Defra Guidance for Successful Reclamation of Mineral and Waste Sites

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Date: August 2004
FOREWORD

On 21 May 1999 the Minister of Agriculture, Fisheries and Food (MAFF) announced changes to the work that the Farming and Rural Conservation Agency (FRCA) undertook on the Ministry’s behalf in relation to land use planning. In essence the changes were a refocusing of inputs, reducing detailed involvement with ad hoc land use planning work, and concentrating more on strategic relationships with Government Offices, planning authorities and the Regional Development Agencies, and inputs to development plans. In addition, priority was to be given to the integration of agricultural considerations, and especially the implementation of the EU Rural Development Regulation, into wider Government policies affecting the rural economy and the environment.

MAFF therefore no longer undertook Agricultural Land Classification (ALC) surveys, except in exceptional circumstances. Instead, greater use was made of desk studies and predictive mapping techniques. It was up to applicants to provide ALC surveys and Statement of Physical Characteristics Reports for proposed sites.

After the formation of the Department for Environment, Food and Rural Affairs (Defra) and the Rural Development Service (RDS) in June 2001, work continues on the above priorities.

Following discussions with sectors of the minerals and waste industry, MAFF agreed to commission FRCA to produce guidance on the agricultural aspects of mineral and waste development, in terms of their experience of “good practice”. This work was continued by RDS, and aims to help fill the gap left by the reduced detailed inputs to ad hoc land use planning work, particularly for mineral planning authorities.

This guidance is based on the technical knowledge and practical experience of FRCA and RDS staff, with advice from the Steering Group formed from a wide cross-section of representatives involved in the minerals and waste industry. The guidance supplements training events run by MAFF/FRCA/RDS over recent years for mineral planning authorities and mineral operators.
ACKNOWLEDGEMENTS

This guidance was compiled on behalf of MAFF/Defra by the following FRCA/RDS staff:

Alex Bowness, David Shaw, Neville Sherlock and Mark Stephen. Keith Roberts and Jeff Barlow were responsible for commenting on the final drafts. Margot Holmes was responsible for the final formatting.

We would like to thank members of the steering group for their guidance and technical input. The steering group comprised:

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INTRODUCTION

One of Defra’s priority interests in land use planning is the protection of best and most versatile agricultural land (grades 1, 2 and 3a) from irreversible development. Linked to this is the recognition in the UK Strategy for sustainable development of the importance of safeguarding agricultural land to meet the needs of future generations, and minimising the loss of soils to new development. (DETR: A Better Quality of Life: May 1999: Paragraphs 6.66 and 8.50). The importance of soil is also highlighted in The First Soil Action Plan for England: 2004-2006. In terms of Government policy it is not necessary for high quality land to be restored to agricultural use, but that the restoration and after-use following mineral or waste development should safeguard it's long-term agricultural potential. It is on this basis that the guidance has been written, although there are also circumstances where lower quality agricultural land may warrant restoration to a high standard.

Achieving high standards of restoration is important in terms of sustainable development, also it keeps the largest number of options open for the future use of the land.

**Competence of consultants and Health and Safety**

An important basis of schemes of working and restoration are Agricultural Land Classification Surveys and Statement of Physical Characteristics Reports. Their preparation should only be undertaken by a competent person with proven and relevant experience in the field. Appropriately qualified persons would be expected to be members of the Institute of Professional Soil Scientists*, the British Institute of Agricultural Consultants or other relevant professional bodies. As a minimum requirement, the competent person would be expected to have 3 years recent experience in carrying out agricultural land classification surveys.

Where reference is made to pesticides and plant nutrition, advice must be obtained from BASIS and FACTS qualified advisers respectively.

Persons using this guidance must comply with the Health and Safety at Work Etc. Act 1974 and it's relevant statutory provisions. This requirement takes preference over any guidance in the document.

The user of this guidance is solely responsible for all liabilities that might arise. No liabilities are accepted for any losses of any kind arising from the use of this guidance.

*The Institute of Professional Soil Scientists maintains an approved list of members suitably qualified to provide technical advice on the planning, working and restoration of sites (see Addresses).
ADDRESSES

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DE6 1GH

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FACTS
(As for BASIS above)
GLOSSARY OF TERMS

The terms used in the text are defined in this glossary, and apply only to this guidance. The authors gratefully acknowledge DETR’s consent to reproduce parts of the Glossary of Terms from “The Reclamation of Mineral Workings to Agriculture” ISBN 0 11 753095 6.

AFTERCARE PERIOD
Period (usually 5 years) following soil replacement during which drainage, cultivation, seeding, fertilising and establishment of after-use to the agreed standard takes place. Programme of aftercare works must be agreed with the Mineral Planning Authority.

AFTERCARE SCHEME
A scheme submitted by the operators and agreed with the Mineral Planning Authority setting out the proposed management of the land during the aftercare period. Alternatively, the steps required during the aftercare period may be set out as a series of planning conditions.

AFTER-USE
The final use of the site following restoration. For example, forestry, amenity, agriculture. An agricultural after-use may be, for example, permanent grass, arable crops, or a rotation including arable crops and grass.

AGRICULTURAL LAND CLASSIFICATION (ALC)
A methodology developed by the Ministry of Agriculture Fisheries and Food (MAFF) for assessing the quality of agricultural land. The system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The principle physical factors influencing agricultural production are climate, site and soil. These factors together with interactions between them form the basis for classifying land. The methodology has five grades (grade 1 the highest quality land and 5 the poorest) with grade 3 subdivided into two subgrades 3a and 3b. The grade or subgrade of land is determined by the most limiting factor present.

AMENDMENT
An organic or inorganic substance which is added to soil forming materials to improve their chemical and physical properties to increase biological activity and facilitate plant growth.

**ANAEROBIC**
Without oxygen. May be a problem with soil storage, where soil may become anaerobic due to compaction or waterlogging excluding air from within the soil, reducing its ability to support plant growth without remedial measures.

