preparing the long term demand projections for silica sand can be seen at, and obtained from:

**DoE, Room
C15/20,
2 Marsham Street,
London, SW1P 3EB.**

Annex B Geological and Other Technical Factors in the Extraction and Processing of Silica Sand

B1 The principal commercial sources of silica sand in Britain are unconsolidated sands and weakly cemented sandstones, ranging from Carboniferous to Holocene (Recent) age. In practice, most production is concentrated on a few high quality deposits, notably those of Pleistocene age in Cheshire; of Cretaceous age in Norfolk, Surrey, Kent, Bedfordshire and Highland region; and of Carboniferous age in Staffordshire and Fife.

B2 The extraction of silica sand is almost exclusively by opencast quarrying, an exception to this being the Lochaline mine in North-west Scotland where a bed of high purity Upper Cretaceous sandstone, underlying Tertiary basalts, is mined by pillar and stall methods. Geological factors which need to be considered in planning for extraction include variations in the chemical purity and grain-size distribution of the deposit; its structure; overburden to mineral ratio, where appropriate; and the position relative to the water table.

B3 Silica sands are commercially valued for their chemical properties, that is, chemical purity, and physical properties - principally grain-size distribution but also grain shape. They exhibit a wide range of physico-chemical properties and individual grades may vary markedly from one another. Even quite small differences in chemistry and grain-size distribution may mean that they are not interchangeable in end-use. For most industrial applications, silica sands have to conform to tight specifications.

B4 Natural sands rarely contain more than 95% quartz, but it is possible to beneficiate deposits containing somewhat lower concentrations of quartz for use in glass manufacture. It is not practicable to define a silica sand by a minimum quartz content, as beneficiation may improve the usability of many impure sands.

B5 Depending on end-use, the processing of silica sands is of varying complexity. For most applications, processing is aimed at improving the physical and chemical properties of the sand, largely by adjusting the grain-size distribution, by removing undersize and oversize material, and removing contaminating impurities in the sand or from the surfaces of the individual sand grains. Washing and size classification are standard methods, but sands used in the manufacture of colourless glass are further processed by acid leaching, froth flotation or gravity separation to remove impurities. Most foundry sands are dried before delivery. Drying accounts for around one-third of the cost of silica sand, due to the energy-intensive nature of the process. Transport accounts for a further one-third of unit costs. Total delivered cost of a tonne of silica sand was in the region of £12-£16 in 1992.

B6 The extremely well-sorted Pleistocene Congleton and Chelford sands of Cheshire provide valuable sources of foundry sand. The deposits are easily worked and have the advantage of proximity to centres of demand, chiefly in the West Midlands. The Chelford Sand is also worked on a large scale for the manufacture of flat glass.

B7 The Leziate Beds near King's Lynn in Norfolk and the Lower Greensand of Surrey and Kent are of Lower Cretaceous age, and are important sources of both glass and foundry sand. The Lower Greensand of Bedfordshire is also an important source of silica sand for a wide range of industrial applications.

B8 Sandstones of Upper Carboniferous age have become important sources of silica sand for the manufacture of colourless glass, among other industrial uses. In Staffordshire, the Millstone Grit is highly discoloured in places but impurities occur in the fine fraction and on quartz grain surfaces and can be removed by processing. Deposits of a similar age occur in Fife, Lothian and North Yorkshire.

B9 The highest quality silica sand deposit in the UK occurs at Lochaline in North-west Scotland, where the Upper Cretaceous White Sandstone is mined for uses including colourless glass manufacture.

B10 There are proven and workable reserves of silica sand of Recent age in Humberside which provide material for coloured glass and foundry use. Sands of comparable age are worked from the intertidal zone of the Ribble estuary for a range of industrial applications.

B11 Smaller amounts of silica sand are produced in a number of other counties. These include the production of naturally-bonded moulding sand from Triassic sandstones in Hereford and Worcester and foundry sand from Jurassic sandstones in North Yorkshire. The Kesgrave Sands and Gravels of Pleistocene age in Essex also yield filtration sands for the water treatment and abstraction industries.

B12 Further information on silica sand resources is given in Mineral Dossier No 18 "Silica"(HMSO, 1977)

Annex C Quarry Plans

C1 Quarry working and reclamation, by its very nature, must be site specific. There can be no blueprint applicable to all situations. Nevertheless there are certain principles of good management which can assist in ensuring that a proper balance is achieved between maintaining the environment of local communities close to a quarry and desirable landscape and restoration objectives on the one hand and, on the other, the planning of a quarrying operation which is both practicable and economic, and ensures optimum use of the resource. It follows that the ways of securing best practice in the working and restoration of a specific quarry should be considered as an integral part of the preparation of plans for landscaping and quarry development from the earliest stages. This calls for close cooperation between the quarry operator, landowner and the mineral planning authority from the outset, and where appropriate, liaison and consultation with the local community and others with an interest in the land.

