

Minerals Planning Guidance 7: Reclamation of mineral workings

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Overview

Mineral Planning Guidance Notes (MPGs) set out the Government's policy on minerals and planning issues and provide guidance to local authorities, the minerals industry and others on policies and the operation of the planning system with regard to minerals. Local planning authorities must take their contents into account in preparing their development plans and in decisions on individual planning applications.

This MPG deals with policies, consultations and conditions which are relevant to achieving effective reclamation of mineral workings. It should be read in conjunction with the general guidance in MPG1, MPG2 , MPG4, MPG9 and MPG14.

The guidance:

- sets out the contribution which reclaimed mineral sites can make to the Government's policies for sustainable development and mineral working, and for land use and other policies in the wider countryside;
- advises on the scope of information which should be provided with applications for new mineral developments, to enable relevant planning conditions to be drawn up and resulting site reclamation to be achieved;
- provides some advice on preparation of schemes of conditions for restoration, aftercare and after-use which owners/operators of older mineral sites may need to draw up for future reviews of such sites;
- emphasises the importance of the roles played by the management of site activities by mineral operators and by development control monitoring and enforcement by local authorities, in achieving successful site reclamation;
- advises on financial provision in relation to securing restoration of mineral workings;
- contains more detailed advice, in Annexes, on soils, reclamation, aftercare and after-use.

Introduction

Planning principles for the reclamation of mineral workings

1 Minerals make an essential contribution to national prosperity and in improving the quality of life. However, their extraction can have significant environmental effects and abandoned sites have, in the past, been one of the country's major causes of dereliction. The Government is committed to minimising the adverse environmental consequences of minerals extraction, and have published a sustainable development framework for minerals in "*Sustainable Development: The UK Strategy*" (Cm 2426 January 1994). An important element of this framework is to ensure that land taken for minerals is reclaimed at the earliest opportunity, and to a standard suitable for the intended use.

2 Restoration and aftercare should provide the means to maintain or, in some circumstances, even enhance the long-term quality of land and landscapes taken for mineral extraction. This will be to the benefit of local communities and ensure that a valuable natural asset will be passed on to future generations. Reclamation can provide opportunities for creating, or enhancing, sites for nature conservation. This can make a contribution, for example, towards achieving specific targets set in the UK Biodiversity Action Plan. Examples include creating new semi natural habitats and providing appropriate locations for the reestablishment of threatened species.

3 The overall standards of reclamation have continued to improve over recent years, and with the development and implementation of appropriate reclamation techniques, there is potential for land to be restored to a high standard suitable for a variety of uses. Consistent and diligent application of the appropriate techniques will ensure that a wide range of sites are restored to appropriate standards. This may lead to the release of some areas of land which would not otherwise be made available for mineral working, for example, the best and most versatile agricultural land. Conversely, where there is serious doubt whether satisfactory reclamation can be achieved at a particular site, then there must also be a doubt whether permission for mineral working should be given.

4 This Minerals Planning Guidance Note (MPG7) was first published in 1989. Since then, there have been some important changes to the legislation and Government policy affecting mineral extraction. The Department has also published the results of a number of research projects which identify more clearly what is technically feasible in terms of returning land to a condition suitable for the intended after-use, and which provide guidance on best practice. A list of published DOE reports is provided in Annex E.

Statutory basis

5 The Town and Country Planning Act 1990 (the 1990 Act), as amended by the Planning and Compensation Act 1991 (the 1991 Act) and the Environment Act 1995, together with the General Development Procedure Order and the General Permitted Development Order, form the basis of the control of mineral development. The 1991 Act also made provision for the restoration and aftercare of landfill sites, many of which are former mineral workings. The powers introduced by the Town and Country Planning (Minerals) Act 1981 (the 1981 Act), regarding the aftercare of land following mineral extraction, have now been consolidated into Schedule 5 of the 1990 Act. The definitions introduced by the 1981 Act remain unchanged in the 1990 Act. They are summarised in Box 1, together with explanations of other non-statutory terms used in this Guidance Note.

Structure of Guidance Note

6 This Guidance Note gives updated advice on the planning considerations, consultations and conditions which are necessary to ensure that land worked for minerals is returned to a beneficial after-use at the earliest opportunity. It should be read in conjunction with the general guidance about planning permissions for mineral development and the imposition of planning conditions contained in MPG2 "*Applications, permissions and conditions.*" The main text of the MPG deals with the key legislative and policy guidance. Annexes contain guidance and further sources of information on the imposition of restoration and aftercare conditions in general, and for particular types of mineral developments, and advice on the role of statutory consultees.

Reclamation policies in development plans

General principles

7 The Planning and Compensation Act 1991 increased the importance of development plans in the determining of planning applications by local authorities. The Government is committed to a planned system of development control. This is given statutory force by section 54A of the 1990 Act, which provides for planning applications to be determined in accordance with the development plan, unless material considerations indicate otherwise.

Box 1

Definitions

(i) Statutory definitions (Schedule 5 of the 1990 Act).

"Restoration condition"

a condition requiring that after operations for the winning and working of minerals have been completed, the site shall be restored by the use of any or all of the following, namely, subsoil, topsoil and soil making materials.

"Aftercare condition"

a condition requiring that such steps shall be taken as may be necessary to bring land to the required standard for whichever of the following uses is specified in the condition, namely,

- a. use for agriculture;
- b. use for forestry; or
- c. use for amenity.

The steps which may be specified in an aftercare condition or aftercare scheme, and hence which are included in the meaning of "aftercare", are "planting, cultivating, fertilising, watering, draining or otherwise treating the land".

(ii) Other definitions

"Reclamation" is used in this MPG to mean:

operations which are associated with the winning and working of minerals and which are designed to return the area to an acceptable environmental condition, whether for the resumption of the former land use or for a new use.

"Reclamation" includes both restoration and aftercare as defined in the 1990 Act. However, it also includes events which take place before and during mineral extraction (e.g. correct stripping and protection of soils); and may also include operations after extraction such as filling and contouring or the creation of planned water areas.

"After-use" is used to mean:

the ultimate use after mineral working for agriculture, forestry, amenity (including nature conservation), industrial or other development.

8 Structure plans and Part 1 of Unitary Development Plans (UDPs) should express in general terms the Mineral Planning Authority's (MPA) strategy for mineral working and related development

taking into account national and regional policies. They should provide policy guidance to applicants including in general terms the need for restoration and aftercare of mineral workings.

9 Minerals local plans (or minerals and waste local plans), district-wide local plans of the new unitary authorities (where authorised to include minerals and waste policies), and Part II of the UDP's provide an opportunity for local authorities to develop in detail the policies and plans for their area. They should provide policy guidance to applicants on appropriate uses of land within the plan areas. This should assist in the early identification of the most appropriate after-use for a mineral site. However, the degree to which this is possible will depend on the characteristics of the proposed or current working, and will need to accord with other policies contained within the plan. General guidance on the development plan system for minerals is given in MPG1 "*General considerations and the development plan system*".

10 When drawing up their plans, local authorities should have regard to Government policies on land use. A wide range of possible options exist for suitable after-uses for mineral workings. Reclamation provides the opportunity to return land either to its original, or an alternative, use of benefit to the local or wider community. Opportunities exist, for example, to enhance the recreational or nature conservation resource of an area by restoring for amenity purposes, or to contribute to initiatives such as the community forests. It is widely recognised, for example, that restored mineral workings have contributed the largest area of new wetland for nature conservation in England, going some way towards replacing primary habitat lost through other forms of development; while other sites provide important refuges for wildlife.

11 In many cases it may be appropriate to look towards multipurpose uses of the land, combining for instance, agriculture, forestry, nature conservation and other amenity uses within single schemes.

National land use policies and reclamation of mineral sites

Agriculture

12 Most of the land taken for mineral working in England is in agricultural use prior to extraction. Planning Policy Guidance Note 7 "*The countryside and the rural economy*" explains how the Government's general policy approach should be reflected in land use planning policies. Guidance on developments involving agricultural land is set out in paragraphs 2.5 and 2.6, and Annex A to the note. Advice specifically on development involving mineral working is set out in MPG1.

13 On many sites, the ability to achieve high standards of reclamation should enable mineral extraction to occur without the irreversible loss of land quality. Where minerals underlie the best and most versatile agricultural land it is particularly important that restoration and aftercare preserve the long-term potential of the land as a national, high quality, agricultural resource.

14 Government policy seeks also to encourage the diversification of the rural economy where this will not result in the significant loss of high quality agricultural land. Therefore whilst agriculture remains the most appropriate after-use for many mineral sites, other uses such as forestry and some forms of amenity including nature conservation (e.g. heathland or unimproved grassland), should also be considered on land which was originally in agricultural use. Where these alternatives are proposed on the best and most versatile agricultural land, the methods used in restoration and aftercare should enable the land to retain its longer-term capability to be farmed to its land classification potential, thus remaining a high quality agricultural resource for the future. A wider

range of non-agriculture after-uses may be appropriate on land of lower quality. Land of lower quality and fertility may be particularly suited to nature conservation as an after-use, resulting in a greater diversity of habitats.

15 Reclamation to non-agricultural uses does not mean that there can be any lessened commitment to high standards in the reclamation and recycling of land taken for mineral working, and they therefore should not be chosen because they are perceived as 'easier options'. They require equal commitment by mineral operators, mineral planning authorities and any other parties involved to achieve high standards of implementation.

Forestry

16 Forestry is defined in the 1990 Act as "the growing of a utilisable crop of timber"(Schedule 5 paragraph 2(9)). However, in recent years there has been increasing recognition that productive woodlands can form a multi-functional land use combining timber production with recreation, nature conservation and visual amenity.

17 The Government's forestry policy document "*Forestry policy for Great Britain*", was published by the Forestry Commission on behalf of Forestry Ministers in September 1991. This seeks the steady expansion of forestry in ways that are in sympathy with the landscape and meet relevant environmental criteria. The White Paper "*Rural England - A nation committed to a living countryside*" published in 1995, went further, stating that the Government would like to see a doubling of woodland in England over the next half century.

18 In 1994 the Government published the report "*Sustainable forestry, the UK programme*"; it is also supporting the joint initiative of the Forestry Commission and the Countryside Commission to create a "National Forest" and a series of new "Community Forests", in several parts of England. Guidance has been issued (DOE Circular 29/92) to local authorities who may be considering the preparation of indicative strategies for the creation of new woodlands and forests. The Circular also explains the relationship of indicative forestry strategies (IFSs) to development plans. Therefore, in the areas of the "Community Forests", the National Forest, and in preferred areas as identified in IFSs, structure plans and minerals local plans should give consideration to inclusion of policies for the after-use of mineral sites to forestry and amenity woodland.

Amenity including Nature Conservation

19 An increasing proportion of mineral workings are being reclaimed for a wide range of subsequent uses which fall into the broad category 'amenity use'. These may include open grassland, country parks, informal recreational areas, conservation of landscape, natural features and wildlife, basic preparations for more formal sports facilities, amenity woodland, and water areas. In many instances a number of after-uses, including agriculture and forestry, may be integrated on a single site. Mineral workings reclaimed to amenity use can therefore contribute to Government policies in respect of recreation and nature conservation, including making a contribution to the UK Biodiversity Action Plan (see PPG7 "*The countryside and the rural economy*", PPG9 "*Nature conservation*" and PPG17 "*Sport and leisure*"). PPG2 "*Green Belts*" contains advice on mineral workings in Green Belts. Policies and proposals in structure and local plans provide the opportunity for local authorities to set a suitable strategic framework on these matters.

Landfilling of surface mineral workings

20 Under the 1990 Act, county councils and National Park Authorities are required to prepare waste local plans or combined minerals and waste local plans. Unitary planning authorities should include waste policies in their unitary development plans.

21 Some surface mineral workings can provide suitable void space for the landfilling of controlled wastes. At the same time, landfilling can provide opportunities to re-create pre-working or acceptable, new landscapes. This interaction is particularly relevant to policy considerations and good practice options for reclamation of such workings. Waste local plans therefore need to take account of minerals local plans. It is open to authorities to prepare combined minerals and waste local plans, and in National Parks waste and minerals policies may be included in the park-wide local plan. Further advice on waste local plans is in PPG23 *"Planning and pollution control"*. The waste planning elements of PPG23 are under revision and updated guidance will be issued. Advice on the suitability of mineral voids as landfill sites is given in paragraphs 47 to 54 of this MPG.

Imposing reclamation conditions for new permissions

General Considerations

22 In granting planning permission for mineral working, MPAs should always carefully consider the applicant's proposals for reclamation of the site, how and whether the proposals are likely to achieve the intended results and, therefore, how requirements to ensure satisfactory reclamation can be incorporated into appropriate planning conditions. It is equally important that the applicant should thoroughly understand, and make financial provision for, the responsibilities he will be taking on under the reclamation conditions likely to be imposed on a planning permission.

23 General guidance on the use of conditions in planning permissions is given in DOE Circular 11/95 . More particular advice on imposing conditions on planning permissions for mineral working, including a general checklist of information which may be required by mineral planning authorities to determine the planning application, is given in MPG2. An advisory 'standard application form' has also been issued by the Department to assist developers in providing the necessary information for mineral planning authorities and statutory consultees, to assist in the efficient determination of applications. Annex A to this note provides detailed guidance on the information required to assist MPAs in liaison with statutory consultees to determine planning applications and draw-up planning reclamation conditions.

24 Planning conditions for reclamation should normally be framed with the intended after-use in mind. However, separate planning permission is likely to be required for any after-use except:

- i. agriculture and forestry (excluded from the definition of development in section 55 of the 1990 Act),
- ii. uses which are included in the Town and Country Planning (General Permitted Development) Order 1995, and
- iii. nature conservation and informal recreation which do not involve substantial public use.

Any application for development on a current or disused mineral working site which would conflict with or prejudice compliance with a restoration and aftercare condition imposed in respect of the mineral working will be dealt with by the MPA. The local planning authority (where different) is likely to be responsible for determining any planning application required to implement any subsequent after-use of a reclaimed site after the requirements of the mineral permission have been satisfactorily completed and formally discharged.

Pre-application considerations

25 The drawing up of practical proposals for site reclamation will require a careful site investigation by the potential mineral operator prior to the submission of an application. The outcome of the investigation should be reflected in the documentation submitted with the application.

26 It is in the applicants interest to discuss working and reclamation proposals and possible planning conditions with the MPA, prior to formal submission of an application. These discussions should also involve the statutory consultees, the landowner, tenant and any other person with a relevant interest.

27 To demonstrate that a site can be reclaimed to an acceptable standard and after-use, the applicant is advised to prepare, at the outset, a working plan which includes restoration proposals and is based upon findings from the site investigation. This should be in sufficient detail for the MPA and any statutory consultees to form a judgement as to its feasibility. For after-uses which involve some form of plant growth (e.g. for agriculture, forestry or amenity including some forms of nature conservation), the plan will usually involve a number of key stages:

- i. stripping of soils and soil-making materials and either their storage or their direct replacement (ie 'restoration') on another part of the site;
- ii. storage and replacement of overburden;
- iii. achieving the landscape and landform objectives for the site, including filling operations if required, following mineral extraction;
- iv. restoration, including soil placement, relief of compaction and provision of surface features;
- v. aftercare.

These stages are considered further in paragraphs [33 to 74](#), with detailed guidance on best practice given in Annex A.

Environmental assessment

28 Where proposals for development are likely to have significant effects on the environment, they will need to be subject to an assessment of those effects under the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988. Whether or not mineral workings would have sufficiently significant environmental effects to warrant an environmental assessment will depend upon such factors as the sensitivity of the location, size, working methods, the proposals for disposing of waste, the nature and extent of processing and ancillary operations, arrangements for transporting products away from the site and proposals for restoration and aftercare of the site. The duration of the proposed workings is also a factor to be taken into account. DOE Circular 15/88 explains the provisions of the Regulations and gives advice on their implementation. Further guidance is given in *"Environmental assessment: A guide to the procedures"* (DOE 1989).

29 Whether or not a formal environmental assessment is required, operators are advised to follow the general methodologies for the assessment of environmental effects in all applications. These provide the applicant with the opportunity to demonstrate, and the MPA to evaluate, for example, the practicality of the proposed after-use(s). Where there is doubt as to the practicality of proposals, the operator should discuss alternative solutions using the available information. Advice on undertaking an environmental assessment can be found in *"Preparation of environmental statements for planning projects that require environmental assessment: A good practice guide"* (DOE 1995); while advice on evaluating environmental statements can be found in *"Evaluation of environmental information for planning projects: A good practice guide"* (DOE 1994).

Submission and determination of planning applications

30 Having received an application for planning permission, it is necessary for the MPA to notify or consult other interested parties before reaching a decision. MPG2 provides guidance on the consultation requirements and procedures. Annex B provides guidance on the procedures for consultation with the Ministry of Agriculture, Fisheries and Food (MAFF) or the Forestry Commission in relation to restoration and aftercare for agriculture or forestry use, respectively. MPAs are not required to consult external experts for advice on amenity use; but they may do so in appropriate cases. Further guidance is given in Annex B.

31 Before granting planning permission and drawing up conditions, mineral planning authorities are advised to consider not only the reclamation and after-use of an individual site but also, where applicable, to relate these to a strategic plan for the area. This will be particularly important where there is a concentration of mineral workings, or where the reclaimed landform will result in a permanent change in the local landscape. Policies and guidance in Minerals Local Plans, Part II of UDPs and other local plans should assist in these considerations.

32 Applicants may wish to call attention to, and authorities will wish to consider, any evidence as to how the applicant's proposed methods of site management, restoration and aftercare are likely to work out in practice. This might be done by providing evidence about the way a similar site is currently being managed, or how restoration and aftercare have been achieved on a similar site. MPAs should thus have regard to the practicality of the proposal before them. The possibility that reclamation techniques may have improved in the intervening time must also be borne in mind.

Drawing up reclamation conditions

General

33 Planning permissions normally run with the land and are not usually personal to the developer. Where a permission is granted, therefore, the conditions should be drafted in such a way that, even if the interest of the mineral operator applying for permission is subsequently disposed of, the requirements for reclamation can still be fulfilled, whether by a new operator or in the case of default, by the land-owner. The general principle is that a MPA should take into account whether it is feasible to implement the applicant's reclamation proposals successfully.

34 Planning conditions for reclamation should be specific to the proposed site and should normally be framed with the intended after-use in mind. They will vary according to:

- i. the characteristics of the individual site;
- ii. the intended after-use;
- iii. the type of mineral to be worked;
- iv. the method of working;
- v. the timescale of the working;
- vi. the general character of, and planning policies for the area.

35 Where possible, it is normally desirable to have 'progressive' or 'rolling' reclamation to minimise the area of land occupied at any one time by the mineral working, unless to do so would be likely to affect adversely the standard of reclamation achieved, or would be impractical having regard to the type of operation and nature of the site. Conditions for progressive reclamation normally limit the area taken for mineral working at any one time and relate it to the rate of restoration of earlier phases of the operation. It is, however, important that conditions permit a sufficient area of land to be stripped of soils in advance of mineral extraction to allow for wet years when soil stripping operations may be impracticable. It is not advisable to specify actual dates in conditions for phasing unless there are overriding reasons to do so.

36 For short-term workings it is usually appropriate to impose a detailed set of conditions at the time of granting planning permission. For longer-term workings, early agreement on the details of at least the later stages of reclamation may not be appropriate. However, to enable the MPA to assess the appropriateness in landscaping terms of the final restored landform, and to identify opportunities for advance planting of vegetation, it is sensible to have, at least, a general outline of

the final landform and intended after-use (see for example [paragraph 42](#)). It is recognised that local demands for particular after-uses can vary with time. The review procedures required under the Environment Act 1995 may provide a suitable opportunity to reassess existing after-use proposals. Where a more appropriate after-use is identified, and agreement can be reached between all the relevant parties, there is scope to make appropriate changes to the planning conditions.

37 For longer-term workings, it is also appropriate to agree at the outset outlines of requirements covering the main stages (e.g. filling, restoration and aftercare), together with detailed schemes for stripping and storage of soil materials. This must be sufficient to clearly demonstrate that the overall objectives of the scheme are practically achievable. Such workings should then normally require the submission of a detailed scheme or schemes for restoration and aftercare, for agreement, by some specific stage towards the end of the life of the permission. Sites where progressive reclamation is to be carried out can require submission of schemes for agreement from time to time as appropriate.