**ARABLE AGRICULTURE**
Production of crops which require cultivation and reseeding each year, such as cereals, root crops and oilseed rape.

**BACKACTER**
Also known as a back-hoe hydraulic excavator. A machine with a reach of about 6 metres normally mounted on tracks, used for stripping and restoring soils, as well as for loading dumptrucks.

**BEST AND MOST VERSATILE AGRICULTURAL LAND**
MAFF Agricultural Land Classification grades 1, 2 and 3a agricultural land.

**BIODEGRADABLE**
(Also *putrescible*) material which is capable of being decomposed by micro-organisms into its elements or constituents.

**BULKING FACTOR**
The % increase in volume of materials when excavated compared to their volume in an undisturbed state.

**BUND**
Stack of stored material, usually soil, often used to screen working areas; or material placed in an engineering context to protect areas from flooding or spillage of fuel etc.

**CAP**
(Also *capping layer*) the cover placed over the landfill on completion of landfilling to exclude water or to ensure landfill gases can be effectively managed. Constructed of low permeability material.

**COMPACTION**
Compression of soils normally by heavy machinery which damages soil structure, resulting in restrictions to plant rooting and poor drainage.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIFFERENTIAL SETTLEMENT</td>
<td>(See also Settlement) process whereby some parts of the site sink more than others, leading to an uneven gradient. May lead to backfalls on drainage pipes resulting in wet areas within the site. May be a particular problem with sites filled with putrescible waste.</td>
</tr>
<tr>
<td>DIRECT PLACEMENT</td>
<td>Restoration of soils to their final location without a period of storage.</td>
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<tr>
<td>DROUGHTINESS</td>
<td>A lack of soil water which may affect the range of crops that can be grown, as well as their yield and sometimes quality. Droughtiness is included as one of the constraints within the agricultural land classification system.</td>
</tr>
<tr>
<td>DUMPTRUCK</td>
<td>Wheeled machine used to transport minerals and soils.</td>
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<tr>
<td>ENVIRONMENTAL IMPACT ASSESSMENT</td>
<td>The process whereby the environmental impact of proposals are assessed, normally as part of the planning application process.</td>
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<tr>
<td>EROSION</td>
<td>The movements of soil particles from the land surface, usually as a result of heavy rainfall or sometimes strong winds.</td>
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<tr>
<td>FERTILISER</td>
<td>Organic or inorganic materials added to the land to provide essential nutrients to promote the growth of plants.</td>
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<tr>
<td>FIELD DRAINAGE</td>
<td>See Underdrainage.</td>
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<tr>
<td>FRIABLE</td>
<td>The condition of a soil when it readily crumbles under light pressure. Often referred to in planning conditions as “dry and friable”.</td>
</tr>
<tr>
<td>HEADLAND</td>
<td>Strip of land at the edge of a field where agricultural machinery turns back into work.</td>
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<tr>
<td>HORIZON</td>
<td>A specific part of the soil profile, e.g. the lower horizon may refer to the subsoil.</td>
</tr>
<tr>
<td>HOLISTIC</td>
<td>Consideration of a system in its entirety rather than in its individual components.</td>
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<tr>
<td><strong>HYDRO-GEOLOGY</strong></td>
<td>The influence of geology upon the earth’s water.</td>
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<tr>
<td><strong>HYDROLOGY</strong></td>
<td>All the earth’s water, both surface and underground.</td>
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<tr>
<td><strong>IMPERMEABILITY</strong></td>
<td>Refers to the inability of water, air and roots to penetrate a material such as soil.</td>
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<tr>
<td><strong>INFRASTRUCTURE</strong></td>
<td>All wells, pipes, pumps, chambers and engineering hardware or utilities which are used in either the landfill gas or the leachate control systems. May also refer to mineral processing plant, site offices etc, or agricultural water supplies, access tracks, fences and gates etc.</td>
</tr>
<tr>
<td><strong>INTERIM RESTORATION</strong></td>
<td>See <a href="#">Restoration</a>.</td>
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<tr>
<td><strong>LANDFILL GAS</strong></td>
<td>By-product of the biological decomposition of putrescible matter in waste, chiefly comprising methane and carbon dioxide.</td>
</tr>
<tr>
<td><strong>LANDFORM</strong></td>
<td>The profile of the restored land surface of the site.</td>
</tr>
<tr>
<td><strong>LANDRAISING</strong></td>
<td>A waste disposal site which is above the height of the surrounding land.</td>
</tr>
<tr>
<td><strong>LEACHATE</strong></td>
<td>Water that has seeped through a landfill and has thus extracted and become contaminated with substances from within the deposited wastes and their products of decomposition.</td>
</tr>
<tr>
<td><strong>LEACHING</strong></td>
<td>The downward removal of materials in solution from the root zone by water percolating through the soil e.g. nitrate which may pollute aquifers in certain circumstances.</td>
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<tr>
<td><strong>LIMING</strong></td>
<td>Use of material containing the carbonates, oxides and/or hydroxides of calcium and/or magnesium used to neutralise soil acidity.</td>
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<tr>
<td><strong>LOOSE TIPPING</strong></td>
<td>Refers to the placement of soils in a bed system using backacters and dumptrucks whereby none of the replaced soils are trafficked by machinery.</td>
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<tr>
<td><strong>LOW LEVEL RECLAMATION</strong></td>
<td>The restoration of land to a level below that which it was pre-working. Restorations may require a pumped drainage system.</td>
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<tr>
<td><strong>LOWER PLASTIC LIMIT</strong></td>
<td>The water content of the soil at which it changes from being brittle to plastic. For cohesive soil this can be assessed by rolling the soil with the palm of the hand to form a thread 0.3cm thick. If this is impossible due to the thread breaking up it is considered to be drier than its lower plastic limit and thus in a suitable state for movement. Cohesionless soil (coarse grained, sandy) has no plastic limit.</td>
</tr>
<tr>
<td><strong>MOLE DRAINAGE</strong></td>
<td>Installation of drains by use of a mole plough. The base of the plough blade is bullet-shaped to form the “mole” and varies in diameter from 5-10cm. This method of drain installation is most suitable for stoneless clay soils which do not have widely fluctuating water tables. This is a temporary drainage system and may require re-moling every 5-6 years.</td>
</tr>
<tr>
<td><strong>MOTOR-SCRAPER</strong></td>
<td>A wheeled machine which can strip soils using an angled blade, as well as transport and replace them. The machine has its own driven wheels.</td>
</tr>
<tr>
<td><strong>NUTRIENTS</strong></td>
<td>Mineral elements essential for plant growth, obtained from the soil. The most commonly considered are N, P and K (Nitrogen, Phosphorus and Potassium).</td>
</tr>
<tr>
<td><strong>ORGANIC MATTER</strong></td>
<td>The organic fraction of soil, which is made up of plant and animal residues, and is important for maintaining good soil structure, fertility, ease of working, and for the prevention of erosion.</td>
</tr>
<tr>
<td><strong>OVERBURDEN</strong></td>
<td>Material underlying the soil profile (i.e. normally below 1.2 metres) and above the mineral to be worked.</td>
</tr>
<tr>
<td><strong>PERMEABILITY</strong></td>
<td>The ability of air and water to penetrate the soil.</td>
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<tr>
<td><strong>pH</strong></td>
<td>A measure of acidity or alkalinity where a pH</td>
</tr>
</tbody>
</table>
of less than 7 is acid and greater than 7 is alkaline.

