Department of the Environment
Welsh Office

MPG7
1989

MINERALS PLANNING GUIDANCE:

THE RECLAMATION OF MINERAL WORKINGS

A memorandum on the Control of Mineral Working in England and Wales (the "Green Book") was first prepared in 1951 as a guide to the planning control of mineral working and to indicate the broad lines of policy on the planning problems raised by mineral working. A revised edition was published in 1960. There have since been further changes in the statutory provisions and in Government policy and revised guidance to explain these changes has been prepared. This is being issued as part of the Department's series of Minerals Planning Guidance Notes. The first note (MPG1) covered the general principles and national considerations of minerals planning with specific advice on the development plan system. MPG2 covered planning applications for minerals development, planning permissions and the imposition of planning conditions. MPG4 covered the review of mineral working sites, including the compensation implications. MPG5 covered those aspects of the General Development Order which are of special relevance to minerals interests. This note gives advice on planning considerations, consultations and conditions which are relevant to the reclamation of mineral workings, and it completes the MPG Notes which are based on the former "Green Book". It should in particular be read in conjunction with the general guidance in MPG2 and MPG4.

The guidance in DOE Circular 1/82 (WO 3/82), Town and Country Planning (Minerals) Act 1981, has now been completely incorporated in, and in some cases updated by, the "Green Book" MPGs. The circular is therefore cancelled. DOE Circular 11/86 (WO 21/86) is also cancelled.

CONTENTS

INTRODUCTION

The importance of reclamation and choices of after-use

1. England and Wales are rich in minerals, but in many areas they are also densely populated. There are pressures on land and competing claims on space for housing, industry, commerce, waste disposal, agriculture, forestry, recreation, nature conservation and other uses. Against this background and the concern for protecting the environment, it is very important that land worked for minerals should not become derelict or remain out of beneficial use for longer than is absolutely necessary. In seeking to reconcile the winning and working of minerals with other claims on land, one of the four main aims of planning control is:

> to ensure that land taken for mineral operations is reclaimed at the earliest opportunity and is capable of an acceptable use after working has come to an end.

2. Unlike most other forms of development, mineral extraction is an ongoing activity as a result of which the land can and should be recycled either to its former use or to a new and acceptable use. Standards of reclamation have generally improved over recent years. Continuation of this trend will enable a wider range of sites to be restored to appropriate standards, leading to the release of land which has not so far been made available for mineral working. If 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.

3. Within the framework of national policies, there is a wide range of possible options for suitable after-uses for mineral workings. Land has often been returned to agricultural use following the winning and working of minerals. The Government's policy on development involving agricultural land is set out in DOE Circular 16/87 (WO 25/87) and, for development involving mineral working, is also set out in MPG1. With changing circumstances of agricultural production in western countries, policies for encouraging diversification of the rural economy are becoming more important. However these changes do not mean that there can be any lessened commitment to high standards in the reclamation and recycling of land taken for mineral working.

4. Agriculture is likely to remain an appropriate after-use for many mineral sites particularly where mineral resources underlie areas of "the best and most versatile" agricultural land and where achievement of a high standard of reclamation would not lead to the irreversible loss of such land. There is now much more consideration of non-agricultural after-uses of mineral workings, particularly for forestry or amenity. These 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. In some instances amenity or forestry after-use may be appropriate on the better land if the methods used in restoration and aftercare enable it to retain its longer-term potential as an agricultural resource.

5. The Town and Country Planning Act 1971 as amended (the 1971 Act), together with the General Development Order (GDO), form the basis of the control of mineral development. Some of the new powers contained in the Town and Country Planning (Minerals) Act 1981 (the 1981 Act), particularly as regards the aftercare of land following mineral working, are of major importance for the reclamation of mineral workings. This Minerals Planning Guidance Note gives advice on planning considerations, consultations and conditions which are relevant to achieving such reclamation. 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. A considerable number of publications consider, and suggest solutions for, the problems associated with the reclamation of mineral workings and similar disturbed land. Some of these are included in Annex 1.

DEFINITIONS

6. The 1981 Act introduced the following definitions into S.30A of the 1971 Act which are also used, as appropriate, in this note:—

i. "restoration condition" means 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 material; and

ii. "aftercare condition" means 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".

7. The term "reclamation" is used in this and related MPG's 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 1981 Act. However it includes events which take place before and during mineral extraction (eg 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.

IMPOSING RECLAMATION CONDITIONS FOR NEW PERMISSIONS

General Principles

8. In granting planning permission for mineral working, mineral planning authorities 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. The planning conditions 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

MPG2 gives general advice on principles and conditions as regards planning permissions for mineral working, including a general checklist of additional information which may be required by mineral planning authorities when considering planning applications for mineral development.

9. Whilst certain types of mineral working and after-use have common features for which particular groups of conditions may be suitable, each site will have certain individual characteristics which will need individual solutions. This MPG can only give examples of general considerations and types of conditions which may be appropriate.

10. The drawing up of practicable 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 this investigation should be reflected in the documentation submitted with the application. In most cases it will be sensible for some discussion of working and reclamation proposals and possible conditions to have taken place prior to formal submission of an application. These discussions should involve not only the mineral operator and the mineral planning authority but also the landowner, tenant and any other person with a relevant interest. Effective pre-application discussions and adequate documentation with a submitted application will help the mineral planning authority to determine the application expeditiously. Consultation requirements and procedures for determining applications are given in MPG2. The procedures for, and particular consultations with, the Minister of Agriculture, Fisheries and Food (MAFF), (in Wales the Secretary of State for Wales) or the Forestry Commission on restoration and aftercare for agriculture or forestry use, respectively, are considered in more detail in paragraphs 53 to 72 and 75 to 81.

11. Before granting planning permission and drawing up conditions, mineral planning authorities may wish to consider not only the reclamation and after-use of an individual site but also to relate these to a broader plan. This can be particularly important where there is a considerable concentration of mineral workings and where there are relevant policies in Minerals Subject Plans or other local plans. These matters will also have been included in effective pre-application consultations. MPG2 includes advice on consultation arrangements between local authorities.

12. The type of mineral and method of working will determine, to a considerable extent, the options for reclamation and after-use of a site. Considerations will include the depth of excavation; the relationship between this and the level of the water table; the nature and volume of waste generated on site or which may be imported and used as backfill; the nature and amounts of soil and soil-making materials; and the topography, altitude, climate, landscape features and wildlife habitats of the site. The majority of mineral workings are likely to be reclaimed for agriculture, forestry or amenity use. Less commonly,

some form of residential, industrial or commercial development may subsequently take place.

13. Planning conditions for reclamation should normally be framed with an intended after-use in mind. However separate planning permission is likely to be required for any after-use except agriculture and forestry (excluded from the definition of development in Section 22 of the 1971 Act), uses which are included in Schedule 2, "Permitted Development" of the GDO and, in practice, 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 or aftercare condition imposed in respect of the mineral working will be dealt with by the mineral planning authority. The district 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.

14. All planning permissions for mineral working are now subject to a time limit condition and when setting conditions for reclamation it will be important to have regard to this. In some instances, such as where mineral extraction is to precede a planned development, the proposed after-use may be a relevant factor in determining the duration of the permission and vice versa.

15. Irrespective of the time limit for a site, the applicant needs to demonstrate that the site can be reclaimed satisfactorily. The best way to achieve this is to prepare a reclamation plan at the outset based on the site investigation and integrated with the working programme (on which guidance is given in MPG2). For after-uses which involve some form of plant growth (eg for agriculture, forestry, amenity), the plan will usually involve 4 main 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 (see paragraphs 20 to 24)

ii. filling operations (if required, following mineral extraction) or otherwise shaping the excavated area (see paragraphs 25 to 35)

iii. restoration (see paragraph 36)

iv. aftercare (see paragraphs 37 to 48)

16. How these general stages are translated into planning conditions will vary. Detailed conditions will often be suitable for short-term workings. For longer-term workings, early agreement on the details of at least the later stages of reclamation may not be appropriate. In such cases outlines of requirements covering the main stages (paragraph 15 (i) to (iii)) and the after-use should normally be agreed at the outset, together with detailed schemes for stripping and storage of soil materials. 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.

17. 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. 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. A schematic diagram of progressive reclamation of a shallow mineral working is at Figure 1.

18. Planning permissions normally run with the land. They 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. The general principle is that a mineral planning authority should take into account whether it is feasible to implement the applicant's reclamation proposals successfully. Whilst the past reclamation record of an operator may be relevant to the consideration of a planning application and therefore whether planning conditions are likely to be met in practice, it should be remembered that this will usually be relevant only for comparable sites which have operated under similar conditions to those being proposed. The possibility that reclamation techniques may have improved in the intervening time must also be borne in mind.

Environmental Assessment

19. 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)

FIGURE 1 — DIAGRAM OF SHALLOW MINERAL WORKING TO SHOW PROGRESSIVE RECLAMATION

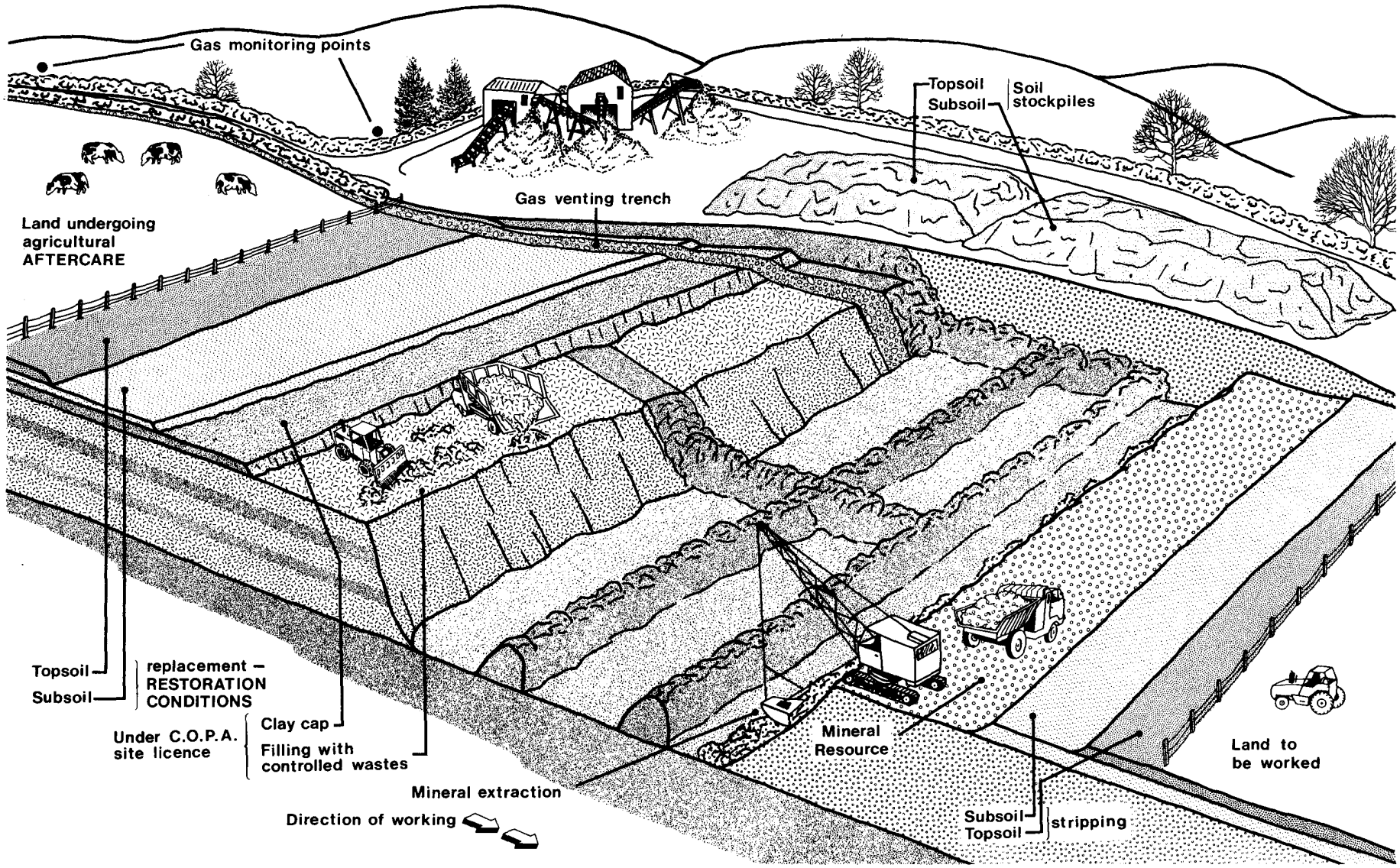


FIGURE 2. TYPICAL SOIL HORIZONS AND CHARACTERISTICS

PLANNING TERMS

TOPSOIL

Usually darker surface layer. Biologically active. Often well structured. Important nutrient source – supplemented by fertilisers.