Soil handling and storage

38 For after-uses requiring the growth of vegetation, effective reclamation will depend on the appropriate identification and management of soil resources prior to and during work as well as in the later stages of restoration and aftercare. Soil resources in this context are taken to include any medium which is not contaminated and which has a realisable potential to permit plant root growth and to retain and provide water and nutrients. Planning conditions will normally prevent soil resources from being exported from the site. In addition they will usually require the separate stripping, storage (where necessary) and respreading in correct sequence of defined thicknesses of topsoil, subsoil, or any other soil-making materials. Some sites may contain considerable variations of soils within them, such as major textural differences, and it may be desirable to require separate stripping (and storage and restoration) of these materials. Such soil variations should have been identified in pre-application site surveys and provided for in the reclamation plan. Further guidance is given in Annex A.

Landform and landscape

39 Good site planning, operation and reclamation practice include consideration of the impact of mineral workings and related waste tips upon the landscape. Key objectives will be to minimise the adverse impacts, and to utilise opportunities for positive contributions which a reclaimed site can make to the landscape. Some of these aspects are relevant more especially to the operational phases of a site than to reclamation; but it is appropriate to summarise the principles in this MPG, where they interact with other reclamation considerations.

40 In preparing a planning application for either a new site or any significant extension to an existing working, the applicant/operator should develop a site-specific landscape strategy, which includes:

- i. defining the key landscape opportunities and constraints;
- ii. considering potential directions of working, significant waste material locations, degrees of visual exposure etc;
- iii. identifying the need for additional screening during operations;
- iv. identifying proposed after-uses and preferred character for the restored landscape.

41 Preparation of such a landscape strategy will be an iterative process, and will guide the contents of the application and suitable planning conditions. Aspects which link operational and reclamation stages include the phasing of extraction and reclamation, their direction and timing, and the use of temporary or permanent screening features.

42 Landscape and reclamation plans should address the impacts which mineral extraction can have on the existing landscape. These will include the working face and operations at the face, locations of waste tips, and haul roads. Where practical, a key objective may be to avoid breaking the natural skyline from particular viewpoints by the mineral working itself, or by the processing plant or spoil heaps. Coordination of phasing, provision of temporary or permanent screening, and progressive reclamation can together minimise visual impact and the impact on landscape quality.

43 The intended final landform, gradients and drainage of a site should be designed and specified at the outset, with controls in planning conditions as appropriate. For many sites there may need to be some flexibility, and a continuation of the iterative design process, to take account of changes necessitated by operational, geological and mineral working safety demands. However, major planned final landform elements are not easily adjusted when extraction is almost complete, and modifications should not compromise the overall environmental acceptability of the scheme.

44 Wherever possible and safe to do so the natural gradients and rock features of the surrounding landscape should be imitated when forming new screening banks, soil storage bunds and final faces. Some reclamation schemes may give opportunities to provide new and attractive landscape and landform features.

45 The final gradients of quarry slopes will affect the total mineral resource which can be extracted; and there may need to be a compromise in the planning decision between maximising the use of the resource and an acceptable landscape 'fit'. For some types of deep quarry, the concept and implementation of a 'reclamation margin' may resolve this. This would require the definition of a sufficient area in all or part of the perimeter of the site, which was beyond the limit of the area permitted for working and which enabled the re-shaping of production faces and/or placement of quarry materials for reclamation purposes only.

46 Further advice on landform and landscape matters, including reference to recent DOE research on hard rock quarries, is given in the Annexes.

Filling and fill materials

General

47 The reclamation of surface workings may entail the filling of the voids left by mineral extraction, using waste materials, up to or above the original ground level.

48 The Town and Country Planning (General Development Procedure) Order 1995 includes a requirement for the local planning authority to consult the Environment Agency before granting permissions for any development involving the use of land for the deposit of refuse or waste. Advice from the Environment Agency should enable MPAs to include any necessary conditions for the protection of groundwater or surface waters when granting planning permissions which include filling of mineral workings. However, where there is unacceptable risk to the environment and mitigation measures are not possible, the Environment Agency may advise against the granting of planning permission for the deposit of such material.

Backfilling or infilling with mine and quarry wastes

49 Where extraction and/or processing of the mineral results in generation of solid mine and quarry wastes or large amounts of overburden, both operational requirements and good reclamation are normally served by requiring progressive backfilling of the wastes and overburden prior to restoration of soils. Workings where relatively thin seams of economic minerals of sedimentary origin occur within geological sequences with a high waste ratio, and where backfilling is routinely practised, include opencast coal and gypsum. However, some types of infilling, such as high moisture slurries within tailings dams and lagoons, can present particular technical difficulties for reclamation. Further details are given in Annex C.

50 Filling of a mineral void with these materials will be controlled by planning conditions. The conditions will need to address both the manner and sequence of filling the excavation and specify, usually by appropriate reference to plans and cross sections, the intended gradients, landform and contours of the final surface. Allowance should be made for predicted final settlement. Mine and quarry wastes are not controlled wastes as defined under the Environmental Protection Act 1990 (the EPA 1990).

Infilling with controlled wastes

51 Approximately 70% of controlled waste produced in the UK is finally disposed of to landfill sites. The vast majority of this waste is landfilled into current or former mineral voids. In many cases this interaction has been, and may continue to be, beneficial both in finding an acceptable location for the disposal of the waste and to achieve the reclamation of the mineral working. However, the choice to integrate the two activities should be a deliberate and conscious one, which takes account of the joint impact of the extraction and landfill on the site and surrounding area. Successful reclamation of a mineral site does not automatically imply a preference for reinstatement to former original contours and ground levels.

52 Any proposal for mineral working which includes infilling the mineral void with controlled wastes requires a waste management licence under Part II of the EPA 1990 as well as planning permission. An important difference between the two is that planning permission normally runs with the land whilst the waste management licence is granted to a specific licence holder.

53 Guidance on the interaction between the two systems of control, and the extent to which the amended EC Framework Directive on Waste (75/442/EEC as amended by 91/156/EEC and 91/692/EEC) places obligations on planning authorities, is contained in PPG23 . Chapter 5 and Annex 11 of PPG23 , (*Adobe Acrobat 145kb*) in particular, contain guidance on landfilling of controlled wastes which are of relevance to the reclamation of landfilled mineral workings and the scope of planning conditions. Additional technical guidance is to be published in the updated Waste Management Paper No. 26 - WMP26E "*Landfill restoration and post closure management*". Further guidance is also given in Annex A of this MPG.

54 The controls on the surrender of waste management licences under the EPA 1990, introduced under the Waste Management Licensing Regulations 1994, mean that the Environment Agency may not accept the surrender of a licence unless it is satisfied that the condition of the land is unlikely to cause pollution of the environment or harm to human health. Therefore, the pollution controls over a particular landfill site will remain in force long after the restoration and aftercare required under the planning permission will have been completed and the after-use of the site commenced. In such circumstances, if the pollution control monitoring and remedial activities

affect such land, there may need to be provision to remedy any damage, either through amendments to the waste management licence, which will still be in force, or in the case of a new planning permission, through a planning obligation or other agreement. The option of remedial action under the waste management licence is likely to be preferable.

Restoration

55 The objective of restoration conditions is to secure the replacement of soil materials on landforms and levels which accord with the planning requirements, in ways that ensure that land is brought back to the standard required for the proposed after-use(s). This usually involves replacement of topsoil, subsoil and soil making materials in correct sequence on worked and suitably contoured land, in such a way as to minimise damage to soil structure and to other characteristics important for the growth of plants. If soils are damaged or lost during stripping, storage or restoration it can significantly affect the quality of the final restoration, even following five years of aftercare treatments. Guidance on soil handling, storage and replacement techniques is provided in Annex A. Restoration conditions also need to cover remedial treatment of soil so as to facilitate the use of cultivation, harvesting and drainage equipment for the aftercare period and the longer-term management of the land. In some cases it may be appropriate not to replace soil across the whole site, particularly where some forms of nature conservation requiring nutrient poor substrates are intended. Guidance on the requirements for nature conservation after-uses is given in Annex B.

Aftercare

General

56 Schedule 5 to the 1990 Act provides powers to enable MPAs to impose 'aftercare conditions' on the grant of planning permission in relation to land which is to be used for agriculture, forestry or amenity following mineral working.

57 The need for aftercare conditions stems from the recognition that land which is to be fully reclaimed needs not only the replacement of the topsoil and subsoil or other soil making materials (through restoration conditions), it also needs to be cultivated and given treatment for a number of years after the initial restoration has been carried out in order to improve the structure and stability of the soil, and to bring it to a satisfactory standard. It also provides an opportunity to establish the site infra-structure such as drainage, and the initial establishment and management of vegetation. The ultimate aim behind the concept of aftercare is that, over time, the land will be brought to a standard whereby it does not have to be treated differently from undisturbed land.

Limitation on the imposition of aftercare

58 There are several limitations on the imposition of aftercare conditions. These are:-

- i. Aftercare conditions may only be imposed on permissions in conjunction with a restoration condition (Schedule 5, paragraph 2(1)).
- ii. The conditions only apply where land used for mineral working or landfilling is being reclaimed for use for agriculture, forestry or amenity (Schedule 5, paragraph 2(2)).
- iii. An aftercare condition can require only the treating of the land - such as planting, cultivating, fertilising, watering, draining or other steps for treating the land (Schedule 5, paragraph 2(5)). It cannot deal with such matters as the erection, construction or

maintenance of fencing, gates, paths, etc. (However, these may be dealt with under other conditions).

- iv. Aftercare begins from compliance with the restoration condition and an operator cannot be asked to complete steps which will stretch beyond five years from that point. However, aftercare may be extended by mutual consent where this will enable reclamation objectives to be met. In the case of progressive restoration the aftercare period will begin from compliance with the restoration condition in respect of the relevant part of the site. Mineral operators may therefore reasonably request MPAs to provide written confirmation that restoration conditions have been complied with. This maximum aftercare period of five years can be varied by the Secretary of State by regulations and may therefore be reviewed in the light of experience (Schedule 5, paragraph 2(6-8)).

Aftercare consultations and responsibilities

59 Before imposing an aftercare condition, the MPAs are required to consult the appropriate Agriculture Minister (through the regional Land Use Planning Units of MAFF) where they propose that the land should be used for agriculture, and to consult the Forestry Commission where they propose that it should be used for forestry. MAFF or the Forestry Commission will advise on whether the proposed use is appropriate, whether aftercare steps should be specified in the condition or the preparation of an aftercare scheme (for approval by the MPA) should be required, and what steps would be appropriate (Schedule 5 paragraphs 4(1) to (3)).

60 Consultation with MAFF or the Forestry Commission is also required before an aftercare scheme for agriculture or forestry is approved. While aftercare is being carried out, the MPA may consult MAFF or the Forestry Commission as to whether the steps are being completed satisfactorily (Schedule 5, paragraph 4(4)). The MPA is not obliged to consult outside expert opinion on aftercare for amenity use at any stage, although in most cases they would probably wish to do so. Where sites are within Sites of Special Scientific Interest (SSSIs), there is a statutory obligation to do so. Sources include the Forestry Authority, the Arboricultural Advisory and Information Service (AAIS), and the National Urban Forestry Unit, where trees are to be planted; English Nature, the Wildlife Trusts Partnership, the Royal Society for the Protection of Birds (RSPB), the Game Conservancy, and the Wildfowl and Wetlands Trust, where nature conservation is relevant, and the Regional Councils for Sport and Recreation. The Environment Agency is also willing to provide advice where recreational and nature conservation after-uses are proposed.

61 Provided the necessary information has been submitted by the operator (see Boxes 5 and 6 in Annex A) then the consultations required for successful aftercare to take place should not be allowed to lead to undue delay in the grant of planning permission or the completion of an agreement on the aftercare condition or scheme.

Form of aftercare conditions

62 Aftercare conditions can be imposed in one of two forms (Schedule 5, paragraph 2(3)):-

- i. an aftercare condition imposed at the time of granting of planning permission, specifying the steps to be taken, or
- ii. a condition which requires an aftercare scheme to be submitted by the mineral operator or other appropriate person for approval (after modification if necessary) by the MPA.

An aftercare scheme will usually be appropriate with a long-term permission where restoration and aftercare may not be begun for a number of years. It should provide a flexible framework for a successful programme of aftercare. There may, however, be cases where it would be appropriate to specify aftercare steps in the aftercare condition itself - e.g. where mineral working will be short-term and the aftercare relatively straightforward, or for the first phase where progressive restoration and aftercare are to be carried out relatively quickly.

Standards of aftercare

63 Aftercare can only be used to bring the land to a required standard which is defined in general terms according to the intended after-use. Where restoration to agriculture is carried out in accordance with Schedule 5, paragraph 3(1), then a statement will have been prepared describing the physical characteristics of the land when it was last used for agriculture. Here, so far as it is reasonably practicable to do so, the objective is to restore land to its original quality. This is a more precise requirement than for other circumstances, where the land must be returned to a standard where it is fit for the use specified in the aftercare conditions (Schedule 5, paragraphs 3(2) to (4)). The latter standard is acceptable, for example, in situations where poor quality land is involved or where a site contains previously despoiled or derelict land. In these circumstances, it is appropriate to define measurable performance criteria or checklists. These could cover, for example, the thickness of topsoil, subsoil, other soil materials; soil texture; stoniness; water holding capacity; degree of compaction (bulk density).

64 To ensure that standards are translated into site specific objectives, it is desirable to achieve close co-operation between those carrying out aftercare, those providing expert advice and the MPA who may need to re-assess the aftercare programme annually. Further guidance is given in Annex B. This approach should provide a flexible framework against which conditions could be tailored to meet specific requirements while ensuring adequate standards of restoration. Guidance on the standards required for forestry and amenity after-uses are given in Forestry Commission Bulletin 110 "*Reclaiming disturbed land for forestry*", and in the report "*Amenity reclamation of mineral workings*" respectively.

Extension of the aftercare period

65 Aftercare conditions are now a normal requirement for relevant mineral planning permissions, and it is usual for them to last for the current maximum period of five years. Experience since the introduction of aftercare powers for new permissions in 1982 suggests that for many circumstances the present five year maximum is adequate.

66 In some limited circumstances it may be appropriate to extend the period of recuperative management of all or part of a site. Examples may include sites which have experienced problems in the establishment of forestry or amenity woodland; and some schemes intended to establish nature conservation after-uses or where aftercare was effectively 'on hold' due to the need to wait for adjoining land to be restored e.g. where drainage installation is required.

67 In some cases it may be appropriate for the MPA to seek a planning obligation to extend the aftercare period, in other cases it may be sufficient for whoever has responsibility for the land in the long-term to treat it with additional care.

Right of appeal against aftercare conditions

68 As with all planning conditions, there is a right of appeal to the Secretary of State against the imposition of aftercare conditions and against any enforcement notice issued requiring compliance with a condition, (section 78(1) of the 1990 Act).

Aftercare compliance certificates

69 MPAs are required to issue, on request from any person with an interest in the land, certificates confirming that aftercare steps have been complied with - providing they are so satisfied (Schedule 5, paragraph (5)). Such a certificate only confirms that the aftercare condition has been complied with and it does not automatically mean that the standards set out in Schedule 5, paragraphs 3(1) to (4) have been attained.

Financial responsibility for aftercare

70 The 1990 Act provides for the person last using the land for the winning and working of minerals to be financially responsible for aftercare of the land unless an alternative legally binding agreement with another party has been made (Schedule 5, paragraph 6). It is important that the likely aftercare requirements are made clear at the outset so that operators are aware of the cost implications involved, and can make provisions for them.

71 Additional points and guidance on aftercare for agriculture, forestry or amenity use are given in Annex B.

Aftercare and agricultural set-aside

72 Under the Arable Area Payment Scheme (AAPS) farmers can claim area payments on cereals, oilseeds and protein crops. However, in order to qualify for these payments, all but the smallest producers have to set-aside a proportion of their arable land. Farmers are required to manage their set-aside land and to maintain it in good agricultural condition, so that it can be brought back into agricultural production, if necessary.

73 Although there is no objection, in principle, to aftercare land being set-aside; mineral operators and farmers are reminded that set-aside management conditions do not provide exemption from aftercare obligations. In addition, positive management may require the establishment of a cover crop, e.g. grass.

74 Before seeking to set land aside farmers and landowners are therefore advised to ensure that they are capable of meeting both aftercare planning requirements and AAPS management rules. Where this cannot be achieved land should not be set aside. Otherwise any subsequent enforcement of planning conditions may cause land to be withdrawn from set-aside. This could lead to the imposition of penalties. Farmers considering setting aside aftercare land are strongly advised to consult with their MAFF Regional Service Centre on the eligibility of the land before submitting their IACS application.

Planning Obligations

75 Section 12(1) of the 1991 Act substituted a new section 106, and section 106A and 106B into the 1990 Act. These enable a planning obligation to be entered into by means of a unilateral undertaking by a developer as well as by an agreement between a developer and a local planning authority. Sections 106A and 106B deal with the modification and discharge of planning obligations and appeals. General advice on the use of planning obligations is given in DOE circular 16/91. Advice on the modification and discharge of planning obligations is given in DOE Circular 28/92. However, special considerations apply to the use of planning obligations and the imposition of conditions in connection with mineral development. Planning obligations may either be sought by an authority as a means of making development acceptable in planning terms, or they may be offered by a developer.

76 Use is made of planning obligations in mineral planning to deal with issues which cannot adequately be controlled by planning conditions. Examples of situations where planning obligations may be appropriate include:

- i. Retention of the after-use: to guarantee that the proposed after-use will be implemented or maintained into the longer-term.
- ii. Long-term maintenance and management: for land to be returned successfully to beneficial use, it is important that it is managed in the long term (i.e. beyond the statutory five year aftercare period). For some after-uses such as nature conservation, which may not generate sufficient funds to be self-sufficient, it may be appropriate to seek a planning obligation between the owner or operator and the MPA to secure such funding.
- iii. Maintenance of water levels: some nature conservation sites may require regular flooding to maintain certain habitats, whereas drainage and pumping may be required for other uses such as sports pitches to prevent flooding in winter, and land reclaimed at low level for agriculture (see Annex A).
- iv. Provision of facilities for sport, recreation, nature conservation and other amenity uses.

However, planning obligations which are sought should fairly and reasonably relate in scale and kind to the proposed development.

77 As an aftercare condition can only be imposed where there is a restoration condition (see paragraph 58), there are certain circumstances, where it is not possible to impose an aftercare condition, even though there are management requirements, for example water areas formed as part of a reclamation scheme. In these circumstances a planning obligation may be an appropriate method of allowing for initial management of both the water area and surrounding land. A similar problem may be encountered with quarry faces, where it is not clear whether they will be treated with soil or soil making materials.

New or improved reclamation conditions for existing permissions and workings, including interim development orders and old mineral permissions

78 Because of the long duration of some mineral workings, there have been, and will continue to be, major changes during the life of the permissions in working methods, in techniques available for landscaping and reclamation, and in the public's perception of environmental acceptability. Planning conditions on older mineral permissions intended to control the environmental effects of mineral working and to ensure adequate reclamation have been extensively reformed in recent years by the Planning and Compensation Act 1991 and the Environment Act 1995.

79 The Planning and Compensation Act 1991 Act dealt with the problems of Interim Development Order (IDO) permissions (i.e. those granted between 1943 and 1948). It required holders of such permissions to apply to the MPA for registration of the permission and subsequently to apply for determination of the conditions to which the permission is to be subject, if they wished the permission to continue to have effect. Guidance on implementing restoration and aftercare conditions on IDOs is given in MPG 9 (paragraphs 29 to 36).

80 The Environment Act 1995 (section 96 and Schedules 13 & 14) provides for an initial review and updating of all old mineral planning permissions granted between 30 June 1948 and 22 February 1982, and the periodic review of all mineral planning permissions thereafter. These provisions will enable the permissions to reflect changing environmental standards and ensure the conditions do not become outdated. They apply to permissions involving the depositing of mineral waste as well as to permissions for development consisting of the winning and working of minerals. Where the depositing of mineral waste (or the winning and working of minerals) is carried out under planning permissions granted under a Development Order, the Environment Act provides an enabling power to make similar provision for initial and periodic reviews within the Development Order itself. The Government intends to bring forward suitable amendments to the 1995 Order in due course.

