



Minerals are essential for development and through that for our quality of life and creation of sustainable communities. Minerals planning ensures that the need for minerals by society and the economy and the impacts of extraction and processing on people and the environment are managed in an integrated way.



PLANNING

Planning and Minerals:
Practice Guide



*Planning and minerals:
Practice Guide*

On 5th May 2006 the responsibilities of the Office of the Deputy Prime Minister (ODPM) transferred to the Department for Communities and Local Government (DCLG)

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CONTENTS

	Paragraph
Introduction	1
National planning policies	6
Statutory basis	8
Mineral planning authorities	12
Planning for the supply of minerals	13
Development plan and minerals	15
Development control	29
Considerations for minerals planning	32
Aggregates	60
Brick clay	82
Building and roofing stone	95
On-shore oil and gas	111
Underground storage of natural gas	150
Other minerals	162

Minerals Policy Statement 1: Planning and Minerals

Practice Guide

Introduction

- 1 This Guide should be read alongside MPS1 Planning and Minerals. It offers examples and principles of good practice and background information, to assist regional planning bodies (RPBs) in the preparation of Regional Spatial Strategies (RSSs), and mineral planning authorities (MPAs) in the preparation of local development documents for minerals, prepared in accordance with the Planning and Compulsory Purchase Act 2004, any development plans covered by transitional arrangements, and in considering applications for mineral development and reviews of conditions attached to exiting permissions. It should also be relevant to the minerals industry and all other interested parties.
- 2 Minerals make an essential contribution to the nation's prosperity and to quality of life, not least in helping to create and develop sustainable communities. Their extraction can have positive impacts on the environment and the economy. Construction raw materials constitute about 82%, by tonnage, of all land-won minerals extracted in Britain. They are a pre-requisite for the buildings and infrastructure that society and the economy needs. In addition, some industries are wholly dependent on minerals as basic raw materials. Exploitation of energy minerals, whether coal or on-shore oil and gas resources, reflects the Government's policy objective of ensuring secure, diverse and sustainable supplies of energy at competitive prices. Opencast coal development can assist the ceramics and brick-making industries through enabling access to supplies of associated clays. Minerals and mineral-based products also contribute to the balance of payments through exports and import substitution.
- 3 The environmental and social impacts of importing internationally traded minerals extracted abroad fall outside the UK. While the market should determine where minerals are obtained, the UK needs to make a suitable contribution to supply in order to avoid exporting environmental damage. However some minerals have fairly low selling prices and, given the relatively high costs of transport of bulk minerals, these are essentially only traded domestically. The domestic minerals industry also provides a market for other goods and services, stimulating competitiveness elsewhere in the economy and providing opportunities for employment, sometimes in remote rural areas, where there are few alternatives.
- 4 However, minerals extraction can have adverse impacts on the environment, some of which may be long-term. These can be mitigated through careful location and management of sites and high quality restoration of land to beneficial subsequent uses.

- 5 The Government’s Planning Green Paper, *Planning – delivering a fundamental change*, published in December 2001, announced that the Government intended to review all its planning policy guidance to see whether it is needed, to provide greater clarity and to separate practice guidance from policy. Following consultation on the Green Paper, the Government announced in July 2002 in the Policy Statement – *Sustainable Communities: Delivering through Planning*, that it intended to proceed with the proposals for review and reform of national planning policy guidance. MPS1 and this practice Guide take account of those proposals. MPS1 deals first with policies and issues applying to all minerals, followed by annexes which deal with policies and issues applicable only to certain specific minerals. This Guide does not have the status of a minerals policy statement, but is intended to inform and support the application of MPS1.

National Planning Policies

- 6 National policies for minerals planning in England are set out in MPS1: *Planning and Minerals*. This Guide amplifies that statement by offering background information and advice on how national policies might be met. It is intended to assist all stakeholders in the minerals planning process by setting out approaches that the Government considers should be followed. The policies in MPS1 must be taken into account by RPBs in the preparation of RSSs (by the Mayor of London for the Spatial Development Strategy for London), and by MPAs and local planning authorities (LPAs) in the preparation of local development documents (LDDs) and any development plans which are being taken forward to adoption under transitional arrangements.
- 7 The advice given in this guidance note should be considered when preparing regional spatial strategies and LDDs and may be material to decisions on planning applications. But MPAs are not required to follow it. They are free to take alternative approaches to secure the delivery of policies in MPS1 where they consider those appropriate.

Statutory Basis

- 8 The Town and Country Planning Act 1990 (“the 1990 Act”), the Planning and Compensation Act 1991 (“the 1991 Act”), the Environment Act 1995 (“the 1995 Act”) and the Planning and Compulsory Purchase Act 2004 (“the 2004 Act”) provide the main basis for control of mineral development. Minerals are defined in section 336 of the 1990 Act as including “all substances of a kind ordinarily worked for removal by underground or surface working, except that it does not include peat cut for purposes other than sale”.
- 9 LDDs should take into account the Government’s national policies as currently set out in Planning Policy Guidance notes (PPGs), Planning Policy Statements (PPSs), Minerals Planning Guidance notes (MPGs), and Minerals Policy Statements (MPSs). This provides the basis for rational and consistent planning decisions. Table 2 lists all MPGs and their current status.

- 10 The key elements of planning control for minerals are:
- the preparation and setting out by RPBs and MPAs in RSSs and LDDs of appropriate policies and suitable locations for the winning and working of minerals and associated development;
 - the grant or refusal of planning permission for the working of minerals, the erection and use of associated plant and buildings, on-site transportation and the disposal of mineral waste, as well as the imposition, when planning permission is granted, of planning conditions to control the development, and thereby mitigate any adverse impacts;
 - the enforcement of planning control to prevent unauthorised development and the monitoring of sites to ensure compliance with planning conditions;
 - the entering into planning obligations, where necessary, which may be by agreement between a developer and a MPA, or by means of a unilateral undertaking by a developer;
 - the undertaking of statutory first and periodic reviews of planning conditions at existing minerals sites by MPAs under the 1991 and 1995 Acts, to ensure that operational and restoration arrangements are subject to conditions that reflect best currently available practices and take account of any environmental implications.
- 11 The Conservation (Natural Habitats &c) Regulations 1994 and the Wildlife and Countryside Act 1981 also provide statutory controls on minerals development in respect of any impacts on protected sites and species.

Mineral Planning Authorities

- 12 MPAs are local authorities with responsibility for planning control over mineral working. Outside Greater London and the metropolitan areas, MPAs comprise county councils, National Park authorities and some unitary authorities. In Greater London and the metropolitan areas, MPAs are respectively, the London borough councils and the Metropolitan district councils, which are all unitary authorities. MPAs are also waste planning authorities. The latter are responsible for the land use planning of facilities for the management of all forms of waste. This is not only a matter of common administrative structure, but is also important because MPAs and waste planning authorities may have, at different times, planning responsibilities for some of the same sites. Examples of this may be when planning for the restoration through landfill of former minerals workings, or for the recycling or re-use of secondary or substitute minerals, or where former minerals sites are used for other types of waste management facilities.

Planning for the supply of minerals

- 13 Planning for the supply of minerals has a number of special characteristics:
- minerals can only be worked where they naturally occur, so location options for the economically viable and environmentally acceptable extraction of minerals may be limited;
 - working is a temporary use of land, although it often takes place over a long period of time;
 - working often has adverse environmental effects that can be mitigated, but not generally wholly eliminated;
 - following working, land should be restored to make it suitable for beneficial after-use and to avoid dereliction;
 - extraction of minerals has been held by the Courts to be a continuous process of development. There is, therefore, a requirement for long-term monitoring, and if necessary, enforcement to secure compliance with conditions that are necessary to mitigate impacts of mineral working operations;
 - mineral working is essentially a physical process and the application of conditions to mineral permissions is the primary means of environmental control. While emissions to air and water and some processes on minerals sites are regulated by the Environment Agency (EA) or local authority environmental health officers, MPAs are in most cases the leading environmental regulator of mineral extraction and restoration.
- 14 Further guidance may become necessary in the light of implementing the 2006 EU Directive on the Management of Waste from the Extractive Industries¹.

Development plan and minerals

Regional spatial strategies

- 15 RPBs have responsibility for preparing, reviewing and monitoring RSS under the provisions of the 2004 Act. They have to seek and take into account advice from county councils and other authorities with strategic planning expertise in the region. RSS replaces Regional Planning Guidance and structure plans. They provide a more focused strategic spatial framework with statutory status for a 15-20 years period, within which Local Development Frameworks and Local Transport Plans can be prepared. RSSs should contain sufficiently clear sub-regional objectives and policies to enable those preparing plans to consider any key strategic sub-regional implications of proposed development. In London, GOL Circular 1/2000² provides for the Mayor to prepare a Spatial Development Strategy.

¹ Directive 2006/21/EC on the management of waste from the extractive industries.

² GOL Circular 1/2000 Strategic Planning in London (June 2000).

- 16 Guidance on the procedures for the preparation and monitoring of RSSs is set out in PPS11: *Regional Spatial Strategies* and in the former Office of the Deputy Prime Minister's (ODPM) *Regional Spatial Strategy Monitoring Good Practice Guide*. RPBs should seek the advice of MPAs when preparing, reviewing or monitoring the implementation of RSS. MPAs may be able to provide up to date data and other useful information which RPBs can use in preparing their draft RSSs. Further advice is set out in PPS11.

Local development frameworks/minerals and waste development frameworks

- 17 MPAs, other than county councils, must prepare a local development framework (LDF); county councils must prepare a minerals and waste development framework (MWDF). These will comprise a folder of documents for delivering the planning strategy for the area. They will include the Local Development Scheme or Minerals and Waste Development Scheme as appropriate, Local Development Documents, Statement of Community Involvement and Annual Monitoring Report. They may also include other documents. Transitional arrangements exist for saving adopted minerals local plans, Unitary Development Plans (UDPs) and relevant structure plan policies. For plans in preparation the 'saved' period will commence from the adoption or approval of the draft plan. However, transition to LDFs should take place as quickly as possible. Further advice is contained in *Creating Local Development Frameworks – a Companion Guide to PPS12* published by ODPM in November 2004.

Local development schemes/minerals and waste development schemes

- 18 MPAs, other than county councils, must prepare and maintain a Local Development Scheme (LDS). This should specify which documents will be local development documents, their subject matter (which will include minerals), their timetable for preparation and revision and which of them are to be prepared jointly with one or more authorities. County councils must prepare and maintain a Minerals and Waste Development Scheme (MWDS). They will have the same general form as an LDS, but limited in scope.