SUBSOIL

Weaker less developed structure.
Less biologically active.
Important for moisture storage.

OVERBURDEN – UNCONSOLIDATED

(typically glacial till, or alluvium)

MINERAL RESOURCE – DRIFT DEPOSIT

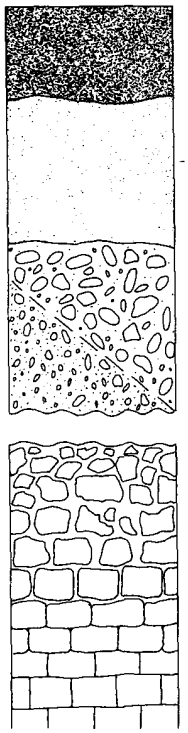
(e.g. terrace sand and gravel)

OVERBURDEN – SOLID

typically weathered or poor quality rock.

MINERAL RESOURCE – SOLID DEPOSIT

Limestone, sandstone, shale, coal etc.



SOIL SCIENCE TERMS

A Horizon

Zone of accumulated humified organic matter, intimately mixed with mineral soil.

B Horizon

Mineral soil. Zone of illuvial accumulation, and chemical alteration of parent material.

C Horizon

Mineral horizon of unconsolidated material, some chemical weathering causing partial altering of parent material.

C Horizon

R Horizon

Bed rock

Regulations 1988. Whether or not mineral workings would have sufficiently significant environmental effects to warrant an EA 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 (WO 23/88) explains the provisions of the Regulations and gives advice on their implementation.

Soils—stripping, movement and storage

20. For after-uses requiring the growth of vegetation, effective site reclamation will depend on the appropriate identification and management of soil resources prior to and during working 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. 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 1 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 2 is an idealised diagram of typical soil horizons and their characteristics.

21. 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 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. 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 ground pressures across soils. Such damage to soils is difficult to remedy once it has occurred. Planning conditions should aim to minimise this potential for damage through limiting when and how soils are moved. Soil movements can be restricted to dry conditions in general terms, by reference to particular soil moisture conditions or by rainfall criteria. In higher rainfall areas and/or with heavier-textured soils it may be more difficult to get ideal circumstances in which to move subsoils. Conditions can also be used to control the routeing of vehicles to avoid unnecessary trafficking over unstripped or

Table 1 Soil characteristics and effects of disturbance

SOIL CHARACTERISTICS	EFFECTS OF DISTURBANCE	EFFECTS CONTROLLABLE BY PLANNING CONDITIONS
SOIL PROFILE AND DEPTH: Arrangement and thickness of different horizons (topsoil, subsoil and weathered parent material)	Possible mixing of different 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 commensurate with amounts of soil actually present
SOIL TEXTURE: Size range of primary particles present (sand, silt, clay, etc)	Not necessarily altered if soil movement carefully controlled	Careful separate stripping, storage and respreading of soil horizons
STONINESS: Particles greater than 2 mm diameter. Percentage volume in top 25 cm of soil and size ranges are important	Possible increase due to mixing of different soil horizons or replacement of stony horizons nearer the top of the soil profile	As for SOIL PROFILE AND DEPTH. *Also,* ripping followed by stonepicking 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 type of structure, site conditions, method of movement. Compaction; increase in bulk density; impeded drainage	Method of soil movement, eg avoidance of movement in wet conditions; direct respreading where possible; specify agreed type of machinery; subsoiling and other cultivations on 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 earth-moving 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 which plants can extract from the soil. Related to soil texture and structure	Altered by soil movement	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 micronutrients (eg 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 ADAS or other standard analysis, on replacement of soils and during aftercare period. Occasionally may need fertiliser and lime added to soil stockpiles. For forestry after-use, foliar analysis may determine nutrient requirements during aftercare

restored soils, or over soil storage heaps. Criteria for the control of soil movement need to be determined for each site individually since soil and site characteristics vary. 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, although conditions can be worded to agree suitable equipment and exclude unsuitable equipment. Particular machinery and methods of use may also be incorporated in agreed schemes or codes of practice which may be drawn up at intervals as required by planning conditions.

22. Whilst damage to soils, and costs, can be minimised by direct respreading of stripped soils in progressive restoration, some of the soil resources on many sites have to be put into storage heaps. Planning conditions will need to define the height, shape and location of such heaps and in many cases provide for their management during storage, such as by seeding and weed control. Whilst it is generally accepted that low soil storage heaps are preferable in order to avoid deterioration of soils in the inner parts of heaps, there are no universally applicable maximum height limits. Low heaps may be most necessary where better quality agricultural soils are involved. Other factors of importance include soil moisture content during stripping and how the material is put into and taken out of store.

23. Both mineral planning authorities and mineral operators have important responsibilities to ensure that planning conditions designed to protect and conserve soil resources are met in practice. Mineral planning authorities have formal responsibilities for monitoring and enforcement. But, particularly for operations where irrevocable damage can occur in a short time through lack of care, the responsibilities of mineral operators for close site supervision and the careful briefing of site-level operatives are especially vital.

24. Guidance on requirements for soil stripping, movement and storage for landfill sites, and which may be helpful in drawing up planning conditions for mineral workings, is contained in Chapter 6 of DOE Waste Management Paper No. 26. Other sources of information are in Annex 1.

Filling and fill materials

(i) *General*

25. The reclamation of surface workings may entail the filling of voids left by mineral extraction, using waste materials, up to or above the original ground levels. This approach depends on the availability of suitable fill materials and on individual site characteristics, (cf paragraphs 8, 15) all of which will require careful consideration in determining individual applications. Legislative controls, as well as some of the characteristics which may affect reclamation, differ according to whether fill materials are mine and quarry wastes (whether generated on-site or brought in from elsewhere), or are household, industrial or commercial wastes as defined in the Control of Pollution Act 1974 (the 1974 Act). Landfilling of these last three groups of wastes requires a waste disposal licence under Section 5 of the 1974 Act. A licence may also be required for wastes normally regarded as exempt if they are poisonous, noxious or polluting.

26. The GDO requires a local planning authority to consult the relevant water authority before granting permission for any development involving the use of land for the deposit of any kind of refuse or waste. In addition, waste disposal authorities in conjunction with water authorities have been appointed the competent authorities to implement the EC directive on the protection of groundwater (80/68/EEC) in respect of licensed waste disposal activities; whilst in the case of wastes from mining or quarrying the competent authorities are the mineral planning authorities in conjunction with water authorities for use in the relatively few cases where such wastes are likely to give rise to discharges coming under the terms of the directive. Advice on the directive is given in DOE Circular 4/82 (WO 7/82). Advice from water authorities should enable mineral planning authorities to include any necessary planning conditions for the protection of surface or groundwaters where filling of mineral workings is involved.

(ii) *Mine and quarry wastes*

27. 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.

The planning conditions will need to address both the manner and sequence of filling the mineral excavation and specify, usually by reference to appropriate plans and cross sections, the intended gradients and contours of the final surface of the fill including appropriate allowances for likely settlement.

28. The most common types of workings filled with mine and quarry wastes are those where relatively thin seams of economic minerals of sedimentary origin occur within geological sequences with a high waste ratio (eg opencast coal, gypsum, ironstone). In many cases both operational requirements and good reclamation are served by requiring progressive backfilling of wastes approximately in correct stratigraphical sequence prior to restoration of soils. 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 (cf paragraphs 107 to 110). In some cases it may be possible to identify 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 soil 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—eg large rocks which would interfere with normal agricultural drainage or cultivation operations, or materials with particularly hostile chemical properties.

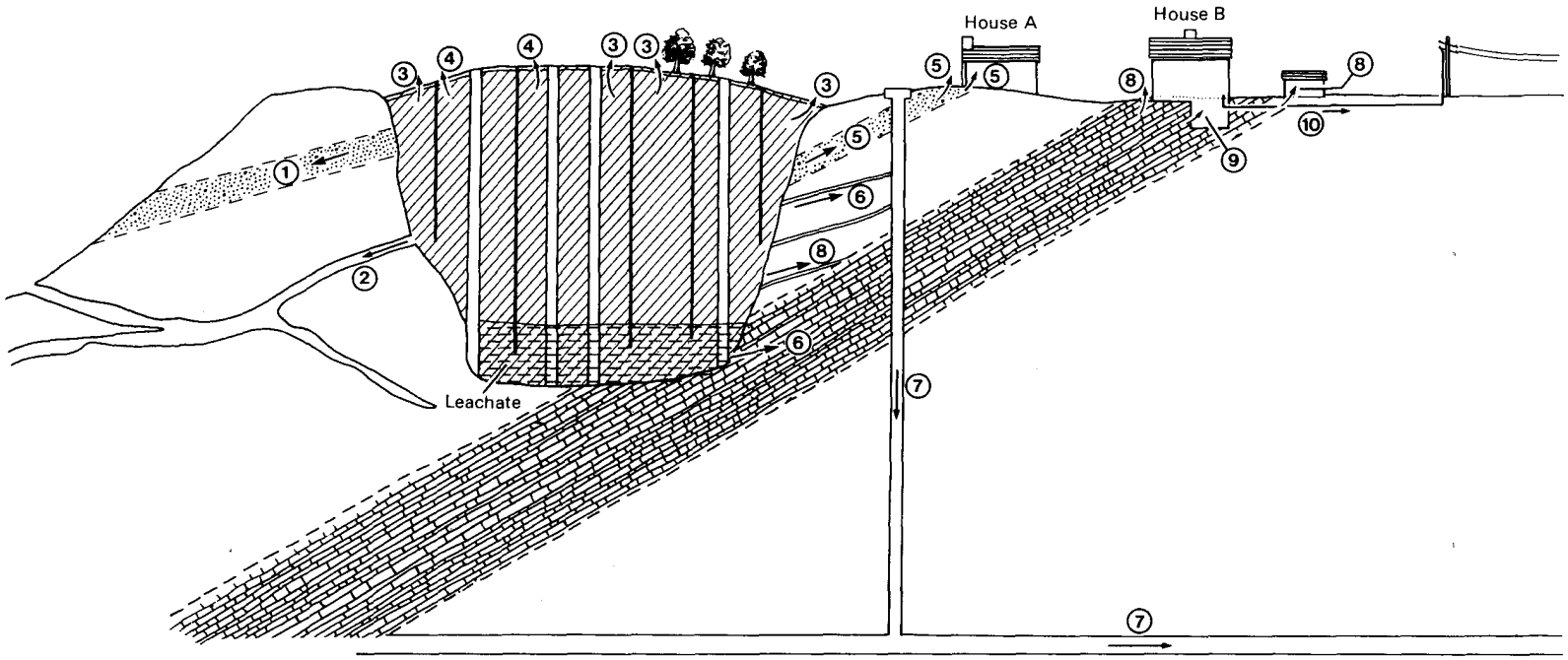
29. Where mineral voids are filled with mine and quarry wastes brought in from elsewhere, similar considerations to the above will apply. However the mineral operator may have less direct control over the timing and availability of fill material.