**PHASED WORKING**

A method of sequential working of the mineral resource, which divides the site into a number of phases allowing for progressive reclamation of the land. Once the site is opened up for working, soils can be used to restore the land progressively without storage.

**PLOUGH PAN**

Smearing and compaction of soil, generally caused by ploughing at the same depth, often in wet conditions.

**PONDING**

Areas of accumulated water on the land surface. May be associated with localised drainage problems and/or periods of heavy rainfall.

**PRE-SETTLEMENT LEVELS (CONTOURS)**

The calculated levels (contours) to which tipping is carried out such that, when settlement is completed, the final consent levels are achieved (also called surcharge levels or contours).

**PROGRESSIVE RECLAMATION**

See [Phased Working](#).

**RECLAMATION**

The process of returning the land to the agreed after-use and standard which includes both the restoration and the aftercare periods.

**RESTORATION**

1. Mineral planning definition: Process of soil replacement to prepare the site for aftercare works (cultivation and seeding).

2. Landfill industry definition: The process which will return the completed landfill to a condition suitable for its proposed after-use, includes design, initial landscaping works, soil spreading and aftercare.

   **Interim restoration** is the establishment of vegetation such as grass following replacement of part of the subsoil layer. This safeguards the remainder of the soil resource from damage that may be caused by remedial works required by the landfill gas and leachate control infrastructure.
restoration may normally be for a period of up to 5 years during which the worst of any settlement normally occurs.

3(1) RESTORATION STANDARD
Defined in the Town and Country Planning Act 1990 Schedule 5 paragraph 3 (1): “the land is brought to the required standard when its physical characteristics are restored, so far as it is practicable to do so, to what they were when it was last used for agriculture”.

3(2) RESTORATION STANDARD
Defined in the Town and Country Planning Act 1990 Schedule 5 paragraph 3 (2): “In any other case where the use specified in an aftercare condition is a use for agriculture, the land is brought to the required standard when it is reasonably fit for that use”.

RIPPING
See Subsoiling.

ROOT ZONE
The part of the soil profile exploited by plant roots.

ROTATION
A sequence of cropping designed to limit a build up of pests and diseases, as well as facilitating good crop husbandry and the maintenance of soil condition and fertility.

SATURATED LEVEL
The level within the soil profile below which the soils are saturated (see also Water Table).

SETTLEMENT
The amount by which a landfill surface sinks below its original tipped level due to compaction by its own weight and degradation of the waste. May also affect restored mineral sites which have not been landfilled to a lesser extent. (see also Differential Settlement and Pre-settlement Levels).

SMEARING
Normally the result of a mechanical action such as ploughing, rotavating or wheel slippage, resulting in a soil layer which is relatively impermeable. Particularly a problem with wet clayey soils.

SOIL FORMING MATERIAL
Materials such as overburden or silt pond
dredgings, which may be treated by the addition of organic matter to enhance their soil-like properties for use in land restoration.

SOIL PROFILE
Cross section through the soil usually comprising a layer of topsoil, which overlies the subsoil; often includes the weathering parent material from which the subsoil is formed.

SOIL STRUCTURE
The combination or arrangement of primary soil particles into secondary particles, units or peds. These peds may be arranged in the profile in such a manner as to give a distinctive characteristic pattern. The peds are characterised and classified on the basis of size, shape and degree of distinctness into classes, types, and grades. Structural units include:
- **Blocky**: Cube-like blocks of soil up to 10cm, in size sometimes angular with well defined planar faces, sometimes with curved surfaces and corners (subangular blocky).
- **Columnar**: Vertically oriented pillars, often six-sided up to 15cm in diameter with rounded tops.
- **Granular**: Rounded aggregates, generally not much larger than 2cm in diameter often found in loose conditions in the topsoil horizon. Where particularly porous, such units are called crumbs.
- **Platy**: Horizontally layered, thin and flat aggregates resembling wafers. Such structures occur, for example in recently deposited clay soils.
- **Prismatic**: Vertically oriented pillars, often six-sided, up to 15cm in diameter, with flat tops to the pillars; common in the subsoil horizon of clayey soils in semi-arid regions.

STATEMENT OF PHYSICAL CHARACTERISTICS REPORT
A report normally produced in conjunction with an agricultural land classification survey, which describes the different soil profiles in detail, allowing the restoration of the site to be judged against this benchmark.