81 Guidance on implementing this new legislation is contained in MPG 14 "*Environment Act 1995: Review of mineral planning permissions*". The basic procedure for the initial reviews, whereby mineral operators or owners must submit new schemes of conditions for approval of MPAs by a specified date, follow those for IDO sites.

82 The new schemes should include provisions for landform, restoration and aftercare of sites to a suitable after-use. Where a site is already subject to satisfactory conditions providing for restoration and aftercare there should be no need to alter them. In all other cases, appropriate restoration and, where relevant, aftercare conditions should be imposed and provision should be made for reclamation to an appropriate after-use as soon as practicable.

83 The guidance on planning conditions for site reclamation in this MPG and in the Department's research reports should be of assistance to minerals operators or owners in preparing new schemes of conditions and to MPAs in determining such schemes, as well as in considering making any formal Orders. A list of the key factors that should be addressed when preparing and considering proposals for restoration, and where appropriate, aftercare conditions is given in paragraph 35 of MPG9 , and paragraph 116 of MPG 14.

84 A further power in relation to planning conditions is contained in section 73 of the 1990 Act. This section provides that in the case of land with an extant planning permission granted subject to conditions, an applicant may apply to the local planning authority for a new planning permission to develop land without complying with conditions previously imposed. The power is explained in paragraph 13 of the Annex to DOE Circular 19/86 and paragraph 4 of DOE Circular 11/95.

Removal of buildings, plant and machinery

85 It is usually desirable to require that buildings, plant and machinery needed in connection with mineral working are removed as soon as they are no longer required in connection with the relevant planning permission. The areas concerned may then be incorporated in schemes for restoration and aftercare. Further advice on the retention and removal of buildings, plant and machinery is contained in MPG2.

Financial provision for reclamation

86 It is Government policy that properly worded and relevant planning conditions which are complied with and, where necessary, enforced, should be able to secure the restoration, aftercare and after-use of mineral sites. No payment of money or other consideration can be required when granting a planning permission except where there is specific statutory authority. Guidance on this matter in relation to the use of conditions in planning permissions is in DOE Circular 11/95 . Financial guarantees to ensure the reclamation of mineral sites should therefore not normally be required, and policies in development plans should not state that a local authority will require or seek bonds other financial guarantees to underpin planning conditions.

87 The Department published a report in 1993, "*Review of the effectiveness of restoration conditions for mineral workings and the need for bonds*". This was part of the Government's commitment, in response to the finding of the Stevens Committee, to keep under review the effectiveness of restoration conditions applying to minerals planning permissions. The study examined whether additional measures such as financial guarantees or restoration bonds could achieve better or more rapid restoration results in practice. The study did not recommend that a new scheme of guarantees or bonds should be introduced, but it did identify a number of problems which needed to be addressed.

88 It was found that most sites where working had been completed had been satisfactorily restored. The largest groups of problems related to sites which lacked modern conditions for reclamation, and sites where technical failures had resulted in unsatisfactory reclamation standards. Only a small proportion of failures resulted from financial failures. The lack of modern conditions has since been addressed through the requirements relating to IDO permissions introduced in the 1991 Act and through the new provisions in the Environment Act 1995 for the reviews of old mineral permissions. Continued improvements by the industry in their technical practices will ensure continued improvements in standards of restoration. The increasing use of progressive restoration, which limits the area of disturbed land at any one time, should also greatly reduce the potential environmental damage left by any failure to restore.

89 Experience so far with voluntary agreements, and with Local Acts in South Wales, suggests that securities have only been called in a few cases of financial failure, because of the difficulty of proving to the satisfaction of the Courts that technical failure had occurred.

90 Consequently the Government does not intend to introduce new provisions to enable financial guarantees or bonds to be required under the planning system, for either financial or technical default on restoration.

91 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 with their applications what the likely financial and material budgets for restoration, aftercare and after-use will be, and how they propose to make provision for such work during the operational life of the site. This is important to avoid future dereliction and the possibility that the costs of reclamation of mineral sites might have to be borne by other public or private sources.

92 Annex D contains more details on possible assessments of options for demonstrating to MPA's the future funding for restoration. These options may include mutual funding schemes within industry sectors, such as that set up by the Sand and Gravel Association.

93 Any demonstration by an operator of how they intend to make financial provision for restoration, aftercare and after-use should relate to the development proposed. MPAs should not seek a demonstration or provision of unlimited cover for unspecified future liabilities or for matters where normal planning mechanisms would apply. In particular MPAs should not seek financial guarantees from applicants, prior to the grant of planning permission, to deal with possible future breaches of planning controls that can be dealt with through existing planning enforcement powers and procedures.

94 There may remain exceptional cases where it will be reasonable for an MPA to seek a financial guarantee to cover restoration (including aftercare) costs, through a voluntary agreement/planning obligation at the time a planning permission is given. Examples of such situations may be:

- i. for very long-term new projects where progressive reclamation is not practicable, such as a super-quarry or some types of industrial or metalliferous mineral sites, where incremental payments into a secure fund may be made as the site develops;
- ii. where a novel approach or technique is to be used, but the MPA considers it is justifiable to give permission for the development;
- iii. where there is reliable evidence of the likelihood of either financial or technical failure, but these concerns are not such as to justify refusal of permission.

However, it is the Government's view that where an operator is contributing to an established mutual funding scheme, such as the SAGA Restoration Guarantee Fund, it should not be necessary for an MPA to seek a guarantee against possible financial failure, even in such exceptional circumstances.

95 There are some other circumstances where a financial guarantee might be appropriate as part of a planning obligation, including where the mineral developer contributes funding towards management of the new after-use of the land which needs to last beyond the formal aftercare period (see Annex D and paragraph A27 in Annex A for examples). In such cases the funding would not arise from fears of restoration failure, but because it is an acceptable provision to enable the mineral development to proceed.

96 The Government's industrial policy includes support for small and medium sized enterprises (SMEs). Operators of mineral sites in Britain include large companies operating at national or international scales and smaller, local operators. It is important that where MPAs may seek specific financial guarantees for site reclamation, this does not unfairly discriminate against smaller operators. Therefore, all planning controls must be applied on an even-handed basis, regardless of the size of the operator.

Monitoring and enforcement of restoration, aftercare and related site operations

97 This MPG has set out guidance on the importance of accurate and relevant planning conditions, and planning obligations under section 106 of the 1990 Act, to achieve successful reclamation of mineral sites. However such conditions will be of little practical effect unless they are properly implemented by the mineral operator, and unless the MPA has an effective system for monitoring the activities on a regular basis and for taking enforcement action if this is necessary. It is recognised that neither mineral companies nor MPA's have unlimited resources. The objective should be for all relevant parties to have in place adequate systems, including quality controls and staff with appropriate training and skills, to achieve their parts in securing successful site reclamation in the most cost-effective manner.

98 There are a number of key stages and operations which critically affect the success of reclamation, such as soil stripping and avoiding loss in storage; creating final landforms including materials balance, slopes, levels, and any water areas; restoration of soils; and aftercare management including drainage and management of vegetation. Mineral operators should ensure that good records of all relevant planning documents, and of operations carried out, are kept at each site; and similar information should be held by the MPA.

99 It is recommended that mineral operators provide MPAs with an annual report on each of their sites, which indicates how they have monitored and complied with specific planning conditions. For new sites such a requirement could be included as a planning condition, providing that the actual conditions to be monitored and reported on are sufficiently precise and identified. However, monitoring reports should not be seen as an alternative to proper and objective monitoring of compliance by the MPA.

100 MPAs should also have a planned series of visits to sites to check on key activities at the right times, such as in advance of soil stripping and stages of restoration, in addition to routine monitoring and recording of progress.

101 The Department has published a report from research "*Guidance on good practice for reclamation of mineral workings to agriculture*", which sets out guidelines for mineral operators and planning authorities for planning, controlling and monitoring site activities. It includes suggested checklists to support the guidance. Whilst this report is concerned with restoration of sites to agriculture, many of the principles accord with recommendations in other recent reports for sites restored to amenity uses and forestry. Further details are given in Annex A and Annex B.

102 New and substantially improved powers for local authorities to enforce planning controls were introduced into the 1990 Act by sections 1 to 11 of the 1991 Act. Advice on these new powers is given in DOE Circular 21/91 and in PPG18 . The advice does recognise that unauthorised activities on mineral workings can cause particular problems, and that there may be a need to stop such activities immediately (e.g. DOE Circular 21/91, Annex 2 paragraph 38; and PPG18 , paragraphs 19-21). The advice supports the need for monitoring by local authorities, since PPG18 says "It is clearly preferable for effective liaison and contracts between MPA's and minerals operators to be sufficiently good for contraventions of planning conditions to be avoided...".

Review and monitoring

103 The Department proposes to review the advice contained in this Guidance Note periodically. This will ensure that it remains up to date and continues to be a useful guide to mineral operators, MPAs and others involved in minerals planning and accurately reflects the views of the Secretary of State.

Cancellation

104 DOE Circular 25/85 is hereby cancelled.

Annex A : Planning and implementing reclamation schemes

Introduction

A1 There is clear evidence that the technical knowledge now exists to enable most land worked for minerals to be reclaimed to a high standard. However, to achieve this requires commitment from all parties involved in the planning and implementation of site working and reclamation.

A2 Restoration and aftercare should be seen as an integral part of the working of the site. The protection, for example, of the soil resource at all stages during the life of the site is of paramount importance to the success of reclamation, as is the need to work towards a final landform (with or without the use of fill), which is in keeping with the natural character of the area, and suitable for the intended after-use of the site.

A3 The aim of this Annex is to provide guidance on the general principles of planning and implementing a reclamation scheme. Consideration is given to specific requirements for reclamation to agriculture, forestry and amenity uses in Annex B. For aftercare procedures reference should be made to paragraphs 56 to 74 in the main text.

Preparation of a reclamation scheme

A4 A formal reclamation scheme should accompany the planning application for the mineral working. It should indicate how the restoration and aftercare of the site is to be integrated with the working scheme, and should demonstrate the suitability of the proposals of the proposed after-use.

A5 Before designing a reclamation scheme, the operator should undertake a comprehensive site survey to identify any existing features on the site that may be incorporated into the reclamation scheme, together with a survey of the soil resource and site hydrology. Consideration should also be given to the potential impacts of the reclamation proposals on adjacent land.

A6 It is becoming common practice for the operator to discuss working and reclamation proposals with the MPA and where appropriate the statutory consultees before submitting the planning application. This provides an opportunity for the parties to discuss and agree the information which needs to be provided by the applicant when submitting the planning application, and should promote early consideration of the reclamation proposals including the acceptability of the proposed after-use. The actual information needed will be site specific, however, a general guide to the type of information relevant to site reclamation is summarised in [Box 2](#). A more general checklist of information required at the planning application stage is given in MPG2 and in the Department's advisory standard application form.

Imposition of reclamation conditions

A7 Reclamation usually involves a number of key stages as indicated in the main text (paragraph 27). These stages need to be translated into planning conditions. [Box 3](#) provides a breakdown of these stages, indicating the key topics that may need to be covered by reclamation conditions. These are considered in more detail below.

Landform and landscape

Introduction

A8 It is of fundamental importance for effective reclamation that the intended final landform, gradients and drainage of a site are well-designed and specified at the outset, with controls in planning conditions as appropriate. Table 1 gives some guidance on slopes of land in relation to use. More detailed guidance on the landform requirements for the wide range of amenity uses is given in "Amenity reclamation of mineral workings".

A9 Final landforms should be the best available compromise between forms which are:

- i. suitable for the intended after-use;
- ii. generally compatible in nature and scale with the natural landform of the area; and
- iii. not liable to slope instability or other ground movement.

Filling of mineral voids

General

A10 Paragraphs 47 to 54 in the main text outlined the general principles and legislative controls involved in filling sites with mine and quarry wastes and with controlled wastes. The following sections provide further advice on the planning considerations relevant to drawing up appropriate planning conditions.

Box 2

Information Which A Mineral Operator Might Provide To MPAS In Support Of A Planning Application To Assist Both The Authority, And Statutory Authorities Advising IT

The list of items should be treated as useful guidance for mineral operators; and on individual cases should take account of the information requirements which may have emerged during pre-application discussions between the parties.

- 1.** A copy of the relevant planning application and Section 66 and 67 certificates.
- 2.** An Ordnance Survey plan of the area at 1:2,500 indicating:-
 - 2.1** The outer boundaries of the area to be excavated;
 - 2.2** The outer boundaries of the total site so that the areas allocated for topsoil, subsoil, soil making material and overburden storage can be seen; and
 - 2.3** Details of any existing topsoil or subsoil heaps that may be used in the restoration, including position, types and quantities available.
- 3.** Details of the type and depth of proposed workings and volumes of material to be removed. If the mineral operator has drilled the site during routine site evaluation then any data obtained should be offered, especially with relation to watertable level, soil-making materials which would be useful in the restoration scheme and should not be removed from the site, and depth and nature of topsoils, subsoils and overburden.
- 4.** A strategic plan of the type of reclamation proposed including:-
 - 4.1** Projected plan of contours and final levels of site, together with information about replacement depths for soil-making materials, subsoil and topsoil in the form of target restoration profiles;
 - 4.2** Areas to be restored to agriculture, forestry and amenity uses or for built development;
 - 4.3** The phasing and time-scale of the working, restoration and aftercare;
 - 4.4** The methods of filling where appropriate, types of fill and materials proposed (eg controlled wastes, mine and quarry wastes etc);
 - 4.5** The methods of stripping, transporting and restoring soils; including, where appropriate, schemes for retrieving and utilising soil making materials, dealing with different soil types and machine movement;

4.6 Proposed outfalls for drainage of the restored land;

4.7 Proposed access roads to restored land.

4.8 For sites taking controlled waste, details of proposed pollution control measures.

5. Any air or ground photographic evidence that might be available for the area (this is not essential but might be helpful if available).

6. Details of existing land uses/land cover i.e. for agriculture (grass, crops etc), forestry (broadleaves, conifers, mixed etc); areas of nature conservation importance/amenity (where appropriate, baseline ecological survey covering vegetation, animals and habitat types etc.)

7. Details of the overall drainage characteristics of the site, including the existence of any known field drainage system, and the positions of main outfall ditches and watercourses.

8. If any restoration is likely to take place within 12 months of the commencement of working, then full details of the proposed aftercare should be submitted.

9. Where restoration will not take place for several years, the operator should submit a summary of the principal items which he proposes to include in an aftercare scheme, to be agreed at a later date.

10. Details of proposals for nature conservation enhancement, indicating how they fit with local nature conservation strategies and the biodiversity action plan.

Note:

Where mineral operators provide detailed information on a site's physical conditions in respect of agricultural land, MAFF are prepared to utilize such data in the preparation of the statement of physical characteristics subject to satisfactory validation. To be of value to MAFF auger boring data should be collected on a grid basis at an appropriate sampling density for the site. At each grid intersection information is required down to 1.2 metres depth on soil texture, colour, gleying and abundance and size of surface stones. Supplementary representative soil profile pits should also be dug to provide information for each mapping unit on soil structure, depth to slowly permeable layers and abundance and size of subsoil stones, also down to 1.2 metres.

Box 3

Key Topics To Be Considered When Drawing-Up Reclamation Conditions

Soil stripping	Timing/condition of the soil Machinery used/routing of vehicles Separation of different soil types/horizons
Soil and overburden storage	Separation of different soil types/horizons; overburden storage Location of storage mounds, height, shape Methods of construction; including environmental safeguards for noise suppression Maintenance requirements (seeding, mowing etc.)
Landform for after-use	Contouring of excavated area and of permanent mineral waste tips Placement of fill or overburden - sequence, phasing, method, order, depth; environmental safeguards Final levels/gradients
Restoration	Soil placement - methods, order, thickness of topsoil, subsoil or soil making materials Timing and methods of placement Routing of vehicles during soil placement: (as for storage - environmental safeguards) Relief of compaction For controlled landfills, installation of gas and leachate control systems (spacing, location, compatibility with reclamation objectives, including vegetation establishment and management) Drainage outfalls
Provision of surface features	Ditches and drainage work Erection of fences Creation of attenuation ponds etc. for water management
Aftercare	Planting or seeding, cultivating, fertilising, tree and hedge planting, watering, drainage Secondary treatments

A11 In some cases it may be appropriate to only partially fill a site to create landforms which are appropriate for the intended after-use, or to conserve features of biological or geological interest existing on the site. In the latter case, the interest may only become apparent once extraction has commenced, and there may be need for some flexibility in implementing the final reclamation scheme (see the section on landform in the main text - paragraphs 39 to 46). Geological interests may require rock faces to be conserved. However these may be subject to falls of rock, with consequential public safety implications. However, there are a number of technical solutions available which may greatly reduce the risk to public safety. It may be possible to conserve small sections of a face which, together, cover a whole succession. This may sometimes be preferable in safety and access terms to conserving high faces. Further guidance is available in "The reclamation of damaged land for nature conservation" and "Earth science conservation in Great Britain, a strategy".

Mine and quarry waste

A12 Requirements for the use of mine and quarry wastes as fill materials (overburden, waste rock etc.) will be controlled by planning conditions. The main considerations will be:-

- i. the bulking and settlement characteristics of the fill and the influence these may have on the intended after-use of the site;
- ii. any particular physical or chemical properties of the fill which could adversely affect groundwater or would have potential to affect, adversely or beneficially, plant growth following restoration.

Table 1. Slopes of land in relation to use

Gradient			
Fraction	%	Degrees (to horizontal)	Significance for land use
1 in 1	100	45	
1 in 2	50	27	Maximum for downhill use of most forestry machinery (Rowan, Forestry Commission (F.C.) 1977).
		25	Maximum for pasture land to avoid soil creep and formation of paths by animals across slopes (Soil survey of England and Wales 1969).
1 in 3		18	Maximum for Grade 4 agricultural land (MAFF 1988). Limit for 2-wheel drive tractors with fully mounted equipment. Maximum for uphill use of most forestry machinery (F.C. 1977).
1 in 4	25	14	Mean recommended incline for artificial ski slopes (English Ski Council).
1 in 5	20	11	Maximum for Grade 3b agricultural land (MAFF 1988). Limit for most machinery used in cereal and grass production including combine harvesters and 2-wheel drive tractors with trailed equipment. Maximum slope for 2-way ploughing.
1 in 8		7	Maximum for Grades 1,2 and 3a agricultural land (MAFF 1988). Suitable for most agricultural machinery but the limit for precision seeding and harvesting equipment.
1 in 10	10	6	Maximum general longitudinal gradient for forest roads.(F.C.).
1 in 25			Minimum settled gradient for the restored profile of landfill sites accepting biodegradable waste.
1 in 40	2	1°25'	Optimum gradient for drainage channels (MAFF).
			Maximum lateral slope for playing fields (Nat. Playing Fields Assn, NPFA, 1963).

1 in 60	1	0°57'	Recommended gradient for winter games 1 in 60-1 in 80 (NPFA). Recommended minimum gradient for restored profile of inert landfill (MAFF).
1 in 80		0°43'	Minimum desirable cross fall for cricket pitches (NPFA, 1963).
1 in 200		0°23'	Minimum practical gradient for piped land drainage (DES 1966).[Note: on reclaimed land and filled land, differential settlement may cause problems on such shallow slopes.]

Notes

1 For agriculture and forestry these are general guidelines which take account of safety. For agriculture the degree of limitation is also influenced by slope form in relation to field boundaries.

2 A geotechnical analysis of proposed slopes should be undertaken, based on information on the behavioural characteristics of the natural and/or emplaced materials found at each site.

A13 Both operational requirements and good reclamation are often served by requiring progressive backfilling of wastes approximately in correct stratigraphical sequence prior to restoration of soils.

A14 The needs and opportunities for greater or lesser compaction of the fill will vary with the methods of working and the intended after-use. Stability considerations and the degree of compaction will obviously be more critical if it is intended to build on a reclaimed site.