(iii) *Controlled wastes*

30. If wastes other than mine or quarry wastes are brought in, their disposal on the site will require a waste disposal licence under Section 5 of the 1974 Act in addition to planning permission (in this context a planning permission for mineral working). A fundamental difference between a site licence and a planning permission is that the former is granted to a licence holder, the latter runs with the land. The extraction of minerals and the subsequent disposal in the excavations of controlled waste are increasingly being seen as complementary activities. The licensing authorities in England are the County Councils except in the metropolitan areas and Greater London where the responsibilities are as set out in Annex 2. In Wales the licensing authorities are the district councils. Care will be needed to ensure that there is no conflict between the terms of a permission and a waste disposal licence. This can only be achieved by close co-operation in the relevant local authorities between those responsible for minerals planning and waste disposal. With the implementation of Part I of the 1974 Act many matters formerly controlled by planning conditions fall within the scope of disposal licensing. Conditions attached to the planning permission should still cover planning matters related to the overall after-use and reclamation of the land and aspects of waste disposal affecting amenity, access and general landscaping. The waste disposal licence should control the detailed operation of the site in order to ensure the secure disposal of waste. It should contain specific conditions intended to minimise the risk of pollution of water or danger to public health including measures required to control landfill gas. The licence conditions govern the nature of the wastes to be disposed of and the manner of their deposit. However, in most circumstances the intended types and quantities of wastes need to be known at the planning application stage in order to assess the impact the operation might have on the local community and the surroundings; and the possible effects on proposals for the restoration and subsequent after-use of the site. DOE Waste Management Paper No. 26 "Landfilling Wastes" contains guidance on current good practice in landfilling controlled wastes. Advice on the relationship between planning and waste disposal legislation was originally given in DOE Circular 55/76 (WO 76/76), particularly in paragraphs 43–48. Updated guidance is in the revised version of the HMIP Waste Management Paper No. 4 "The Licensing of Waste Facilities".

31. Currently it is considered that licence conditions only apply during the life of a disposal site and do not give control over post-closure management, or where a licence has been surrendered or revoked. Experience of operating the 1974 Act has demonstrated the need for adjustments to waste regulation powers and duties, including some which affect landfill sites. Moreover continual changes occur in the knowledge, capability and public expectations of pollution control. For landfilled mineral workings, the main concerns are the generation and control of landfill gas and leachate. Following public consultation exercises the Department has announced its intention to amend the waste disposal legislation (Hansard, House of Commons, 29 June 1988, cols 254 to 256). The amendments will include a statutory duty of care on both producers and holders of waste. Waste disposal authorities will be empowered to impose conditions requiring pollution control measures at licensed waste disposal sites to continue as long as may be necessary to make each site safe. Irrespective of these proposed changes, it will remain appropriate for the planning permission to provide for land use aspects of the reclamation of landfilled mineral sites, including details of final levels and contours, the

FIGURE 3 – DIAGRAM OF POSSIBLE GAS MIGRATION PATHS FROM A RECLAIMED, FILLED MINERAL WORKING



Gas pathways to atmosphere

① Through high permeability strata down the bedding plane

② Through caves/cavities

③ Through dessication cracks of the capping at the site perimeter, around tree roots etc.

④ Around site features which provide vertical pathways; gas or leachate wells

⑤ Through high permeability strata up the bedding plane, to atmosphere or house A

⑥ Through fissures caused by explosives etc.

⑦ Along man made shafts etc.

⑧ Through highly fissured strata into the atmosphere or buildings such as house B or shed etc.

⑨ Into underground rooms

⑩ Along underground services

Notes:

(i) Gas could be different compositions passing through ⑤ route compared to ⑧ as different source of gas passes through different routes

(ii) Leachate may degrade to give gas generation at some distance from the site

thickness of final coverings, the respreading of soil layers and subsequent aftercare.

32. There is now increasing realisation of the need to take adequate account, in both planning and waste disposal legislation, of the potential of landfills which take biodegradeable wastes to generate gas over a considerable period of time. HMIP Waste Management Paper No. 27, "The Control of Landfill Gas", provides guidance on the production of such gas from landfilled wastes and the methods to be used to prevent its migration to surrounding land and property. Figure 3, taken from Waste Management Paper No. 27, indicates possible gas migration paths from a hypothetical completed and reclaimed landfill site in a former mineral working. A new requirement has been included in the GDO to ensure a minimum degree of consultation between local planning authorities and waste disposal authorities on development proposals near landfill sites which are likely to emit gas. The statutory limits require consultation if a proposed development is within 250 metres of a site notified to the local planning authority by the waste disposal authority, which is being, or has been within the previous 30 years, used for waste disposal. These statutory requirements are minimum limits only. The reverse situation can occur if an application is made for a mineral working which includes proposals for filling with controlled wastes to reclaim the site, and where part of the site is within 250 metres of existing development. District councils have the opportunity to comment on county matter applications under the GDO. In addition, such mineral applications will require effective liaison between departments responsible for minerals planning and for waste disposal (whether within the same authority or in different tiers of local government), before a decision is issued. DOE Circular 22/88 (WO 44/88) provides general updated guidance on the revised GDO. In Circular 17/89 (WO 38/89), "Landfill Sites: Development Control", the Department has issued further guidance to local authorities on the use of planning powers for the development of landfill sites or of buildings close to them.

Reclamation of workings which do not involve fill

33. Effective reclamation of surface mineral workings does not necessarily require filling of the voids with solid materials. For example there is a wide range of possible beneficial after-uses for water-filled voids in areas with a high natural water table, as referred to later (paragraphs 87 to 90). 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.

34. 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. However it has not proved possible to devise an acceptable "model" condition which would enable mineral planning authorities to grant planning permission for applications for mineral operations which propose low level restoration. The main problem concerns the imposition and enforceability of longer-term or "perpetual" pumping conditions. The use of voluntary agreements may present a practical solution to this type of case. DOE Circular 25/85 (WO 60/85), "Mineral Workings—Legal Aspects relating to Restoration of Sites with a High Water Table" provides current guidance on this situation on the basis of present legislation and experience. Both these guidelines and the technical requirements for low level restoration of sand and gravel workings 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 concludes that voluntary agreements to complement normal planning conditions can be made, which will secure the enforceability of covenants to safeguard the restored land.

Landform

35. 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. Whilst there may need to be some flexibility in final landform to take account of changes necessitated by operational demands, a proposed final landform is not easily capable of fine tuning and adjustment after completion. This applies to surface workings which involve filling and those which do not, and to the reclamation of tips of mine and quarry wastes. Table 2 gives some guidance on slopes of land in relation to use.

Table 2 Slopes of land in relation to use

Gradient			Significance for land use
Fraction	%	Degrees (to horizontal)	
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, SSEW, 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 40	$2\frac{1}{2}$	1°25′	Optimum gradient for drainage channels (MAFF) Maximum lateral slope for playing fields (Nat. Playing Fields Assn, NPFA 1963)
1 in 60	$1\frac{2}{3}$	0°57′	Recommended gradient for winter games 1 in 60-1 in 80 (NPFA, 1963)
1 in 80		0°43′	Minimum desirable cross fall for cricket pitches (NPFA, 1963)
1 in 200	$\frac{1}{2}$	0°23′	Minimum practical fall for piped land drainage (DES 1966). [On reclaimed land and filled land, differential settlement may cause problems on such shallow slopes.]

Note 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.

Restoration

36. Both the drawing up and implementation of effective restoration conditions will be vital for successful site reclamation. The objectives will be similar to those concerned with the stripping and movement of soils prior to working. They will require the preservation of resources of soils and soil-making materials and their replacement in correct sequence on worked and (as appropriate) filled areas which are at agreed contours and gradients, in such a way as to minimise damage to soil structure and other characteristics important for the growth of plants. Good restoration is of vital importance since if soils are damaged at this stage it will set back, or even render abortive, the improvements and standards which can be expected during the aftercare period. The guidance in Table 1 and paragraphs 20 to 24 is also applicable when considering suitable restoration conditions. Restoration conditions can require mechanical subsoiling of the restored soil layers to relieve compaction. This, again, must be undertaken in suitable soil moisture conditions and having regard to the effective depth of subsoiling equipment. Advice on restoration as a result of consultations with the appropriate Agriculture Minister is referred to in paragraph 56, and with the Forestry Commission in paragraphs 75 and 76.

Aftercare

(i) *General*

37. Section 30A of the 1971 Act, inserted by section 5 of the 1981 Act, introduced an important new power to enable mineral planning authorities to impose an "aftercare condition" on the grant of planning permission in relation to land which is to be used for agriculture, forestry or amenity following mineral working. 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 bring it to a satisfactory standard. The ultimate aim behind the concept of aftercare is that, over time, the land does not have to be treated very differently from undisturbed land.

38. The power to impose aftercare conditions to new permissions for the winning and working of minerals came into force on 22 February 1982, through the Town and Country Planning (Minerals) Act 1981 Commencement Order No. 1 (SI 1982/86 (C.4) 1982). These and other relevant paragraphs of the MPG include, and in some cases update, the advice on aftercare conditions contained in DOE Circular 1/82 (WO 3/82). The Circular is now cancelled.

39. 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 (S.30A(1)).

ii The conditions only apply where land used for mineral working is being reclaimed for use for agriculture, forestry or amenity (S.30A(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 (S.30A (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.) Aftercare may include measures designed to control leachate and landfill gas where controlled wastes have been deposited as part of the reclamation. However these measures can be required only during the aftercare period (paragraph (iv) below), whilst the generation of leachate and landfill gas will often continue well beyond this.

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. 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 mineral planning authorities 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 can therefore be reviewed in the light of experience (S.30A (7 & 8)).

40. The Act (S.30A(3)) allows aftercare conditions to be imposed in one of two forms:—

i an aftercare condition imposed at the time of granting of planning permission, specifying the steps to be taken, or

ii a condition which allows an aftercare scheme to be submitted by the mineral operator or other appropriate person for approval (after modification if necessary) by the mineral planning authority.

The second method will usually be appropriate with a long term permission where restoration

and aftercare may not be begun for a number of years. An aftercare scheme will often provide the best and most flexible framework for a successful programme of aftercare aimed at agriculture or forestry. There may, however, be cases where it would be appropriate to specify aftercare steps in the aftercare condition itself—eg 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. In all cases, early discussion with the mineral operator, tenant or landowner (whichever is responsible for aftercare) is important and aftercare conditions and schemes should be designed to allow flexibility in fulfilling them. In the majority of cases, the operator, tenant or landowner has a vested interest in the success of aftercare as the really heavy costs have already been incurred in complying with restoration conditions, and so it is of benefit to increase the value of the restored land as much as possible over the ensuing aftercare period. Guidance on the imposition of aftercare conditions generally, with particular reference to agriculture and forestry, is in Annexes 5 and 6. 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 36(1) of the Town and Country Planning Act 1971 as amended by Schedule 15 of the Local Government Planning and Land Act 1980).

(ii) *Standards*

41. 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 agricultural after-use is intended, if a survey of the physical characteristics of the land has been carried out when it was last used for agriculture, the aftercare standard to be aimed for can be more precisely defined as in Section 30A(9) than in other circumstances (see paragraphs 59 to 61). In any other situation (Sections 30A(10) to (12)), the land must be returned to a standard where it is fit for the use specified in the aftercare conditions. Since these standards may be difficult to define, it is desirable to achieve close co-operation between those carrying out aftercare, those providing expert advice and the mineral planning authority who may need to re-assess the aftercare programme annually.

(iii) *Consultations and responsibilities*

42. Before imposing an aftercare condition, the mineral planning authority are required to consult the appropriate Agriculture Minister (in practice, ADAS) 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. ADAS 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 mineral planning authority) should be required, and what steps would be appropriate (S.30A(13 to 15)). It will clearly be advantageous if the mineral operator, tenant or landowner is involved in discussions with the mineral planning authority at an early stage about the type of aftercare desirable and whether steps for achieving it should be set out in the aftercare condition or in an aftercare scheme.

43. Consultation with ADAS or the Forestry Commission is required before an aftercare scheme for agriculture or forestry is approved. While aftercare is being carried out, the authority may consult ADAS or the Forestry Commission as to whether the steps are being completed satisfactorily (S.30A(16)). The mineral planning authority is not obliged to consult outside expert opinion on aftercare for amenity use at any stage, although in some cases they would probably wish to do so, eg Forestry Commission where trees are to be planted or the Nature Conservancy Council where nature conservation is relevant.

44. 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. ADAS and the Forestry Commission are willing to advise on whether agriculture or forestry respectively is an appropriate after-use and, if so, they will begin preparation of their advice immediately an application for planning permission for development involving aftercare is copied to them. Effective pre-application consultations can speed-up the carrying out and completion of this advice. Preparation of an aftercare scheme should begin, say, six months prior to commencement of aftercare on all or part of the site. This will allow time for consultations and any necessary amendments to be made before a scheme is agreed.