Local development documents

- 19 Counties are required to prepare Local Development Documents (LDDs) under their MWDS. These must be in general conformity with the RSS. LDDs are of two types – development plan documents (DPDs) that have been subject to independent testing and have the weight of development plan status, and supplementary planning documents (SPDs), which have not been subject to independent testing and do not have development plan status, although they should have been subject to community involvement. DPDs should include a core strategy, site specific allocations of land, a proposals map, and where needed, area action plans. Generic development control policies can be included in any of these DPDs. Together with the relevant RSS, these will form the statutory Development Plan.

- 20 Counties may continue to prepare either separate LDDs for minerals and waste or combine them. In either case they should have a single MWDS within a single MWDF. All other MPAs including National Park authorities, will prepare a LDD under their LDS, which should contain minerals (and waste) policies. Within two-tier planning areas, counties and districts should liaise closely during plan preparation and when determining planning applications, in order to ensure that any proposed developments are not prejudicial to the others' interests. A MPA may agree with any one or more MPAs to prepare a joint LDD for minerals for the combined area. Policies in a LDD should give local expression to, and be in general conformity with, the RSS (or Spatial Development Strategy in London). Where this practice Guide refers to LDDs it should, therefore, be taken to apply to those prepared by all MPAs.
- 21 LDDs for minerals should provide a clear guide to mineral operators and the public about the locations where mineral extraction may take place. They should set out clear and appropriate development control policies, which should include the safeguarding both of sensitive environmental features and of mineral resources with potential for future extraction. They should cover all aspects of environmental and resource protection including restoration.
- 22 For any MPA's area in Greater London, the statutory Development Plan for minerals comprises the Spatial Development Strategy for that area, and the development plan documents (taken as a whole) that have been adopted or approved in relation to that area.
- 23 For any MPA's area outside Greater London, the statutory Development Plan for minerals comprises the RSS for the region in which the area is located, and the development plan documents (taken as a whole) that have been adopted or approved in relation to that area.
- 24 The form, content and the procedures for making, altering and replacing these plans and the rules for resolving any conflicts between or within them, are given in the Town and Country Planning (Local Development) (England) Regulations 2004 and in PPS12 Local Development Frameworks, and for saving plans in the Town and Country Planning (Transitional Arrangements) (England) Regulations 2004.
- 25 All proposals for allocating land for minerals purposes will be included on an Ordnance Survey-based Proposals Map. Where MPAs consider that a more detailed planning framework for areas of change is needed within a LDD, they may choose to prepare area action plans. These may identify specific site allocations and indicate diagrammatically the inter-relationships between various minerals activities, such as extraction, processing, storage and access etc and with other land uses, as well as opportunities for integrated restoration plans in areas of intensive extraction. Proposals maps can also be useful for areas where other significant change is proposed or where it is necessary to resolve conflicting objectives, caused perhaps by intense development pressures. They can assist in the regeneration of areas by promoting new non-mineral built development, whilst also ensuring full consideration is given to any wider implications, such as potential sterilisation of mineral resources.

Preparation and review of local development documents

- 26 MPAs should keep the minerals elements of their LDDs under review and revise them as required so that they are as up to date as possible. The extent to which the policies in these documents are up to date and relevant is a material consideration in the determination of planning applications. New information gained as a result of monitoring or through experience of implementing minerals policies may suggest that a LDD needs to be revised.

Sustainability appraisal of policies and proposals

- 27 It has been Government policy for some years that an authority should be able to establish that its policies and proposals are sustainable, and the 2004 Act makes it a requirement that all RSSs and DPDs, and most SPDs, are subject to sustainability appraisal (SA). The Government's publication "*Sustainability Appraisal of RSSs and LDDs*" (2005)³ provides guidance on SA, incorporating the requirements of European Union (EU) Directive 2001/42/EC (the "SEA Directive").⁴
- 28 In drawing up policies and proposals for their LDDs, MPAs should appraise the policy options in terms of their social, environmental and economic effects and against the objective of securing a prudent use of natural resources. They should be able to demonstrate that the selected policies have been derived from an integrated consideration of the social, environmental and economic costs and benefits, of maintaining an adequate and steady supply of minerals to meet the needs of society and the national economy, commensurate with protecting or enhancing the environment.

Development control

Development control policies

- 29 LDDs should set out the criteria against which applications for minerals development or the framing of conditions to be attached to planning permissions will be assessed. Development control policies should be expressed precisely and unambiguously.

Ancillary development

- 30 Part 19 (Part 20 in the case of the Coal Authority) of Schedule 2 to the Town and Country Planning (General Permitted Development) Order 1995 (the GPDO), gives minerals operators permitted development rights (PDRs) to erect or alter ancillary buildings and plant, subject to certain restrictions. It also provides for the removal of ancillary development after minerals operations have permanently stopped. The Government considers that PDRs should not in general be withdrawn in respect of minerals and associated development. Advice on the GPDO is currently in MPG2: *Applications, Permissions and Conditions*. Where exceptionally a MPA wishes to withdraw these rights, it should make its intention clear in its LDD policies for minerals, and fully justify its reasoning.

³ Sustainability Appraisal of Regional Spatial Strategies and Local Development Documents. ODPM (November 2005).

⁴ Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the Environment (SEA Directive).

Environmental Impact Assessment

- 31 Where MPAs consider a proposed development is likely to have significant environmental effects on the environment, and for proposals for new operating conditions made at the first or subsequent periodic reviews of existing permissions, an environmental impact assessment (EIA) will be required. Legislative requirements relating to EIA are contained in the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, (“the 1999 Regulations”), as amended. DETR Circular 02/99⁵ provides guidance to authorities on the Regulations.

Considerations for minerals planning

Safeguarding of mineral resources

- 32 The planning system has an important role to play in safeguarding proven deposits of minerals which are, or may become, of economic importance within the foreseeable future, from unnecessary sterilisation by surface development. It is therefore important that mineral safeguarding areas (MSAs) are identified and that appropriate safeguarding policies are incorporated in DPDs. MSAs can be defined objectively using the best available geological and minerals resource information, including that published or held by the British Geological Survey or made available by the industry. However initially defined, areas will generally need to be refined in discussion with the industry and other stakeholders. It should be kept in mind that, in addition to proposed development within a MSA, incompatible development that is allowed close to a MSA may also lead to sterilisation of part of the reserves. It may be appropriate to develop policies for prior extraction of minerals, where practicable, within safeguarded areas.
- 33 In two-tier planning areas, safeguarding of mineral resources can be achieved only through county and district councils co-operating in the exercise of their respective planning powers over land with potential for mineral extraction. This can be facilitated by defining all, parts of, or marginally more than a MSA as a minerals consultation area (MCA). These provide the mechanism for district councils to consult county councils before granting planning permission, on any planning applications they receive for non-mineral developments which fall within the boundary of a MCA, and which would be likely to affect the winning and working of minerals. This arrangement should also be used by county councils to consult district councils before granting planning permission for mineral working which could affect other existing or proposed land uses. MPAs should seek advice from the minerals industries operating in their areas when they are considering the delineation of MCAs. However there is no presumption that resources safeguarded through MSAs or MCAs will actually be worked for minerals.

⁵ DETR Circular 2/99: Environmental Impact Assessment (1999), available at communities.gov.uk/index.asp?id=1144396

Safeguarding of potential storage, handling and transport sites

- 34 The transport of minerals, particularly aggregates, cement materials and coal often requires storage and handling facilities. Safeguarding existing facilities, identifying future sites, including wharves, ports and depots, and establishing suitable transport links for bulk materials can be important to promote movement of material by rail, inland waterway and by sea, and thereby contribute to sustainable development. This will be particularly so in London and other metropolitan areas that rely on the importation of significant quantities of aggregate materials.
- 35 MPAs should be alert to the possibilities of combining such sites with those for the processing and distribution of recycled and alternative aggregate material. MPAs will also need to take account of the possibility that future use of such sites may be constrained if sensitive developments such as housing are permitted nearby. Therefore the safeguarding of such areas needs to be considered within the wider framework of spatial planning for the surroundings.

Permitted development rights for exploratory operations

- 36 The identification by MPAs of areas for future working in their DPDs may sometimes require operators to undertake for a limited period drilling or other survey work in order to determine the extent or quality of the resource. In most cases such investigation would not be likely to be significantly damaging, although mineral operators should take particular care when undertaking this work in any designated areas of landscape when exploring for oil, natural gas or coal-derived gases. Part 22 of the GPDO gives mineral operators PDRs to carry out short term works for the purposes of mineral exploration. Long term drilling or exploratory survey work will normally require planning permission. The process of exploration and appraisal does not carry any presumption that long-term production or mineral extraction will take place at that location. Where a potential PDR is a Schedule 1 or Schedule 2 development for the purposes of the 1999 (EIA) Regulations, the development will not be a PDR unless the provisions of Article 3 (10)-(12) of the GPDO apply.

Areas for future mineral working

- 37 The policies and areas indicated in a LDD should show how a MPA proposes to provide for the supply of minerals which can be worked economically. It should also provide a clear guide to mineral operators and others the places where mineral extraction is most likely to take place. These may take the form of 'specific sites', 'preferred areas' or 'areas of search'.
- 38 Specific sites will generally be where viable mineral resources are known to exist, where landowners are supportive of mineral development taking place and where MPAs consider that any planning applications which are made are likely to be acceptable in planning terms. The allocation of specific sites in DPDs is important, and mineral operators should aim to offer such sites for consideration at an early stage in their preparation.