A15 The pre-application survey may have identified particular horizons of waste rock or overburden which could benefit plant growth on the reclaimed site if specifically reserved for use as the uppermost layer of fill before replacement of the subsoil in order to increase the total 'soil' depth, or as a replacement for unsuitable subsoil. Such a requirement could be included in the agreed scheme of working, although it will be important to consider both the increased costs to the operator of complying with the requirements as well as the overall benefit to be gained in terms of plant growth and any likely reduction in the costs of aftercare. In contrast it may be necessary to avoid the placement of certain types of wastes immediately below the soil layers - e.g. large rocks which would interfere with normal agricultural drainage or cultivation operations, or materials with particularly hostile chemical properties.

A16 Where mineral voids are filled with mine and quarry wastes brought in from elsewhere, similar considerations to the above will apply. However, the mineral operator may have less direct control over the timing and availability of fill material.

Controlled wastes

A17 Where it is planned from the outset that a surface mineral working is to be reclaimed by landfilling with controlled wastes, it is vital that the landfilling engineering requirements are integrated with the requirements and objectives for restoration, aftercare and after-use of the site. There have been a number of significant changes in landfilling since Waste Management Paper 26, "*Landfilling wastes*" was first published in 1986 and since the original version of MPG7 was issued in 1989. The changes of most relevance for mineral and landfill operators and for MPAs and the Environment Agency, include:

- i. the legislative framework for planning control and, especially, waste management licensing, has been extensively revised;

- ii. new technologies have been developed for landfill construction and capping, control over landfill gas migration and extraction, and leachate management and treatment, and these are likely to affect the timing and techniques for landfill reclamation - especially for those sites taking biodegradable wastes;
- iii. the results of research into accelerated stabilisation of biodegradable wastes, into assessment of stability and estimation of settlement, and into the processes and products of biodegradation, have a direct effect on the design and practice of landfill reclamation;
- iv. further experience has been gained, and improvements made, in the standards of restoration and aftercare for landfill sites, which are encouraging a wider range of after-uses to be considered on restored landfill sites; in addition, recent and continuing research into the potential for tree planting on landfill sites has shown that the guidance in WMP26 on this topic was overly restrictive.

A18 Many landfilled workings will remain in operation over several years, if not decades. It is, therefore, important that there is interaction between all the parties concerned with the design and planning of site operations and their implementation, and that this is seen as a continuing process. The requirements in the Environment Act for periodic reviews of all mineral workings should assist the practical interface between the separate planning and licensing control systems.

A19 The planning conditions may need to allow for "interim restoration" for a limited period, for sites where significant settlement is anticipated, or on parts of sites where remedial works to environmental protection measures (gas and leachate systems) will be required. This will usually entail replacement of part of the soil profile (e.g. subsoil only) and establishment of a temporary grass sward. The duration of such "interim restoration" should be kept to a minimum but the actual duration will need to be site specific; and it should then be followed by completion of restoration of the full soil profile, and aftercare appropriate for the after-use.

A20 More detailed technical guidance, which is relevant for planning as well as licensing controls, is given in Annex 11 of PPG23 and especially in WMP26E "*Landfill reclamation and post closure management*"[in preparation].

Reclamation of workings which do not involve fill

A21 Effective reclamation of surface mineral workings does not necessarily require filling of the voids with solid materials. For example, there are many possible beneficial after-uses for water-filled voids in areas with a high natural water table. In areas where the base of the excavation is above the level of the water table, planning conditions can require shaping of the excavated area to agreed contours and gradients prior to restoration and, often, aftercare for agriculture, forestry or amenity use.

Low level restoration in areas with a high water table

A22 In areas with a high natural water table, one possible option for determining a planning application for mineral working is to permit extraction, leaving the restored level of the site below the water table but requiring the site to be adequately drained by pumping on a continuing basis. This has become known as 'low level restoration'. It may also be a relevant option for mineral deposits such as clays where there is no true 'water table' but where there will be a continuing need to dispose of surplus water resulting from direct precipitation. The situations in which low level restoration has generally been implemented or proposed have been in parts of East Anglia and the East Midlands where sand and gravel deposits underlie high quality agricultural land with a high

water table, and where for policy reasons it is desirable to restore sites to agricultural use, but where lack of suitable fill materials and other factors preclude restoration of worked sites to original levels. In such circumstances the acceptable release of the land for mineral working may depend on restoring the worked area to agriculture at the lower level, with continuing pumping.

A23 Such restoration proposals raise particular legal and technical issues which need to be satisfied if permission is to be given. The main legal problem concerns the imposition and enforceability of longer-term or 'perpetual' pumping conditions. It is possible that a condition which would require the mineral operator and, once he had left the site, the landowner, to pump the site in perpetuity or for an unspecified period would be considered to be unreasonable or even *ultra vires*, because it would impose an unlimited obligation on the landowner.

A24 The use of a planning agreement under section 106 of the 1990 Act (as substituted by section 12(1) of the 1991 Act) may present a practical solution to this type of case. Section 106(1) provides that a local planning authority may enter into an agreement with anyone with an interest in the land for the purpose of restricting or regulating the development or use of the land. DOE Circular 16/91 provides guidance on the provisions for making planning obligations and on the use to be made of them. DOE Circular 28/92 describes the procedures for modification and discharge of planning obligations and the related Regulations.

A25 The technical requirements for low level restoration of sand and gravel workings, and the original DOE Circular providing guidance on the legal aspects (DOE Circular 25/85) have been reviewed in a DOE research project. The resulting report "*Low level restoration of sand and gravel workings*" has been published by HMSO. The report includes recommendations for best technical practices for low level sites and guidance on the scope of information which should be provided with planning applications involving this type of restoration. On the legal aspects, the report concluded that voluntary agreements (i.e. planning obligations) to complement normal planning conditions can be made, which will secure the enforceability of covenants to safeguard the restored land. However, the introduction of legal provisions relating to planning obligations (see paragraph A24 above), has widened the scope for such agreements and overtaken some of the detailed legal comments made in the report.

A26 The technical guidance in the HMSO report should be taken into account in preparing and determining any relevant planning applications. A summary of key items is in Box 4. Additionally applicants and MPAs will need to take account of the advice of the Environment Agency on the potential effects of proposals on groundwater, where low level restoration will permanently reduce the thickness of the unsaturated zone of an aquifer. The powers and duties of Land Drainage Authorities under the Land Drainage Act 1991 and Water Resources Act 1991 will also need to be considered. English Nature should be consulted where water draw-down or suspended solids within the pumped water would have a potential to impact on adjacent wetland habitats.

A27 The terms of a planning obligation are a matter for negotiation between the parties and must reflect the particular circumstances of each individual case. However, it is likely that most obligations related to this type of restoration will:

- i. require the mineral operator to execute the works necessary to restore the land and install the necessary drainage and pumping equipment;
- ii. refer to the detailed technical specification for the proposals, a copy of which should be appended to the obligation;
- iii. require the mineral operator to carry out the works specified; and

- iv. make suitable financial provision for the necessary works.

It is possible to cover points i. to iii. using planning conditions. Financial provision and longer-term management and maintenance of the system are likely to require a planning obligation.

Box 4

Summary Of Items For Best Technical Practice For Preparing Low Level Restoration Proposals

1. Site without a groundwater barrier

- Will continuing local drawdown of the water table be acceptable? if "yes":
- Undertake detailed hydrogeological investigation of predicted drawdown effects;
- design of water balance facility;
- design of pumping systems;
- specification for stabilising perimeter walls and water management scheme;
- prepare long term management scheme.

2. Site with groundwater barrier

Primary ground investigation

- geological, hydrogeological and geotechnical profile of site to depth of c.10 metres below base of proposed workings;
- samples of all strata for in situ and laboratory testing;
- monitor groundwater, and relate to rainfall events, commencing (at least) 1 year prior to submission of application.

Secondary & tertiary ground investigation

- Further assessments of groundwater and for selecting materials for earthworks construction (with or without artificial liner);
- water balancing and other management factors as for 1.

A28 It may also be desirable for the landowner, where different from the applicant, to covenant with the MPA to maintain the under drainage of the land and any groundwater barrier or other works designed to prevent the ingress of water into the restored site. In a planning obligation of this type, it will be important to include all the necessary parties.

Handling soil during mineral working operations

Introduction

A29 For after-uses requiring the growth of vegetation, effective reclamation will depend on the appropriate identification and management of soil resources prior to and during work as well as in the later stages of restoration and aftercare. Soil resources in this context are taken to include any medium with a realisable potential to permit plant root growth and to provide water and nutrients.

A30 Pre-application site investigations should provide adequate information on the amounts and characteristics of topsoil, subsoil, soil-making materials and overburden; drainage and original landforms. [Table 2](#) gives a broad indication of important soil characteristics and the extent to which planning conditions may be employed to minimise alterations to those characteristics which may in turn affect the standard of restoration achieved on a site. [Figure 1](#) is an idealised diagram of typical soil horizons and their characteristics.

A31 Planning conditions will normally require the separate stripping, storage (where necessary) and respreading in correct sequence of defined thicknesses of topsoil, subsoil, or any other soil-making materials. Some sites may contain considerable variations of soils within them, such as major textural differences, and it is often desirable to require separate stripping (and storage and restoration) of each main soil type. Subsoils, for example, often comprise two or more layers which may vary in their physical and chemical characteristics. Such soil variations should have been identified in pre-application site surveys and taken into account in the proposed restoration profiles in the reclamation plan. However, it is important not to make the requirements for separate stripping of each soil type too complicated for the operator to deal with in a practical manner.

Soil handling machinery

A32 It has been relatively unusual for particular types of machinery to be specified in planning conditions for soil movement, since this restricts flexibility to take account of advances in techniques and practice over the total period of the mineral operations.

A33 Two systems for handling soil are commonly used in Britain; earthscrapers, and dumptruck and excavator, with hybrids of the two being used in some instances. Bulldozers are also often used, particularly in conjunction with dump truck and excavator, or with dumptruck only, to spread soil.

A34 The dumptruck method if correctly implemented, should minimise soil compaction and allow movement of soils across a wider range of moisture contents than a scraper, which undoubtedly compacts soils moved when moist. It may also reduce the need for remedial work during the aftercare period. The dumptruck method should, therefore, be considered particularly for sites affecting the best and most versatile agricultural land. It is also recommended by the Forestry Authority as a means of loose tipping soils prior to the establishment of trees. Dump trucks come in a range of sizes and capacity and it should be noted that the larger the machine the greater the risk of soil compaction unless ground pressures can be reduced by use of suitable machinery. However, if the technique is properly used, passage of dump trucks over the soil should not occur.

Figures

Figure 1 - Typical Soil Horizons and Characteristics

FIGURE 1: TYPICAL SOIL HORIZONS AND CHARACTERISTICS

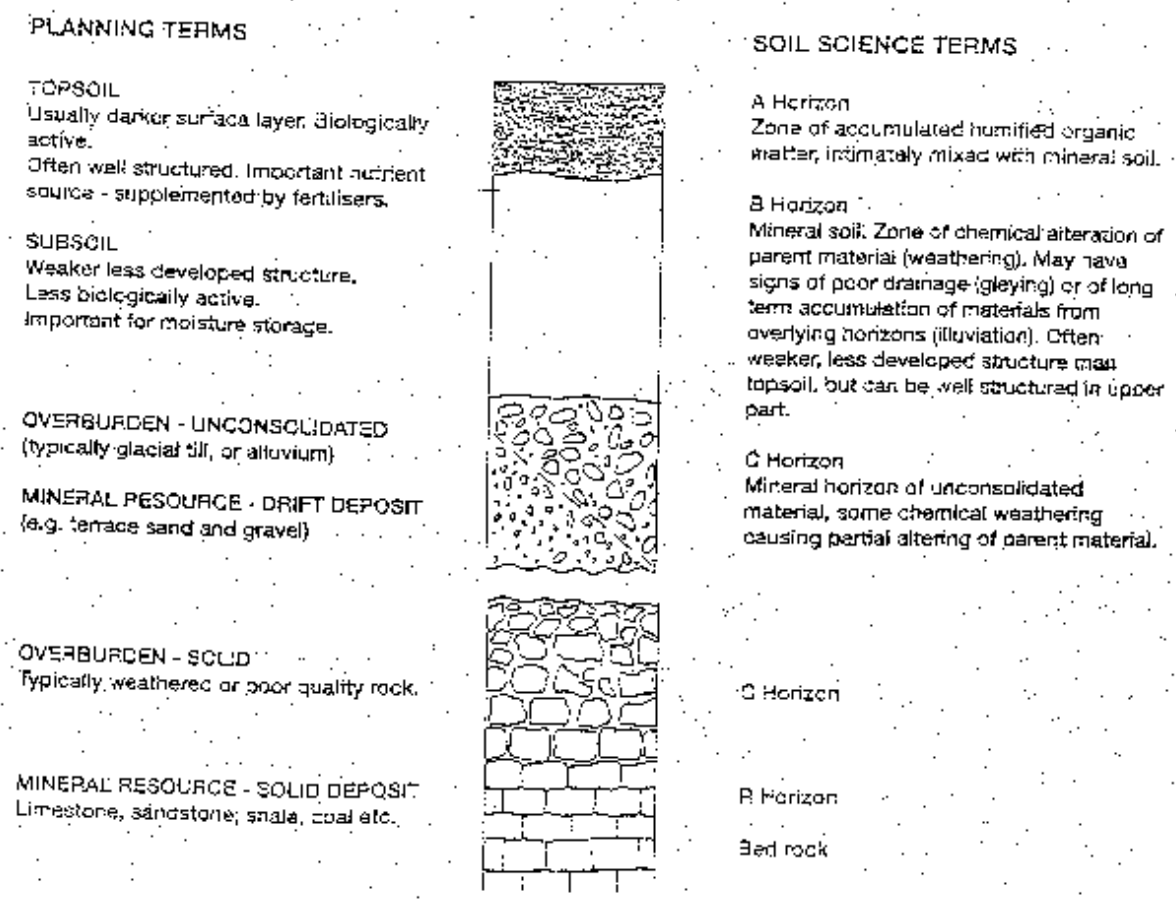


Table 2 Soil characteristics and effects of disturbance

Soil characteristics	Effects of disturbance	Effects controllable by planning condition
Soil Profile And Depth: Arrangement and thickness of different horizons (topsoil, subsoil and weathered parent material).	Possible mixing of soil types and soil horizons, loss of material, possible bulking during soil movement and subsequent resettlement.	Careful separate stripping, storage and respreading of soil horizons, to specified depths, commensurate with amounts of soil present, and proposed after-use. Avoidance of soil mixing.
Soil Texture: Size range of	Not necessarily altered if soil	Careful separate stripping, storage

primary particles present (sand, silt, clay etc).	movement carefully controlled.	and respreading of soil horizons.
Stoniness: Particles greater than 2 mm diameter. All stones dilute the volume of soil and reduce available water capacity. Larger stones interfere with cultivation especially those in the topsoil.	Possible increase due to mixing of different soil horizons or replacement of stony horizons nearer the top of the soil profile. Contamination with overburden.	As for Soil Profile And Depth Also, ripping followed by stone picking upon replacement of stony layers.
Soil Structure: Arrangement of individual soil particles into larger compound units or 'peds' with channels between.	Inevitable disturbance by soil movement; extent depending on initial structure, site conditions, method of movement. Compaction; increase in bulk density; loss of number and continuity of macro pores and fissures; impeded drainage. Subsoils are generally most prone to longer term damage.	Avoid soil movement in wet conditions; use direct respreading where possible; specify agreed soil handling methods and machinery so as to avoid trafficking by heavy machinery; subsoiling and other cultivations of replaced soil; remedial cropping.
Bulk Density: The weight of soil per unit volume. A measure of compaction, and related to soil structure and texture.	Possible loosening during stripping decreases bulk density but main danger is increased bulk density by passage of earthmoving machinery.	As Soil Structure.
Soil Drainage: Movement of water through the soil. Depends mainly on soil texture and structure; and level of water table.	Disturbed by soil movement.	See Soil Texture and Structure. Levels and gradients of reinstated sites; subsequent installation of drainage system.
Available Water Capacity: Measure of moisture that plants can extract from the soil. Related to texture, structure, stoniness and depth of the soil profile that roots can exploit.	Altered by change in soil structure due to soil movement. Usually decreases with increases in bulk density and water becomes less accessible to plant roots where compaction is severe.	Not directly; but indirectly by conditions on soil movement.
Nutrient Status And Chemical Characteristics: Content of main plant nutrients (N, P, K, Ca, Mg), acidity (pH), and micro-nutrients (e.g. Mn, Cu, Mo Fe).	Soluble compounds leached during storage of soils, and pH may be lowered. Anaerobism in wet/compacted soils. Possibility of contamination.	Addition of lime and fertilisers, as indicated by standard analysis, on replacement of soils and during aftercare period. Occasionally may need fertiliser and lime added to soil stockpiles. For forestry, foliar analysis may determine nutrient requirements during aftercare.

A35 Where particular machinery and methods of use are favoured at the outset, it may be helpful to review their appropriateness from time to time.

Soil stripping

A36 Compaction, smearing and loss of soil structure can be caused by handling and movement of soils in unfavourable weather and soil moisture conditions, by unsuitable storage of soils, and by passage of machinery with high axle weights or ground pressures across soils. In many cases it is not possible to remedy such damage, particularly where compaction has occurred in the lower soil profile.

A37 Planning conditions should aim to minimise this potential for damage through limiting when and how soils are moved. Soils movements can be restricted to dry conditions in general terms, by reference to particular soil moisture conditions or by rainfall criteria.

A38 The use of rainfall criteria was considered in a report for the DOE to be unnecessarily restrictive in some cases. The use of soil moisture status appears to be more common and may provide a more flexible mechanism to ensure that soil damage is minimised. However, the study concluded that the single most important requirement was to ensure that the conditions imposed are properly complied with. Guidance on methods to determine the appropriate timing of soil movement is given in the report "*Guidance on good practice for the reclamation of mineral workings to agriculture*". Even during periods of weather generally suitable for soil stripping, supervision should ensure that operations are suspended after heavy rain. The damage caused to soils by continuing earthmoving during adverse soil moisture conditions may be costly or impossible to reverse during aftercare. Suitably dry soil moisture conditions for stripping subsoils are more likely to be achieved if the site is kept vegetated or, in arable situations, if a temporary grass sward is established for the period prior to stripping.

A39 In areas of high rainfall and with some heavier-textured soils it may be more difficult to get ideal circumstances in which to move subsoils. In these circumstances the soil handling methods employed should be designed to minimise compaction and an appropriate programme of cultivation devised.

A40 The movement of soils in dry and windy conditions can cause a dust nuisance to surrounding property or some types of land-use (e.g. some wetland habitats) or sensitive industrial developments (e.g. 'high tech' industries). Planning conditions may therefore need to provide for cessation of soil movements in certain weather conditions, if nearby properties or sensitive habitats might be affected. Further guidance is available in "*The environmental effects of dust from surface mineral working*". There may also be potential problem of suspended solids in run-off following soil stripping. Controls to prevent run-off of soil into surface waters should be put in place where this is identified as a potential risk.

Soil storage

A41 Wherever possible soils should be moved directly from areas being stripped to areas being restored, as storage necessitates double handling and increases the opportunities for soil losses. Progressive reclamation reduces the need for soil storage, but this may still be required for part of a site.

A42 Current evidence suggests that while some deterioration to soil quality can occur during storage, such changes tend to be fairly rapidly reversed following restoration, although microbial biomass and activity as well as structural stability may take longer to recover.

A43 Planning conditions will need to define the location, height and shape of storage heaps and in many cases provide for their management, such as by seeding and weed control.

A44 Soil stores should not be sited in locations which lie wet or are liable to flooding, or where soil mixing, loss or damage by trafficking is likely to occur. When planning the siting of storage mounds consideration should also be given to landscaping and noise attenuation requirements.

A45 Whilst it is generally accepted that low soil storage heaps are preferable in order to minimise deterioration of soils in the inner parts of heaps, there are no universally applicable maximum height limits. However it is recommended that soil heaps should be restricted to the minimum height practicable, compatible with the amount of soil storage space available on site.

A46 MAFF have published a "*Code of good agricultural practice for the protection of soil*" which provides practical guidance to farmers on the avoidance of long-term damage to soil. This includes advice on the handling and management of soil during and after mineral extraction. While being primarily aimed at land for agriculture, the guidance also has wider relevance for the management of damaged soils used for other purposes.