45. Mineral planning authorities are required to issue, on request from any person with an interest in the land, certificates confirming that aftercare conditions have been complied with—providing they are so satisfied (S.30A(17)). Such a certificate only confirms that the aftercare conditions have been complied with and it does not automatically mean that the standards set out in Sections 30A(9) to (12) of the 1971 Act have been attained.

46. The 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 (S.30A(18)).

47. Experience since 1982 indicates that aftercare conditions are now a normal requirement for relevant mineral planning permissions, and that their duration following compliance with restoration conditions is usually for the current maximum period of 5 years. The 1988 surveys of land for mineral working in England and Wales, carried out for DOE and the Welsh Office by mineral planning authorities, include information on the extent of permissions with aftercare conditions. However, given the sequence of operations which must precede aftercare, few sites permitted since February 1982 will as yet have reached the aftercare stage. Hence it will be some time before the effectiveness of aftercare controls becomes known.

48. Additional points and guidance on aftercare for agriculture, forestry or amenity use are in paragraphs 53 to 72, 73 to 81, and 82 to 93 respectively.

IMPOSITION OF NEW OR IMPROVED RECLAMATION CONDITIONS ON EXISTING PERMISSIONS AND WORKINGS

49. Because of the long duration of mineral working at many sites 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 society's concern for the environment. Many planning conditions on older permissions which were intended to control the environmental effects of mineral working and to ensure adequate reclamation are now considered ineffective or, in some cases, are non-existent. The 1981 Act introduced new powers, which came into effect on 19 May 1986, to enable mineral planning authorities to revise these older conditions and to modify the compensation payable as a result of such revisions. It also made two other related changes. Firstly it imposed a duty on mineral planning authorities to review mineral workings in their area. Secondly it empowered these authorities to impose, inter alia, restoration and aftercare conditions for sites for the winning and working of minerals by making Orders under Sections 45, 51 and 51A of the 1971 Act. Further details on these Orders and the review of mineral working sites generally are in MPG4.

50. The guidance on planning conditions for site reclamation given in this MPG should be of assistance to mineral planning authorities both in drawing up conditions for new permissions and in conducting their reviews and considering making the new types of Order. However it is recognised that both costs and technical factors may limit the practicable options for improvements following completion of reviews.

51. A further power in relation to planning conditions is contained in Section 31A of the 1971 Act, which was introduced by the Housing and Planning Act 1986. 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 to vary or revoke any or all of those conditions. The power is explained in paragraph 13 of the Annex to DOE Circular 19/86 (WO 57/86).

RECLAMATION FOR DIFFERENT AFTER-USES

I. General

52. The responsibility for deciding on the intended after-use of a mineral working rests jointly with the applicant, the landowner and the mineral planning authority (or, for some types of after-use, the local planning authority) taking due account of national policies. This general policy framework in relation to choices of after-use is set out in the Introduction (paragraphs 1 to 4). On sites that have been reclaimed with controlled wastes, any after-use should not compromise the pollution control measures.

II. Reclamation to agriculture

(i) *The role of MAFF*

53. In addition to setting out current policy on agricultural land, DOE Circular 16/87 (WO 25/87) contains procedural advice to local authorities on consultations with MAFF (Annex A). For mineral planning applications MAFF has a statutory role in considering the land use implications of sites on Grades 1, 2 and 3A land over a certain size threshold and in connection with aftercare conditions for all sites to be restored to agriculture irrespective of land take or quality. Advice on consultations with MAFF is also given in MPG2. References to MAFF should, in respect of Wales, be read as references to WOAD.

54. DOE Circular 16/87 (WO 25/87) includes in Annex B an explanation of the Ministry's 5-grade Agricultural Land Classification System (ALC) and its uses and limitations. Revised guidelines and criteria for grading the quality of agricultural land were published by MAFF on 25 October 1988 and became operational from 1 January 1989. The basic concepts of the 5-grade system remain unchanged although the former subgrades 3b and 3c have been combined into a single

subgrade 3b. The revised guidelines include consideration of the classification of restored and disturbed land.

55. The following paragraphs and Annexes 3 to 5 provide guidance on the procedures followed by MAFF's Agricultural Development and Advisory Service (ADAS) in relation to minerals planning which MAFF has prepared in consultation with DOE, mineral planning authorities and the minerals industry.

56. Where reclamation to agriculture is proposed in a planning application MAFF have a responsibility to offer mineral planning authorities advice and guidance on the appropriateness of this afteruse and on suitable aftercare conditions if planning permission is to be given (see paragraphs 42 to 44). Such consultation is required regardless of the area of land involved or its agricultural quality. Whilst MAFF (in practice ADAS) are only statutorily required to advise on agricultural aftercare conditions, the achievement of good standards in the aftercare period depends in part upon appropriate (and enforced) planning conditions covering the stripping, movement and restoration of soils over suitably contoured ground following mineral extraction. In line with Circular 16/87 ADAS will therefore continue to comment or advise on conditions for these aspects. In providing their advice to the mineral planning authority ADAS 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. It will normally be useful for ADAS to be involved in informal pre-application consultations with the applicant and the mineral planning authority (cf paragraph 10), in addition to the statutory consultations when a planning application is submitted and during the aftercare period.

57. In practice ADAS' 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; or

iv a technical appraisal of the agricultural considerations with, where appropriate, any comments on the restoration and/or aftercare proposals. This technical response will provide the necessary information to assist mineral planning authorities to consider the agricultural implications together with the environmental and economic factors.

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

58. Decisions on applications can be taken more speedily if the applicant provides appropriate supporting information. Annex 3 contains a list of items which may be useful guidance where a proposed mineral working is to be reclaimed to agriculture. It supplements the general checklist in MPG2. The actual information needed must depend on the individual site, and account should be taken of information requirements which may have emerged during any pre-application discussions.

(ii) *Standards of aftercare*

59. Subsections 30A(9) and (10) of the 1971 Act refer to the standards to which land must be brought to comply with an aftercare condition. Where an application involves better quality agricultural land to be returned to agricultural use, ADAS will normally wish to base aftercare on Section 30A(9). In these circumstances, where the land is in agricultural use or where the previous authorised use had been for agriculture and ADAS can provide details of the physical characteristics of the land, the land must be restored, in so far as it is practicable to do so, to those physical characteristics. Where possible these standards should be quantified and the statement of physical characteristics should be provided to the mineral planning authority before planning permission is granted. To expedite preparation of the statement, ADAS are prepared to make use of appropriate soil data provided by the applicant, subject to satisfactory validation.

60. Annex 4 is a typical, but hypothetical, example of a physical characteristics report. Two copies of the report will be sent by ADAS to the mineral planning authority, including a land classification report where appropriate. The applicant will normally wish to have a copy of the statement/report of physical characteristics. Mineral planning authorities are encouraged to provide this as soon as it is available, informing ADAS that they have done so.

61. There may be occasions when the most appropriate standard for aftercare will be that under Section 30A(10) of the 1971 Act, ie that the land be made reasonably fit for agricultural use. In such cases ADAS will notify the mineral planning authority of this view and will not provide a statement of the physical characteristics. As additional guidance on meeting this standard at the end of aftercare, it is suggested that land may be considered reasonably fit for agricultural

use when after restoration and aftercare it is capable of sustained and beneficial agricultural use by an occupier reasonably, but not exceptionally, skilled in husbandry.

(iii) *Form of aftercare conditions*

62. When imposing agricultural restoration and aftercare conditions, mineral planning authorities should consult ADAS on the form of the aftercare condition (cf paragraph 40). There will be cases where it would be appropriate to specify aftercare steps in the aftercare condition itself. But in many 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 ADAS and the mineral planning authority, when restoration is nearing completion. When considering aftercare schemes, mineral planning authorities 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.

63. To assist operators with scheme preparation, ADAS will be prepared to attend a pre-aftercare meeting convened by the mineral planning authority. ADAS will advise on the items to be covered and the level of detail required within the scheme in question. Annex 5 gives guidance on the level of detail generally required and items to be included. To be most effective such meetings should be held about 6 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.

64. The aftercare scheme should be submitted to the mineral planning authority by the operator at least 3 months prior to commencement of aftercare of the full site or any phase of it. This gives adequate time for the authority to consult ADAS and for any necessary amendments to be made.

65. An aftercare scheme should broadly describe the aftercare strategy to be adopted over the 5 year period and contain detailed proposals for the first year's management. Details for subsequent years should be submitted about 1 month prior to the annual aftercare site meeting to permit an element of management flexibility (see Annex 5).

(iv) *Progress and completion of aftercare*

66. ADAS have said they consider it essential to be consulted at least annually on the way in which aftercare conditions are being complied with. This can most effectively be done by holding an annual aftercare review site meeting. This generally needs to take place between the person(s) responsible for carrying out the aftercare (the mineral operator, tenant or landowner) the mineral planning authority and ADAS in order to:—

i. review progress to date;

ii. agree any remedial measures or improvements necessary;

iii. consider the detailed aftercare programme for the coming year.

For the purposes of these meetings it is advisable for the person(s) responsible for aftercare to keep and make available a detailed record of work undertaken in fulfilling the aftercare conditions and provide, as necessary, a detailed aftercare programme for the forthcoming year (see Annex 5). This latter programme should be circulated to the mineral planning authority and ADAS at least 1 month prior to the annual meeting.

67. There may be cases where inspections at more frequent intervals than a year would assist in achieving adequate aftercare. If this is the case ADAS may approach the mineral planning authority and operator to seek their agreement to extra meetings. Alternatively ADAS may be approached by the mineral planning authority for additional meetings or advice.

68. The mineral planning authority may involve ADAS in the issuing of a certificate confirming that aftercare conditions have been complied with (cf paragraph 45).

69. Any assessment by ADAS of compliance with, and the success of, an aftercare programme will be much assisted by detailed records of the farming practices undertaken during the aftercare period, and these details should be submitted to ADAS by the mineral planning authority when they are available.

(v) *Other issues*

70. It may be desirable for sites to be returned to agricultural use even where there is little or no soil although there may be soil-making materials available (eg old workings where the soil was not stripped and stored separately, or sites with naturally shallow soils). Mineral planning authorities will wish to seek the advice of MAFF in respect of such sites—both on the desirability of an agricultural after-use and the means by which this might be achieved. For new applications,

such advice will be obtained through the normal consultation procedures already described.

71. The same consultation requirements do not apply to sites which mineral planning authorities are under a duty to review under S.264A of the 1971 Act (see MPG4). However after carrying out reviews, authorities have powers, introduced respectively under Sections 8, 9 and 10 of the 1981 Act, to include restoration and aftercare conditions in making under the 1971 Act any new orders under S.45(6) (revocation or modification of planning permission), S.51 (discontinuance of use), or S.51A (prohibition). For agricultural aftercare the same consultation requirements would then apply as under S.30A for new applications. Even where this is not the case, MPG4 recommends that appropriate consultations take place, inter alia, with MAFF when embarking on a review and before any decision on action in respect of a review site is taken by a mineral planning authority.

72. There are a number of instances of lagoons from mineral extraction being used for fish farming and which, under the definitions used in the 1971 Act, would come within the meaning of "agricultural after-use". These instances are not the same as the operation and continuation of established fish farms which are authorised under the GDO. Some general guidance on technical, financial and procedural aspects of fish farming is contained in "Fish for Food and Sport", MAFF (ADAS) Booklet 2007, 1982. However this document was drawn up for farmers and not for the guidance of mineral operators. Further advice on fish farming may be obtained from the MAFF Fisheries Laboratory, Lowestoft.

III Reclamation to forestry

(i) *Policy aspects*

73. Whilst in the past reclamation to forestry use following mineral extraction has been less common than to agriculture, the need to foster the diversification of the rural economy is likely to lead to increasing consideration of forestry as an after-use for mineral workings. In this context forestry means "the growing of a utilisable crop of timber" (S.30A(19) of the 1971 Act). In England, workings reclaimed for forestry have mainly been in previously forested areas such as the plateau gravels of the south and south-east. Afforestation has also been undertaken on steep, rough or very stony sites, areas lacking in topsoil, and sites at higher altitudes. In Wales areas of mineral workings with subsequent reclamation to forestry have been mainly on opencast coal sites.