SUBSOIL
The subsoil horizons of soils with distinct
profiles. In soils with weak profile development, the subsoil is below the top-soil (or its equivalent of surface soil) in which roots normally grow. Although generally lower in organic matter, it is an important source of available water for plants.

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<tr>
<th>Term</th>
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<tbody>
<tr>
<td>SUBSOIL SUBSTITUTE</td>
<td>Material such as overburden or silt pond dredgings which are used as a substitute for subsoil in land restoration.</td>
</tr>
<tr>
<td>SUBSOILING</td>
<td>Disturbance of the subsoil/subsoil substitute within the soil profile using a rigid-tined subsoiler, often with wing attachments, such that soil compaction is broken up improving the permeability of the soil to air, water and penetration by plant roots.</td>
</tr>
<tr>
<td>SURCHARGE</td>
<td>1. Additional material which may cause or encourage settlement. 2. To fill a landfill above final contours to allow for subsequent settlement (see also Pre-settlement Levels).</td>
</tr>
<tr>
<td>SURFACE WATER RUN OFF</td>
<td>Excess water which does not infiltrate the soil and runs off the surface. This can be a significant problem in the initial years after reclamation, due to compaction and lack of vegetation cover. Additional measures in the form of ditches and drains may be required to conduct water safely downslope and prevent sheet and gully erosion.</td>
</tr>
<tr>
<td>TEXTURE (SOIL)</td>
<td>Soil texture is the relative proportions of clay, silt and sand within the soil.</td>
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<tr>
<td>THATCH</td>
<td>Build up of dead matted grass at the base of the plants on the soil surface.</td>
</tr>
<tr>
<td>TILLERING</td>
<td>The production of shoots from the base of a plant.</td>
</tr>
<tr>
<td>TILTH</td>
<td>Tilth generally refers to the size of the topsoil particles in a seedbed.</td>
</tr>
<tr>
<td>TOPSOIL</td>
<td>The uppermost or cultivated layer of soil, often of relatively dark colour. A specified depth of soil from the natural surface.</td>
</tr>
<tr>
<td>TOWED SCRAPER</td>
<td>A wheeled machine which can strip soils</td>
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using an angled blade as well as transport and replace them. The machine is pulled by a tracked bulldozer.

<table>
<thead>
<tr>
<th>Term</th>
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<tr>
<td><strong>UNDERDRAINAGE</strong></td>
<td>A system of clay or perforated plastic drainage pipes installed within the subsoil to carry excess water from the soil profile to the ditch system.</td>
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<tr>
<td><strong>WATER TABLE</strong></td>
<td>The level within the soil profile where the saturated layer is positioned.</td>
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<tr>
<td><strong>WHEEL COMPACTION</strong></td>
<td>The compression-induced decrease in volume of an unsaturated soil by wheeled equipment. Wheel track compaction effects are proportional to axle load, contact area, and loading frequency.</td>
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## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AHLV</td>
<td>Area of High Landscape Value</td>
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<tr>
<td>ALC</td>
<td>Agricultural Land Classification</td>
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<tr>
<td>AONB</td>
<td>Area of Outstanding Natural Beauty</td>
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<tr>
<td>BASIS</td>
<td>British Agrochemical Standards Inspection Scheme</td>
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<tr>
<td>BIAC</td>
<td>British Institute of Agricultural Consultants</td>
</tr>
<tr>
<td>BMV (agricultural land)</td>
<td>Best and Most Versatile</td>
</tr>
<tr>
<td>CRoW Act</td>
<td>Countryside and Rights of Way Act 2000</td>
</tr>
<tr>
<td>EA</td>
<td>Environment Agency</td>
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<tr>
<td>FACTS</td>
<td>Fertiliser Advisers Certification and Training Scheme</td>
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<tr>
<td>IPSS</td>
<td>Institute of Professional Soil Scientists</td>
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<tr>
<td>MPA</td>
<td>Mineral Planning Authority</td>
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<tr>
<td>MRF</td>
<td>Material Recycling Facility</td>
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<tr>
<td>R &amp; D</td>
<td>Research and Development</td>
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<tr>
<td>SAC</td>
<td>Special Area of Conservation</td>
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<tr>
<td>SNCI</td>
<td>Site of Nature Conservation Interest</td>
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<tr>
<td>SPA</td>
<td>Special Protection Area</td>
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<tr>
<td>SSSI</td>
<td>Site of Special Scientific Interest</td>
</tr>
<tr>
<td>1990 Act</td>
<td>The Town and Country Planning Act 1990 (as amended)</td>
</tr>
</tbody>
</table>
FURTHER INFORMATION

Agricultural Land Classification of England and Wales (MAFF 1988)

British Standard Number 3882 Specification for Topsoil (1994)


Controlling Soil Erosion (MAFF 1999 PB4262)


Green Code - Code of Practice for the Safe Use of Pesticides on Farms and Holdings (MAFF 1998 PB3528)

Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)


Landfill Gas & Leachate Control Applied to Arable After-use (MAFF November 1998 PR4869)

Low Level Restoration of Sand and Gravel Workings (DoE 1989)


MPG7 The Reclamation of Mineral Workings (DoE 1996) (www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606885.hcsp)
Planning Conditions for Mineral Extraction and Waste Management Facilities (www.planningofficers.org.uk)

PPS7 Sustainable Development in Rural Areas (ODPM August 2004) (www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_030148.hcsp)

PPG10 Planning & Waste Management (DETR 1999) (www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentserver_template/odpm_index.hcst?n=3404&l=3)

Preventing the Spread of Plant and Animal Diseases – A Practical Guide (MAFF 1991 PB0486)

The Design of Field Drainage Systems (MAFF Booklet 345)

The Reclamation of Mineral Workings to Agriculture (DoE 1996)


Workmanship and Materials for Land Drainage Schemes (ADAS 1995)
HOW TO USE THE GUIDANCE

It is important to remember that the guidance represents the experience of staff working on MAFF/Defra’s behalf to promote Government policy. It should be used as a “tool kit”, not followed slavishly, with the user selecting the relevant issues and tailoring them to site specific circumstances. Not every issue will need to be addressed on every site, but the guidance should be a useful starting point for flagging up the agricultural issues, and then pointing the way for “good practice”.