Routeing of vehicles

A47 Conditions should be used to control the routeing of vehicles to avoid unnecessary trafficking over unstripped or restored soils, or over soil storage heaps. Recently respread soils are particularly vulnerable to damage. Criteria for the control of soil movement need to be determined for each site individually since soil and site characteristics vary.

Restoration

A48 Restoration refers to the replacement following mineral extraction of any or all of the following, subsoil, topsoil and soil making material. Restoration conditions can require the placement of soil in the appropriate order, and to appropriate depths. They can also require mechanical subsoiling of the restored soil layers to relieve compaction and remove stones. It is generally appropriate to require subsoiling of the uppermost layers of overburden before placing subsoils. Where soils are not placed by loose tipping using dump trucks, it is often appropriate to replace subsoils in layers, with subsoiling of successive layers prior to placing the topsoil. All soil movements and treatments must be undertaken when the soil moisture conditions are suitable and having regard to the effective depth of subsoiling equipment. The guidance in [Table 2](#) (soil characteristics and effects of disturbance) is also applicable when considering suitable restoration conditions.

A49 The use of available soil resources should be planned so as to match soil quality and depth with the requirements of the proposed after-use(s) and target reclamation standard. This may be particularly appropriate where the reclamation scheme includes a number of after-uses.

Soil making material

A50 Many older mineral workings and some more modern sites have limited quantities of soil available for restoration purposes. It is often inappropriate to import large volumes of soil, because of the high cost, and the variable and often poor quality of available materials. The use of on-site quarry and other waste materials as soil making material is already widely used by some sectors of the minerals industry and those involved in derelict and landfill restoration.

A51 The wide ranging characteristics of different soil making material makes it difficult to provide specific guidance for their use. However, Forestry Commission Bulletin 110 provides guidance on

the minimum physical and chemical qualities acceptable for forestry use (see Table 4 in Annex B). These are likely to be generally acceptable for a range of other after-uses. British Standard BS 3882:1994 "*Topsoil and other growing media*" provides quality standards for the use of imported soils and soil making material and advisory guidance on soil handling and management. In addition, efficient systems need to be agreed and established for checking the quality of materials as they are imported onto site and covered by specific planning conditions.

A52 If quarry or processing 'wastes' are to be used as soil making material, especially without any natural soils, it is recommended that their suitability for establishing and maintaining vegetation is assessed by prior site field trials. With agricultural after-uses and to a lesser extent forestry, the growing medium should be able to retain applied fertilisers and to supply the growing crop with relatively high levels of nutrients. In contrast, some amenity and nature conservation after-uses require substrates which supply plants with only very low levels of nutrients. In such cases, the use of soil making material such as quarry wastes may be preferable to topsoil or other similar materials (see also [paragraph A79](#)). The Department has commissioned research which will provide more detailed guidance on the appropriate selection, use and management of soil making material and the use of amendments such as sewage sludge.

Drainage

A53 Soil wetness caused by inadequate drainage is one of the most common limitations to the achievement of high standards of reclamation. There are a number of causes of excessive wetness including:

- i. poor infiltration leading to surface ponding and run-off;
- ii. compacted and slowly permeable horizons within the restored soil profile impeding the downward movement of surplus water;
- iii. a slowly permeable substrate below the soil profile;
- iv. a high water table.

A54 Site drainage can usually be achieved by a combination of topography, permeable soils, and where necessary, the installation of underdrainage.

A55 Compaction within the soil profile occurs most often when machinery is allowed to pass over the restored soil. Relief of compaction in the deeper soils usually requires loosening either by subsoiling or ripping during the restoration stage, with in some cases, repeated treatments during and possibly beyond the aftercare period. Sequential ripping and replacement of shallow layers of soil can enhance the effectiveness of profile loosening. For agricultural after-uses, it is usually necessary to install an under-drainage system as part of the after-care requirements (see [paragraph A75 to A77](#)). Compaction of the surface may be required however, for specific uses, such as built development or some forms of habitat creation. This should be carefully planned and not result from poor practice.

A56 Ripping is most effective on soils which are dry enough to shatter readily. However some soils may remain too wet over most of the year to be effectively ripped.

A57 Soils replaced over impermeable substrates rely on the lateral movement of water either across the soil surface as run-off or through the soil profile. This is greatly assisted by a sloping topography, and a loose and permeable soil. Where soils are directly replaced over free-draining substrates, such as the permeable floor of some limestone or chalk quarries, there is less need for

gradients to be created for drainage purposes. However, it is particularly important that soils are placed and maintained in a loose state to allow for down-ward drainage.

A58 Discharge from on-site drainage can affect downstream watercourses or groundwater. Sites with potential drainage problems should be subject to an investigation to ensure the acceptability of the reclamation proposals. Early consultation with the Environment Agency is recommended.

Aftercare

Introduction

A59 The ultimate aim of aftercare treatments is to bring restored land into a condition which does not need to be treated differently from undisturbed land in the same use.

A60 In England as of 1994, more than 35,000 hectares of land permitted for mineral extraction was covered by aftercare conditions. This represents over 30% of the total permitted area, and compares with only 16% in 1988. Mineral types which in general have a relatively short life-span have a higher proportion of their total permitted area covered by aftercare conditions (e.g. two thirds of the area permitted for opencast coal extraction and 45% of sand and gravel areas had requirements for aftercare).

A61 The text below provides general guidance on preparing aftercare schemes. It should be relevant to all sites for which aftercare is appropriate (i.e. agriculture, forestry or amenity uses, including nature conservation) except where it is more practical to impose an aftercare condition specifying the steps to be taken. The main text provides guidance on the procedural arrangements for imposing aftercare conditions, and on the standards to be achieved. Guidance on the specific requirements for restoration and aftercare for different after-use is provided in Annex B.

Aftercare scheme preparation

A62 The preparation of an aftercare scheme should begin at least six months prior to commencement of aftercare on all or part of the site with the submission of outline proposals to the MPA. This will allow time for consultations and any necessary amendments to be made before a scheme is agreed.

A63 The preparation of a successful aftercare scheme requires two levels of information from the mineral operator:-

- i. An outline strategy of commitments for the five year aftercare period.
- ii. A detailed programme for the forthcoming year.

A64 The **outline strategy** should broadly outline the steps to be carried out in the aftercare period and their timing within the overall programme. A summary of the main items to be covered within the outline is given in [Box 5](#). It should be submitted to the MPA at least three months prior to the commencement of aftercare.

A65 A map should accompany the outline, identifying clearly all areas subject to aftercare management, with separate demarcation of areas according to differences in the year of aftercare and proposed management. Where a choice of options is retained this should be made clear together with criteria to be followed in choosing between them.

A66 Commitments to provide the MPA with additional plans, specifications, site records or analyses for approval at specified intervals ought also to be covered. Normally such information is required one month in advance of agreed consultations.

Box 5

Outline Strategy For An Aftercare Scheme

The outline strategy document should cover as appropriate the aftercare steps detailed below plus any additional aspects that may be required by the mineral planning authority. Person(s) responsible for carrying out these steps ought also to be identified. Aftercare steps to be covered include:-

1. Timing and pattern of vegetation establishment

A brief description of sequence of vegetation establishment over the full aftercare period eg "the land will be put down to grass. Initially with a short term ley which will be ploughed up and reseeded after 2 to 3 years and replaced within a long ley mixture," or "Trees will be planted in years x and y according to plan X". Details of species composition, stock type and size, spacing, method, timing and position of planting. For nature conservation, proposed method of vegetation establishment (natural colonisation, turf transplants, seeding etc). A ground plan showing where different species are to be planted is helpful. Where a range of options are to be retained this should be made clear.

2. Cultivation practices

An outline of the range of cultivations likely to be undertaken. This is necessary since on some sites certain practices can be detrimental to soil structure. Adoption of non-specified techniques will be permissible at a subsequent date subject to mineral planning authority approval where these are unlikely to prove harmful. The need for flexibility is recognised in view of changes over time in the design and availability of machinery.

3. Secondary treatments

Commitments to undertake secondary treatments such as moling, subsoiling (and in some instances, for woodland establishment, discing to form low planting ridges), and stonepicking need to be outlined. Since the efficacy and need for such treatments is dependent upon soil conditions all that is required is a general statement of intent accompanied by criteria for determining the need for such treatments. For example "During cultivations any stones lying on the surface which are larger than would pass through a wire screen mesh spacing of xxx mm, together with other objects likely to obstruct future cultivation, will be removed from the site."

4. Drainage

This should cover any commitments in principle to undertake under-drainage; consultations with the mineral planning authority in advance of installation to agree scheme design; timing of installation work within the aftercare programme plus commitments to carry out any necessary maintenance works or temporary drainage measures.

5. Management of soil fertility, weeds etc.

To cover measures for improving soil fertility and control of weeds. The basis for determining need and application rates should be outlined (eg soil sampling and analysis); appearance or health of vegetation in amenity schemes. Methods of maintenance of required soil fertility (fertilisers, use of legumes, organic manures, sewage sludge etc).

6. Irrigation and watering

This is likely to be a component in a minority of aftercare schemes only. Where it is proposed information should be provided to cover equipment specifications, siting of installations, and criteria for determining irrigation rates. (It should be made clear that all necessary consents for abstraction etc must be obtained in advance.) Where investment in equipment is intended, early discussion will enable applicants to assess whether their plans are compatible with aftercare requirements.

NB Footnote. Fencing, provision of water for livestock and management of water areas are not covered by aftercare conditions since they are not "treatment of the land". Where their provision is essential for satisfactory aftercare management alternative arrangements are needed to cover these aspects. Some aspects can be required as a separate planning condition.

Box 6

Detailed Annual Programme For An Aftercare Scheme

The elements of the scheme requiring consideration should identify the person(s) responsible for the succeeding year's programme unless this is adequately covered in the outline strategy. Detailed prescriptions should then be provided for specific steps where appropriate including:-

1. Vegetation establishment

Details should be provided for the cropping programme/ planting schemes on site (see also 6. below). For each field/area information should include details on:-

The nature and timing of any cultivations and stone picking operations including approximate depth of activities.

The content and origin of seeds mixtures; proposed seed rates

and timing of sowing operations.

Proposed fertilizer and lime application rates based upon the results of soil nutrient analyses.

Details of spraying programmes, both herbicides and fungicides, so far as these are known at the aftercare meeting. Plus commitments to carry out all reasonable spring dressings as the on-going situation demands.

2. Vegetation management

For grassland, this should cover the anticipated timing and frequency of cutting; grass removal; proposed grazing regime including type, age and numbers of livestock and the extent of the grazing period. For other vegetation types, similar consideration should be given, together with specific requirements for the desired vegetation, including weed control.

3. Secondary treatments

Specifications should include timing, working depths, tine spacings and the equipment to be used for moling and subsoiling operations.

4. Field drainage

Details on the timing of underdrainage installation work for the forthcoming year plus scheme details including a map showing pipe layout plus details on installation method; drain spacings; drain depths; pipe size and gradients; nature and depth of permeable fill; outfalls; post installation remedial works.

5. Irrigation/watering

Details of irrigation proposals specific to the forthcoming year.

6. Tree and hedge establishment

This should confirm establishment proposals for the forthcoming year covering ground preparation, planting details (species, type of stock, establishment methods, planting density, timing) and maintenance including, as appropriate, beating up (i.e. replacement of dead trees); weed control policy; fertiliser application protection from grazing animals and cutting/pruning.

A67 The detailed programme should cover requirements for the forthcoming year, including those identified in [Box 6](#). It should:-

- i. Amplify the outline strategy for work to be carried out in the forthcoming year.
- ii. Confirm that steps already specified in detail in the outline strategy will be carried out as originally intended.

- iii. Include any modifications to original proposals e.g. due to differences between actual and anticipated site conditions.

A68 The first detailed programme should be submitted with the outline strategy. Subsequent detailed programmes should be submitted annually to the mineral planning authority for approval not later than one month prior to the annual aftercare site meeting, at which they will need to be discussed and agreed.

A69 These schemes need to be discussed and agreed by the mineral planning authority, the person(s) responsible for the conduct of the aftercare programme and any expert advisors. In the majority of cases, the operator, tenant or landowner has a vested interest in the success of aftercare as the greater costs have already been incurred in complying with restoration conditions. Where expensive equipment is to be purchased for aftercare purposes, early consultation is particularly advantageous to ensure that proposed purchases are compatible with aftercare requirements.

A70 The MPA will need to bear in mind that no two aftercare programmes will be exactly the same and that the way in which any individual scheme is implemented will depend on a number of factors such as weather conditions, the quality of materials used and the condition of the individual site.

Aftercare steps

Choice of vegetation

A71 In agricultural aftercare, the choice of crop is important. The crop grown should be matched to the nature and state of soils present, the local climate, requirements for remedial aftercare treatments and specialist skills of the person farming the land. In particular, and so as to minimise the risk of damaging soil structure, crops should not be grown where there is need to undertake cultivations, harvesting operations or traffic across land with agricultural equipment when soils are wet.

A72 Grass traditionally been used as the initial aftercare crop, although for sand and gravel sites in particular, there has been a growing trend for agricultural cropping to be based entirely on arable crops or vegetables. Cereals are probably the most suitable arable crop as their deep rooting habit helps to promote the re-establishment of the subsoil structure. Crops which leave the soil bare over the winter months, require harvesting late in the year because of the crop type (e.g. root crops) or climatic constraints, or have limited root pattern are not normally appropriate.

A73 The selection of amenity and woodland vegetation should be strongly influenced by the conditions prevalent on, and adjacent to, the site and the particular type of after-use. Further guidance is given in Annex B. Where possible it is also preferable to select species that are characteristic of the local area, although in some cases this may not be possible. Forestry Commission Bulletin 110 provides guidance on the selection of appropriate species. Guidance is also available in the report produced for the Department "*Amenity reclamation of mineral workings*".

Cultivation techniques and secondary treatments

A74 The specific requirements for cultivation and other treatments will depend to a large extent on the after-use and the need to remedy localised problems such as poor drainage, compaction, settlement and vegetation failure.

Under-drainage

A75 Achievement of satisfactory soil drainage is essential if high standards of reclamation are to be achieved since excessive wetness affects seed germination, root development and the range of plants, including agricultural crops, that can be grown. Of particular relevance to restored land, inadequate drainage increases a soil's susceptibility to structural damage and reduces the effectiveness of remedial aftercare treatments. It also reduces the number of days when land is suitable for cultivation, passage of machinery, grazing by livestock or use for some intensive amenity purposes.

A76 Over large areas of England installation of artificial drainage systems is required to achieve satisfactory control over soil wetness. This is especially the case with much restored land if suitably high standards of reclamation are to be achieved. Installation of under-drainage is nearly always necessary for agricultural and some forms of amenity use, where the land contained drains prior to mineral working and may also be required to overcome adverse changes to site physical characteristics caused by mineral operations. Nevertheless, there are exceptions where underdrainage may not be needed, namely where the original soils have been replaced by soils which are substantially lighter in texture, where restoration enables pre-existing groundwater problems to be overcome, and for some forms of habitat creation (e.g. wetlands).

A77 However, it is much more common for under-drainage to be required where it did not previously exist and such instances occur where:

- i. permeable sandy materials are removed and the depth is significantly reduced between topsoil and underlying impermeable layers e.g. clay subsoils, underlying basal clays or a landfill cap;
- ii. soil handling operations significantly damage soil structure so reducing the permeability of subsoils;
- iii. removal of material introduces the need for groundwater control.

It must be accepted, however, that underdrainage installed at the outset may be affected by subsequent ground settlement and thus, may need to be repaired or replaced. Guidance on the use of underdrainage on landfill sites is to be included in WMP26E.

Fertilisers

A78 Adequate fertiliser should be used on restored land and additional nitrogen, especially following soil storage, is often appropriate. Fertiliser and liming recommendations for agricultural restoration are usually based on MAFF indices derived from standard soil analyses. These are given in Reference Book 209 (1994) "*Fertiliser recommendations*" and Reference Book 35 (1988) "*Lime and liming*" both published by MAFF.

A79 For amenity, nature conservation and tree planting schemes the need for fertiliser addition, and levels of application will depend on the nature of the substrate and the vegetation type being established. With many amenity schemes, adequate soil nitrogen levels can be attained using grass/legume mixes. Small applications of other plant nutrients (such as phosphorus and potassium)

may, however, be required. The success of many nature conservation schemes may depend on the soil providing only very low levels of plant nutrients (see [paragraph A52](#)). In some cases the application of fertiliser will be unnecessary, and could damage the nature conservation interest. Further guidance is given in "*Amenity Reclamation of Mineral Workings*" and "*Reclamation of damaged land for nature conservation*". Over-application of fertiliser can result in pollution of surface and ground waters and should be avoided.

A80 On soils or substrates which are deficient in nitrogen, the use of legumes, either as the predominant species or in mixture with others, can assist in the build up of soil nitrogen, reducing, in many cases, the need for additional fertiliser applications.

Weed control

A81 Weed infestation can cause crop failure on land being reclaimed to agriculture. Thus weed control by appropriate application of herbicides or, in grass, by cutting or grazing will be a necessary part of the aftercare programme. Arable crops may require regular weed control throughout the growing season as well as other sprays against diseases and other pests. Specialist advice is needed to choose which herbicides, fungicides and pesticides to use and when and how to apply them.

A82 Weed control is particularly important for tree planting schemes. Competition for water and light by fast growing weeds can reduce growth rates significantly and in some cases result in tree death. It is generally recommended that a weed free zone of 1 metre is maintained around each tree. Guidance on appropriate methods is given in Forestry Commission Bulletin 110. Under the provisions of the Weeds Act 1959, it is also the responsibility of all occupiers of land - whether used for agriculture or not to control injurious weeds, so that they do not spread to nearby agricultural land. For amenity and nature conservation schemes, weed control may be important to prevent dominance of a limited number of aggressive species. However, care must be taken when choosing and applying weed killers to prevent harm to plants of interest. Weed control can also be achieved in many situations using mulches. This has the additional advantage that it also reduces water loss from the soil, and therefore the need for watering. Guidance on the need for weed control and on appropriate methods for different types of amenity after-use is given in "*Amenity reclamation of mineral workings*".

Irrigation and watering

A83 The success of vegetation establishment in some parts of the country may be severely limited by long dry periods and drought. Trees and shrubs may be particularly susceptible in the first few years following planting and if not watered may die. The replacement of dead plants can be costly and can set back progress during aftercare. During prolonged dry periods it is therefore advisable to water plants. Consideration should therefore be given to the potential need for watering, and methods of applying it when planning the reclamation scheme to ensure that sources of water can be made available and that appropriate methods are available for its application. The need for watering can be reduced, especially of trees and shrubs in particularly dry parts of the country, by selection of drought resistant species and by applying mulches to the soil surface.

Control of livestock and pests

A84 Uncontrolled grazing by animals such as sheep and rabbits can seriously affect the quality of reclamation. Excessive grazing pressure can expose the soil surface and result in erosion, while

excessive trampling of fragile soils can result in poaching, loss of soil structure and erosion. In contrast, grazing at low intensity can be an important management tool, as it can encourage the establishment of wildflowers, and for agricultural land, it can contribute to the build up of soil nitrogen and promote soil structural development.

A85 Livestock should therefore be carefully managed on reclaimed land. In the early years following restoration, possibly extending beyond the aftercare period, the land may be unable to support as many animals per hectare as undisturbed land. It will normally be necessary to exclude livestock altogether during winter months and at other times if soils become wet.

A86 The level of control of rabbits and other pests will need to be site specific. It is generally preferable to exclude the animals altogether, rather than to control them once established, although as indicated in [paragraph A84](#), some grazing can be beneficial. Rabbits can be excluded using fencing, which may need to be maintained on a regular basis. Individual trees can be protected from rabbits, voles and other browsers using tree guards, some of which have the additional benefit of sheltering young trees from exposure. Rabbit numbers may need to be monitored well beyond the aftercare period, and control measures, such as shooting and gassing, may be necessary. The risk of rabbit infestation can be reduced by ensuring that habitats they favour, such as scrub, are removed from surrounding areas of land prior to site reclamation. This may, however, only be possible in a limited number of situations.