74. The increasing role of forestry as an after-use will need to be reflected in decisions on individual applications and in policies in development plans. Such decisions and policies will need to take account of the development of Government policy on environmental aspects of forestry in general, and in England in particular. The outlines of this policy were given in a joint announcement from the Secretary of State for the Environment and the Forestry Minister for England (Hansard, House of Commons, 16 March 1988 Cols 595, 596). That announcement emphasised the statutory duty of the Forestry Commission to endeavour to achieve a reasonable balance between forestry and environmental considerations. It also stated that the main potential for afforestation in England lies on arable land and improved grassland which may no longer be needed for food production.

(ii) *Planning conditions*

75. For new permissions, the general principles and stages in imposing reclamation conditions in paragraphs 8 to 48 will be applicable for forestry after-use. There is no statutory requirement for mineral planning authorities to consult the Forestry Commission on appropriate restoration conditions, as against aftercare, for forestry after-use. However, as for agriculture 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. For example underdrainage is rarely considered 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.

76. Drainage is probably the most critical site property for successful forestry reclamation. 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, fertilising and planting operations. It is therefore recommended that mineral planning authorities seek the advice of the Forestry Commission on all planning conditions which are likely to affect the ultimate success of forestry aftercare.

77. General advice on the statutory consultations with the Forestry Commission on aftercare is in paragraphs 42 to 44. 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 Commission is desirable. 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. Further guidance on aftercare scheme content is given in Annex 6. The Forestry Commission may also be able to advise where tree planting is planned on sites returned to amenity use. 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.

78. Forestry Commission Research and Development Paper 141 "A guide to the Reclamation of Mineral Workings for Forestry" is designed to assist in the satisfactory implementation of forestry aftercare. It considers the factors affecting the growth of trees on restored sites, recommends techniques which have proved successful in forestry reclamation, and includes some criteria which will help in assessing the success of the afforestation. The report does not attempt to set out model planning conditions. However it should provide a useful basis to assist mineral operators in preparing planning applications which involve proposals for forestry after-use and to assist in the statutory consultation process (see also Annex 1 for references). Table 3 summarises the major types of overburden associated with the major groups of surface mineral operations and lists their main limitations for tree establishment and growth. However this 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 broadleaved species may be grown.

79. 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 and selection of shallow rooting species. (See also Waste Management Papers No. 26 and 27.)

80. When mineral planning authorities carry out reviews of sites under S.264A of the 1971 Act, it is recommended that appropriate consultations with the Forestry Commission take place, on the same basis as with MAFF (see paragraph 71).

81. Forestry planting of restored mineral workings may be eligible for the Woodland Grant Scheme which was introduced in April 1988 and is administered by the Forestry Commission. The aims of the scheme are to increase timber production and to promote the contribution which new woodland can make to rural employment, to the provision of alternative uses for agricultural land no longer needed for food production and to the enhancement of landscape, recreation and wildlife conservation. The new scheme succeeds both the Forestry Grant Scheme and the Broadleaved Woodland Grant Scheme.

IV. Reclamation to amenity

(i) *General*

82. 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 sports facilities, amenity woodland, lagoons for water recreation, and the conservation of landscape and wildlife. For amenity after-uses which require the planting of some form of vegetation, the general considerations in paragraphs 20 to 48 will be relevant in preparing an application and in drafting and implementing appropriate planning conditions. This section considers particular aspects of different types of amenity after-use which may influence the drawing up of schemes for working and site reclamation—in particular restoration and aftercare. It mentions bodies and organisations who can provide advice on requirements for different amenity after-uses. The 1971 Act (S.30A) does not require mineral planning authorities to consult external expertise for advice on aftercare for amenity use; but they may wish to do so in appropriate cases. Mineral operators may also find it useful to obtain advice from such sources.

83. The 1971 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 amenity use; and it is provided that land is brought to the required standard when it is suitable for sustaining trees, shrubs and other plants (S.30A(12)). However, this does not mean that trees, shrubs etc must in fact be planted; nor does it mean that the whole of a site must necessarily reach this standard. Where the quarry floor is below the water table, the site could equally well become a lake for water recreation (eg angling, sailing, swimming), with a requirement for trees or shrubs to be planted around the lake.

84. If it is proposed that a site be reclaimed to a recreational after-use, both mineral planning

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

Mining operation	Type of overburden/soil	Texture[1]	Major limitations for tree establishment	Best suited species[2]
Opencast coal	Hard and soft sandstones, siltstones and mudstones. Glacial tills, sandy pebbly to dense clays.	S, SL, SCL, ZCL, CL & C, 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.	JL, Alders, CP below 250 m O.D., SS, JL, Birch, Willow.
Colliery spoil	Shaly material.	ZC and C.	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, LP, CP, False acacia.
Jurassic and Permian Limestones	Thin calcareous soils over limestone rock.	CL, ZCL, SCL.	High pH restricts species choice; soil droughtiness due to stoniness; N deficiency; risk of lime-induced chlorosis.	Italian alder, CP, Norway maple, Sycamore, Poplar.
Carboniferous Limestone	Drift: till in N England, silty drift in Midlands; some thinner calcareous soils in S Wales and parts of S Pennines	Dominantly clayey till. ZCL in Midlands.	Heavy textures lead to winter waterlogging and summer drought; liability to compaction; silty drift particularly erodible; N deficiency.	Alders, Birch, JL, CP, Willow.
Chalk	Thin calcareous soils directly over chalk.	ZCL.	High pH restricts species choice; N, P, K deficiencies; risk of lime-induced chlorosis.	Italian alder, CP, Norway maple, Sycamore, Poplar, 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, CP, JL, Birch, Willow.
Plateau Gravels	Stony sandy or loamy soil.	SL, LS.	Droughtiness; stoniness; low pH; N, P deficiencies.	CP, Alders, Birch.
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 materials.	CP, Alders, Birch, Willow.
China Clay	Coarse gritty sand.	S	Pronounced droughtiness; low pH; N, P, K, Mg deficiencies.	Alders, CP, SS, Maritime pine.
Igneous	Gritty drift, often with peat surface.	SZL, SL	Low pH; P deficiency.	SS, Alders.
Vein minerals	Wastes variable in composition.	Variable	Heavy metal toxicity; N, P deficiencies; drought risk.	SS, Alders.

Notes

1 ZCL silty clay loam; CL clay loam, C clay, SL sandy loam, SCL sandy clay loam, LS loamy sand, S sand, SZL sandy silt loam, ZC silty clay.

2 JL Japanese larch, CP Corsican pine, SP Scots pine, SS Sitka spruce, LP Lodgepole pine.

3 Source: Forestry Commission.

authorities 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. In addition, if areas are to be planted with vegetation and used for informal open space, the Countryside Commission, Forestry Commission and Nature Conservancy Council (NCC) may each be able to provide advice on individual applications which will be useful for restoration and aftercare. For example 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 (see Annex 1). The Forestry Commission's R & D Paper No. 141 (see paragraph 78) whilst primarily aimed at forestry after-use, contains information on factors affecting tree growth and recommended techniques which may be useful in tree planting for amenity purposes. In addition the NCC can advise on the recreation of grassland/heathland habitats and other reclamation for wildlife interest. A report recently completed for DOE, "Cost Effective Management of Reclaimed Derelict Sites", which is to be published, contains guidance on management and maintenance aspects of land reclaimed for "amenity" uses which will be of value in the context of minerals planning as well as for grant-aided reclamation.

(ii) *Formal sports facilities*

85. 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. However 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. 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 again 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. Where possible, aftercare conditions should take due note of tested and recommended seed types appropriate to the intended use.

86. 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.

(iii) *Water areas*

87. 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" (cf paragraphs 25 to 34), 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.

88. 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 4 summarises some guidance notes on general operational requirements for water-based recreational uses.

89. Advice on lagoon areas intended for wildfowl breeding and feeding may be obtained from the British Association for Shooting and Conservation, the Game Conservancy, and the Royal Society for the Protection of Birds; and for nature conservation, from the NCC and the Royal Society for Nature Conservation (RSNC).

90. 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 1971 Act. Formation of a lake to a specified configuration and depth may be properly required under Section 29. However given the definition of a restoration condition under S.30A(2), a requirement to allow an excavation to fill with water would not come within this and provide the basis for an aftercare condition (or

Table 4 Guidance notes on operational requirements for water based recreational uses

Sport	Type of bank	Minimum depth of water	Preferred shape of water	Approximate minimum size of water	Bankside facilities[1]
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 adjacent to the bank as a bank wash stopper to limit bank erosion.	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. 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 ski-ing	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 boards. No trees to be planted on the bank in the direction of the prevailing wind.[2]	1.5 metres		11 hectares	Clubhouse. Good access. Space for sail board storage.
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.

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 voluntary agreements, (eg under Section 52 of the 1971 Act) to achieve reclamation and initial management of water areas—particularly for wildlife and nature conservation.

(iv) *Nature conservation*

91. "Amenity use" includes the conservation or promotion of landscape and wildlife. In this context the NCC may have an interest in many of the possible after-uses of reclaimed mineral working. DOE Circular 27/87 (WO 52/87) (Nature Conservation) sets out policies for the protection of flora, fauna and their habitats, outlines the role of the Council, and draws attention to the need for local authorities to have regard to considerations of nature conservation in drawing up planning policies and in determining individual planning applications. Extraction of minerals can create new types of habitat where they were formerly absent or rare, while 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. The NCC should be consulted for advice on habitat types and conservation practice. County Naturalists Trusts (within the RSNC) may provide useful local advice and information, and may also be able to manage reclaimed nature conservation areas.

92. 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 into account 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. Advice on geological features of interest should be sought from the NCC.

93. If a mineral working is designated as an SSSI, the NCC can enter into a management agreement with the owner of the land under Section 15 of the Countryside Act 1968 for the purpose of safeguarding the scientific interest of the site. Under these agreements the NCC 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 mineral planning authorities to make agreements relating to the management of reclaimed mineral workings.

PARTICULAR PROBLEMS AND REMEDIAL TECHNIQUES

General

94. Certain types of surface mineral workings or the surface disposal of wastes from mining and quarrying create particular problems for effective site reclamation and/or require the use of specialised techniques. Some of these problems arise from the configuration and long timescales of certain types of workings, and others from the physical and chemical characteristics of the particular minerals and wastes. This section refers to the major problems in the context of the main minerals worked in England and Wales, and the extent to which solutions are available and appropriate to planning control over mineral workings. Table 5 summarises the main physical and chemical factors which may inhibit (cause problems for) plant growth on the major mineral substrates.

Deep hard-rock quarries

95. Major deep hard-rock quarries operate over a long timescale. Planning permissions for such sites may allow for the phasing of areas of extraction, including interim landscaping of the quarry margins and faces. Whilst final site reclamation and possible after-uses must be considered at the time of a planning application and appropriate provision included in the conditions, it is likely that most schemes prepared before extraction commences will require updating and amendment during the lifetime of a working. Planning conditions may allow for this by requiring a general treatment scheme to be prepared and agreed before extraction starts, to be followed

up by submission of detailed schemes for particular phases as they are completed; and by setting a time-limit for submission of the final reclamation plan which is commensurate with the duration of the mineral permission. The main reclamation options for mineral workings have been discussed in the preceding paragraphs. However the physical characteristics of deep workings—particularly the level of the water table; the amount of, and access to, level floor areas in dry quarries; and sidewall stability—may often limit the realistic possibilities. Some consideration of reclamation and after-uses for deep hard rock quarries, and the factors limiting their applicability, have been the subject of reports arising from research for DOE and the minerals industry. The Department has also completed a review of technical, operational, administrative and legal aspects of the stability and hydrogeology of deep mineral excavations. A comprehensive technical review has been published, together with a handbook which includes guidelines on the investigation, assessment and inspection of excavated quarry slopes (see references in Annex 1).

96. Phased progressive working and reclamation will often be difficult to achieve for hard rock quarries because of the depth of excavations. Also in some cases different qualities of stone may occur at varying depths and in various parts of a permission which may require to be worked simultaneously or intermittently as demand fluctuates. For long-life quarries, wherever the upper faces will be visible for many years prior to the completion of mineral working, it will be useful to consider a condition requiring progressive reclamation of finished upper faces and benches.