- 39 Preferred areas are areas of known resources where planning permission might reasonably be anticipated, (subject to the usual tests of environmental acceptability, if necessary through the use of appropriate conditions to mitigate adverse impacts). They may also include essential operations associated with extraction such as tipping of mineral waste and processing, including that of secondary materials. In practice there may sometimes be little to distinguish between specific sites and preferred areas, and it will be for MPAs to decide whether they wish to make or maintain this distinction. In identifying preferred areas, MPAs may choose to follow a search sequence, with the aim of identifying initially those areas where extraction would be most sustainable, which would generally involve the mineral being transported the least distance, taking account of the objectives and policies for minerals planning set out in MPS1 and the appropriate RSS and LDF.
- 40 It may sometimes be preferable, as a means of minimising environmental disturbance, to adopt a policy of preference for allowing extensions to existing mineral workings rather than allowing mineral working at greenfield sites. This can secure the utilisation of minerals that might otherwise be sterilised. However that will not always be the case because some existing mineral workings may be unsuitably located, and others may have already reached their acceptable boundaries. In some cases therefore, it may be more appropriate to open a new mineral working, especially if this would be likely to lead to less overall environmental impact. Any general preference for extensions to existing workings is not to be construed as a policy for protecting existing suppliers and a constraint on competition because each case must be considered on its merits. It is for the MPA to consider all the relevant factors before making its decision.
- 41 Areas of search will be broader areas, where knowledge of mineral resources may be less certain, but within which planning permissions for particular sites could be granted to meet any shortfall in supply if suitable applications are made.
- 42 Whichever approach to siting is adopted, either singly or in combination depending on the circumstances, each MPA is responsible for making sufficient provision in its LDDs to meet the anticipated need over the period of the plan. It is not generally appropriate to identify only areas of search in a LDD because these provide less certainty of where development might take place. MPAs that choose this approach must fully justify it in their LDDs. In most cases sufficient specific sites and/or preferred areas should be identified, so that on adoption of a LDD, there is adequate provision to cover the LDD, if sufficient acceptable sites are known at that stage. Where this is not possible Areas of Search can also be identified to cover any remaining part of the LDD period. The annual monitoring of LDDs provides an opportunity for MPAs and the industry to develop specific sites and/or identify preferred areas as required from the areas of search previously identified.

Applications outside areas identified for future working

- 43 Planning applications for mineral developments at locations outside of areas identified in a LDD for future working should still be considered on their merits. It is possible that new information about mineral resources or developments in technology might lead to a proposal which could be significantly more acceptable overall than one for an area identified in a LDD. In other cases there may be good environmental reasons for doing so, such as providing borrow pits to reduce mineral traffic movement. Borrow pits are mineral workings provided specifically for, and located close to, specific major projects, and not for general supply purposes. Where new information about mineral resources significantly changes the overall context of the plan, it may justify a review of that part of it. The key point is that MPAs should be satisfied there are good reasons for permitting such applications, after having considered all the relevant circumstances.

Access

- 44 Some existing quarries may have poor access. It is desirable that this should be improved to an appropriate standard for the proposed use, where necessary, in the event of any new application being lodged. The industry will wish to consider this when preparing planning applications.

Environmental impacts

- 45 Relevant and effective planning conditions can mitigate environmental impacts, and are usually essential if development is to be permitted. Most environmental effects can be covered by suitable planning conditions, although some, such as discharges of pollutants to air or water, are dealt with separately by the EA through environmental protection legislation.
- 46 The principal impacts of mineral working, and the environments on which they may have an effect, are considered to be:
- noise
 - dust/air quality
 - blasting/vibration/fly rock
 - mineral waste
 - visual intrusion into the local setting and the wider landscape
 - archaeological and heritage features
 - traffic
 - groundwater
 - surface water
 - land instability

- landscape character
 - internationally or nationally designated, protected or sensitive species and plant and wildlife habitats
 - nationally protected geological and geomorphological features.
- 47 MPS2: *Controlling and Mitigating the Environmental Effects of Minerals Extraction in England* (March 2005) sets out the principles to be followed in considering the environmental effects of mineral working. Technical annexes on noise and dust support that guidance. A further annex or MPS on mineral wastes is likely to be needed to take into account the requirements of the EU Mine Waste Directive, when implemented. MPAs should also have regard to PPS23: *Planning and Pollution Control*, Annex 1 of which covers development and its impact on air and water quality. Advice on the stability of land in quarries, surface mines and related structures is contained in MPG5: *Stability in Surface Mineral Workings and Tips*. For coal and colliery spoil disposal, further advice is given in Annexes A and C to MPG3: *Coal Mining and Colliery Spoil Disposal*.

Restoration, aftercare and afteruse

- 48 Unlike many other forms of development, mineral extraction is a temporary use of land, although it may be long-term. Land from which minerals have been extracted may be restored to its former condition or to a number of beneficial new uses. Sustainable minerals development aims to preserve the land's long term potential to support the widest range of afteruses in the future by achieving high standards of working and restoration. Guidance on good technical practice for the reclamation of sites to a range of after-uses is contained in MPG7: *The Reclamation of Minerals Workings* and in a series of research reports published by the Department and its predecessors.
- 49 Proposals for the restoration and aftercare of a site should form an important part of the information submitted with a minerals planning application. Details of the materials to be used for site restoration, which could include overburden from mines and quarries, soils and soil-forming materials, should be specified. Where there is serious doubt about whether satisfactory reclamation can be achieved at a particular site, there must also be doubt whether permission for mineral working should be given. Similarly, where existing mineral sites are due for first or subsequent periodic reviews of conditions under the 1991 and 1995 Acts, MPAs should test the proposed new conditions against current best practice, and amend those conditions that are considered inadequate as a result. The use of mineral waste in site restoration should also conform to any relevant waste management controls operated by the EA, and in due course, the competent authority arrangements in the implementation of the 2006 EU Mine Waste Directive.

- 50 Mineral workings often provide the opportunity in their restoration and after-use to create new wildlife habitats, landforms and sites of geological interest. In particular they should make a contribution, wherever possible, towards achieving specific targets set out in the UK Biodiversity Action Plan and local Geodiversity Action Plans. In addition, they can contribute in certain locations to initiatives such as the creation of the National Forest or Community Forests. Opportunities may exist to contribute to such initiatives even in cases where nature conservation or woodland may not be the primary end use of a site. PPS9: *Biodiversity and Geological Conservation* (August 2005) provides further advice.
- 51 Mineral workings restored by landfill or, particularly, to water uses or wetland habitat, may attract large numbers of birds. These may be a hazard to aircraft at sites close to aerodromes. ODPM Circular 01/2003⁶ sets out requirements for local planning authorities to consult on planning applications close to safeguarded aerodromes⁷. MPAs and aerodrome operators should undertake early consultation on such proposals to determine whether a bird strike risk assessment is required.

Financial provision for reclamation

- 52 Responsibility for the restoration and aftercare of mineral sites lies with the operator and, in the case of default, with the landowner. Applicants should therefore demonstrate the likely financial and material budgets for the restoration, aftercare and after-use, and how they propose to make provision for such work during the operational life of the site with their applications.
- 53 Properly worded, relevant planning conditions which are complied with and, where necessary, enforced, should secure the restoration, aftercare and after-use of mineral sites. No payment of money or other consideration should be sought when granting a planning permission except where there is specific statutory authority. Guidance on the use of conditions in planning permissions is given in DOE Circular 11/95⁸, – *The Use of Conditions in Planning Permissions* and, as regards minerals development, in MPG2.
- 54 If it appears to the MPA that a bond or guarantee is required, but an operator can demonstrate that it is covered against default by an established and properly funded guarantee scheme, the Government considers that a bond should not be necessary. Should the position change as a result of the transposition of the 2006/21/EC Mine Waste Directive, which includes proposals in this area, further guidance will be given.

⁶ A Joint ODPM/DfT/NAFW Circular: Safeguarding Aerodromes, Technical Sites and Military Explosives Storage Areas: The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) Direction 2002 – ODPM Circular 01/2003, DfT Circular 01/2003, NAFW Circular 01/2003.

⁷ These are listed at dft.gov.uk/stellent/groups/dft_aviation/documents/page/dft_aviation_040247.hcsp 8

Available at communities.gov.uk/index.asp?id=1144452

Agricultural land

- 55 The Rural White Paper (2000), *Our Countryside – the future*, made clear that planning decisions should consider the overall value of the land in deciding what countryside should have the greater protection. Agricultural quality should be treated as only one factor. Decisions about proposed development affecting ‘best and most versatile’ (BMV) agricultural land should be taken locally through the planning process. When determining minerals planning applications MPAs should consider the agricultural quality of the land, together with other sustainability considerations (e.g. wildlife; geodiversity; the quality and character of the landscape; its amenity or historic interest), and the feasibility of reclamation or restoration to a standard required to secure an appropriate after-use.

Forestry and woodland

- 56 Forestry and woodlands are increasingly recognised as a means of delivering a range of environmental, social and economic benefits. These benefits are outlined in the Government’s forestry policy document, the England Forestry Strategy, which is currently being updated. Forestry and woodland can often provide opportunities for restoring mineral sites. Guidance on restoration of minerals land to forestry uses is contained in MPG7. Regional Forestry Frameworks provide a more regionally focussed context for considering forestry needs.

Options for use of waste minerals and other extracted materials

- 57 Material from mineral working deposits (including extraction and processing materials such as overburden, waste rock and fines etc) may be used, where suitable, for a variety of purposes. Examples are use in construction as substitutes for primary aggregates, as daily cover for landfill, engineering and for full site restoration. MPG5 also provides options for the use of this type of material. MPAs should discuss with developers which end-option for unavoidable minerals waste arisings and other extractive materials is most suitable in each case. In granting planning permission MPAs should take account of the suitability of the site, impacts on adjoining land-uses, and whether the proposals would enhance or constrain proposals for restoration of the land and its intended after-use. Further guidance on landfilling as an option in the reclamation and re-use of mineral workings is contained in MPG 7.

Transport

- 58 Minerals are heavy and it is costly to transport them for long distances. Therefore low priced minerals tend largely to be secured locally (e.g. aggregates), whereas higher priced commodities can bear longer transport distances (e.g. energy and metalliferous minerals which are mainly traded internationally). Aggregates are therefore often transported for short distances from the quarry by road. However there are economic and environmental advantages in transporting large amounts of heavy materials by rail or water provided that there is the network capacity and adequate loading and reception facilities. This means it is important to identify potential loading and unloading depots and wharves and to safeguard these from potentially competing uses.

Recycling

- 59 Construction and demolition waste can be recycled and used as an aggregate material. Pulverised fuel ash can be used as a general fill material, as a cement replacement to make concrete and grout, and as a feedstock in the manufacture of lightweight aggregates. Blast furnace slag can be used for road construction, as rock wool for heat insulation and as a cement replacement material. Silica sand and products manufactured from it, e.g. certain types of glass, can be re-used and recycled, together with some newly dug sand. This saves sand and reduces energy consumption. China clay waste, colliery spoil and slate waste can all be used for a variety of construction purposes including engineering fill and aggregate substitutes in road construction. Minerals producers and industries that use minerals are encouraged to make full use of such options whenever practicable.