Annex B : Reclamation for different after-uses

Choice of after-use

B1 The main text of this MPG sets out the key policy issues which influence the choice of after-use for the reclamation of mineral workings. This Annex provides more detailed guidance on consultations and technical matters which are relevant to drawing up and implementing planning conditions for different after-uses. For agricultural and forestry after-uses, there is a statutory requirement to consult with MAFF or the Forestry Commission as explained in the relevant sections below. This has led to a well developed system for assessment and implementation of restoration and aftercare schemes. For other after-uses, and in particular for nature conservation and other forms of amenity there is a vast range of possible options for reclamation. While many of the procedures will be similar for all after-uses, each use will have its own specific requirements. It is not possible in a document of this size to give specific technical guidance for each after-use. However, over the last few years, the Department has published a number of reports which provide comprehensive guidance on best technical practice for the range of after-uses. While they are not the only sources of information available, the comprehensive literature reviews they contain should provide a useful link to other relevant material. The bibliography in Annex E provides the full list of relevant DOE research reports.

B2 In many cases it is possible to integrate more than one after-use within a restored site. For example, even where it is proposed that the main land use is to be agriculture, it may be appropriate, subject to other planning considerations, to establish woodlands, nature conservation interest, or water-areas at the margins. Where forestry/woodland is proposed, it is Government policy to encourage a more recreational based use than solely timber production. Again there may be opportunities to provide for nature conservation or formal and informal recreation.

B3 The degree to which the after-use of a site can be specified prior to extraction will depend on the life of the working and the mineral type. However, whatever the proposed after-use, the same general principles apply to the need for protection of the soil resource and ultimately restoration and aftercare.

B4 When considering the suitability of alternative after-uses it is important to have regard to the long-term implementation of the use, and in particular who is likely to be responsible for long-term site management and finance.

Reclamation to Agriculture

Role of MAFF

B5 For mineral planning applications, MAFF has a statutory role in advising the MPA on the land use implications of all development proposals affecting Grades 1, 2 and 3a land over a certain size threshold (20 hectares), or on less than 20 hectares in circumstances where the development is likely to lead to further losses amounting cumulatively to 20 hectares or more. MAFF is also a consultee on aftercare conditions for all sites to be restored to agriculture irrespective of site size or land quality. MAFF's 5-grade Agricultural Land Classification System (ALC) and its uses and limitations is explained in Annex A to PPG7 . Advice on consultation with MAFF is also given in MPG2

B6 The following paragraphs provide guidance on the procedures followed by MAFF's Regional Land Use Planning Unit in relation to minerals planning.

B7 Where reclamation to agriculture is proposed in a planning application MAFF have a responsibility to offer mineral planning authorities a view on the appropriateness of this after-use and on suitable aftercare conditions if planning permission is to be given. Such consultation is required regardless of the area of land involved or its agricultural quality. MAFF may also provide advice and comment on site working and restoration since the achievement of good standards in the aftercare period depends in part upon appropriate and satisfactory (and enforced) stripping, movement and restoration of soils and contouring. Likewise MAFF will assist MPAs to enforce standards by passing on intelligence that it receives concerning site specific breaches of planning requirements that are detrimental to agricultural reclamation.

B8 In determining its responses to development proposals MAFF will take into account, *inter-alia*, the feasibility of achieving a high standard of restoration and the adequacy of proposals submitted by the applicant for site working, restoration and aftercare.

B9 In practice MAFF's response when consulted will normally take one of the following forms:-

- i. an objection to the application;
- ii. a conditional objection citing proposals for the agricultural restoration and/or aftercare of the land which are inadequate or missing;
- iii. a conditional acceptance citing, if necessary, additional conditions to the restoration and aftercare proposals;
- iv. a technical appraisal of the agricultural consideration with, where appropriate, any comments on the restoration and/or aftercare proposals. MAFF will deploy staff resources where they can be used most effectively. For sites of less than five hectares, MAFF will not normally make site visits when advising on site working, restoration or aftercare considerations. However, in all cases the technical response will provide sufficient information to assist MPAs to consider the agricultural implications together with the environmental and economic factors; or
- v. wrong referral where a non-agricultural after-use is proposed for a site that affects less than 20 hectares of Grades 1, 2 and 3a land and where the development is unlikely to lead to further losses that cumulatively affect 20 hectares or more of such land.

Responses categorized in i. to iii. above will only be made where an application involves a significant amount of the best and most versatile land.

Form of agricultural aftercare conditions

B10 When imposing agricultural restoration and aftercare conditions, MPAs should consult MAFF on the form of the aftercare condition (cf. paragraph 62 in the main text). There will be cases where it would be appropriate to specify the aftercare steps in the aftercare condition itself e.g. most sites under five hectares. But in many other cases, and particularly where a long-term permission is being sought, it may be more appropriate to impose a condition requiring the submission of an aftercare scheme at a later stage. In such cases, the steps to be included in the scheme should be outlined in the permission, but they can be drawn up in detail by the mineral operator, in consultation with MAFF and the MPA, when restoration is nearing completion (see paragraphs A62 to A70 in Annex A).

B11 To assist operators with scheme preparation, MAFF may be prepared to attend a pre-aftercare meeting convened by the MPA. Guidance on the level of detail generally required and items to be included in aftercare schemes is given in Annex A. To be most effective such meetings should be held about six months prior to the commencement of aftercare on all or part of the site. Such meetings may not be required for all sites, particularly where aftercare requirements have been previously discussed in detail or where previous guidance has already been given on a similar site.

B12 The aftercare scheme should be submitted to the MPA by the operator at least three months prior to commencement of aftercare of the full site or any phase of it. This gives adequate time for the authority to consult MAFF and for any necessary amendments to be made.

Progress and completion of aftercare

B13 Where aftercare is carried out subject to an approved scheme, it is essential that the MPA, and through them MAFF, are consulted by the site operator at least annually on the way in which aftercare conditions are being complied with. This is most effectively achieved by the site operator providing, for the MPA's approval, a record of work undertaken and a detailed aftercare programme for the forthcoming year.

B14 Upon receipt of these documents, the MPA will consult MAFF and determine whether it is necessary to arrange an aftercare review site meeting to review progress. In response, MAFF will provide advice to the MPA on whether the detailed record of work undertaken and the programme for the forthcoming year satisfy aftercare requirements. MAFF will attend such agreed aftercare review meetings as may be appropriate.

B15 Aftercare meetings generally need to take place between the person(s) responsible for carrying out the aftercare (the mineral operator, tenant or landowner) the MPA, and any expert advisers.

B16 There may be cases where inspections at more frequent intervals than a year would assist in achieving adequate aftercare. If this is the case it will be for all parties to agree to holding the additional meetings.

B17 The MPA may involve MAFF in the issuing of a certificate confirming that aftercare conditions have been complied with (cf. paragraph 69 in the main text).

Reclamation to Forestry

Role of the Forestry Commission

B18 The Forestry Commission is responsible for regulating forestry in the UK. The Commission operates a national advisory service through the Forestry Authority which administers Government grants and undertakes statutory duties in relation to forestry. It has specialist staff to advise on forest design and on site preparation and site conditions. It publishes a series of guidelines which set out the standards expected of the forestry industry.

B19 The Forestry Commission is also a statutory consultee for any development requiring an Environmental Assessment and which could have an adverse effect on woodlands. Guidance is available from the Forestry Commission on the environmental assessment of forestry schemes.

B20 The Forestry Authority should be consulted if any of the following apply:

- i. if it is proposed that the land be reclaimed for a forestry after-use;
- ii. woodland on the land proposed for mineral working is dedicated under the Forestry Commission Dedication Scheme, or grant aided under section 1 of the Forestry Act 1979;
- iii. if tree planting is to be supported by a grant under the Woodland Grant Scheme or Community Woodland Supplement.

B21 MPAs are also advised to seek advice from the Forestry Authority on all significant planting schemes, including those considered as part of a more general 'amenity' reclamation.

B22 Forestry Commission Bulletin 110 "*Reclaiming disturbed land for forestry*" provides guidance on factors that need to be considered before, during and after mineral extraction where tree planting is proposed as part of a reclamation scheme. It considers reclamation strategies for particular types of mineral working, and provides guidance for planting trees into different substrates. A set of 'specimen conditions' are provided in Bulletin 110 for planning permissions involving forestry as an after-use, which should provide a useful basis to assist mineral operators in preparing planning applications and in the statutory consultation process. Guidance on amenity tree planting is also given in "*Amenity reclamation of mineral workings*" and Forestry Commission Handbook 11 "*Creating and managing woodlands around towns*".

Restoration conditions for forestry

B23 For new permissions, the general principles and stages in imposing reclamation conditions will be applicable for a forestry after-use (see Annex A). There is no statutory requirement for MPAs to consult the Forestry Authority on appropriate restoration conditions, as against aftercare, for forestry after-use. However, it is clear that the achievement of good standards in the aftercare period must in part depend on appropriate (and enforced) planning conditions covering, for example, the stripping and movement of soils and their restoration on appropriately contoured ground (with or without filling) after mineral extraction.

B24 Compaction on restored sites is a major problem for tree establishment and growth. Ripping can be effective in decreasing soil bulk density, but it can only be attempted immediately prior to planting, and its full effects can be short-lived. Hence it is important to consider soil placement techniques that minimise soil compaction, rather than attempt to redress soil compaction after it has occurred.

B25 Loose tipping of soil using hydraulic excavators and dump trucks produces a less compact soil than earthscrapers followed by ripping. Wherever possible the planning conditions should therefore specify this method of restoration.

B26 Drainage is probably the most critical site property for successful forestry reclamation. Under-drainage is rarely used in forestry and most opportunities to return a site with good drainage qualities occur at the landform and restoration stages by means of controlling the slopes of the land. If opportunities are missed during the restoration process it may be impossible or prohibitively expensive to install drainage during aftercare. Poor site drainage has deleterious effects on cultivating, planting operations and on longer-term survival and growth of trees.

Aftercare for forestry

B27 As with reclamation to agriculture, details of a programme of reclamation to forestry use should be individually tailored to suit the particular site in question and the prevailing conditions. Close liaison with the Forestry Authority is desirable.

B28 The timing of the first year's steps should normally be designed to prepare for tree planting between October and March. These steps may include soil sampling, fertilizing, cultivation, drainage and the sowing of nitrogen fixing and slope stabilising crops. The highest quality plants and the highest standards of plant handling and planting are essential for plant survival on restored sites. As with agriculture an annual re-assessment of the effectiveness of the aftercare steps is desirable. Fencing may be necessary to protect young trees, and so the planning permission may need to have a separate condition setting out the requirements for erection and maintenance of forest fencing.

B29 The predominant overburden materials associated with different types of mineral working are summarised in [Table 3](#). Variations in their physical and chemical characteristics impose a range of problems for tree establishment and growth. In many cases it is best practice to select suitable species rather than to modify significantly the characteristics of the overburden materials.

B30 While some species of tree are known to be tolerant of severe conditions, there is a need to ensure that a minimum set of standards is achieved before tree planting. Guidance on the minimum standards of substrate suitable for tree growth is provided in [Table 4](#).

B31 However, [Table 3 and 4](#) should be taken only as a very general guide to the requirements for reclamation of individual sites. Where adequate topsoil is available a wider range of both coniferous and broadleaves species may be grown.

B32 Sewage sludge has been successfully used as a fertiliser for forestry on both reclaimed and undisturbed land. Guidance on its use is given in Forestry Commission Bulletin 107 "*A manual of good practice for the use of sewage sludge in forestry*".

Grants for tree planting

B33 Tree planting schemes on restored mineral workings may be eligible for the Woodland Grant Scheme, while the Community Woodland Supplement is an amenity grant which offers funding to landowners willing to open newly planted woods to public access.

Tree planting on landfill sites

B34 Where the deposit of controlled waste has been carried out, reclamation to forestry is only desirable if the integrity of the landfill design (particularly the impermeable capping and any gas control system) will not be compromised, for example by supply of adequate thickness of soil over the landfill cap (a minimum of 1.5 metres is recommended) and selection of appropriate tree species. Further guidance on the establishment of trees on landfill sites is available in "*The Potential for Woodland Establishment on Landfill Sites*". This updates guidance in Waste Management Paper No.26 which is undergoing revision.(See also Waste Management Paper No.27).

B35 Where it is proposed that trees are to be planted on landfill sites, it may be appropriate in some cases to delay replacement of the topsoil until such time that the site has stabilised sufficiently to minimise the risk of further disturbance necessitated by the need to maintain pollution control

systems. In these cases it is recommended that initially only the subsoil is replaced and seeded with a grass mix to stabilise the soil and reduce the risk of erosion and weed invasion. The formal aftercare period would then begin once the topsoil was replaced (i.e. once the restoration condition has been fully complied with) and would provide for the full aftercare period for tree establishment.

B36 When MPAs carry out reviews of sites under the 1991 Act and the Environment Act, it is recommended that appropriate consultations with the Forestry Authority take place, on the same basis as with MAFF.

Reclamation to amenity uses

General

B37 Mineral workings may be reclaimed for a wide range of subsequent uses which fall into the broad category 'amenity use'. These may include open grassland for informal recreational use, basic preparations for more formal sport facilities, amenity woodland, lagoons for water recreation, and the conservation of landscape and wildlife.

B38 The Department has published detailed guidance on the planning and technical aspects of amenity reclamation ("*Amenity reclamation of mineral workings*"), and in a supplementary volume, advice in the form of fact sheets for each of the main amenity end uses to which mineral workings may be restored ("*The use of land for amenity purposes: a summary of requirements*"). Extensive guidance on the reclamation of mineral workings for nature conservation, including geological conservation, is also available in "*Reclamation of damaged land for nature conservation*".

B39 This section draws upon the information in these reports, to consider particular aspects of the different types of amenity after-use which may influence the drawing up of schemes for working and site reclamation - in particular restoration and aftercare.

Table 3. Mining overburden types, their principle limitations for tree growth, and best suited forestry species where topsoil or topsoil substitutes are lacking

Mining operation	Type of overburden/soil	Texture	Major limitations for tree establishment	Best suited species
Opencast coal	Hard and soft sandstones, siltstones and mudstones. Glacial tills, sandy pebbly to dense clays.	Variable, sometimes with peat. All with varying proportion of stones.	Fine to coarse textures leading to winter water-logging or summer drought. Stoniness; liability to compaction and erosion. N, P deficiencies.	Japanese larch, Alders, Corsican pine below 250 m O.D., Scots Pine, Birch, Willow.

Colliery spoil	Shaly material.	Silty clay and clay.	Heavy textures lead to winter waterlogging and summer drought; stoniness; liability to compaction and erosion; N, P deficiencies; risk of low pH and salinity (pyritic soils).	Alders, Birch, Hawthorn, Ash, Scots pine, Lodgepole pine, Corsican pine, False acacia.
Jurassic and Permian Limestones	Thin calcareous soils over limestone rock	Clay loam, silty clay loam, sandy clay loam.	High pH restricts species choice; soil droughtiness due to stoniness; N deficiency; risk of lime-induced chlorosis.	Italian alder, Corsican pine, Norway maple, Sycamore, Poplar.
Carboniferous Limestone	Drift: till in N England, silty drift in Midlands; some thinner calcareous soils in parts of S Pennines.	Dominantly clayey till, silty clay loam in Midlands.	Heavy textures lead to winter waterlogging and summer drought; liability to compaction; silty drift particularly erodible; N deficiency.	Alders, Birch, Japanese larch, Corsican pine, Willow.
Chalk	Thin calcareous soils directly over chalk.	Silty clay loam.	High pH restricts species choice; N,P,K deficiencies; risk of lime-induced chlorosis.	Italian alder, Norway maple, Sycamore, Poplar, Corsican Pine, False acacia.
Clay/Shales	Till covered in many places.	Dominantly clayey, though lighter textured material does occur.	Heavy textures lead to winter waterlogging and summer drought; liability to compaction; N deficiency.	Alders, Corsican pine, Japanese larch, Birch, Willow.
Plateau Gravels	Stony sandy or loamy soil.	Sandy loam, loamy sand.	Droughtiness; stoniness; low pH; N, P deficiencies.	Scots pine, Alders, Birch, Corsican pine.

River Terrace Gravels	Variable thickness and quality	Very variable.	High groundwater levels in flood plain areas, may have low pH (pyritic soils); other limitations depend on texture and stoniness of soil making material.	Corsican pine, Alders, Birch, Willow.
China clay	Variable. Ranging from coarse sand to silt. Generally tipped separately	Sand, silt.	Pronounced droughtiness; low pH; N, P, K Mg deficiencies.	Alders, Corsican pine, Maritime pine, Sycamore, Sitka spruce.
Igneous	Gritty drift, often with peat surface.	Sandy silt loam, sandy loam.	Low pH; P deficiency, pioneer species.	Alders, and other
Vein Minerals	Wastes variable in composition.	Variable.	Heavy metal toxicity; N, P deficiencies; drought risk.	Alders and other pioneer species.

Table 4. Minimum standards for soil-forming materials used in restoration to forestry

Bulk density	<1.5 g cm ⁻³ to at least 0.5 m depth.
	<1.7 g cm ⁻³ to 1 m depth.
Stoniness	<40% by volume; few stones greater than 100 mm in size.
pH	3.5-8.5.
Electrical conductivity	<2000µ S cm ⁻¹ (1:1 soil:water suspension).
Iron pyrite content	<0.5%
Heavy metal content	Not excessively over ICRL threshold trigger concentrations.
Organic contaminants	Not exceeding ICRL action trigger concentrations.

B40 For amenity after-uses which require the planting of some form of vegetation, the general considerations in Annex A will be relevant in preparing an application and in drafting and implementing appropriate planning conditions.

B41 Many amenity after-uses have very precise topographical requirements, including site area and gradients. A knowledge of these requirements is important when deciding on the appropriate after-use for individual sites, and when planning and drawing up appropriate restoration and aftercare schemes. Reference should be made to the documents referred to in [paragraph B38](#).

B42 The 1990 Act (Schedule 5) does not require mineral planning authorities to consult external expertise for advice on aftercare for amenity use; but they are advised to do so in appropriate cases. Mineral operators may also find it useful to obtain advice from such sources, to ensure that the proposed after-use(s) is both appropriate to its location and that the scheme is technically achievable. As with agricultural and forestry after-uses, maximum benefit is gained from consultation between the operator and external experts at an early stage in the planning process.

B43 The 1990 Act allows aftercare conditions to be applied to bring land into use for amenity purposes. Such conditions would require steps to be taken to bring the land to the required standard for the intended amenity use; and it is provided that land is brought to the required standard when it is suitable for sustaining trees, shrubs or other plants (Schedule 5, paragraph 3(4)). Where the base of the working is below the water table, part of the site could equally well become a lake for water recreation (e.g. angling, sailing, swimming) or nature conservation, with a requirement for trees or shrubs to be planted around the lake.

B44 If it is proposed that a site be reclaimed to a recreational after-use, both MPAs and district councils will usually be able to give advice on likely demand and design requirements, including drawing attention to relevant policies in structure and local plans (but see also "*The use of land for amenity purposes: a summary of requirements*").

B45 If areas are to be planted with vegetation and used for informal open space or nature conservation, the Countryside Commission, Forestry Commission, English Nature, and the Environment Agency may each be able to provide advice on individual applications which will be useful for restoration and aftercare. The Countryside Commission's Countryside Character Programme aims with English Nature and English Heritage to help provide a framework for landscape and nature conservation. This could be useful in assisting the integration of reclamation schemes into the local landscape.

B46 The Countryside Commission have published guidance on grass species, mixes and seeding rates for different soils and types of recreational area, and on management aspects (summarised in "*Amenity reclamation of mineral workings*"). The Forestry Commission's Bulletin 110, Handbook 5 "*Urban forestry practice*" and Handbook 6 "*Forestry practice*" contain information on factors affecting tree growth and recommended techniques which may be useful in tree planting for amenity purposes. In addition, English Nature can advise on the recreation of grassland/heathland habitats and other reclamation for wildlife interest, as can the Wildlife Trusts and RSPB.