Mine and quarry wastes

(i) *General*

97. Tips of mine and quarry wastes from surface workings which cannot be backfilled into excavations, used, or otherwise disposed of, will require reclamation in situ. It is equally important to ensure the reclamation of waste materials produced by underground mining which are brought up and deposited on the surface. The "Survey of Land for Mineral Working in England 1982", which was undertaken for DOE by mineral planning authorities, indicated that, within this general category, much the most important type was surface waste deposits from deep-mined coal. The second largest entry was for disposal of china clay wastes. Lesser, but still important, totals were recorded for limestone, vein minerals (which included tin, copper, lead, zinc, silver, haematite iron ore, barytes, calcspar and fluorspar), igneous rock and sandstone. A similar survey in Wales indicated that deep-mining for coal was again the major source of surface waste, although with slate waste forming a significant secondary feature. Further mineral surveys have been carried out for DOE and the Welsh Office by mineral planning authorities during 1988 and the results will be published.

98. The after-use envisaged and the surrounding landscape will influence the final landform of a tip, although the availability and quality of land for deposit of the waste are also major factors. Tip reclamation may, or may not, involve regrading of the material. Most new permissions for mineral waste tipping are likely to define the total land requirements from the start of an operation. Planning conditions may include stripping of soils before tipping commences, appropriate gradients and contours, and progressive restoration and aftercare to establish the required vegetation. Aftercare powers are, however, limited to waste tips which form part of a permission and after-use for the winning and working of minerals. Other general guidance is in MPG2.

99. The GDO contains provisions under which mineral planning authorities have the power to require a waste management scheme making provision for the manner in which the waste is to be deposited, the preliminary stripping and storage of topsoil and subsoil and the restoration and aftercare of a site. Details of this are given in MPG5.

100. Where the deposit of mine and quarry wastes forms part of a permission for the winning and working of minerals, it may be possible under the new Review and Order-making powers introduced by the 1981 Act to improve, or impose for the first time, planning conditions—particularly for restoration and aftercare. Advice on this is contained in MPG4. Section 1 of the 1981 Act resolved previous uncertainties by bringing the removal of material from mineral working deposits (as defined) clearly under the planning control of the 1971 Act. Following the undertaking given during Parliamentary consideration of this provision, an addition to the GDO has given permitted development rights for the removal of material from bona fide stockpiles and small or temporary mineral working deposits. Advice on the removal of minerals from bona fide stockpiles is given in MPG5; and in Circular 22/88 (WO 44/88) as regards the GDO in general.

(ii) *Colliery spoil heaps*

101. Under the GDO many spoil heaps from deep mined coal activities are permitted development without reclamation conditions attached. Nevertheless considerable areas of these spoil heaps have been reclaimed. Many of these sites had little or no soil cover available, and the nature of the spoil presented physical and chemical

problems for the establishment and maintenance of suitable vegetation (see Table 5). On current and future colliery spoil disposal sites where soil cover is available the technical problems of actually establishing and maintaining vegetation will be less, but planning conditions will aim at enabling good standards of reclamation to be reached for the appropriate after-use (including restoration and aftercare or after-treatment).

102. Following concern about the environmental impacts of spoil disposal, raised by the Commission on Energy and the Environment, a major research project has been carried out for DOE. The main aim of the project was to design and construct an Evaluative Framework to assist decision making on the selection of options for colliery spoil disposal. Section 8 of the Final Report considers restoration and aftercare of spoil tips (see Annex 1 for references).

(iii) *Tailings*

103. The fine-particle residues from the processing of minerals are normally disposed of as high-moisture slurries into lagoons impounded within purpose-built dams. However in some industries the use of modern dewatering techniques (eg filter-presses and chemical stabilisation) is increasing. The reclamation of tailings lagoons can present major engineering problems since, depending on their physical and chemical properties, the deposited materials may remain unstable for many years. The principal sources of tailings in Britain are the working of china clay, coal, tin, fluorspar and associated minerals. Large silt lagoons from washing of sand and gravel or crushed stone may also present similar physical characteristics. Chemically, there are wide variations between the different types of tailing, which also affect the ease of reclamation.

104. It is likely that the reclamation of most tailings areas will depend on the planting of vegetation (eg for agriculture, amenity or forestry). The time period required before such planting can take place will depend on the time required for dewatering and stabilisation of the materials. This will influence the planning conditions which are appropriate. A literature survey by Warren Spring Laboratory has reviewed possible methods of modifying lagoon systems to accelerate consolidation, although also emphasising the additional costs which may be involved. Plant growth problems arising from the chemical characteristics of metalliferous tailings are referred to in paragraph 105 and in Table 5.

(iv) *Metal toxicities*

105. Many of the wastes from metal mines contain concentrations of metals which present problems for the successful establishment of vegetation and hence for site reclamation (see Table 5). In addition to sites used primarily for extraction of non-ferrous minerals, wastes with some metal contents may be generated during the extraction and processing of other materials, such as fluorspar and barytes. Careful analysis of the physical and chemical properties of the likely wastes to be produced is a prerequisite for determining reclamation requirements and planning conditions. In such situations particular investigations should be undertaken if the mineral waste is likely to be used as backfill in association with the disposal of controlled wastes, since many metals can be leached under these conditions. Planning conditions need to include not only provision for treatment of the wastes but also for control and disposal of drainage and any run-off. The options for establishment of vegetation are generally either to cover the wastes with soil and/or other soil-making materials such as non-metalliferous overburden (if sufficient on-site material is available) or to plant directly into the wastes using suitable species and ground preparation treatments and amendments. Caution needs to be exercised in grazing these areas with livestock owing to the risk of toxicity effects. A guidance note based on current information and advice from ADAS is to be issued by the Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL), "Notes on the Restoration and Aftercare of Metalliferous Mining Sites for Pasture and Grazing". For individual sites MAFF (WOAD) is able to provide advice on these risks and on preventive measures that may be taken.

Vegetating difficult terrain

106. Special techniques may be required to establish vegetation on quarry faces or steep-sided mineral waste tips which are inaccessible to normal agricultural machinery or established tree planting techniques. Hydraulic seeding or hydroseeding is the most common of these. It entails a liquid (water-based) slurry containing seed, fertilisers and a mulch being sprayed onto the slopes. Horizontal spraying is equally possible (eg to accelerate drying and establishment of plants on the surface of a tailings lagoon). The use of hydraulic seeding can be specified in drafting restoration and aftercare conditions if it is not desirable or practicable to use more conventional ground preparation and planting methods. However, its use is only likely to be preferred in treating the types of difficult terrain mentioned. Other techniques for seeding difficult terrain with herbaceous vegetation and trees are evolving, and will doubtless continue to do so. If use of a particular technique is proposed as part of a reclamation scheme in a planning application, the mineral planning authority will wish to have

Table 5 Main physical and chemical factors which may inhibit plant growth on mineral substrates, where soil resources are lacking

Mineral substrate	Physical							Chemical		
	Instability (of tipped material)	Steep slopes (of tips and excavations)	Spontaneous heating and ignition	Texture and structure (eg compaction, absence of fines)	Inhibitory water regime (water supply)	Extremes of surface temperature	Wind erosion	Low nutrient status	Extremes of pH	High levels of toxic substances
Brick clay	0	2	0	2	1	1	0	2	1 to 0	0
China clay (wastes and pits)	1	2	0	2	1	1	1	2	1	0
Coal—colliery spoil	2 to 0	2 to 0	2 to 0	2	2 to 0	2	1	2	2 to 0	1 to 0
Coal—opencast	0	0	0	2 to 1	1 to 0	1	0	2 to 1	2 to 0	0
Ironstone	0	1 to 0	0	1	1 to 0	0	0	1	0	0
Non-ferrous metals	2 to 0	2 to 0	0	2	1	2 to 0	2 to 0	2	2	2 to 1
Sand and gravel	0	1	0	1	1 to 0	1 to 0	1 to 0	1	1 to 0	0
Acid rocks (Clays, sandstone acid igneous)	2 to 0	2	0	2	1	1	0	1	1	0
Calcareous rocks (limestone, chalk basic igneous)	2 to 0	2	0	2	1	1	0	2	1	0
'Normal' soils	0	0	0	0	0	0	1 to 0	1 to 0	0	0

Key to Inhibitory Factors
0 = Negligible or absent
1 = Moderate
2 = Very Pronounced/Severe

NOTE There is an inter-relationship between some of the inhibitory factors such as poor texture and water supply problems for growth.

adequate evidence of the likely success of the technique for the particular site.

Building on made ground

107. Housing, commercial or industrial building may be the after-use ultimately intended for some reclaimed mineral workings, although a separate planning permission and compliance with building regulations for any such development would be required. Particular foundation engineering problems may occur if development takes place on, astride, or across the peripheries of backfilled worked out areas—whether filled with on-site mineral wastes or with imported minerals. The British Standard Code of Practice for Foundations (CP 8004: 1986) states that: "All made ground should be treated as suspect, because of the likelihood of extreme variability. Any proposals to found a structure on made ground should be investigated with extreme care".

108. However, properly placed and compacted mineral waste materials may provide acceptable foundations for building (see paragraph 2.2.2.3.5 of CP 8004). The costs of any special requirements attributable to an after-use such as building should fall on the new use and not on the mineral working. This is broadly accepted and conditions should not normally be imposed on a mineral working permission to require special compaction of the fill. There may, however, be occasions when a mineral working is permitted and where they are firm proposals for building on the backfilled area. In these circumstances it may be both more economical and practical to include in the mineral permission a suitable planning condition controlling backfilling of the overburden. Layered compaction during backfilling of a site is likely to give better, more uniform results than trying to consolidate the full depth of looser material after tipping has been completed. The economics of these two options will vary with the method of working.

109. Proposed planning guidance "Development on Unstable Land" will provide background information and planning guidance about surface development on unstable land. In addition to consideration of instability caused by underground cavities and unstable slopes, it will include consideration of compressible ground such as backfilled quarries.

110. Made ground containing controlled wastes, particularly non-granular materials with a high biodegradable content, may present chemical as well as geotechnical problems for subsequent building development (eg generation of landfill gas and potential combustibility of fill material). It may also contain chemicals which may attack building materials or be potentially toxic to plants, animals or humans. Prospective developers should carry out detailed site investigations and obtain expert advice before deciding on the end use of such sites. Guidance on the advisability of building on or near completed landfills and on the factors to be taken into account is contained in Chapter 6 of DOE Waste Management Paper No. 26, and in the HMIP Waste Management Paper No. 27 "The Control of Landfill Gas" (see also paragraphs 30 to 32). Guidance in relation to development of contaminated land is in DOE Circular 21/87 (WO 22/87) and in various papers issued by the ICRCL.

REMOVAL OF BUILDINGS, PLANT AND MACHINERY

111. It is usually desirable to require that buildings, plant and machinery needed in connection with mineral working are eventually removed. 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.

LAND LEFT DERELICT AFTER MINERAL WORKING

112. The main purpose of this MPG is to provide guidance on planning controls to achieve the reclamation of mineral workings to an acceptable after-use. However, as noted in the National Audit Office Report "Department of the Environment: Derelict Land Grant", whilst sites brought into operation since 1948 are subject to planning permission, early permissions may have no, or no adequate, reclamation conditions. There are also areas of dereliction resulting from previous mineral working operations which pre-dated planning controls. The survey of derelict land in England carried out in 1982 showed 45,687 hectares of land as derelict, about one half of which was the result of mineral working. Special provisions have been made to encourage reclamation of derelict land.

113. Under Section 1 of the Derelict Land Act 1982, grants (known as Derelict Land Grants) are available for the reclamation of derelict land to both local authorities and bodies other than local authorities, such as private companies and nationalised industries. The word "derelict" has no statutory definition but for the purposes of grant aid it means "land so damaged by industrial or other development that it is incapable of beneficial use without treatment". In Assisted Areas and Derelict Land Clearance Areas grants

are paid at the rates of 100% to local authorities and English Estates and 80% to other successful applicants. Outside these areas the rate is 50% for both local authorities and others, except that in the National Parks and Areas of Outstanding Natural Beauty, local authorities can receive 75% grants.