Aggregates

- 60 Aggregates supply is, by far, the largest minerals extraction sector in England at about 153 million tonnes per annum consisting of about 86 mt of crushed rock, 62mt of land won sand and gravel, and 12 mt of marine dredged sand and gravel in 2004. These construction materials are essential to built development, other construction, and maintenance of infrastructure (e.g. roads, flood defences) and are therefore essential to delivering growth and regeneration.
- 61 There are significant regional imbalances in the occurrence of suitable natural aggregate resources. For example, London, the South East and East of England, including major growth areas, depend significantly on crushed rock aggregate from the South West and East Midlands (e.g. Somerset, Derbyshire and Leicestershire). The North West similarly depends on rock imported from the East Midlands and North Wales. Parts of the North of England receive crushed rock from North Yorkshire and Yorkshire Dales. The main impacts of extraction can, therefore, often occur in upland landscapes distant from where the products are used. On-shore deposits of sand and gravel are more widely spread across regions, but are often in areas with good quality agricultural land or under pressure for other development.
- 62 A sound national/regional policy framework is needed to protect valuable landscapes whilst encouraging source regions to continue to make provision for supply to “deficit” regions from environmentally acceptable sources. This is addressed through the preparation of national and regional guidelines for aggregates provision and the translation of these to policies in RSS and LDDs. Strong guidance is also needed to underscore the Government’s policy, and to complement the Aggregates Levy, in encouraging the maximum use of alternatives to material newly dug from the ground (e.g. recycled construction and demolition waste), to minimise waste of construction materials, and secure adequate and timely supplies at the least environmental and social costs in the face of strong public opposition to new large-scale quarrying.

- 63 In the early 1970s the Verney Committee considered the problem of supply of aggregates in Great Britain⁹. Because of the impacts of rising demand on environmentally sensitive areas and the uneven distribution of mineral resources, and therefore of impacts of extraction, between and within regions the Committee supported a system of Regional Aggregate Working Parties (RAWPs). These would collect and analyse necessary data and provide the opportunity for MPAs, industry and statutory consultees to engage with central government (at officer level) to reach a consensus on the interpretation of information and on advice as to necessary levels of supply.
- 64 The RAWPs were set up in 1975-6. There were initially 8 RAWPs in England (and 2 in Wales – Scotland was not part of the system). A ninth RAWP was added when London gained regional status in 2002. Over the years there have been some changes to the boundaries of RAWPs when regional boundaries have been amended. The current list is:
- South East of England
 - London
 - East of England
 - South West
 - East Midlands
 - West Midlands
 - North West
 - Yorkshire and the Humber
 - North East
- 65 The RAWPs collect data on supply and reserves of aggregate minerals annually and the survey is extended to data on transport and distribution of aggregates every fourth year. These data are used in the preparation and review of national and regional guidelines for aggregates provision in England. RAWPs also provide technical commentary on trends in aggregates supply by region to the Department and to the relevant RPB, but do not provide policy advice. They meet at least once a year. Where necessary, the RAWPs liaise with the Regional Technical Advisory Bodies on planning for the management of wastes. All agreed RAWP agendas and papers are published either on paper or electronically.

⁹ Report of the Advisory Committee on Aggregates (the Verney Committee) 1976 Aggregates: the way ahead. HMSO (London)

- 66 The RAWPs are guided by a National Coordinating Group (NCG) convened by the Department and consisting of representatives from each RAWP and from national stakeholder organisations. This meets annually except when supply policy is being updated when it meets more frequently. From time to time, the NCG convenes a technical sub-group (TSG) drawn from its membership to advise it on technical issues. In addition, the secretaries of each RAWP meet to discuss matters of common interest about three times per annum. The terms of reference of the NCG are at communities.gov.uk/index.asp?id=1143435. The secretariats are funded by the Department and the work to be undertaken is specified in the Department's contracts.
- 67 RAWP annual monitoring reports can be seen at communities.gov.uk/index.asp?id=1144933
- 68 The Department publishes National and Regional Guidelines for the provision of aggregates in England. These are intended to assist the timely preparation and revision of RSSs and MWDFs in a way that addresses effectively the geographical imbalances between supply of, and demand for, aggregates at national level. The guidelines are for land-won aggregates but assumptions about the likely contributions to meeting demand for alternatives, imports and marine-dredged sand and gravel are taken into account in their preparation. The current guidelines, based partly on a 2001 survey of aggregates, and the way they are to be used, were published in the ODPM note *National and Regional Guidelines for Aggregates Provision in England, 2001-2016*, in June 2003. This also described how the guidelines are being monitored annually and will be reviewed and revised. The current annual monitoring report and a paper describing the methods used in preparing it can be found at communities.gov.uk/index.asp?id=1161491
- 69 The guidelines are apportioned to the local level by the RPBs in collaboration with the MPAs and on the basis of technical advice from the RAWPs. The results of apportionment are then taken into account in draft RSS and LDDs for minerals and are tested through sustainability appraisal and the process for consultation upon and adoption of the present policies. Advice on environmental appraisal of the provision of aggregates has been published by ODPM¹⁰ .
- 70 Aggregates landbanks are indicators required to assess when new permissions should be considered in each MPA area. This is of particular importance in the case of aggregates because of the scale and long term nature of the industry. The landbank is the sum in tonnes of all permitted reserves with valid planning permission including, dormant sites and current non-working sites, but not those so defined in the relevant schedules to the Planning and Compensation Act 1991 and the Environment Act 1995 at a specified time. The length of the landbank should be calculated using the expected provision (supply in response to demand) included in the development plan expressed on an annual basis. For example, if the landbank is 144mt and the provision over the 10 year life of a plan is 240mt, the length of the landbank will be 144/24 or 6 years. Such calculations can only estimate likely supply within an accuracy of a year or two and, therefore, need not be over-precise. Unless otherwise expressly justified and agreed, the assumption should be that provision will be spread evenly across the plan period.

10 ODPM 2004 Good practice guidance on the environmental appraisal of the provision of aggregates. Available at communities.gov.uk/index.asp?id=1500953

- 71 The minimum length of the landbank should reflect the time needed to obtain planning permission and bring replacement operations into full production. Separate landbanks should be calculated for crushed rock and sand and gravel because they partly serve different markets and have different site infrastructure requirements. In general quarries producing rock aggregates will need a longer security of reserves to justify capital investment in, for example, crushing equipment. Therefore landbanks for rock are likely to be longer than those for sand and gravel. However a degree of flexibility is needed to allow for maintenance of production capacity when major sites have to be replaced or for scarce types or qualities of aggregate or to allow for distance to market. Moreover a large existing landbank bound up in very few sites or in limited ownership should not stifle competition.
- 72 In some MPA areas aggregates landbanks may already be large. Thus, this may indicate that no new permissions are needed in the immediate future. However management of landbanks should be based on considerations of real need and real supply taking into account factors such as:
- local apportionment of the Regional Aggregates Guidelines;
 - significant future increases in demand that can be forecast with reasonable certainty;
 - actual levels of production in recent years compared with average annual provision included in the development plan;
 - locations of consented reserves relative to main market areas;
 - the nature and qualities of the aggregate such as suitability for particular use;
 - known constraints on the availability of consented reserves that might limit output over the landbank period; and
 - the extent to which permitted reserves are within inactive sites unlikely to ever be worked.
- 73 Detailed examination of productive capacity at specific sites, based on amounts of material that can be actually supplied taking account of any limitations of plant and imposed by planning conditions or agreements, would not generally be appropriate but other factors having a bearing on supply should be considered and would include matters such as:
- necessary restrictions, for environmental reasons, such as limits on output or numbers of lorries leaving sites;
 - physical characteristics that limit the amount of material which can be extracted;
 - whether production is limited by major infrastructure constraints; and
 - whether production is dominated by a single or a few outlets.

- 74 Where there is a distinct market for a specific type or quality of aggregate such as high specification rock, asphaltting sand, building sand or concreting sand, a separate landbank calculation based on provision to that market may be justified for that material or those materials.
- 75 In some cases, landbanks may be artificially inflated by permitted reserves in some dormant and inactive sites, which are unlikely to ever be worked. In such instances it is good practice for the industry to consider their voluntary revocation or prohibition. Prohibition Orders are generally the most convenient way of dealing with such sites by removing the possibility of surprise proposals to reopen these in the future. Government policy on Revocation and Prohibition Orders can be found in MPG⁴¹¹. It would be appropriate for sites which have not been worked for 10 years to be considered to assess whether production is likely to begin again. Those dormant and inactive sites, which industry agrees are unlikely to be worked again, should be excluded from the landbank calculation.
- 76 Alternatives to primary aggregates include suitable:
- recycled construction, demolition and excavation wastes;
 - mineral by-products notably waste from china clay, coal and slate extraction;
 - industrial wastes such as glass, slag, ash, railway ballast, fine ceramic waste, and scrap tyres; and
 - industrial by-products such as spent foundry sand.

If material is not used as aggregates, in the absence of other economic uses, there is a strong likelihood that it will be either landfilled or deposited in tips. However, if re-used as aggregate, this reduces the amount of primary aggregate extracted. Therefore, the Government encourages the maximum use of these materials and set a target in the June 2003 Guidelines. In recent years, the proportion of construction, demolition and excavation waste productively used has increased to the point where additional recovery depends on improved segregation of waste materials at the demolition site. Demolition protocols have been proposed to address this issue, see for instance, www.aggregain.org.uk/demolition/the_ice_demolition_protocol/index.html

- 77 Despite the wider benefits of re-using material otherwise likely to be discarded as waste, recycling of aggregates has environmental effects broadly similar to those caused by processing of primary aggregates. A research report *Controlling the Environmental Effects of Recycled and Secondary Aggregates Production: Good Practice Guidance* (DETR Feb 2000) aims to help MPAs identify suitable locations for these operations. Information to assist the specification, purchase or supply of recycled and secondary aggregates can be obtained from The online AggRegain Service (which was established by WRAP – the Waste and Resources Action Programme) at their website: www.aggregain.org.uk

11 DETR 1997 Minerals Planning Guidance – revocation, modification, discontinuance, prohibition and suspension orders – Town and County Planning (Compensation for restrictions on mineral working and mineral waste depositing) regulations 1997. HMSO (London) paras. 12-17

- 78 In addition, other minerals of lower quality for aggregate uses, such as chalk, shale and clay, can be used for some undemanding purposes such as construction fill, but these still require quarrying from the land and, where quarried, should be subject to all the normal requirements for mitigation of adverse impacts.
- 79 In addition to supply of land-won material, sand and gravel are dredged from the seabed from licensed areas of the Humber, East Anglia, the Thames Estuary, the English Channel, Bristol Channel and Liverpool Bay. These make a significant contribution to supplies in London, East and South East England, and smaller contributions to the South West and North West. Landings can be made directly at wharves in urban areas thus reducing road traffic required to deliver aggregates. More information can be found at www.thecrownestate.co.uk.
- 80 However, marine dredging can adversely affect the marine environment including habitats and heritage interests. Therefore the activity is carefully controlled. Since licensing of marine sand and gravel dredging is outside the scope of the Town and Country Planning System, it is not within the control of MPAs. Applications are, at present, determined by the Department pending the reconsideration of marine development consenting arrangements envisaged in Defra's proposal for a Marine Bill¹². Therefore, MPS1 takes account of the contribution from this source, but does not give comprehensive guidance on it. The relevant policy guidance is Marine Minerals Guidance Note 1, *Guidance on the extraction by dredging of sand, gravel and other minerals from the English seabed*, available at communities.gov.uk/index.asp?id=1144305
- 81 Borrow pits are time-limited extractive operations that directly serve specific civil engineering projects, such as a new road. The pit is usually on or adjacent to the project so that off-site road traffic can be reduced to a minimum. There are environmental advantages in using borrow pits but there have also been past examples of poor restoration and after-care of such sites. To avoid this, such sites need to be managed to high standards during extraction and be restored to standards as high as those required of other extractive operations.