Nature conservation

B47 Reclaimed sites frequently provide opportunities for the enhancement of the nation's nature conservation resource by enlarging or linking together existing habitats, thus helping to offset the effects of habitat fragmentation. Restoration to nature conservation may be particularly appropriate, for example, where there are important adjacent habitats or where soil or hydrological conditions suit a particular habitat type. More generally, nature conservation as an after-use can provide a valuable and cost-effective after-use for land, which contributes to wider national policies such as the Biodiversity Action Plan.

B48 Guidance on how the Government's policies for the conservation of our natural heritage are to be reflected in land use planning is given in PPG9 "*Nature conservation*". It sets out the Government's objectives for nature conservation and policies for the protection of flora, fauna and their habitats under domestic and international law. Paragraphs 40-43 of PPG9 give advice in relation to minerals development.

B49 In some cases it may be possible for the extraction of minerals to create new types of habitat where they were formerly absent or rare, whilst quarry faces may provide a valuable supplement to natural rock outcrops. Many of the existing important biological nature conservation sites in mineral workings have regenerated naturally, a process which takes many years. It may be possible for this process to be speeded up using some more recently developed ecological techniques, which might be included in the preparation of schemes for working and reclamation.

B50 The planning and design of reclamation schemes for nature conservation can often be improved by undertaking a feasibility study before drawing up a detailed plan. Such a study should identify existing nature conservation interest and assess the suitability of the site for new habitats. Some of the most important factors to consider include site size, substrate quality, climate and the existence of similar habitats in the vicinity (to provide a source of colonising species). Many habitat types require non-fertile soils or mineral substrate, or the establishment of waterlogged conditions, to encourage the growth of the desired vegetation. This may require a different approach to reclamation than for agriculture or forestry after-uses. Guidance on the drawing up of reclamation schemes and the requirements for long-term management of sites is given in "*Amenity reclamation of mineral workings*", and in "*Reclamation of damaged land for nature conservation*".

B51 English Nature should be consulted for advice on habitat types and conservation practice. County Wildlife Trusts (within the Wildlife Trusts Partnership) may be able to provide useful local advice and information, and may also be able to manage reclaimed nature conservation areas.

B52 Features of geological importance may be revealed during quarrying operations. When existing evidence makes it possible to predict the likely occurrence of scientifically valuable sections the scheme of reclamation may be able to allow, from the outset, for the permanent retention of particular quarry faces or parts of them. Retention of important geological sections which are only revealed during quarrying may be possible by modifying or adapting the agreed scheme of working and reclamation. The permanent preservation of sections will not normally be acceptable where this would sterilise large amounts of the permitted mineral reserves. Particular problems may arise if it is intended to fill the site with imported waste. It may be possible to safeguard sections by preventing tipping against them and by appropriate contouring of the final surface. Permanent retention of features of geological interest will need to take account of issues such as access, maintenance, and the responsibility for ensuring safety of exposed faces which do not come within the Mines and Quarries Act 1954 .

B53 Advice on geological features of interest should be sought from English Nature. Further guidance on geological conservation is available in the Appendices to "*Earth science conservation in Great Britain*" and in "*Reclamation of disturbed land for nature conservation*".

B54 If a mineral working is notified as an SSSI, English Nature can enter into a management agreement with the owner of the land under section 15 of the Countryside Act 1968 or section 16 of the National Parks and Access to the Countryside Act 1949, for the purpose of safeguarding the scientific interest of the site. Under these agreements English Nature takes on some practical aspects of site maintenance and access. In addition section 39 of the Wildlife and Countryside Act

1981 enables the relevant authorities to make management agreements with owners and occupiers of land for conserving or enhancing natural beauty or amenity. In suitable circumstances this power could be used by MPAs to make agreements relating to the management of reclaimed mineral workings. The owners and occupiers of land may incur specific responsibilities under the Health and Safety at Work Act 1974 and the Occupiers Liability Acts 1957 and 1984 in respect of any hazards on their land, and may also have Common Law responsibilities in respect of these. These responsibilities relate to the safety of employees, legitimate visitors, and trespassers, particularly child trespassers, on their land or premises. Any management agreement would need to address these safety issues.

Formal sports facilities

B55 The use of land for formal sports activities will require a separate planning permission where approval for such use was not given as part of the permission for mineral working and reclamation. Planning guidance on sport and recreation activities is contained in PPG 17 "*Sport and recreation*". Where the sports after-use is known even in principle, the planning conditions for the mineral working could allow for appropriate contouring, restoration, and aftercare to establish and sustain an appropriate grass seeds mixture. Guidance on the management of sites used for formal sports activities and on financial mechanisms for achieving long-term management is given in "*Amenity reclamation of mineral workings*". Nevertheless, if the land is to become a golf course it would be unreasonable to expect the aftercare condition to be interpreted to require five years of green, fairway and bunker maintenance; or if the land is to become a public football pitch, all that can reasonably be required in an aftercare condition is that the grass should be sustainable.

B56 Advice on local needs and the planning and design of facilities for both land and water-based sport and recreation may be obtained from the Regional Councils for Sport and Recreation and the Sports Council's Sports Development Unit. Advice on tested and recommended grass seed mixtures appropriate to different land-based recreational after-uses may be obtained from the Sports Turf Research Institute and its publications. Where areas are likely to receive heavy wear, the primary requirement will be to manipulate conditions on the site to ensure the survival of hard-wearing species.

Water areas

B57 Man-made inland water areas in Britain are put to a wide range of uses including various forms of water recreation, wetland habitats for nature conservation and education, and water storage and balancing reservoirs. The demands for such uses may be indicated in structure and local plans. Where minerals are worked below the water table and it is not desirable or practicable to fill the void or to consider "low level restoration", permissions will normally include conditions which will enable one or more appropriate water-based after-uses to be established. The conditions will need to be based on information obtained from pre-application site investigations and working and landscaping plans, which may be subject to more detailed schemes submitted and agreed from time to time during the life of the mineral operations. The information may need to include depths and areas of water to be created, hydrology, water quality, bank profiles into the water, creation of islands, prevailing wind direction, preservation and use of soils, the treatment and planting of water and land margins, and subsequent management of the area.

B58 Different water recreational uses have different requirements, whilst water areas for wildfowl and nature conservation again need specific consideration. It will therefore not be satisfactory to propose a scheme which only anticipates in general the creation of a lake which might be suitable

for a water recreation after-use or for nature conservation. The dual use of water areas for some form of recreation and nature conservation may often be attractive, but such mixing of uses is in practice rarely compatible unless they can be physically separated within the configuration and area of water concerned. Table 5 summarises some guidance notes on general operational requirements for water-based recreational uses.

B59 Advice on water areas intended for wildfowl breeding and feeding may be obtained from the Wildfowl & Wetlands Trust, British Association for Shooting and Conservation, the Game Conservancy, and the Royal Society for the Protection of Birds; and for nature conservation, from English Nature and the Environment Agency and non-statutory nature conservation organisations such as the Wildlife Trusts Partnership and local Wildlife Trusts.

B60 When imposing planning conditions for water areas, surrounding banks and islands to be formed as a result of mineral working, it will be important to take account of the available powers under the 1990 Act. Formation of a lake to a specified configuration and depth may be properly required under section 70. However, a requirement to allow an excavation to fill with water would not come within the definition of a restoration condition in Schedule 5, paragraph 2(1) and (2), so this could not provide the basis for an aftercare condition (or scheme) for the water areas. Whilst, therefore, use of soil materials on banks and islands would provide the basis for requiring aftercare for these areas for amenity use, it may be more appropriate to use planning obligations, (e.g. under section 106 of the 1990 Act) to achieve reclamation and initial management of water areas - particularly for wildlife and nature conservation. Consideration should also be given to incorporating appropriate measures for water areas into a management plan which then forms part of a planning obligation between the MPA and the applicant and/or landowner.

Table 5. Guidance notes on operational requirements for water based recreational uses

Sport	Type of bank	Minimum depth of	Preferred shape of water	Approximate minimum size of water	Bankside facilities¹
Canoeing	No special banking needed. Provision for easy launching and beaching of canoes.	1.5 metres	Rectangular. Competitive canoeing requires length of 1200 metres.	7 hectares	Space for canoe storage and repair. Clubhouse.
Power boating	Well protected banks, preferably strengthened against wash. Norfolk Reed or Reed Mace planted	2 metres	Triangular. Each leg of triangle course should be at least 400 metres.	15 hectares	Concrete hardstanding for launching boats. Space for storage and repair of boats. Clubhouse. Good access.

	adjacent to the bank as a bank wash stopper to limit bank erosion.				Mounds around site to protect from noise.
Rowing	No special banking needed. Should have a launching platform.	1.5 metres	Rectangular. Minimum length for competitions of 1200 metres.	7 hectares	Boathouse for storage and repair of boats.
Sailing	No special banking required. If possible angled earth banks should be provided. No trees should be planted on the bank nearest the direction of the prevailing wind ² . Launch platform.	2 metres;		20+ hectares	Jetties and/or concrete ramps for launching boats. Clubhouse. Good access. Boat storage.
Water skiing	Banks strengthened against problems of wash. The provision of a shallow water area shelving rapidly at the launch platform.	2 metres	Rectangular.	15 hectares	Jetties, launching, ramps. Boathouse. Clubhouse. Good access.
Windsurfing	No special banking needed. Provision for easy launching and beaching of sail	1.5 metres		11 hectares	Clubhouse. Good access. Space for sail board storage.

	boards. No trees to be planted on the bank in the direction of the prevailing wind ² .				
Angling	Fishing position more than 1 m from water surface. Banks preferably reinforced against erosion; and permanently installed positions.	2 metres	Diverse with embayments.	2 hectares	Clubhouse preferable.

Notes

1 Such facilities will need planning permission and are not part of restoration and aftercare.

2 In many inland areas, prevailing wind direction is often statistically ill-defined.

Built development

B61 As most mineral workings are located in rural areas, the majority of reclamation is to agriculture, forestry or amenity uses. However, 10% of all reclamation is to some form of built development. Development plans should identify where this after-use is appropriate and draw attention to the considerations which would apply to ensure that working are restored to a condition suitable for the proposed use. Specialist advice should be sought on the engineering implications of such proposals. As explained in the main text (paragraph 24), separate planning permission is required where sites are to be built upon.

Annex C : Characteristics of the main types of surface mineral workings and spoil disposal areas in England and the implications for reclamation

Introduction

C1 Mineral workings can vary considerably in the scale, method and timescale of working, and the nature and quantity of material available for reclamation. Certain types of surface mineral workings or areas affected by the surface disposal of spoil arising from mining and quarrying can create particular problems for effective site reclamation and/or require the use of specialised techniques. Conversely, mineral extraction can provide opportunities for landscape enhancement, the reclamation of derelict land and the creation of new habitats. The importance of many older sites for cultural, heritage and nature conservation reasons is increasingly being recognised while plans to make increasing use of mineral wastes as secondary aggregates need to be considered alongside landscape and reclamation objectives.

C2 The Department has addressed these issues by commissioning a series of research studies which have assessed the nature and characteristics of particular types of mineral working, and provided guidance on the planning and technical requirements for their effective reclamation. The following section summarises the characteristics of the main mineral types worked in England, and provides guidance on their reclamation. A list of relevant published reports is given in Annex E.

Sand & gravel

C3 Sand and gravel workings are the most numerous and extensive forms of mineral extraction in England, accounting in 1994 for 35% of all sites, and 30% of the total permitted area. Most production exploits drift deposits in river valleys or glacial and fluvioglacial gravel deposits. The water table often lies close to the land surface, and sites may be worked either in a wet or dry state.

C4 The drift deposits are usually relatively thin and uniform which allows for progressive working and reclamation, often within a short period of time. In the six year period 1988 to 1994 almost 8,000 hectares were reclaimed, principally to agriculture (60%), and amenity uses (31%).

C5 The Triassic Sherwood Sandstone of the Midlands is the chief source of sand and gravel won from formations older than the Pleistocene. Building or concreting sands are worked from some of the Mesozoic or Tertiary formations, especially the Cretaceous Lower Greensand. All of these sites are deeper quarries, with characteristics for reclamation which differ from workings in drift deposits. Progressive reclamation is, for instance, often less feasible.

C6 The restored landform and choice of after-use will usually be site specific. The ratio of mineral to overburden is usually high, which means that the importation of fill is necessary if the land is to be returned to its original levels. In some cases this may not be appropriate or necessary (see paragraphs A8-A28).

C7 Much of the sand and gravel resource is overlain by relatively thick and high quality soils, which enables high standards of reclamation to a range of after-uses to be achieved. Where sites overlie the best and most versatile agricultural land, it is usual for them to be reclaimed to agriculture either at a lower level or with imported fill. Research undertaken for the Department ("*The Reclamation of mineral workings to agriculture*"), has identified that sites can often be reclaimed to their original agricultural land quality if appropriate techniques are used throughout the life of the site. The most common limitation to agricultural land quality was identified to be

droughtiness due predominantly to the coarse textured soils commonly overlying sand deposits, and compaction within the restored profile. Droughtiness can be minimised to some extent by ensuring soils are well managed so as to maintain and promote a good soil structure and water holding capacity, and by ensuring that soil depths are adequate to store sufficient moisture for use by plants during dry periods. At some sites very stony soils can also be a limiting factor.

C8 Many sites with a high water table are allowed to fill with water following extraction and are used for the creation of habitats for wildlife. In these circumstances careful consideration should be given to the contours and gradients of the base of the working. The provision of features such as islands, shallows and gently sloping shores can greatly enhance the potential for habitat creation. Other sites are used for water based recreation or water storage. More detailed guidance is given in Annex B, in "*Amenity reclamation of mineral workings*" and in "*Reclamation of damaged land for nature conservation*".

C9 The restoration of sand and gravel sites for forestry has been particularly common on some of the plateau gravels in Southern England, which were under woodland prior to extraction. The quality of some of these soils is relatively poor, and much research has been undertaken by the Forestry Commission and others on methods to establish trees on such sites. Further details are given in Forestry Commission Bulletin 110. This guidance is also appropriate for amenity tree planting on such sites.

Opencast coal

C10 The opencast mining of coal is used to work seams which are too shallow or too thin to be worked safely and economically by underground mining. Opportunities exist to work coal left from earlier mining, including for example pillar and stall systems. In a number of cases opencasting provides an opportunity to remove coal from beneath derelict land, resulting ultimately in the return of the land to a beneficial use.

C11 The relatively high economic value of the mineral makes it cost-effective to work seams overlain by thick layers of overburden. Estimates vary but it is not uncommon to remove 20-25 tonnes of overburden for each tonne of coal extracted. During the life of the site there is therefore a need for the storage of topsoil, subsoil and large volumes of overburden. As indicated elsewhere the volumes involved can be minimised by the progressive working and reclamation of the site.

C12 In many cases the high ratio of overburden to coal allows the site to be infilled to pre-working levels without the need for importation of additional fill materials.

C13 Between 1988 and 1994, over 4,000 hectares were restored following opencast coal extraction, of which two thirds were reclaimed to agriculture. A further 16% were reclaimed for amenity uses including nature conservation.

C14 Heavy soils predominate over many opencast areas and soil wetness tends to be the main limiting factor affecting Agricultural Land Classification grade. This can cause difficulties when handling soils, as there may be limited opportunities during the year when the soils are in a suitably dry condition. However, with restoration of appropriate gradients and installation of under-drainage, such land can be restored to its original grade.

C15 Because of the heavy texture of soils often associated with opencast sites, reclamation schemes should aim to install a drainage system as soon as possible following soil placement. This

increases the opportunities for cultivating the soil and establishing vegetation. The initial drainage may be temporary, and a more permanent scheme may need to be installed during the aftercare period.

C16 Opencast sites are often relatively large, and can provide opportunities for a range of after-uses such as areas for agriculture, amenity or commercial woodland, and nature conservation within one site.

C17 The Countryside Commission have published guidance on the landscaping and restoration of opencast coal sites in "*Opencast coal mining*".

Hard rock quarries

C18 These include igneous rock, limestone/dolomite and sandstone quarries. The size of many of these quarries and the timescale over which they are worked can present difficulties for effective reclamation. This is often compounded by limited availability of fill material and/or a shortage of soil; physical constraints include the level of the water table; the amount of and access to, level floor areas in dry quarries; and sidewall stability.

C19 Quarries can be very prominent in the landscape, while the stability of their faces can present health and safety risks. Reclamation should therefore aim to reduce the risk of accident while providing a visually acceptable landform that is appropriate for its intended long-term use. Where possible, planning permissions for sites should allow for the phased working and restoration of areas of extraction. This may be difficult to achieve with some sites where extraction proceeds in a vertical rather than horizontal direction, while at others, particularly where the quality of stone varies across the site, some faces need to be kept 'open' to allow intermittent extraction as demand fluctuates.

C20 While the final site reclamation and possible after-uses should be considered at the time of the planning application and appropriate provision included in the conditions, it is likely that most schemes will require updating and amendment during the life of the working. Planning permissions may allow for this by requiring a general treatment scheme to be prepared before extraction starts, to be followed up by submission of detailed schemes for particular phases as they are completed; and by setting a timescale for submission of the final reclamation plan which is commensurate with the duration of the mineral planning permission. For long-life quarries, wherever the upper faces will be visible for many years prior to completion of mineral working, it will be useful to consider, where appropriate, a condition requiring progressive reclamation of finished upper faces and benches.

C21 A number of techniques are available for reducing the visual impact of large quarries. Many involve the establishment of vegetation directly onto the rock face, or the use of selective blasting to reduce the face angle, create scree slopes and to provide a more natural appearance. Where fill materials are available, it is possible to fill all or part of a site, including total or partial masking of the quarry margins. The Department has funded research on one form of selective blasting and habitat creation known as 'Landform Replication', the interim results of which have been published in "*Landform Replication as a technique for the reclamation of limestone quarries. A progress report*". This technique requires a multi-disciplinary approach to quarry reclamation including application of a series of geo-engineering and ecological reclamation strategies, and aims to construct a landform/vegetation assemblage which resembles that in the unexcavated landscape around the quarry. The final results of the research will be published shortly. A short review of the

wider range of techniques which have been used to revegetate quarry faces, and guidance on their application is provided in "*Amenity reclamation of mineral workings*".

C22 Rock-fall can be a hazard to people and livestock and can destroy or disturb revegetated areas lower down the face. This may require initial stabilisation measures, but faces may also become unstable after weathering. Careful recording and monitoring of excavated quarry faces and slopes should be undertaken on a regular basis, using appropriate measures, such as 'scaling', where necessary. A review of technical, operational, administrative and legal aspects of the stability and hydrogeology of deep mineral excavations has been published in "*Technical review of the stability and hydrogeology of mineral workings*", as has a handbook providing guidance on the investigation, assessment and inspection of excavated quarry slopes "*Handbook on the hydrogeology and stability of excavated slopes in quarries*".

Other types of surface mineral working

C23 There are a range of other types of minerals worked from surface excavations in England, including chalk for cement and other uses, industrial sand, clay for bricks, ceramic wares and cement, gypsum and peat. The advice in the main part of this MPG and in Annex A and Annex B should enable appropriate planning conditions to secure reclamation of most of these sites to be prepared and implemented. In addition, the Department has issued specific planning guidance, including on reclamation, for certain of these materials. MPG10 "*Provision of raw materials for the cement industry*", contains guidance on reclamation of relevant workings and preparation of quarry plans, particularly for chalk and limestone sites (paragraphs 64-69 and Annex C). The reclamation of peat workings presents a number of special problems. These are dealt with in MPG 13 "*Guidelines for peat provision in England, including the place of alternative materials*" which contains guidance on rehabilitation of cut-over lowland peat sites. MPG15 "*Provision of silica sand in England*" provides specific guidance on industrial sand.

Colliery spoil

C24 Colliery spoil or minestone is the waste material that is extracted while mining coal. Land based tipping accounts for over 90% of the total annual disposal of spoil nationally. Most of this is tipped in spoil heaps usually close to the colliery. A small proportion is used in local land reclamation schemes, for example, for filling of old mineral workings and increasingly as a secondary aggregate. Nationally, over 20,000 hectares has been affected by tipping, making it one of the most significant minerals-related impacts on land use in the country. Nevertheless, by 1994, over 10,000 hectares had been reclaimed much having been achieved using the Department's Derelict Land Grant (DLG). Some spoil tips may be regarded as a resource, which may be left for utilisation or treated temporarily for later use. Some may also have developed important semi-natural habitats following natural colonisation or may contain scientifically valuable objects such as fossils. Many spoil heaps have benefited from permitted development rights under the old General Development Order, and are subject to no provisions for reclamation. Changes originally made in the 1977 and 1988 General Development Orders and now contained in the Town and Country Planning (General Permitted Development) Order 1995, which require the submission of a waste management scheme, together with new restoration obligations in the Coal Industry Act 1994, should ensure that all future colliery spoil tipping is subject to proper planning control.