114. DOE Circular 28/85, "Reclamation and Re-Use of Derelict Land", sets out the Government's priorities for Derelict Land Grant expenditure. Guidance notes explaining the range of works for which grant is normally available, how grant is assessed and how to apply are available through DOE offices. Grant is not normally payable for land which has legally enforceable but unfulfilled reclamation conditions relating to it. In such cases reclamation should be achieved by enforcement of the planning conditions.

115. In the Welsh Development Agency Act 1975—Section 16, as substituted by the Derelict Land Act 1982, Section 2—powers are laid down whereby local authorities throughout the Principality can be 100% grant aided in respect of eligible reclamation costs. Grants of 80% on the net loss incurred in carrying out an approved reclamation scheme are available to private individuals or bodies other than local authorities.

116. The Welsh Development Agency issues Explanatory Memoranda defining the conditions applicable to grants to both local authorities and other bodies.

ANNEX 1

REFERENCES AND EXAMPLES OF USEFUL PUBLICATIONS

This annex is not intended to be comprehensive. Apart from listing relevant DOE Circulars and Minerals Planning Guidance Notes, it gives merely a general indication of the range of publications available which may be useful in assessment and advice on the reclamation of mineral workings.

A. DOE CIRCULARS

55/76 (WO 76/76)
Control of Pollution Act 1974—Disposal Licences

4/82 (WO 7/82)
EC Directive on the Protection of Groundwater Against Pollution Caused by Certain Dangerous Substances (80/68/EEC).

1/85 (WO 1/85)
Use of Conditions

25/85 (WO 60/85)
Mineral Workings—Legal Aspects Relating to Restoration of Sites with High Water Tables

28/85
Reclamation and Re-use of Derelict Land

19/86 (WO 57/86)
Housing and Planning Act 1986: Planning Provisions

6/87 (WO 25/87)
Development Involving Agricultural Land

21/87 (WO 22/87)
Development of Contaminated Land

27/87 (WO 52/87)
Nature Conservation

15/88 (WO 23/88)
Environmental Assessment

22/88 (WO 44/88)
General Development Order Consolidation

17/89 (WO 38/89)
Landfill Sites: Development Control

B. MINERALS PLANNING GUIDANCE NOTES

MPG1 1988
General Considerations and the Development Plan System

MPG2 1988
Applications, Permissions and Conditions

MPG4 1988
The Review of Mineral Working Sites

MPG5 1988
Minerals Planning and the General Development Order

C. OTHER REFERENCES

General

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of the Institute of Mining and Metallurgy and the Royal Institute of Chartered Surveyors.

1. Statutes, Directives
2. Planning and Development Control
3. Resources and Reserves
4. Materials
5. Transport
6. Extraction
7. Processing
8. Restoration and After-use
9. Supply and Demand
10. Environmental Impact and Environmental Effects

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NOTE: ICRCL Guidance Notes may be obtained from the DOE Publications Sales Unit, Building 1, Victoria Road, South Ruislip, Middlesex HA4 0NZ.

RESPONSIBILITY FOR DETERMINING APPLICATIONS FOR WASTE DISPOSAL SITE LICENCES IN THE METROPOLITAN AREAS AND GREATER LONDON

(i) A metropolitan district council in Tyne and Wear, South Yorkshire and the West Midlands. (In each area there is a lead district which serves a Joint Committee that deals with common criteria and systems for site licensing).

(ii) A Joint Committee in West Yorkshire, with Wakefield acting as "lead district".

(iii) The Greater Manchester and Merseyside Waste Disposal Authorities for the whole of those areas; and

(iv) The London Waste Regulation Authority for the whole of London.

RECLAMATION OF MINERAL WORKINGS TO AGRICULTURE

INFORMATION WHICH A MINERAL OPERATOR MIGHT PROVIDE TO MINERAL PLANNING AUTHORITIES IN SUPPORT OF A PLANNING APPLICATION TO ASSIST BOTH THE AUTHORITY AND ADAS IN ADVISING THE AUTHORITY

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 27 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 and subsoil 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 evalution then any data obtained should be offered, especially with relation to watertable level, soil-forming 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. Where mineral operators provide detailed information on site physical conditions 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 metre 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 metre.

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 agricultural usages, eg grass, crops etc.

7. Details, including a plan, of any known field drainage system, including the positions of main outfall ditches and watercourses.

8. A strategic plan of the type of reclamation to agriculture that is proposed including:—

8.1 Projected plan of contours and final levels of the site, together with information about soil-forming materials, subsoil and topsoil depths in each case;

8.2 The phasing and time-scale of the working, restoration and aftercare;

8.3 The methods of filling where appropriate, types of fill and materials proposed (eg controlled wastes, mine and quarry wastes etc);

8.4 The methods of stripping, transporting and restoring soils;

8.5 Proposed outfalls for drainage of the restored land;

8.6 Areas to be restored for agriculture;

8.7 Areas to be restored for tree planting and other uses, including their soil requirements; and

8.8 Proposed access roads to restored farmland.

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

10. 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.

HYPOTHETICAL EXAMPLE OF ADAS PHYSICAL CHARACTERISTICS REPORT (SECTION 30A(9) OF 1971 ACT)

PHYSICAL CHARACTERISTICS REPORT FOR LAND AT RED HOUSE FARM

Following the request for detailed information on the physical characteristics of soil at Red House Farm, members of the RPG visited the site during the summer of 1988. An ALC survey was undertaken and soils augered to 100 cm and soil pits dug to determine the physical characteristics.

Location, Altitude and Relief

The site lies to the east of West Burton, south of Hale village between the River Stour in the west and the A88 in the east. The land lies at an altitude of about 20 m (65 ft) and is level or very gently sloping. Altitude and relief are non limiting in the classification of the site.

Climate and Relief

The main parameters used in the assessment of the climatic limitations are average annual rainfall (AAR) and accumulated temperature (ATO). For this site these figures are 650 mm and 1425°C respectively indicating that there are no climatic limitations on the site. The field capacity days figure for the site is 145 days. The mean last frost occurs in late April.

Geology and Soils

The area is underlain by river terrace deposits on which deep light textured soils have developed over sand and gravel. Typically sandy loam overlies slightly stony loamy sand with sand at depths of below 50 cms. In isolated areas Keuper Marl outcrops at the surface and on these areas sandy loam overlies clay at depths below 25 cms.

Land Use

At the time of survey arable crops including fodder rape, barley and sugarbeet were growing at the southern end of the site whilst in the north grass leys and permanent pasture supported a dairy herd.

Agricultural Land Classification

The majority of the site is of a high quality.

Grade 1

This grade accounts for 0.9 ha and 2% of the site. It is mapped in the north where sandy loams occur to at least 100 cms or are underlain by clay loam at depths below 80 cms. These soils have only occasional stones and fall into wetness Class I with no evidence of gleying above 70 cms.

Grade 2

Grade 2 is mapped over 29 ha and 71.5% of the site to include soils which have typically, sandy loams overlying loamy sand at depths below 50 cms. Sand occurs in some profiles at depths below 80 cms. These soils fall within wetness Class I with no evidence of gleying in the profile to at least 100 cms. In dry years crop yields may be slightly reduced due to a lack of available water but these soils are very flexible and capable of supporting a wide range of crops. In small areas in the north and west sandy clay loams and clay loams occur below sandy loam topsoils and these profiles are too poorly drained for a higher grade, and the presence of gleying and a slowly permeable layer at 45–50 cms places these soils within wetness Class III.

Isolated profiles of Grade 1 and 3a occur within the land mapped as Grade 2 but these areas were too small to map separately at this scale.

Grade 3

Sub Grade 3a accounts for 10.7 ha and 26.5% of the site. It is mapped where the soils are too droughty or too poorly drained for a higher grade. In the south east and centre of the site 30/45 cms of slightly stony sandy loams and coarse sandy loams overlie loamy sand and loamy coarse sand with coarse sand and gravel in some profiles at depths below 60 cms.

In the south west and north east of the site the soils are too poorly drained for a higher grade showing distinct gleying in the profile at depths below 30 cms. In these areas sandy loam topsoils overlie sandy clay loam with heavy clay loam and

clay marl in the profile at 35 cms in the north and below 27 cms in the south west. Soils in this area fall mainly into wetness Class IV.

Breakdown of ALC grades

Grade	Area	%
1	0.9	2.0
2	29.0	71.5
3a	10.7	26.5
Total	40.6	100.0

Soil Units

The area is underlain by uniform soils except in the extremities of the site. Two units have been identified which may require separate handling if the site is worked for gravel.

Unit 1

Unit 1 is mapped over the majority of the site accounting for 32.1 ha and 79% of the area. Typically 27 cms of dark brown (10 YR 3/3) sandy loam topsoil overlies dark brown (7.5 YR 3/4 to 4/6) sandy loam upper subsoil to depths between 40 and 70 cms. Loamy sand (and in the south, loamy coarse sand) lower subsoil occurs below this depth, with sand, grit and gravel occurring in many areas within 100 cms of the surface. The lower subsoil colours range from dark brown (7.5 YR 3/4) to reddish brown (5 YR 4/3).

The soils have strongly formed medium to fine sized subangular blocky peds which break to fine subangular blocky peds under pressure. Similar structures occur in the subsoils. Where bands of sand and gravel occur the soils were too stony to assess the structure. All horizons are very porous and well drained.

Plant roots are abundant to at least 45 cms and often to 80 cms. Worms are common throughout the profile especially in the grass land areas.

In the north the soils are almost stoneless (ie less than 1%) but in the south small and medium sized rounded quartzite pebbles account for between 5 to 10% of the top 40 cms of soil and up to 15% of the soil volume below this depth.

A soil pit dug at the northern end of the site showed the soils to have very porous, moderately strong, medium sized, subangular blocky peds to 58 cms with weakly formed, moderately porous prismatic structures, in subsoils with very variable textures. The area involved is not sufficiently large to map as a separate unit. Roots and worms are common to 60 cms but become less common with depth. These soils contain less than 5% of rounded quartzite pebbles and in many areas the soils are stoneless.

Unit 2

This unit is mapped over 8.5 ha and 21% of the site. Typically 30 cm of dark brown (10 YR 3/3) sandy loam topsoil overlies strong brown (7.5 YR 4/6) sandy clay loam upper subsoil. This overlies strong brown (7.5 YR 4/6) clay loam or silty clay lower subsoil which occurs in most profiles at depths below 50 cm, and is gleyed in many profiles. In isolated areas sandy loam occurs below 80 cm.

The structure is moderately formed medium sized subangular blocky in the surface horizons but in the clay loam and silty clay horizons structure is more typically weak columnar breaking to medium angular blocky. The soils are very porous at the surface and become less porous with depth, with clay loam and sandy clay loam lower subsoil horizons being only slowly permeable.

Rounded quartzite pebbles occur in the sandy horizons of most profiles but nowhere account for more than 5% of the total volume and in many profiles account for less than 1%. The heavy textured subsoils are usually stoneless. Plant roots and worm channels are common to 60 cm but become less with depth.