The guidance includes an index in the form of a “tree diagram” which is divided into 4 colour-coded sections (application, site working, restoration and aftercare) and then sub-divided into a number of colour-coded sub-sections. The first page(s) of each sub-section sets out the various issues and considerations with a column of tick boxes for different phases, enabling users to confirm that they have been considered. There are also boxes for references and cross-references to other sub-sections of the guidance. The Annex of each sub-section replicates the paragraphs and sub-paragraphs of the first page(s) and provides more detailed information on the issues raised, including advice on “good practice” and where to source further information if appropriate.

This guidance may be used as part of a quality assurance or audit paper trail. For example, users may print off relevant pages, annotate them when visiting sites and then place the pages on the case file as a record of the issues considered and any actions taken.

Text, which is in italics, refers to waste specific considerations.

The user will note that some guidance is repeated within the guide: this is to make it more user-friendly, by removing the need for too much cross-referencing to other sections. Also, some repetition occurs where matters normally dealt with at the “Application” stage, for example, are dealt with or amended at the “Site Working” or “Restoration” stages, and hence the guidance relating to these matters is repeated within those sections.

The guide makes use of hyperlinks for ease of use and cross referencing. Any blue underlined text contains a hyperlink. Click on the text to go straight to the relevant section. Using the ‘back’ button on the toolbar returns you to the previous screen.
Please see Annex AP1 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

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<tbody>
<tr>
<td>1.</td>
<td>Has there been a pre-application discussion relating to the application area</td>
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<td>2.</td>
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<td>9.</td>
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For more detailed information see:

- **PPS7 Sustainable Development in Rural Areas** (ODPM 2004) (Paragraphs 14 – 16, 28 & 29)
- **MPG2 Applications, Permissions and Conditions** (DoE 1998)
- **MPG7 The Reclamation of Mineral Workings** (DoE 1996) (Paragraphs 12-15 and Annex A Box 2)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) Page 8
- **PPG10 Planning & Waste Management** (DETR 1999)
- ‘Landfill Gas & Leachate Control Applied to Arable After-use’ (MAFF 1998 PR4869)

Cross references:

- AP 2, 3, 6
1. Has there been a pre-application discussion relating to the application area

Prior to the planning application being submitted, have there been discussions between the operator, MAFF and/or the MPA? If so, is there a record available of the discussion(s) and was a scoping report produced, detailing what information would be submitted in the detailed planning application and accompanying environmental statement? Pre-application discussion is encouraged in order to identify the key agricultural issues, impacts and possible remedial measures. This can save considerable time and effort for all the parties involved. (For further details see MPG2 Applications, Permissions and Conditions (DoE 1998) Paragraphs 10-13).

2. Is the submitted application complete, or are further ancillary applications to be submitted at a later date

It is common practice for all details to be submitted with the application. However, it is worth checking to see if the submitted application is complete. If this is not the case, it is important to establish whether the additional details may impact further on agricultural land and interests and, if necessary, seek information from the applicant or agent. On occasions, there may be some details referred to in text, which are missing from the accompanying statement.

3. What are the areas (in hectares) of the site, application and working areas

What is the total site area and how much agricultural land is involved? Similarly what are the application and working areas? It is essential to establish at an early stage what impact the proposals will have on the national and local agricultural interests. Clearly, site and working areas will be a major factor in assessing likely impacts. Allied to this assessment will be the area of BMV agricultural land which will be affected by the proposals (see AP6).

4. What is the operator’s capacity to restore

The operator’s past record in achieving what was originally proposed may be a factor to be taken into consideration in some cases. In particular, on proposed sites where significant areas of BMV land are involved, a decision has to be made not only as to whether such land can be restored following extraction but also the likelihood of it being restored.

5. Are there likely to be future applications which could change the proposed landform

Final landform is very important for an agricultural after-use or where the land’s long-term agricultural potential is to be safeguarded. Landform will dictate, along with other factors such as soil and climate, not only the type of agricultural use to which the land
may be put, but also its ALC. Whilst it is clearly a subjective assessment, some consideration needs to be made on the likelihood of further applications which may alter the proposed final landform.

6. What is the life (working and post working) of the proposed waste scheme

In examining any application for a waste disposal scheme, it is important to establish the expected life of the scheme including the likely time periods for:

- mineral extraction (if applicable)
- landfilling
- restoration and aftercare
- monitoring of the site for gas and leachate emissions

Having established the total lifespan of the site, an assessment has to be made on how realistic it is for agricultural land to be restored at a future date. This assessment is particularly important if there are significant areas of BMV agricultural land involved.

7. Will mineral extraction, landfilling and restoration be undertaken by the same or different operators. If different, have the detailed proposals been agreed by both the mineral and waste operators

On many waste disposal sites there may be different operators responsible for separate phases during the life of the site. For example, there may be different firms responsible for mineral extraction (if applicable), landfilling and restoration. Are all the parties concerned with the site aware of what has been proposed in the planning application and agreed upon the proposals? If not, other operators not party to the planning application details may consider the proposals unworkable and seek to radically alter the scheme, which in turn could greatly alter the impact on agricultural interests.

8. Have all details been submitted or are there details which will be submitted only when a waste licence is applied for

Under current arrangements, many details of proposed waste disposal operations are not included in the planning application, but will be provided in a later application to the EA for a Waste Management Licence (see Paragraphs 19 - 23 of PPG10 - Planning & Waste Management for more detail). These may include details such as the exact quantities of each waste type to be disposed of and the design of infrastructure to control gas and leachate. Such omissions can make it difficult to make an informed assessment of all the impacts the proposals will have on agricultural interests, both within and without the site boundary. MPAs should encourage applicants to think holistically at the planning application stage and where practical, seek such details in order to make a more informed decision. Detailed guidance can be found in “Landfill Gas & Leachate Control Applied to Arable After-use” (MAFF 1998 PR4869) Page 16.