Brick Clay

- 82 "Brick clays" are primarily mixtures of various clay minerals, with variable amounts of impurities that may be either advantageous or deleterious to their commercial use. For example, the presence of some silica aids in the drying of the brick clay and reduces shrinkage when the clay is fired. The majority of bricks fire to various shades of red but the presence of calcium carbonate gives a yellow colour to the product and other materials may give different colours. Naturally-occurring carbonaceous material within the clay may assist the firing process. The precise nature of the clays in a specific deposit and the amounts of additives also affect plasticity of the material and, therefore, the ability to hold a moulded shape. Ideally the quarried feedstock should match the exact requirements of the manufacturing process to give the desired product.

12 Defra 2006 A Marine Bill: a consultation document Defra (London)

- 83 In practice, it is often necessary to modify the feedstock by blending different brick clays, and introducing specific additives to provide the required material to secure a consistent product that meets the customers' requirements. Thus only some geological clays, shales, mudstones and slates are suited to brick manufacture without excessive blending and use of additives. Many contain impurities that make them undesirable as feedstock. Therefore it is important to secure the necessary materials for blending and to safeguard suitable clays for potential use.
- 84 A wide variety of products, including bricks, pipes, roofing tiles, and refractory products are manufactured from a diverse range of clays, shales and mudstones or, more rarely, slates (referred to in the MPS1 Annex as "brick clay"). These products are durable, versatile and sustainable construction materials for flexible and adaptable building, and can often be reused or recycled. Bricks and pavers contribute significantly to local architectural styles and conservation of the architectural heritage. Unfired brick clay is also used as engineering fill and environmental purposes such as capping material for landfill sites. Brick clay is also sometimes used for the manufacture of specialist products such as lightweight aggregates. Brick clay and its products are therefore important for building houses and other structures, and the quality and texture of the built environment. For all these reasons brick clays contribute significantly to the creation of sustainable communities.
- 85 While brick clays are found in many parts of England only parts of specific geological formations have the physical and chemical properties suitable for use in the manufacture of bricks, pipes and tiles, or for environmental and engineering uses. The variety of compositions of feedstock and therefore of bricks gives rise to distinctive regional variations in the appearance of the built environment and contributes, therefore, to a "sense of place". Some particularly valuable clays are nationally scarce, for example clays of the Etruria Formation and fireclay. The Etruria Formation occurs in a limited number of locations, mainly in Staffordshire and other parts of the West Midlands. It usually lacks deleterious impurities and is, therefore, a high-quality raw material both for the manufacture of premium bricks of various colours and textures, and for more specialised applications. The outcrop area of this clay is very limited. Large parts have already been sterilised by other development, particularly urbanisation, but some undeveloped sites remain and others might become available during land reclamation initiatives or redevelopment schemes.
- 86 Fireclay is found in association with certain coal seams and is mainly secured from opencast coal workings in some parts of the Midlands and the North of England. It is valued by the brick industry for its combination of good technical characteristics and its cream/buff coloured firing characteristics, and is required in limited but fairly steady quantities. However the recent decrease in the amount of opencast coal extraction in England is raising questions about the continuing availability of this material. Changes in the technology of clay-based products, the introduction of EU standards and the demand for new products, such as highly engineered prefabricated 'brick' panels, have led to an increased demand for premium-quality clays, such as those from the Etruria Formation and certain fireclays.
- 87 About 95% of extracted brick clay is used in the manufacture of bricks. Demand for brick clays has been fairly stable at about 8 million tonnes per annum over recent years. The main products are:

- engineering bricks which are high strength, low porosity bricks that are used in load bearing structures and other technically demanding applications; and
- facing bricks which can be of lower strength and are manufactured to give an attractive external appearance.

- 88 Demand for both types of brick has been fairly steady overall, but with some fluctuations, reflecting periods of greater or lesser house building. Trends for future house building and development of sustainable communities will need to be monitored to determine the extent to which demand is likely to increase in future. Demand for bricks and tiles for heritage and vernacular use may be erratic. Small works providing these may need to sell more widely in order to stay in business.
- 89 Brick clays generally have comparatively low selling prices, although the cost of some clays is increasing as more reserves are being worked from modern planning permissions under stricter environmental controls. The total annual output is valued at only around £24 million a year on an ex-quarry basis. However, these raw materials support an important value added manufacturing sector, with total annual sales of bricks, pipes and tiles valued at about £632 million (2004). Because of relatively low selling prices of most products, particularly bricks, and high costs of bulk transport there is limited international trade and the UK is generally self-sufficient. For the same reason, the location of brickworks within England reflects the distribution of clay raw materials.
- 90 Following large-scale rationalisation in recent years, the UK brick industry is now dominated by five large manufacturers, each of which operates a number of highly automated production units and other factories. There is a very small number of producers of clay pipes and a small number of producers of clay roof tiles. In addition there are about 25-30 small operators who either work a single, small clay pit, which may have limited environmental impacts, or buy clays from others. These smaller producers mainly serve specialist or local markets, including the manufacture of bricks and tiles for conservation of heritage buildings and for building in the vernacular style in conservation areas and designated landscapes.
- 91 The capital investment needed to set up, maintain, and modernise existing brick-making plant and equipment is larger than for most other mineral-related downstream operations. Security of supplies of clay over an appropriate period is needed by operators to justify and secure that investment. Large, highly automated production units require consistency of physical, chemical and firing properties from the feedstock. This is achieved through blending of raw materials. A local clay pit often provides the main feedstock, possibly supported by one, or more, satellite pits that provide different qualities of clay to ensure that the required blends can be produced. Large plants may also require access to other, specific clays from a regional or even national supply area. In this way products of consistent strength, porosity and durability, as well as appearance, can be manufactured. Planning for the supply of brick clay should, therefore, have regard to the need at each individual brickworks for a variety of clays that may necessarily be supplied from more than one source.

- 92 Manufacturing plants, whether large or small, are often located initially in, or adjacent to, a clay pit. However when that source is approaching exhaustion, it becomes necessary to secure alternative supplies, either from pit extensions or from satellite pits. Local supply is generally desirable in order to reduce costs and the environmental and social impacts of transportation of clay from the pit(s) to the works, as well as to maintain the investment in the factory and local employment. This can generally be more economic than relocating the factory nearer to more distant sources of raw materials.
- 93 Most products (e.g. bricks, ceramic pipes, clay tiles) manufactured from brick clay will be fired, a process generally requiring a permit under the EC Directive on Integrated Pollution Prevention and Control (IPPC) Directive 96/61/EC through the Pollution Prevention and Control (England and Wales) Regulations 2000. The LPA or EA as appropriate, issues permits which are site specific and take into account plant variation, raw materials, topography and environmental impacts. Permits cover plant operating conditions, emission limits to air, land and waste, and annual reporting of pollutant releases. Permits may also include measures for both the management of waste generated by the installation and for the protection of soil and groundwater, although these matters can sometimes also be governed by planning conditions. The planning and pollution control systems are separate, but complementary, and should not duplicate each other. Further advice is given in PPS23: Planning and Pollution Control and its Annex 1: Pollution Control, Air and Water Quality.
- 94 MPAs can only properly assess the need for new permitted reserves if the industry provides information on levels of existing permitted reserves and their rates of depletion. Therefore good industry-local planning authority liaison is important. Further information can be found in *Brick Clay: Issues for Planning*, British Geological Survey Commissioned Report CR/01/117N and fact sheets on brick clay and fireclay which can be downloaded from www.mineralsUK.com

Building and roofing stone

- 95 England has a wide variety of natural building and roofing stone resources, some of which have been exploited since Roman times. Following a peak in extraction during the second half of the 19th century, levels of production fell. Many traditional mines and quarries closed, reducing the range of types of stone that were readily available. Falling demand was due to competition from cheaper man-made materials, increased labour costs, and imports of inexpensive stone from elsewhere in the world. Subsequently demand has stabilised. Many building and roofing stone quarry operators have reported a steady increase over the past decade.
- 96 Building stone and roofing stone is used for repair of old buildings and structures, and for new construction. Products range from architectural masonry (dimension stone), cladding, natural stone “slates”, dressed walling stone, rough walling, kerbs, setts, sawn paving, natural riven paving, crazy paving, other external landscaping, monumental stone, and internal flooring fireplaces and ornamental features. The principal markets served are for:
- contemporary design requirements in new buildings, structures and monuments and internal and external decorative features;

- new structures that are compatible with traditional local building practices and the regional or local vernacular styles; and
 - repair and maintenance of historic buildings and structures, which often requires materials to be obtained from original or compatible sources.
- 97 Stone selected for repair of buildings and structures has to match the original stone closely to avoid differences in appearance and sometimes damage to the original stone where it is in contact with replacement material. More detailed information is available in an English Heritage Technical Advice Note¹³.
- 98 The principal sources of building stone in England are the Jurassic Limestones, especially in Portland, Purbeck and to the east of Bath, and Carboniferous Sandstones of the East Midlands and Yorkshire and the Humber, particularly York Stone. Ordovician and Silurian slates are extracted in North West England, and Devonian slates in the SouthWest. However there is a very wide variety of small more localised sources of materials that have been used in historically significant buildings or which add to local vernacular character.
- 99 There are currently about 300 active quarries and mines in England that produce building and roofing stone but only a few produce roofing stone. Most are very small compared with, for example, modern aggregates quarries. Ninety percent of these are intermittently worked sites that have an annual output of 2,000m³ or less and many produce 100m³ or less. These commonly have only one or two employees and mainly serve local or specialist markets. However the remaining 10% of larger sites produce on average 20,000m³ per annum and, therefore, account for about 70% of the total annual production of about 650,000 tonnes (1m³ weighs about 2.0-2.6 tonnes). These larger quarries may market stone on a regional, national and even international scale.
- 100 Some building stone quarries have been worked only intermittently, often connected with repair contracts for specific historic buildings that require a close match to the original stone. Some specific quarries are of importance in securing repair of structures of national importance. In such cases, old planning permissions may remain extant. However some sites may not have the benefit of current planning permission when there is a need to secure more stone from them.
- 101 Some intermittently worked quarries may have undergone natural regeneration to the extent that they are, or are included within, sites of nature conservation value. Many have been designated as Special Areas of Conservation, Sites of Special Scientific Interest or Regionally Important Geological Sites. Some retain features that are of industrial history significance. This may inhibit their re-use for quarrying unless suitable mitigation measures can be undertaken.