Typical soil descriptions

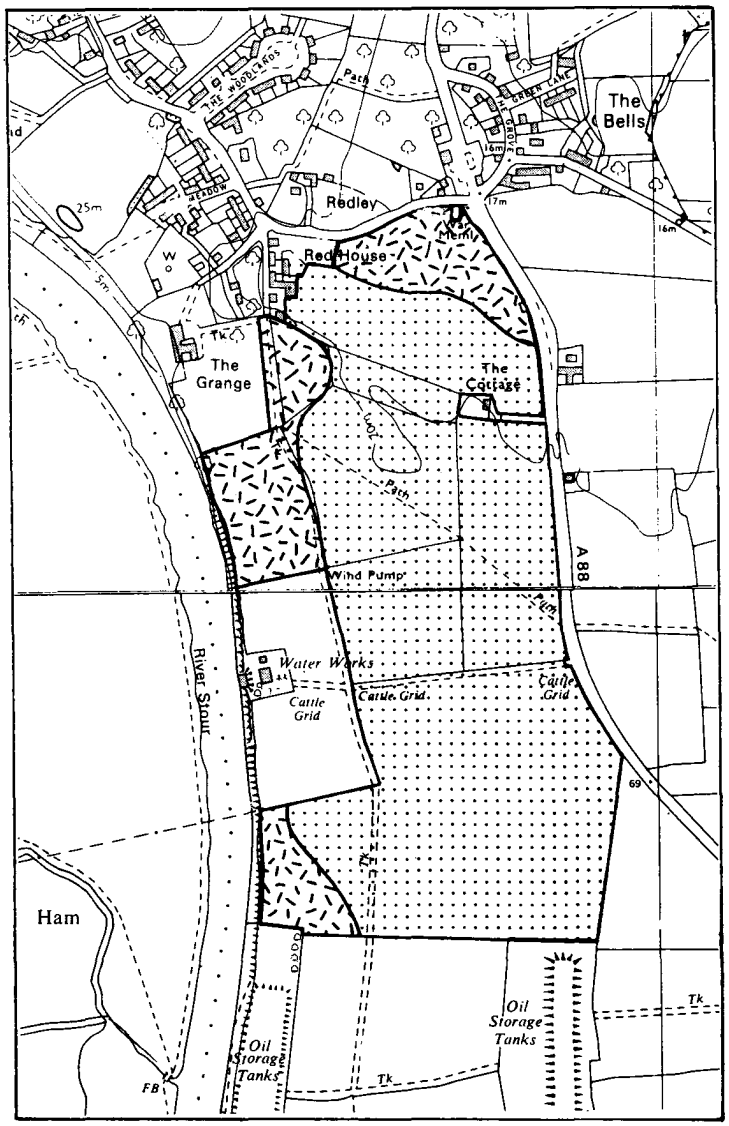
Unit	Depth (cms)	Texture	% stones
Unit 1 (South)	0–27	SL	2–10%
	27–40/70	SL	2–10%
	40/70–100	LCS–S	V. variable
Unit 2	0–30	SL	0–5%
	30–50	SCL	0–5%
	50–100	CL–C	0%
Unit 1 (North)	0–30	SL	<1%
	30–60	SCL	<1%
	60–100	SCL–SL	<1%

Summary

The majority of the site is underlain by river terrace deposits on which sandy loams have developed over sand and gravel. The land is of a a high quality when considered on the national scale, with 73.5% of the site mapped as Grades 1 and 2. The rest of the site is of above average quality (26.5% sub grade 3a). Two soil units have been identified. Unit 1 includes deep sandy soils whilst unit 2 covers sandy loams which overlie heavier textured subsoils. If the site is worked for gravel the two units may need to be handled separately.

Mr J Smith
Senior Research Officer
October 1988

RED HOUSE FARM



SOIL UNITS

UNIT 1 — SL / LS/LCS / S

UNIT 2 — SL / SCL/CL / SCL/C

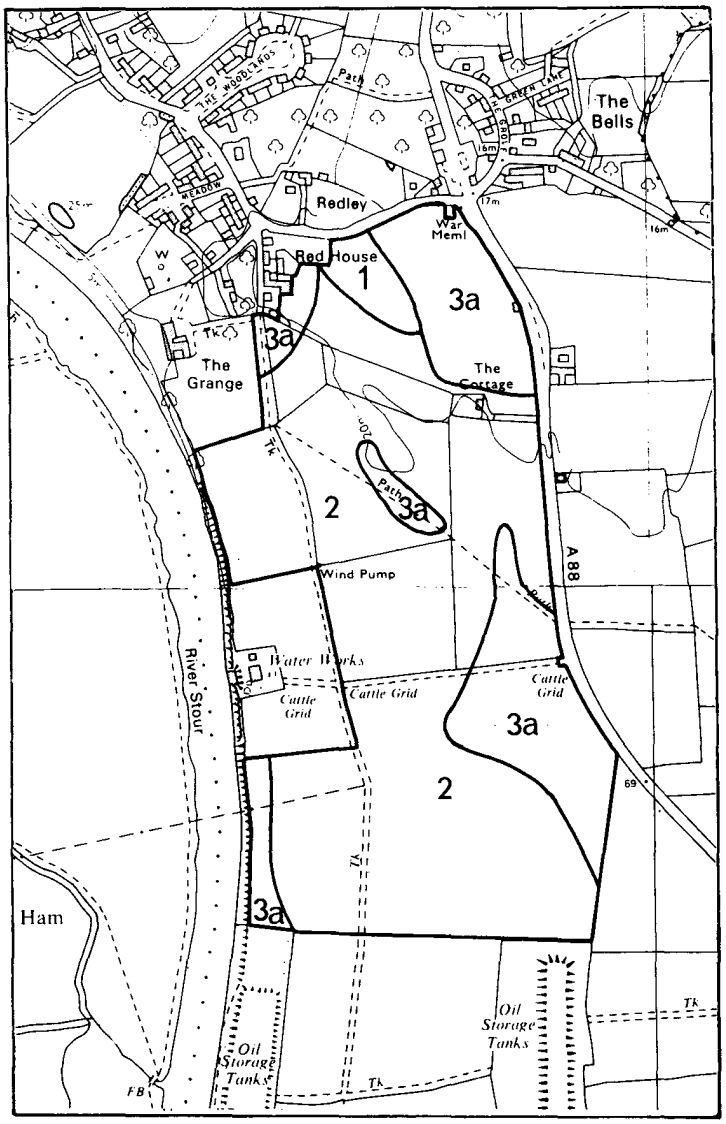
Scale
0 — 400
Metres
Source maps

Surveyed by Resource Planning Group
Oct 1980 Job No. W16/88
Map produced by Cartographic Unit,
Land and Water Service.
Wolverhampton R.O.

This map is accurate only at the scale shown.

Any enlargement would be misleading.

RED HOUSE FARM



Agricultural Land Classification

1	1	VERY HIGH
2	2	
3a	3a	MEDIUM
3b	*	
4	*	
5	*	VERY LOW

Non– Agricultural Land

Land predominantly in urban use *

Land primarily in non-agricultural use *

Agricultural Buildings *

Land not surveyed *

Land in this grade does not appear on this map *

Scale 0 — 400 Metres

Source maps

Surveyed by Resource Planning Group Oct.1988 Job No. W16/88

Map produced by Cartographic Unit, Land and Water Service. Wolverhampton R.O.

This map is accurate only at the scale shown.

Any enlargement would be misleading.

ANNEX 5

RECLAMATION TO AGRICULTURE

GUIDANCE ON AFTERCARE SCHEME CONTENT

Introduction

1. The preparation of a successful aftercare scheme requires two levels of information:

a. An *outline strategy* of commitments for the 5 year aftercare period. This should be submitted to the mineral planning authority not later than 3 months prior to the commencement of aftercare.

b. A *detailed programme* for the forthcoming farming year. The first detailed programme will be submitted with the outline strategy. Subsequent detailed programmes will be submitted annually to the mineral planning authority for approval not later than 1 month prior to the annual aftercare site meeting.

2. These schemes need to be discussed and agreed by the mineral planning authority, MAFF and person(s) responsible for the conduct of the aftercare programme. Where expensive equipment is to be purchased for aftercare purposes, early consultation may be particularly advantageous to ensure that proposed purchases are compatible with aftercare requirements. The items to be included and level of detail required for each are discussed in paragraphs 3 to 6 below. The proposals need to take into account any relevant local circumstances and will also conform to the Rules of Good Husbandry and Estate Management.

The Outline Strategy

3. This will broadly outline the steps to be carried out in the aftercare period and their timing within the programme. Where a choice of options is retained this should be made clear together with criteria to be followed in choosing between them. map should accompany this outline. All areas subject to aftercare management should be clearly marked on this map together with separate demarcation of areas according to differences in proposed management. Commitments to provide any plans, specifications, site records or analyses to the MPA for approval at specified intervals ought also to be covered. Normally such information is required one month in advance of agreed consultations.

4. The outline strategy document should cover as appropriate the aftercare steps detailed below (4.1–4.7) 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:—

4.1 *Cropping Pattern*

A brief description of cropping pattern to be adopted 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." Where a range of options are to be retained this should also be made clear.

4.2 *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 agricultural machinery.

4.3 *Remedial Treatments*

Commitments to undertake stone picking operations and secondary treatments ie moling and subsoiling 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."

4.4 *Field 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.

4.5 *Fertilizers, Weed Control 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).

4.6 *Irrigation*

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.

4.7 *Shelter Belts, Hedges etc*

An outline strategy is needed to cover:—location, ground preparation (see previous sub-sections for levels of details required); planting and maintenance commitments. Practitioners are advised that consideration of aftercare schemes for commercial woodland are the responsibility of the Forestry Commission. Woodland which is ancillary to the farming of the land for other agricultural purposes is normally the responsibility of MAFF.

NB *Footnote* Fencing and provision of water for livestock 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. Fencing can be required as a separate planning condition.

Detailed Annual Programme

5. This will provide the detailed proposals for the forthcoming year. It will need to be discussed and agreed at the annual site management meeting held with representatives from the mineral planning authority and MAFF. It should:—

(i) Amplify the outline strategy (paragraph 4) 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 eg due to differences between actual and anticipated site conditions.

6. 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 will then be provided for specific steps including:—

6.1 *Cropping*

Details should be provided for the cropping programme on site. For each field information should include details on:—

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

The content 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.

6.2 *Grassland Management*

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.

6.3 *Secondary Treatments*

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

6.4 *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.

6.5 *Irrigation*

Details of irrigation proposals specific to the forthcoming cropping year.

6.6 *Shelter Belts, Hedges etc*

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; weed control policy; fertiliser application and cutting/pruning.

ANNEX 6

RECLAMATION TO FORESTRY

GUIDANCE ON AFTERCARE SCHEME CONTENT

Introduction

1. A successful aftercare scheme for forestry requires details of all steps that will be undertaken during the 5 year period, plus others that may become necessary as a result of steps such as foliar analyses.

2. An *initial programme* should be prepared to include all requirements necessary to plant and establish the tree crop. This should be submitted to the mineral planning authority not later than 3 months prior to the commencement of aftercare.

3. The details need to be discussed and agreed by the mineral planning authority, the Forestry Commission, and the person(s) responsible for the conduct of the aftercare programme. The items to be included and level of detail required for each are discussed in paragraphs 6 to 13 below. The proposals need to take into account any relevant local circumstances, and will also conform to principles of good forestry practice.

4. The aftercare scheme should be accompanied by a map showing all areas subject to aftercare management, together with separate demarcation of areas according to differences in proposed management.

5. In subsequent years, an *annual programme* of procedures to be carried out to maintain the plantation(s) should be submitted to the mineral planning authority for approval not less than one month prior to an annual aftercare site meeting. Commitments are likely to be drawn from the guidance in paragraphs 11 to 14 below although, exceptionally, drainage may also need to be considered during this period of aftercare.

6. *Cultivation practices*

An outline of the range of cultivations likely to be undertaken, including depth and timing of operations, and suggested machinery to be utilized.

7. *Secondary treatments*

Commitments to undertake secondary treatments, such as discing to form low planting ridges, need to be outlined.

8. *Drainage*

Drainage should have been considered during the planning and execution of the restoration phase. However, if there is a perceived need for drainage during aftercare, the drainage design needs to be outlined, including a map showing location of ditches, their depth, gradients and outfalls.

9. *Ground cover*

Where herbaceous ground cover is proposed, details of species composition, density of cover, and timing and method of establishment should be outlined.

10. *Tree planting*

Details of species, stock type and size, tree spacing, method, timing and position of planting are required. If mixtures of species are proposed, details of the proportion of individual species are needed, together with a ground plan showing how the mixture is to be planted. If individual tree protection is proposed details should be included.

11. *Fertilizers*

The basis for determining the need and application rate for fertilizers should be outlined, including method(s) of approach (eg soil and/or foliar analysis), and the timing of such investigations and operations.

12. *Weed control*

Details of intended weed control, including methods and timing, should be included.

13. *Site maintenance*

Commitments to maintain tree stocking to an agreed density, and tree protection where appropriate, need to be outlined. There should also be a commitment to investigate and remedy site conditions which cause abnormal tree failure.

14. *Fencing*

Fencing is not covered by aftercare conditions. Erection of fencing and its subsequent maintenance needs to be a separate condition of the planning permission.