9. Are there likely to be further applications for MRFs and/or composting facilities
Normally, such facilities occupy fairly small areas in relation to the rest of the site and are usually located on the periphery. Therefore, their impact on the long-term restoration and aftercare of the site is usually minimal. However, with targets for recycling and composting there is likely to be an increase in applications for such facilities. If such applications are likely, the MPA needs to establish whether they may impact on the future agricultural use of the land.
Please see Annex AP2 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Is the site in the development plan**
   Is the proposed site in the adopted development plan (or earlier versions if not yet adopted), either as a specific site or within a wider area of interest?

2. **Are there other policy constraints**
   When appraising a minerals planning application, it is essential to establish at an early stage whether there are other significant policy constraints which will impact on the proposals. These may include:
   - National Planning Policy Guidance
   - Statutory environmental designations (e.g. AONB, National Park, SSSI, SAC etc.)
   - Other statutory development plan designations (e.g. land use allocations, non-statutory designations - SNCI, AHLV etc.)

3. **What are the views of other consultees**
   It is often very useful to establish at an early stage the views of other consultees to gauge the level of support or objection to the proposals. Whilst such views should not influence the agricultural position, it is beneficial to be aware of the other issues relevant to the proposals.

4. **Are there alternative sites**
   Are there suitable alternative sites (regardless of operator) which would be less damaging to the national agricultural interest? Have other alternatives been examined by the operator in the environmental assessment and why were they dismissed?
For more detailed information see:

- **PPS7 Sustainable Development in Rural Areas** (ODPM 2004) (Paragraphs 14 – 16, 28 & 29)
- **MPG2 Applications, Permissions and Conditions** (DoE 1998)
- **MPG7 The Reclamation of Mineral Workings** (DoE 1996) (Paragraphs 12-15 and Annex A Box 2)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) Page 8
- **PPG10 Planning & Waste Management** (DETR 1999)
- ‘Landfill Gas & Leachate Control Applied to Arable After-use’ (MAFF 1998 PR4869)

Cross references:

- AP 1, 3
1. Is the site in the development plan

Is the proposed site in the adopted development plan (or earlier versions if not yet adopted), part of a wider area of interest, or a departure from the adopted plan? If the site has been included in an adopted plan, it is likely that Defra will have already made an assessment of the site’s likely impact on agriculture. This may be a useful source of information on agricultural interests for the MPA and operator alike. It will be important to understand on what basis the Defra assessment was made. Was the assessment made on the basis of a desk exercise or were detailed ALC survey and farm visits undertaken? The level of detail available will dictate what further investigation may be required.

If the site is only within a defined area of search or interest, it is unlikely that a detailed assessment will have been made of agricultural interests, both national and local. If the site contains significant areas of BMV agricultural land and is not allocated in the adopted plan, as part of the assessment of whether planning permission should be granted, a decision should be made as to whether any irreversible loss of BMV agricultural land runs contrary to any policies in the plan, and Government policy protecting such land.

2. Are there other policy constraints

When Defra appraises a mineral planning application to gauge the impact on national and local agricultural interests, it is common practice to establish early on what the other significant planning issues are. This helps to put into context the agricultural impacts and the weight that should be given to them in the decision making process. For example, if there is a significant area of BMV agricultural land within the application area which may be irreversibly lost, a judgement has to be made as to whether there is an ‘overriding need’ outweighing the agricultural considerations.

3. What are the views of other consultees

The reasons for establishing the views of other consultees at an early stage are very similar to those given in 2. above. Whilst the views of others should not directly influence any decision taken based on the agricultural impact of the proposals, it is nevertheless useful to establish all of the issues relevant to the proposals.

4. Are there alternative sites

For proposed mineral sites that have already been allocated in an adopted development plan, it is likely that Defra will have already commented upon alternative sites and their relative agricultural land quality. However, if a site is proposed which has not been allocated in an adopted plan and it involves a significant area of BMV agricultural land, evidence should be sought as to whether there are suitable and viable alternative sites less damaging to the national agricultural interest.
### Application | Other Considerations

**Ref:** [CHECKED]

Please see Annex AP3 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Is agricultural restoration appropriate**
   - There are many proposed sites where an agricultural restoration is not the most appropriate after-use, either on all or part of the site. (see AP5)

2. **Is the site subject to any designation**
   - Existing statutory and non-statutory designations, either on the site or adjoining it, can influence the appraisal of agricultural considerations.

3. **Is there formal/informal public access**
   - Is there a public right of way across the application area or is a new one proposed in the application? (See MPG2 Applications, Permissions and Conditions (DoE 1998) Paragraph 36)

4. **What is the impact on farm businesses**
   - Whilst most mineral operators will negotiate with agricultural owners and occupiers prior to mineral working, there are still many other agricultural considerations. These may include the effect of severance and fragmentation of the farm holding (may be only temporary), access to farm buildings or key fields, or severance to water supply, drainage or irrigation systems? (see AP12)

5. **What are the community’s aspirations**
   - The local community may be seeking an alternative to agriculture as an after-use, particularly if the site is close to a settlement or in an area with a long history of minerals activity, where public benefits may be sought.