¹³ English Heritage 2006 Technical advice note: identifying and sourcing stone for historic building repair: an approach to determining and obtaining compatible replacement stone. Product Code 50912 English Heritage (London)

- 102 Building stone is usually extracted from a quarry or underground mine in the form of blocks. It is important that the extracted stone is structurally sound. Therefore blocks have to be selected carefully and are usually prised out relatively gently using, for instance, mechanical excavators, cutting equipment, hydraulic mechanisms or, if unavoidable, black powder. High explosives are avoided since these damage the rock. Roofing stone such as slate may be extracted in a broadly similar manner. However some thinly bedded rocks used as roofing stone or paving (flagstones) are still extracted as blocks using traditional hand tools such as picks, iron wedges and crowbars. These techniques therefore have limited environmental impacts. In some operations known as “delves” roofing stone is searched for just below the topsoil with relatively little disturbance.
- 103 Building stone is often dressed, to at least some extent, at the quarry by hand shaping or sawing. It may then be sold to other companies which make the final products. However some extraction operations have their own works and stonemasons, who may work either at a single quarry or serve a group of quarries.
- 104 Because of the small-scale and generally slow-working nature of most building and roofing stone extraction operations, the local environmental impacts may be significantly less in terms of the amount of ground opened, noise, and dust emissions than for many other types of quarrying. Similarly, levels of traffic may be relatively very small, although movements of vehicles may, for instance, be concentrated where several quarries serve a single processing works. However because of the relatively slow rate of working, such quarries often continue in operation for a very long period. Therefore planning conditions need to reflect the specific characteristics of such operations. It should be recognised however, that some sites may be worked intermittently, but intensively (“campaign working”), and involve stockpiling of stone, or the use of noisy plant and equipment especially in otherwise tranquil areas, though only for comparatively short periods.
- 105 In some cases, several small building stone quarries may serve a single processing works often located at one of the quarries. While traffic from any one quarry may be limited there may be transportation issues associated with the processing works.
- 106 Many existing building stone quarries (some with origins in the pre-motor transport era) have poor access. It is desirable that this should be improved where necessary in the event of any new application being lodged. The industry should give careful consideration to potential improvements.
- 107 Where it is proposed to extract building stone by underground mining, the subsequent stability of the ground surface needs to be safeguarded. Relevant advice is contained in Planning Policy Guidance Note 14 Annex 2 *Planning and subsidence*.
- 108 Reviews of minerals planning permissions under the 1991 Act and the 1995 Act may sometimes provide the opportunity for identifying potential for supply of building or roofing stone from parts of existing planning permissions.

- 109 Waste stone from extraction and processing of building and roofing stone is often suitable, if produced in sufficient quantity, for use as aggregate. Some former building stone quarries have become aggregates quarries. This has led to public concern that modest building stone permissions may lead to later working of aggregates on a large scale. Therefore it is important that MPAs consider for specific proposals whether the relevant national policy guidance is that for building and roofing stone, that for aggregates, or both.
- 110 Further information can be found in the ODPM-commissioned report, which was published in 2004, entitled *Planning for the Supply of Natural Building and Roofing Stone in England and Wales*. The report is available at communities.gov.uk/index.asp?id=1500902

On-shore oil and gas

- 111 Conventional oil and gas has been extracted in England since 1919, but generally on a small scale. Active collection of gas from coal seams in the form of coalbed methane is a more recent concept which has not yet been proved to be commercially viable in the UK. Gas from coal seams is also collected on a small scale from working and abandoned coal mines. Underground coal gasification has been carried out in a number of other countries but no trials have yet been the subject of planning proposals in the UK.
- 112 The extraction of conventional oil and gas is licensed by the Department for Trade and Industry as well as requiring planning permission. Information on the licensing system is available at www.og.dti.gov.uk, or from DTT's Oil & Gas Licensing Administration at 1 Victoria Street, London SW1H 0ET. The Coal Authority licences access to use of coal for underground coal gasification (UCG), coal mine methane (CMM), abandoned mine methane (AMM) and coal bed methane (CBM).

Conventional on-shore oil and gas

- 113 The main activities in conventional on-shore oil and gas development are exploration, appraisal, and production. Each oil and gas field will exhibit particular characteristics that can raise problems that will require a specific design approach or individual remedy.
- 114 Whether a developer is seeking to exploit oil or gas from a conventional underground reservoir or from coal seams, the only way to confirm the content of the strata is to drill wells. However, before a decision to drill is made and the optimum locations are defined, a great deal of preliminary data is collected and examined.
- 115 The first step is to study existing geological and geophysical maps to gather information about the underground rock formations. Data may also be available from mining or quarrying activities and possibly from earlier drilling for oil, water, coal or other minerals. Satellite photographs and samples of rock outcrops may also be examined. Gravity and magnetic field measurements also provide information about deep rock structures. Thousands of observations may go into constructing a detailed geological map of a district, showing the types and ages of the rock formations and the way they lie at depth, in order to define structures that may be of economic interest.

- 116 The focus of the search is then narrowed down by a seismic survey using sonic waves. These are generated at or near the surface, travel deep underground and are reflected back, like echoes, from the different rock layers to the surface where they are detected by geophones. These are connected by cable to control and recording equipment. The results are processed by computer to produce maps of the reflection times. These can be analysed to identify potential oil and gas traps and coal seams. The sonic vibrations can be created either by small controlled explosions or by impact.
- 117 In the first method, small charges are detonated at the bottom of shot holes drilled at regular intervals along a straight line laid out by a surveyor. It takes less than a day to complete a seismic operation by this method along each mile of survey provided that the shot holes are pre-drilled and pre-loaded.
- 118 The second, less disturbing, and more commonly used method is “vibroiseis”, where sonic waves are created by vehicles fitted with vibrator pads. No shot holes are needed. The survey vehicles can cover a few kilometres during a working day so the time spent and disturbance in any one spot is minimal. However, the survey line should avoid buildings, crops, water and gas mains, sewers, telephone and electricity cables and other installations above and below ground, and to avoid disused shafts or other areas of potential instability. With careful management, the environmental effects of such surveys are minimal.
- 119 On-shore seismic survey work of less than 28 days duration does not normally require planning permission, but should be notified to the LPAs (Part 22 of the GPDO). If the survey is likely to take longer, planning permission will be required. Consent by the Secretary of State for Trade and Industry is not required for on-shore seismic surveys, although Licensees [operators holding extraction licences] are required to notify DTI of any intended surveys.
- 120 Data from the seismic survey will indicate whether a subsurface structure of interest is present and will identify the most promising area(s) in which to drill an exploratory well. Whilst there are good operational reasons for the surface location of the well to be directly above the crest of the structure, there may be some scope for lateral movement, dependent upon geological criteria. Planning permission must be obtained before DTI will give approval for drilling to proceed.
- 121 The main objective of an exploratory well is to establish whether or not hydrocarbons are present. However, whether or not hydrocarbons are encountered at that location, the geological information the well yields is of great importance to the wider search. The fact that an exploratory well is plugged and abandoned as a “dry hole” does not mean that the project was not worthwhile, since negative information helps to narrow the area of search for an economic prospect.
- 122 Exploration drilling on-shore is a short-term, but intensive, activity. Typically, site construction, drilling and site clearance may take twelve weeks or less. However, if hydrocarbons are encountered, this timescale needs to be extended to allow for testing. The rig is normally retained for an additional ten to fourteen days in order to carry out a variety of short-term tests and measurements. These are needed to obtain some idea of the flow characteristics of the reservoir and more detailed knowledge of the hydrocarbon behaviour.

- 123 The appraisal of a promising structure can take several forms including additional seismic coverage and longer-term tests. If the results of short-term tests are sufficiently promising, much longer tests (Extended Well Tests – EWTs) may be needed for a full commercial appraisal. These require the consent of the Secretary of State for Trade and Industry and are normally limited to a period of 90 days, although this period can be extended. Normally in the case of oil production an EWT will usually involve the installation of a pump and storage tank(s). In the case of gas production DTI will normally allow a relatively small amount of gas to be vented or flared during testing, subject to planning constraints, unless the gas so produced is made use of, such as for electricity generation. In some cases DTI may approve a Phased Development Plan at an early stage, but usually there will be no proposals for production facilities until after the appraisal and associated testing programme.
- 124 Appraisal may involve the drilling of additional wells or may form the first phase of a Phased Development Plan involving initially only the discovery well. Much will depend on the size and complexity of the geological structure involved. In the case of large structures, the limits of which are not accessible by directional drilling, additional drilling site(s) at a distance from the discovery site will be required to appraise the structure adequately. These will normally be selected with a view to their retention for production purposes if the appraisal programme indicates that production from the discovery is a commercial proposition. More than one well may be required from each appraisal/development site. Smaller geological structures can often be appraised using wells drilled directionally from the original exploration site. There may be circumstances in which it is considered desirable to drill directional wells for appraisal/development purposes from the discovery site before deciding whether to seek an additional site or sites.
- 125 Directional wells are drilled by gradually increasing the angle from the vertical, if necessary even until a well becomes horizontal. One of the advantages of directional drilling is that it allows a target to be accessed from surface locations other than the point directly above it, which means that environmentally sensitive locations can be protected. In some cases directional drilling in different directions from a single location can also reduce the number of surface drilling sites needed. But directional wells are necessarily longer than vertical wells and so are more expensive. Interpretation of data can be more difficult, they take longer to drill, and they may require larger and noisier drilling rigs.
- 126 If MPAs need expert advice on the technical information accompanying such approaches, they may consult the Licensing Exploration & Development Branch at DTI. (Details at para 130). The other factors listed above for exploration wells are equally relevant to appraisal wells.