C2 The following principles may usefully be applied to the preparation and implementation of detailed working and reclamation plans. Reference should also be made to relevant published Government and other guidance, particularly Minerals Planning Guidance Notes (MPGs) and Planning Policy Guidance Notes (PPGs). For sites involving filling with controlled wastes, additional guidance is contained in DOE/Environment Agency Waste Management Papers.

The preparation of a quarry plan

C3 Consultation with the mineral planning authority on operational practice, landscaping and reclamation should take place from an early stage so that appropriate consideration can be given to its views while the Quarry Plan is in preparation. Informal pre-application discussions can help to resolve potential difficulties and clarify the requirements for documentation to accompany the planning application. Pre-application discussions can also clarify the requirements of other possible statutory consultees, such as MAFF and Forestry Commission, as well as the Environment Agency.

C4 Whilst details of quarry operations, final site reclamation and after-use must be considered at the time of planning application, the timescale of a major quarry means that the planning conditions and the related Quarry Plan will probably need updating and amendment.

C5 Sometimes potential future quarrying areas can be screened by planting, years before working commences. Operators should draw up a quarry plan at application stage which includes screening and other pre-working activities.

C6 The Quarry Plan should cover the time scale of the development, incorporating progressive restoration wherever possible. For future and recently-permitted sites, it will normally be linked to relevant planning conditions dealing with stripping and storage of soils, landscaping and restoration and aftercare. The site should be monitored to ensure compliance with such conditions, and the Plan should be regularly reviewed to incorporate site experience gained.

C7 The Plan should aim to minimise the need to rehandle, or to import into the quarry, topsoils, subsoils and overburden or quarry waste. Soil resources should be carefully preserved and not be exported from the site. Soils should be stripped, handled and stored so as to minimise any damage to their structure (see, for guidance, Table 1 of MPG7, soil characteristics and the effects of disturbance), and to avoid mixing topsoil with subsoil and unnecessary mixing of dissimilar soil types.

C8 The phases of the Plan, with progressive restoration where possible (including temporary landscaping and management proposals for, for instance, soil or overburden stockpiles) should generally seek to minimise the area of exposed workings.

C9 The quarry plan should require that details are kept of the depth extent and profile of the quarry. Where it is likely or conceivable that the after-use could include built development, infilling materials should be inert and non-degradeable in order to prevent the risk of methane generation, and selected and placed to ensure the limited and quick settlement of the fill.

C10 Where landfilling with controlled wastes is involved, the Plan will need to take account of the requirements of both the planning permission and the site licence. Care will be needed to ensure that there is no conflict or incompatibility between the two. In particular, careful attention needs to be given to ensuring that pollution control systems are designed to be compatible with the proposed after-use. Any proposal to use controlled wastes in infilling will also require consultation with the waste disposal authority at an early stage. They will expect to see a working plan for the disposal operations and early preparation of this eases the agreement of a suitable disposal site licence.

Implementation of the quarry plan

C11 The aim should be to integrate working restoration and landscaping work into routine quarry management operations, thereby avoiding large variations in operational costs and using the general stock of quarry equipment and materials where possible. The workforce should be trained to achieve this pattern of working and to regard restoration requirements as of equal importance with meeting output targets.

C12 The Plan may provide for varying of slopes and contours during extraction to soften geometric quarry shapes and to assist in restoration. It may be possible in some locations to replicate naturally occurring landforms.

C13 Where appropriate to the agreed after-use, planting of vegetation should reflect woodland, grassland and flowering plants occurring naturally in the area, and provide wildlife habitats. It may also be appropriate to consider whether any features of geological importance which have been revealed during the quarrying operations can and should be preserved and included in the restoration scheme.

C14 Restoration design and methods should take into account possible effects on groundwater and surface water drainage, levels and quality.

C15 Vegetation cover in all restored areas should have regular management and maintenance as a formal aftercare requirement of the planning permission.

C16 Quarry operators will normally expect to maintain control of, and responsibility for, their sites until completion of restoration and aftercare; and for any post-closure responsibilities arising from landfills. However in the longer term it may be intended that the land should be leased or sold. Discussions may therefore be needed with agricultural, forestry or nature conservation bodies, and the Environment Agency, depending on the actual after-use.

Annex D

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