6. **Are there any existing contamination problems on the site**

7. **Are there adequate proposals to control vermin (birds and rodents), dust, smell and disease risk (e.g. botulism)**
For more detailed information see:
- **PPS7 Sustainable Development in Rural Areas** (ODPM 2004) (Paragraphs 14 – 16, 21 – 25, 28 & 29)
- **MPG2 Applications, Permissions and Conditions** (DoE 1998)
- **MPG7 The Reclamation of Mineral Workings** (DoE 1996) (Annex A Box 2)
- **PPG10 Planning & Waste Management** (DETR 1999) Annex A

Cross references:
- AP 1, 2, 5, 12
- AC 4
1. Is agricultural restoration appropriate

Schedule 5, Section 4 (1)(a) of the 1990 Act, requires Defra to inform the MPA whether agriculture is an appropriate after-use. In determining whether agriculture is an appropriate after-use on all or part of the site, a number of factors will have to be considered. These may include:

- the existing land use
- physical features (existing and proposed) such as climate, soil and topography
- the area of the land (i.e. is it too small an area to be practically farmed)
- agricultural land quality
- will the access be too limited for either livestock or machinery
- environmental constraints - particularly if there are statutory designated areas close by
- need for formal or informal recreation areas
- whether the land has already been designated for an alternative use in a statutory development plan
- if the use of the site is constrained by urban fringe type problems such as trespass, crop damage, or theft of livestock

It is important to note that where a non-agricultural after-use is proposed, if the land was formerly BMV agricultural land, a high standard of restoration should be required to safeguard the land’s long-term agricultural potential.

2. Is the site subject to any designation

Statutory and non-statutory designations, either on or adjoining the site can strongly influence the appraisal of agricultural considerations. (See PPS7 Sustainable Development in Rural Areas (ODPM 2004) (Paragraphs 14 – 16, 21 – 25) for further details). Such designations may include:

- landscape designations (National Park, AONB, AHLV etc.)
- nature conservation designations (SAC, SPA, SSSI, Ramsar, SNCI etc.)
- Scheduled Ancient Monuments
- Public Rights of Way
- open access under the CRoW Act

If such designations exist, they may significantly constrain the type and intensity of agricultural practice, or even rule out agriculture entirely as an appropriate after-use.

3. Is there formal/informal public access

Many minerals and waste planning applications involve sites where there is existing or proposed public access. These may include footpaths, bridleways, open access land under the CRoW Act or cycleways. Such features, depending on number and location, can influence the type of agriculture and management of the land. For example, if there is an unfenced footpath crossing the land, this will probably limit the type of livestock that can be kept in those fields through which the footpath crosses. Similarly, if arable crops are being grown, additional measures will need to be taken when carrying out cultigations and other operations such as spraying and fertilising, as required by the

4. **What is the impact on farm businesses**

Mineral and waste operators will normally discuss and negotiate with agricultural owners and occupiers on issues such as financial matters and the management of the land within the site area, before, during and after mineral working. However, it is still important to establish during the appraisal of a planning application, what the full impact of the proposals will be on agricultural interests. Generally, the impacts on agricultural businesses are greater for agricultural tenants. Things to consider would include:

- whether the mineral working will sever or fragment the holding. For example, the proposed site may cut off the main access to an outlying piece of the farm holding, and therefore may require long diversions or even make the severed land unviable to farm
- access to farm buildings may be cut off, thus requiring longer diversions
- existing water supplies to fields or buildings, land drainage (surface ditches and underground) or irrigation systems may also be severed
- the impact on the remaining agricultural land and business

When assessing the impact, it is important to investigate what mitigating measures are being proposed and how long the impacts will occur for.

5. **What are the community’s aspirations**

Whilst community aspirations may not have a direct influence on the appraisal of agricultural considerations, it is useful to be aware of such issues. For example, the local community may wish to see the land restored following mineral or waste working to amenity or recreational use. This particularly occurs on sites located close to a settlement, or in an area where there is a long history of mineral working and the local community wish to see a public benefit. In such instances therefore, agriculture may not be the most appropriate after-use of the land. However, as stated previously, if the agricultural land was BMV pre-working, a high standard of restoration and aftercare should still be sought to safeguard the land’s long-term agricultural potential.

6. **Are there any existing contamination problems on the site**

Some waste sites may be affected by contamination, which may limit the potential for agriculture and new proposals may be the only long term solution to ‘clean up’ the land and put it to a beneficial after-use.
7. Are there adequate proposals to control vermin (birds and rodents), dust, smell and disease risk (e.g. botulism)

A very important consideration when appraising waste related planning applications is the impact the proposals will have on adjoining land uses, including agriculture. Agricultural production methods, food safety and animal welfare issues have increasingly come under the public spotlight and are also subject to more legislation and regulations. Therefore, without sufficient preventative and control measures, waste disposal facilities can have major implications for agricultural businesses adjoining the site. The application needs to be carefully appraised to establish what measures are proposed to prevent problems caused by:

- **vermin, such as birds and rodents** - if uncontrolled their numbers can proliferate and increase the risk of spreading disease to farm livestock or contaminate crops and animal feed
- **dust** - if dust is allowed to settle in sufficient quantity this can cause significant reductions in grass sward quality, contaminate arable or root crops or carry airborne diseases to livestock
- **smell** - as well as being unpleasant and a nuisance to nearby residents, it may also be the case that there is an increased risk of airborne disease being transmitted to farm livestock
- **leachate** - if leachate is inadequately controlled, there could be a serious risk of contamination to either surface or groundwater. This could have very serious implications for water supplies for both livestock irrigation of crops
Please see Annex AP4 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Are the proposals based upon standard industry or novel practice**
   Proposals based upon standard industry practice may have a better chance of success than those not tried and tested under commercial site-scale operations. However, well thought out novel proposals should be considered with an open mind.

2. **Are the proposals practical and capable of being achieved**
   It is important that applicants demonstrate that proposals based upon novel or experimental methods are achievable as a commercial site-scale operation. Where such proposals are complex the chances of success may be increased with high levels of staff briefing, training and supervision.

3. **Are the proposals likely to be sustainable**
   Where standard industry practice is not proposed this may result in disproportionately expensive operating costs. Have the applicants taken account of this?

4. **Do the proposals offer opportunities for R & D and/or training**
   Novel working methods may be part-funded as R & D and contribute to worthwhile improvements and advances in the operations of the industry.