- 127 Hydrocarbon production normally involves the drilling of additional wells from the existing sites, and possibly from additional sites if these are considered necessary to drain the reservoir(s) adequately. For large finds, a gathering station may be required at the first stage of the refining process to separate the oil, gas and water from the well products and, thereby, render the oil and/or gas suitable for longer distance transportation, usually by pipeline. At smaller sites this may be unnecessary, and oil might simply be taken elsewhere by tanker. Oil and/or gas from production wells may flow under its own pressure, or it may have to be pumped to a gathering station. However gathering stations are not always needed since even small sites, consisting of single wells, can be commercially viable. In such circumstances the raw material could be removed by tanker or pipeline for processing elsewhere.
- 128 Oil and gas is transported from the gathering station to an export terminal where it is first stored and then moved via road, rail or pipeline, or some combination of these. An export terminal generally consists of storage tanks, administration offices and despatch facilities. Within the limitations imposed by pipeline construction, an export terminal can be located adjacent to the existing transportation network or to the production field. Gas may be used on site or at a gathering station for electricity generation. The production life of an oil or gas field can be over 20 years, after which time the facilities should be dismantled and the sites restored to their former use, or, in exceptional circumstances, an appropriate new use. Permissions for oil and gas production should include appropriate conditions to secure this, or make effective provision for this to be addressed at a later stage.
- 129 For large finds, it will be particularly important to establish how far the envisaged surface production facilities would be sufficient to handle the expected output from the find or related finds as a whole. These considerations will also form part of the development programme which operators are required to submit for consent to DTI under the terms of their licence. In exceptional cases, where finds cross licence boundaries, the Secretary of State for Trade and Industry has powers to direct that such a find or accumulation is worked and developed as a unit.
- 130 DTI also considers very carefully such other matters as the proposed rate of production (depletion), the technical and financial competence of the operator or consortium, the existence of adjoining prospective structures and the need to appraise them before the development commences or to consent to a Phased Development Plan. DTI is prepared to advise MPAs on these matters (contact DTI, 1 Victoria Street, London SW1H 0ET Att: Geoff Swann; tel 020 7215 5062; e-mail geoff.swann@dti.gsi.gov.uk).

Gas from coal

- 131 There are three main ways of recovering gas from coal to provide energy:
- extraction of coalbed methane
 - extraction of methane from coal mines
 - underground coal gasification

A useful summary of the coal resources of the UK, including potential for use of gas from coal seams, is contained in a coal resources map prepared by the British Geological Survey for the Coal Authority, see <http://www.bgs.ac.uk/mineralsuk/minequar/energy/home.html>.

Coalbed methane (CBM)

- 132 Methane contained in unworked coal seams is known as “coalbed methane”. This can be extracted by drilling vertically into a coal seam and fracturing the coal, making use of pre-existing fracture patterns, by means of water pressure. Alternatively, directional drilling along a coal seam can remove the need for fracturing by exposing a much greater area of coal. In both cases the well is then pumped to remove water and thereby lower the pressure within the seam. This causes methane to diffuse through microscopic pores within the coal into the network of fractures and, thence, into the well bore. This emerges at the surface as a mixture of water and methane, which is passed through a separator. The gas is dried and sent for use while the water is sent for treatment, if necessary, before disposal.
- 133 The gas extraction process does not detrimentally affect the physical properties of the coal or prejudice it being worked at some later date by conventional mining methods. Methane can be extracted from coal seams that would be unsuitable or uneconomic for coal mining. Alternatively, gas can be removed before mining, helping to reduce consequential methane emissions. Unlike underground coal mining, extraction of the gas does not cause subsidence of the land surface. Methane is a powerful greenhouse gas, and methane capture can be a useful carbon mitigation measure in climate change terms.
- 134 Extraction of coalbed methane depends on the permeability of the coal and the pressure of adsorption in the coal. It can be contemplated at depths of 200 – 1500m. At shallower depths the gas pressure in the coal is likely to be insufficient, while at depths greater than 1500m the pressure of the overlying strata is likely to have reduced coal permeability restricting the flow of methane. There is nothing in theory to indicate that the right conditions for exploitation (i.e. an adequate flow of gas) is limited to coal of a particular geological age.
- 135 The equipment used in coalbed methane extraction is similar to that for conventional natural gas reservoirs. However, there are differences in the technology because of the nature of the reservoirs. Conventional gas reservoirs are easier to locate, and generally cover a much smaller area.

- 136 De-watering is commonly required to initiate gas production through the ensuing pressure reduction in the strata. The de-watering process can, in some cases, last for the whole of the productive life of the well. Typically as water production decreases, gas production increases. Eventually, the water production will almost stop and gas production will enter a conventional decline curve. The intention is, therefore, to lower the pressure immediately around the well to a point where the methane desorption will occur. The gas released will then diffuse through the coal matrix towards the point of lowest pressure, i.e. the well bore. The water produced in the process must be disposed of. It is likely that consent to discharge water would be required from the EA to control this activity and that it would be made subject to conditions regarding the control and mitigation of pollution. The cost of disposing of (and, potentially, treating) produced water is a major factor in the economics of coalbed methane production.
- 137 Coalbed methane wells generally have much lower flow rates than conventional wells and may take some time (6 – 12 months) to build up to full production. The production of commercial volumes of gas requires networks of wells with associated pipelines. The usual spacing is for one for every 500 to 1000m, though directional drilling of a number of wells from a single surface location offers one way of reducing the number of surface drill sites and pipelines.
- 138 Well spacing in coal seams has a much more significant role in obtaining maximum gas recovery than in conventional gas reservoirs. In the latter the porosity and permeability characteristics of the reservoir rocks largely determine the ideal well spacing. If conventional wells are spaced too close they compete for drainage of gas located in the overlapping drainage areas between adjacent wells, and if too widely spaced not all of the reserves will be recovered. However, in the case of coalbed methane wells, closer spacing can have beneficial effects. More closely spaced wells cause additional pressure reduction and increase the desorption rate, thus supplying more free gas.
- 139 From the start of drilling, a coalbed methane well could be in production within six weeks. But experience in the UK suggests that it may be some time after appraisal has been completed before production proposals are drawn up. If exploration/appraisal wells reveal a potentially economically viable find, the developer will wish to retain them for subsequent production.
- 140 The potential CBM resource in England is large. In defining the extent of the relevant coalfield and potential areas for CBM development, MPAs will find it helpful to consult the Coal Resource Map published by the Coal Authority and the British Geological Survey. Annex D to Energy Paper 67, Department of Trade and Industry, April 1999, ISBN 0 11 515462 0. This also outlines the UK opportunities for CBM extraction.

Methane from coal mines

- 141 During working of a coal mine methane escapes from the coal seams into the workings and mixes with air. It may reach explosive concentrations, unless it is extracted and must, therefore, be continuously removed as part of the mine development. Typically, methane recovered from working mines is used to drive energy generation plant at the mine site for local power supply.

- 142 After a coal mine has been closed or abandoned methane will continue to accumulate in the mine voids diluted with air to the extent of methane concentrations of between about 25% and 75%. It may escape to the surface through natural or mining induced fissures and can present a serious hazard. Controlled venting to atmosphere of the methane has, therefore, often proved necessary by means of a pipe set into the mine shaft as it is being filled in. However, since methane is a powerful greenhouse gas, it is preferable to capture and flare it into less harmful carbon dioxide and water vapour or, better, to use it if possible for electricity generation or industrial heating. A number of schemes to capture methane from coal mines and use it to generate electricity are in operation in England.
- 143 DTI and Defra have investigated the most cost-effective way of controlling leakage of abandoned mine methane. The results are available at dti.gov.uk. As a result, DTI and the Coal Authority are in the process of developing a grant-based scheme to encourage its capture for either flaring or electricity generation. In such cases, the scale of the site investigations and of the plant is likely to be modest. The duration of exploitation of the gas will be limited by the quantity of methane resource. It should be noted that the ability to implement such a scheme is dependent on funds becoming available in the future.
- 144 Evaluation of coal mine sites for exploitable methane normally requires techniques no more obtrusive than other forms of site investigation. The gas can be collected for use on the site, as an adjunct to an industrial operation, or can be carried elsewhere by a pipeline. Where methane needs to be extracted from the ground for environmental or safety reasons, developers and LPAs should consider whether it is practical to put it to good use, eg in local electricity generation. However, such sources are only likely to provide modest amounts of gas for a limited period of time, and planning policies and permissions need to take this into account.

Underground coal gasification

- 145 This process involves controlled combustion of coal seams beneath the ground and the recovery of the resulting gases. Trials were undertaken in the UK as long ago as the 1950s, but the process was considered uneconomic at the time. Although commercial installations based on overseas technologies could be introduced into the UK, it is likely that trials would be undertaken before the technology could be put to commercial use, if the technique thus proved to be economically competitive.
- 146 DTI has examined the opportunities for UCG and its potential contribution to the future UK energy supply. If this source of energy is to be exploited then an experimental UCG development would need to be undertaken. If any such experiment were to be proposed in England, it would be subject to all the usual planning procedures including the Secretary of State's power to consider and if appropriate call-in applications for her own determination.