C25 Tipping practices have changed significantly in recent years, largely in response to the need to achieve higher safety standards. Older tips are often conical or irregular in shape, with high profiles. Their reclamation normally involves some degree of regrading and in some cases

considerable movement of spoil is necessary. In contrast, modern tips usually have lower, less intrusive profiles making reclamation and landscape compatibility simpler. Modern tips are also far less likely to spontaneously ignite, which has in the past resulted in damage to, or loss of, established vegetation.

C26 A better understanding of the main physical and chemical characteristics of colliery spoil and improved methods of ameliorating problems, has led to considerable improvements in reclamation practices in recent years. However, sward regression has continued to be a problem on some reclaimed tips, particularly where the spoil material is pyritic, but also where inappropriate handling of soil and/or spoil materials during restoration has caused excessive compaction within the rooting zone. Where pyritic spoils are identified the reclamation scheme and subsequent management should aim to prevent long-term problems, usually by separating the spoil from the vegetation using 'clean' spoil or soil, or by neutralising any acid that develops.

C27 Modern sites are more likely to have soil materials available, and the technical problems of actually establishing and maintaining vegetation should be less. Where soil cover is not available, or its use is considered to be inappropriate, it is important that the surface layers of spoil are placed so as to avoid compaction, while sufficient measures are carried out to control drainage and acidity. The incorporation of humified organic matter, may also assist in the development of a suitable rooting medium. Recent research also suggests that the incorporation of sewage sludge may help to reduce the incidence of acid generation. However, the long-term success of this approach has yet to be determined.

C28 Planning conditions should aim to ensure that the standards of reclamation to be achieved are appropriate for the intended after-use. On particularly pyritic sites, where repeated remedial treatments are likely to be necessary, careful consideration should be given to the choice of after-uses, both to ensure that vegetation can tolerate conditions, and that access to the site and the application of remedial treatments are not hampered by the mature vegetation (i.e. trees). However, where possible, operators should identify and select non-pyritic materials to use as soil making materials.

C29 Drainage and run-off from pyritic spoils can cause contamination of the surrounding area as well as on-site. There has been an increased use of reed beds and other technologies to improve the quality of water leaving a site, before it enters surface water courses. The Environment Agency should be consulted where there is potential risk of contamination of surface or ground waters.

C30 Further guidance is available in "*Restoration & revegetation of colliery spoil tips and lagoons*".

China clay

C31 The extraction of china clay is confined to Cornwall and Devon, where in localised areas (St. Austell in Cornwall and Lee Moor in Devon, in particular) it is the predominant use of the land. Clay production has occurred for over 150 years, but in the last 20-25 years there has been a progressive and substantial change in the scale of mineral extraction. The industry now produces in the order of 25 million tonnes of waste each year, most of which is tipped outside the limits of the pits. Most of the 3,000 hectares of land already affected by pits, tips and lagoons in the St. Austell area are covered by old permissions with limited provisions for reclamation. In contrast, the Lee Moor area is covered by more modern permissions, which provide a framework to contain tipping to discrete areas and to provide conditions for more sustainable after-uses of the land.

C32 The Department commissioned a research study to review the practices and information on the landscaping and revegetation of china clay waste tips ("*Landscaping and revegetation of china clay wastes*"). The report recommended the need for more long-term and broadly based reclamation and landscape strategies for the area, which took account of existing tips and future tipping requirements, and considered both long-term objectives and short-term improvements to the local environment. To ensure the long-term success of the reclamation it was proposed that a land-use led approach to the design of tips was necessary.

C33 A range of constraints to reclamation were identified, including:

- the continued need to dispose of very large volumes of waste, with limited opportunities for back-filling voids;
- the presence of many old, steep angled tips which limit the possibility of overtipping or regarding, but which provide prominent unnatural landforms, which are unsuitable for many after-uses;
- the physical and chemical characteristics of the waste, the local climate and the degree of exposure on some sites restricting vegetation establishment and development, and encouraging erosion;
- the presence, within and adjacent to the tipping areas, of locally important semi-natural habitats, and areas of interest developed following natural colonisation of older tipped areas;
- the presence of settlements within the tipping areas.

C34 For new tips, it should be possible to identify appropriate after-uses within the tipping areas and design the tips accordingly. For existing tips, the after-uses will be constrained by the opportunities to alter the landforms. The ability to achieve a specific after-use depends in part on the viability of the vegetation, which is influenced by site and climatic conditions. Table 6 provides a summary of after-use options, while Table 7 summarises the options for landscape improvements of the wider area.

C35 The china clay industry and MPAs concerned have accepted the main recommendations from the study, and the Government looks to them to implement these recommendations through phased reviews of existing old mineral permissions, in any new proposals for working and tipping, and in statutory plans.

Slate

C36 Slate workings and waste tips are not extensive in England, being largely confined to Cumbria and Cornwall. However, they are usually found in scenic rural areas, often in or visible from National Parks and Areas of Outstanding Natural Beauty. Most of the permissions are old and have no provisions for reclamation. A number of abandoned sites have been reclaimed in the past using the Department's DLG.

C37 Slate production creates vast quantities of waste material (19 tonnes of waste per tonne of usable slate), which is usually tipped adjacent to the working area. It is generally impractical to backfill quarry holes, and in most cases it is therefore necessary to reclaim the spoil *in situ*. Soil is rarely available in sufficient quantities to cover the spoil, and where vegetation establishment is required it is usual to plant directly into the spoil material. The physical and chemical characteristics of the spoil limit its suitability as a growing medium (in particular, a very coarse texture, extremely slow weathering rate, and minimal nutrient content). In the absence of soil,

surface preparation techniques usually include the crushing of the surface slate waste to produce fine fragments, and the use of organic mulches. The choice of vegetation types should be influenced by the intended use of the site and site factors and in particular tolerance of climatic and substrate conditions, and compatibility with the surrounding vegetation and landscape.

Table 6. After-use options for china clay waste tips

Use	Suitable for tip types *					
	Old	Csa	Tob/St	GT+	GT-	

Annex D : Financing of restoration and aftercare

General

D1 Government policy on the financing of reclamation is set out in paragraphs 86 to 96 of the main text. This makes it clear that it is the responsibility of the mineral operator to secure the restoration and aftercare of the site within the terms of the planning permission. Mineral companies, or other applicants, should demonstrate to the MPA, therefore, that financial, as well as technical, capabilities are sufficient to undertake the proposed restoration and aftercare. The need for this arises in part because, except where there will be progressive reclamation, the work required is likely to take place after the revenue-generating extractive operations have been completed.

D2 The main text also makes clear that MPAs should not seek financial guarantees, prior to the grant of planning permission, except in the exceptional circumstances listed in paragraphs 94 and 95.

D3 This policy is based on the recommendation of consultants in their report to the Department, "*Review of the effectiveness of restoration conditions for mineral workings and the need for bonds*" which is referred to in paragraph 87 in the main text. The consultants also recommended that mineral planning guidance should be provided on the circumstances under which it would be appropriate for a planning authority to reach an agreement with an operator in relation to financial guarantees, together with advice on the forms of guarantee and checks that the local authority might make on the financial institutions offering guarantees. This is to ensure that future agreements, where they are appropriate, are put onto a consistent basis, to avoid discriminatory, costly and irrelevant bonding arrangements coming into effect.

D4 This Annex therefore provides guidance on two separate aspects of the financial provision for reclamation. The first indicates the main options which mineral companies may already use, or may wish to consider, for financing reclamation. The second, in response to the consultant's recommendation, considers specific types of securities that may be suitable as financial guarantees in the exceptional cases that they are appropriate. Some of these schemes may also be suitable for securing long term funding of the site after-use. Further details on the benefits and constraints of some of the funding schemes, can be found in the consultant's report.

Financial provisions by mineral companies for restoration and aftercare

D5 It is reasonable for the MPA to ask about an applicant's plan for the development, extraction and reclamation of the site, and for the applicant to be able to demonstrate the ability to fulfill the likely conditions which would be imposed on the grant of planning permission. It would not, however, be part of an MPA's function to assess the viability of an applicant's plan in relation to the potential profitability of the proposal.

D6 An applicant may offer or indicate some specific ways of assuring the availability of financial funding for restoration and aftercare.

D7 Options for financial provision to cover restoration and aftercare costs, which may be practised by mineral companies, may include:

- i. making general provision in advance covering all company sites;
- ii. specific provision made in advance for each site;

- iii. full provision made when site development commences;
- iv. provision made on an incremental basis as sites are developed.

D8 These options will have different impacts on the amounts of money which would be 'tied up' throughout the operational life of a site. The choice made will therefore, in the first instance, be for the applicant or operator. The following paragraphs set out the most usual options.

Mutual funds

D9 This would be a guarantee scheme covering several operators where risks are spread and where the group offers security. The only current example in the British mineral industry is the Sand & Gravel Association (SAGA) Restoration Guarantee Fund which was set up in 1974. The fund has a number of conditions attached to its use, and can in effect be called upon solely in the event of financial failure of a SAGA member and which results in failure to comply with the restoration requirements of an MPA. The Confederation of Coal Producers are seeking to set up a broadly similar system for opencast coal producers (Confederation Guarantee Scheme).

Internal - provision in accounts, or sinking fund

D10 A company may have a policy of setting aside a sum of money in a sinking fund, perhaps based on an "internal levy" of the output of a site, that will build up as a site is developed and which will cover the estimated restoration and aftercare costs. In other cases there may be a more general provision in the company's accounts to meet future liabilities. The sinking fund offers a regulator greater assurance since it should be represented by specific cash or investment.

Internal - self-insurance

D11 Some companies are sufficiently large, and of a credit-worthiness, to undertake self-insurance in one form or another, including by parent company guarantees. In such cases there may be a separate evaluation of performance and risks.

Coal mining operations

D12 Under Section 2(1)(b) of the Coal Industry Act 1994, it is the duty of the Coal Authority to carry out its function of licensing persons to carry on coal-mining in the manner it considers best suited to ensure, so far as practicable, that licensed persons are able to finance those operations and to discharge the liabilities arising from them. Such liabilities include restoration and aftercare of sites, in addition to subsidence, drainage and sealing of adits. "Coal-mining" under the Act includes opencast and underground operations and depositing spoil from any associated activities, including drainage.

Financial guarantees

D13 The main text emphasises that financial guarantees should only be sought in exceptional circumstances. paragraphs 94 and 95 refer to these limited circumstances. Some of these schemes may also be appropriate ways of securing funds, where relevant, for the long-term maintenance of sites beyond the aftercare period. Where these are obtained they will usually form part of a s.106 planning obligation/agreement.

ESCROW Accounts

D14 An escrow account is an independently held account into which the operator would pay, at a rate and to a limit agreed with the MPA, to meet restoration and aftercare requirements. The operator would expect to draw on the account to finance the reclamation work. Calls on the account need to be agreed by both parties or in arbitration. The interest on escrow accounts would normally be paid to the operator, as would any balance when reclamation was completed.

D15 Setting up such accounts can involve complex negotiations and hence add to an operator's costs. In theory, however, if a company is intending to finance restoration and aftercare by the options in paragraph D7 ii, iii or iv it is possible that such funding might be put into an escrow account.

D16 This type of account may be appropriate, attached to a section 106 planning obligation or other form of agreement, to provide a commuted sum to cover longer-term costs of pumping equipment and its maintenance for "low level restoration" or, for example, to contribute to management of some types of nature-conservation after-uses.

On-demand bonds

D17 These are most commonly offered by banks. The bondsman agrees to pay the bond on demand and without proof of breach of contract or condition or any other factor which may be relevant to the two other principal parties. The bank would secure itself against possible payment, normally by requiring the mineral operator to provide full security. Therefore, this type of bond has a high cost to an operator and carries a danger that an MPA might call on it instead of pursuing justifiable enforcement action.

Conditional bonds

D18 These are usually secured against a counter-indemnity in the form of a company written guarantee. The bondsman would not pay any claims until such time as he is fully satisfied that the terms of the bond have been met and the beneficiary (i.e. the MPA) is able to prove its loss. Both banks and the insurance surety market issue such bonds, but the cover is not widely available from the insurance sector.

Financial provisions and landfill

D19 Some planning applications for mineral extraction include proposals to landfill the site with controlled wastes, as part of the proposals for creating a suitable final landform and after-use. MPA's should not seek, through agreements attached to the planning permission, to obtain the financial provision adequate to discharge the obligations arising from the waste management licence. This will be a matter for the licensing authority. Guidance on these matters is given in DOE Waste Management Paper No 4, "*Licensing of waste management facilities*".

Annex E : Bibliography

Primary legislation

National Parks and Access to the Countryside Act 1949
Mines and Quarries Act 1954
Countryside Act 1968
Forestry Act 1979
Wildlife and Countryside Act 1981
Town and Country Planning (Minerals) Act 1981
Town and Country Planning Act 1990
Environmental Protection Act 1990
Planning and Compensation Act 1991
Coal Industry Act 1994
Environment Act 1995

Statutory Instruments

Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 (SI 1988 No. 1199) (as amended)
Town and Country Planning (General Permitted Development) Order 1995 (SI 1995 No. 418) (as amended)
Town and Country Planning (General Development Procedure) Order 1995 (SI 1995 No. 419) (as amended)

DOE Circulars

25/85 Mineral workings - Legal aspects relating to restoration of sites with high water tables
19/86 Housing and Planning Act 1986 : Planning provisions
15/88 Environmental assessment
16/91 Planning and Compensation Act 1991 : Planning obligations
21/91 Planning and Compensation Act 1991 : Implementation of the main enforcement provisions
28/92 Planning and Compensation Act 1991 : Modification and discharge of planning obligations
29/92 Indicative forestry strategies
11/95 The use of conditions in planning permissions

Minerals Planning Guidance Notes

MPG1 - General considerations and the development plan system
MPG2 - Applications, permissions and conditions
MPG3 - Coal mining and colliery spoil disposal
MPG4 - The review of mineral working sites
MPG7 - The reclamation of mineral workings
MPG9 - Planning and compensation Act 1991 : Interim Development Order Permissions (IDOS) Conditions
MPG10 - Provision of raw material for the cement industry
MPG12 - Treatment of disused mine openings and availability of information on mined ground
MPG13 - Guidelines for peat provision in England including the place of alternative materials
MPG14 -Environment Act 1995 : Review of mineral planning permissions

Planning Policy Guidance Notes

PPG2 - Green Belts

PPG7 - The countryside and rural economy

PPG9 - Nature conservation

PPG14 - Development on unstable land

PPG17 - Sport and recreation

PPG18 - Enforcing planning control

PPG23 - Planning and pollution control

Other Publications

ADAS (1988). Lime and liming. Reference book 35.

ADAS (1988). Fertiliser recommendations. Reference book 209.

Andrews, J. and Kinsman, D.(1990). Gravel pit restoration for wildlife, a practical manual. RSPB.

Arup Economics and Planning (1993). Review of the effectiveness of restoration conditions for mineral workings and the need for bonds. HMSO.

Arup Environmental (1995). The environmental effects of dust from surface mineral workings. HMSO.

British Standards Institute (1994). Topsoil and other growing media 3882: 1994.

Carter M.J.,(1989). Low level restoration of sand and gravel workings. HMSO.

Coppin N J and Bradshaw A D (1982). Quarry reclamation. Mining Journal Books, London.

Countryside Commission (1993). Opencast coal mining - CCP 434.

Department of the Environment (1989). Environmental assessment: A guide to the procedures.

Department of the Environment (1994). Sustainable forestry, the UK programme. HMSO.

Department of the Environment (1994). Sustainable development: The UK strategy (Cm 2426). HMSO.

Department of the Environment (1988). The licensing of waste management facilities. Waste Management Paper No. 4. HMSO.

Department of the Environment (In preparation). Landfill restoration and post closure management. Waste Management Paper No. 26E. HMSO.

Department of the Environment (1991). Landfill gas. Waste Management Paper No. 27. HMSO.

Department of the Environment (1996). Survey of land for mineral working in England 1994. HMSO London.

Dobson M.C.& Moffat A.J.(1993). The potential for woodland establishment on landfill sites. HMSO.

Environmental Consultancy University of Sheffield and Richards Moorehead & Laing Ltd (1994). The reclamation and management of metalliferous mining sites. HMSO.

Forestry Commission (1991). Forestry policy for Great Britain. HMSO.

Geoffrey Walton Practice (1988). Technical review of the stability and hydrogeology of mineral workings. HMSO.

Geoffrey Walton Practice (1988). Handbook on the hydrogeology and stability of excavated slopes in quarries. HMSO.

Geoffrey Walton Practice (1991). Handbook on design of tips and related structures. HMSO.

Giles N (1992). Wildlife after gravel, twenty years of practical research by the Game Conservancy and ARC. Game Conservancy Limited.

Gunn J., Bailey D. and Gagen P.(1992). Landform replication as a technique for the reclamation of limestone quarries. A progress report. HMSO.(Final report to be published in 1996).

Hawke, C.J. and Jose, P.V.(1996). Reedbed management for commercial and wildlife interests.

RSPB/BRGA/Broads Authority/English Nature.

Hibberd B.G. ed.(1989). Urban forestry practice. Forestry Commission Handbook 5. HMSO.

Hibberd B.G. ed.(1991). Forestry Practice. Forestry Commission Handbook 6. HMSO.

Hodge S.J.(1995). Creating and managing woodlands around towns. Forestry Commission Handbook 11. HMSO.

ICRCL 59/83 (1987). Guidance on the assessment and redevelopment of contaminated land. HMSO.

ICRCL 70/90 (1990). Notes on the restoration and aftercare of metalliferous mining sites for pasture and grazing. HMSO.

Key R.S.(1994). Invertebrate conservation in quarries, mines, sand, clay and gravel pits. English Nature Species Conservation Handbook 6.3, Peterborough.

Land Use Consultants (1992). Amenity Reclamation of Mineral Workings. HMSO.

Land Use Consultants (1992). The use of land for amenity purposes: a summary of requirements. HMSO.

Land Use Consultants (1994). Good practice on the evaluation of environmental information for planning projects. HMSO.

Land Use Consultants and Wardell Armstrong (1996). Reclamation of damaged land for nature conservation. HMSO.

MAFF (1993). Code of good agricultural practice for the protection of soil. MAFF London.

Moffat A., and McNeill J.(1994). Reclaiming disturbed land for forestry. Forestry Commission Bulletin 110. HMSO.

NRA (1992). Policy and practice for the protection of groundwater. HMSO.

NRA (1995). Landfill and the water environment. NRA position statement.

Nature Conservancy Council (1990). Earth science conservation in Great Britain, a strategy. Peterborough.

Parker, D.M.(1995). Habitat creation. A critical guide. English Nature Science Report 21. Peterborough.

RPS/Clousten and Wye College (1996). Guidance on good practice for the reclamation of minerals working to agriculture. HMSO.

RSPB, NRA The Wildlife Trusts (1994). The new rivers and wildlife handbook.

Richards Moorehead & Laing (1995). Slate waste tips and workings in Britain. HMSO.

Richards Moorehead & Laing Ltd (1996). Restoration and revegetation of colliery spoil tips and lagoons. HMSO.

Wardell Armstrong (1993). Landscaping and revegetation of china clay wastes. Main report. DOE, Eastcote.

Wardell Armstrong (1993). Landscaping and revegetation of china clay wastes. Summary report. HMSO.

Wardell Armstrong (1993). Non-ferrous metalliferous mineral extraction in Scotland. Processes and environmental consequences. Report to the DOE and Scottish Office. Available from Wardell Armstrong, Newcastle-under-Lyme.

Watkins C.(1991). Nature conservation and the new lowland forest. English Nature. Peterborough.

Williamson N. A., Johnson, M.S. and Bradshaw A. D.(1982). Mine waste reclamation. Mining Journal Books, London.