- 147 The coal can be accessed by carefully controlled directional drilling of several wells that penetrate the coal seam, essentially horizontally, for an appropriate distance. For directional drilling, the drilling rigs are relatively large. The access wells are used to inject fuel to trigger the combustion of the seam, in the presence of water or steam. A single vertical well removes the resulting gas-water vapour mixture to the surface for treatment. The rate of burning can be controlled by varying the amount of ignition fuel, and process can be shut down, when necessary, by ceasing to inject the fuel and flooding the seam with water. The recovered gases are, after pressure regulation, cleaning and drying, either directly used for energy generation, or for the production of hydrogen.
- 148 DTI has considered whether this is a practical technology for future use if previously un-mined coal is accessed at depths of between about 600 and 1200m below the ground surface. There are considerable resources remaining at these depths both beneath the land and under the UK's sector of the North Sea. The potential has been assessed, in general terms, by the British Geological Survey. It has been concluded that suitable circumstances may occur within a number of coalfields, and these are identified in the map *UK Coal Resource for New Exploitation Technologies* (BGS/DTI).
- 149 UCG development presents a number of actual and potential impacts that need to be addressed and mitigated. Many of these are common to other types of mineral and industrial operations, for instance: noise and vibration; air quality and nuisance; dust; visual impacts; surface water quality; soil quality; and traffic. Issues of particular relevance to trial or production combustion operations are the arrangements for the control and termination of burning; arrangements for controlling the ingress of pollutants into groundwater; and the quality of groundwater that might become affected. Consultation with the EA on groundwater impacts and protection would be advisable. Subsidence is unlikely to be an issue in most cases but, nevertheless, the geological circumstances should be carefully assessed. Surface works and facilities are likely to involve similar issues to other types of industrial and power generation facilities. Further information on the technical aspects of UCG can be found in the DTI report, "Review of the Feasibility of Underground Coal Gasification in the UK" at dti.gov.uk/files/file19143.pdf

Underground storage of natural gas

- 150 Natural gas can be stored at the surface or underground, but it is more economical and safer to place large volumes underground. Use of underground gas storage facilities in the UK has been limited to date, although a number of new projects are currently under consideration. Underground storage of gas is not new. There are several hundred facilities in use world-wide, especially in the USA, Canada, and mainland Europe. Some in the USA have been operating safely since the early 20th century. The technology is well developed for the most widely used types of facilities.
- 151 As the UK has become increasingly dependent on imported gas, so the demand for storage facilities has increased substantially. In certain circumstances applications may be made by licensed gas transporters under the Gas Act 1965, which is administered by the Department for Trade and Industry, or made more generally through the Town and Country Planning Act provisions. LPAs also have a role as consultees in the Gas Act procedures.

152 Gas can be stored, either dispersed through spaces and small cavities in major bodies of porous rock, or in sizeable underground cavities. The principal types of storage facility are:

- depleted gas, or less commonly oil, reservoirs;
- aquifers;
- cavities in salt deposits produced by either conventional underground mining or by solution mining; and
- lined rock caverns.

153 Natural gas and oil reservoirs are, by definition, geological structures that are porous enough to accommodate large volumes of these fluids, confined by essentially impermeable strata until extracted through wells. Following extraction, the depleted reservoir has the capacity to accept large volumes of gas pumped in through wells and later tapped through these when needed. Because of the pre-existing suitable and well-investigated geological structure and infrastructure associated with oil and gas extraction, this is generally the cheapest option for underground gas storage, and one that is favoured where the circumstances exist. Minerals planning authorities that have productive on-shore hydrocarbons fields within their administrative areas may, at some stage, receive applications for underground gas storage.

154 An aquifer is a porous geological horizon containing groundwater confined beneath or between relatively impermeable strata. As with the depleted gas or oil reservoir, gas can be pumped into the pore spaces to become dissolved within or partly displace the water. Aquifers are widespread but, to be suitable for gas storage, these must be confined such that gas will not escape. In general very shallow aquifers or those which are affected by geological discontinuities such as faults will be less suitable.

155 Cavities within thick salt deposits are able to confine gases effectively. These can be excavated by:

- conventional underground mining; or
- pumping fresh water into the salt deposit to dissolve it to form brine that can be extracted by pumping.

156 Both methods are used to work salt deposits. Gas storage may be undertaken in existing cavities excavated for mineral or in purpose-made cavities where salt extraction is incidental to the main purpose of the work. Once the brine-filled dissolution cavern attains the intended dimensions, gas can be pumped in and brine extracted simultaneously until the facility is fully commissioned. This may take several years. The extracted brine may be re-injected into the ground into a suitable geological stratum or discharged into a nearby estuary or sea.

- 157 Since the recovery of gas depends on the ambient pressure within the store, it is desirable to place the facility as deep as possible below the ground surface, but depth is constrained by the level at which suitable geological strata occur, and also by the tendency of salt to deform by flowing or creeping in response to differential pressures, especially below about 1000m from the surface.
- 158 Where sound bedrock occurs at shallow depths but other potential, and generally less costly, underground storage prospects are absent, storage is sometimes undertaken in mined rock caverns lined with sheet steel supported by concrete. The planning considerations are therefore broadly similar to other mining operations. The lining must be effective at preventing leakage of gas through the surrounding strata. Lined cavities are generally constructed at depths of the order of 100 to 200m.
- 159 The techniques for exploration and evaluation of the potential for underground storage of gas are essentially similar to those used for oil and gas exploitation, described earlier. Detailed consideration of a proposed facility requires careful examination of:
- the integrity of the geological structure and proposed works such that there is no possibility of uncontrolled gas escape;
 - results of advanced modelling of likely gas pressure regimes and behaviour since these will control the amounts of gas that can be stored and recovered, and the rates of injection and tapping of gas; and
 - number and locations of wells required for effective use of the facility.

The evaluation of such information generally requires specialist expertise.

- 160 To ensure sufficient gas supply capacity to meet seasonal and daily peaks in gas demand, against the background of declining gas production from the North Sea, there is a national need for additional underground storage facilities of natural gas in appropriate locations. The Department for Trade and Industry issued a statement of the need for gas storage facilities on 16 May 2006¹⁴.
- 161 For further information on this topic see <http://www.hse.gov.uk/landuseplanning/index.htm> and <http://www.hse.gov.uk/comah/index.htm>.

Other minerals

- 162 A wide variety of other minerals are, or have been, worked within England. These are listed in Table 1. All are covered by the general guidance in MPS1 and some are covered by specific guidance in the annexes to MPS1 or in extant Minerals Planning Guidance Notes (Table 2).

¹⁴ Hansard link: www.publications.parliament.uk/pa/ld200405/ldhansrd/pdvn/lds06/text/60516-49.htm

163 There are marked differences in geology, properties, processing, markets, supply and demand between different minerals, all of which can lead to different land-use planning implications for their extraction. These are briefly summarised as follows:

- geology influences the size of an industrial mineral deposit, how it is worked (surface or underground; dry or wet extraction process) and processed, and the amount of waste produced;
- markets for industrial minerals are based on consistent physical and/or chemical properties of each mineral. Different uses can require different specifications. These form the basis on which specific grades of mineral are traded. However, individual grades of the same mineral can meet different specifications and are often not interchangeable in use
- a wide variety of processing techniques may be applied to raw materials to meet customers' specifications. These may vary from simple screening, to washing, drying, shredding and grinding, or a combination of these;
- the quality of mineral extracted from a single site can vary greatly. This may require multiple extraction faces within one quarry, or supplies of specific feedstock from several different quarries, to enable blending of lower specification material with that of higher grade or, alternatively, result in only a small proportion being suitable for specific industrial end-uses, with remaining minerals occasionally being used for alternative purposes such as aggregates;
- industrial minerals are essential raw materials for a wide range of downstream manufacturing industries. Their economic importance therefore extends well beyond the sites from which they are extracted. As such, minerals will travel for significant distances, often globally, by sea, but generally by road or rail within the UK;
- the mineral operator may use the extracted mineral for the manufacture of value-added products at an adjacent works; and
- some industries are dependent on several industrial minerals. The loss of supply of one mineral could create difficulties for manufacturers even if the other minerals remain available.

164 Many minerals are economically important and some such as cement materials, china and ball clay, silica sand, industrial limestone and dolomite, are required in England in substantial quantities.

165 More information is contained in a review of industrial minerals¹⁵. A series of Mineral Planning Factsheets on specific minerals that are of economic importance to the UK has also been produced by the British Geological Survey on behalf of the former ODPM. These Factsheets are an important source of information for the land-use planning process. They describe special requirements and characteristics of specific minerals operations and briefly summarise important issues associated with the supply of each mineral and their applications. The Factsheets, which are updated from time to time, can be downloaded free of charge from www.mineralsUK.com

15 British Geological Survey 2004 "Industrial minerals": issues for planning British Geological Survey Report CR/04/076N (Keyworth) ISBN 0 85272 499 3

Table 1: List of minerals worked in England other than those dealt with in Annexes 1-4 of MPS 1

Anhydrite	Fuller's Earth	Silica Rock
Ball Clay	Ganister	Silica Sand
Barytes	Gravel	Slate
Calcspars	Gypsum	Tin
Celestite	Igneous Rock	Tungsten
Chalk	Ironstone	Witherite
Chert	Lead	Zinc
China Clay	Lignite	
Chinastone	Limestone	
Clay	Natural Gas	
Coal	Oil	Note: some of these are not produced at present. In addition there are some products that may come from a number of mineral sources, such as armourstone for use in coastal defence which may consist, for example, of limestone or igneous rock.
Copper	Peat	
Diatomite	Potash	
Dolomite	Salt	
Fireclay	Sand	
Flint	Sandstone	
Fluorspar	Shale	

Table 2	
MPG Number and Title	Status
MPG1: General Considerations and the Development Plan System.	Replaced by MPS1.
MPG2: Applications, Permissions and Conditions. The rest remains in force.	Part replaced by Annexes 1 and 2 of MPS2.
MPG3: Coal Mining and Colliery Spoil Disposal.	Paragraphs C10 to C15 in Annex C replaced by Annex 2 of MPS2. Paragraphs C20 to C24 in Annex C replaced by Annex 1 of MPS2. The rest remains in force.
MPG4: Revocation, Modification, Discontinuance, Prohibition, and Suspension Orders – Town and Country Planning (Compensation for Restrictions on Mineral Working and Mineral Waste Depositing) Regulations 1997.	Remains in force.
MPG5: Stability in Surface Mineral Workings and Tips.	Remains in force.
MPG6: Guidelines for Aggregates Provision in England.	Replaced by MPS1, the MPS1 Annex on the supply of aggregates, and the current National and Regional Guidelines for Aggregates Provision in England 2001-2016.
MPG7: The Reclamation of Mineral Workings.	Remains in force.
MPG8: Planning and Compensation Act 1991: Interim Development Order Permissions (IDOs) – Statutory Provisions and Procedures.	Remains in force.
MPG9: Planning and Compensation Act 1991: Interim Development Order Permissions (IDOs) – Conditions.	Remains in force.
MPG10: Provision of Raw Material for the Cement Industry.	Remains in force.
MPG11: The Control of Noise at Surface Mineral Workings.	Replaced by Annex 2 of MPS2.
MPG12: Treatment of Disused Mine Openings and Availability of Information on Mined Ground.	Replaced by Annex 2 of PPG14.
MPG13: Guidelines for Peat Provision in England, including the place of alternative materials	Remains in force.
MPG14: Environment Act 1995: Review of Mineral Planning Permissions.	Remains in force.
MPG15: Provision of Silica Sand in England.	Remains in force.

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