**COMMENTS**

For more detailed information see:
- [Good Practice Guide for Handling Soils](#) (MAFF April 2000)
- The Reclamation of Mineral Workings to Agriculture (DoE 1996)
- [Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture](#) (DoE 1996)

**Cross references:**
- AP 7, 8, 9
- SW 9
- RN 5, 6, 8
1. Are the proposals based upon standard industry or novel practice

Proposals based upon established industry “good practice” may have the greatest chance of success ([Good Practice Guide for Handling Soils](#)) (MAFF April 2000); The Reclamation of Mineral Workings to Agriculture (DoE 1996)). Industry experience in operating established working practices is likely to reduce the risk of failure, particularly when undertaking operations such as soil stripping and restoration. This equally applies to the choice and operation of machinery. However, it should be borne in mind that advances in industry practice are to some extent dependent upon trying new methods on a site-scale under commercial conditions, although it should be expected that the proposals have been tried and tested successfully under smaller-scale conditions beforehand. The applicants should provide reasoned justification for wishing to depart from standard practices, and their proposals should be considered with an open mind.

2. Are the proposals practical and capable of being achieved

The industry has widespread experience in a number of well-established methods of working and restoring mineral sites, some of which can be identified as “good practice”. Where novel or complex alternatives are put forward, there may be difficulties in finding staff with appropriate experience to undertake the work on the site to an acceptable standard, and an increased need for staff briefing, training and supervision to maximise the chances of success. The costs of the work may also be higher for unusual working methods and it may take longer to carry out. It is important to remember that it is one thing to demonstrate proposals within a planning application, but another to put them into practice successfully on site. Applicants need to demonstrate that they have considered all these factors in arriving at their proposals.

3. Are the proposals likely to be sustainable

Many operations, such as different methods of soil stripping and restoration, are well-established within the industry and well understood in terms of practice and cost. Where these well-established methods are not proposed, there may be significant implications in terms of cost, time, timeliness and practicality. Contractors may be reluctant to tender for operations, such as soil stripping and restoration, where the contract specifies novel proposals. If these proposals are not fully understood, there may be reluctance to adhere to the specification rigidly, leading to lower standards. Contractors who are not familiar with the proposals may add a significant “premium” for carrying out the work. The applicants should demonstrate that they have taken account of these factors when putting forward their proposals.

4. Do the proposals offer opportunities for R & D and/or training

*Industry advances in standards of working and restoration are often achieved following R & D, through work done both in-house by mineral companies and through sponsorship by industry bodies and Government departments. This research is appropriately*
designed, monitored, published and reviewed. However, it is generally not appropriate for commercial mineral extraction proposals to be based upon practices that have not been independently tried and tested to establish their effectiveness, at least in small-scale trials. Nevertheless, it should be borne in mind that advances in industry practice are to some extent dependent upon trying new methods on a site-scale under commercial conditions.
Please see Annex AP5 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **What is the proposed after-use**
   If the after-use is agriculture, is it proposed to keep the restored site in grass or in an arable rotation?

2. **Check that the landform is appropriate**
   a. for BMV land, gradients are 1 in 8 (7 degrees) or less; for grade 3b, 1 in 5 (11 degrees) or less
   b. even slopes without backfalls
   c. site boundaries merge appropriately with adjoining land
   d. no “dead-end” valley features
   e. reasonably shaped/sized enclosures
   f. low level restoration - special considerations

3. **Are the restoration proposals generally acceptable**
   Most sites of any size will be progressively restored on a phased basis. Check the following:
   a. is the phasing logical, generally working through the site and back to the plant site and exit
   b. does the phasing reduce the need to have haul roads across unworked/restored land
   c. are the plant site/processing/storage areas appropriately located
   d. do the proposals minimise disturbed areas throughout the life of the working
   e. are impacts upon access, drainage and water supplies taken into account
   f. are impacts upon the water environment in the area taken into account
   g. will dust on agricultural crops be prevented
   h. are there provisions to prevent the spread of plant or animal diseases

4. **Where putrescible waste is to be landfilled, check that the following have been considered**
   a. has scheme been produced holistically
   b. is interim restoration proposed
   c. what are the implications of landfilling on the proposed after-use
   d. has an appropriate allowance been made for settlement
   e. is the site to be managed as a biological reactor
   f. if clay is to be used for cell construction, where is it sourced
Applications | Overall Restoration

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<td>have the EA and the applicant’s agricultural advisers been involved in the design process and are there likely to be conflicts between Waste Management Licence and planning conditions</td>
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<td>what material is to be used for daily cover</td>
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<td>i.</td>
<td>does the design and siting of the environmental controls minimise their impact on the proposed after-use</td>
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<td>have appropriate access arrangements been proposed for monitoring and maintenance of wellheads etc</td>
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**COMMENTS**

For more detailed information see:

- The Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Good Practice Guide for Handling Soils (MAFF April 2000)
- MPG7 The Reclamation of Mineral Workings (DoE 1996)
- Low Level Restoration of Sand and Gravel Workings (DoE 1989)
- Town and Country Planning Act 1990 Schedule 5
- Landfill Gas and Leachate Control Applied to Arable After-use (MAFF 1998 PR4869)

**Cross references:**

- AP 3, 7, 10
- SW 3, 6, 10
- RN 3, 4, 7, 9, 10
- AC 3, 4, 9
1. What is the proposed after-use

If the proposed after-use is agriculture, is this to be to grassland or arable? Extensive grassland may be less demanding in terms of the standard of restoration, depth of restored soil profile and drainage, although where grass is to be part of an arable rotation the requirements are more demanding, as for arable. Arable crops ideally require at least 1 metre of rootable soil depth with good drainage characteristics. A drainage scheme may therefore be needed, which will normally require a minimum of 0.6 metres of soil cover above the top of drainage pipes. The aim should be to restore at least 1 metre of soil profile wherever possible. Generally, BMV agricultural land should be restored to the 3(1) standard set out in Schedule 5 of the 1990 Act, even where the after-use is not agriculture. This will safeguard the long-term agricultural potential of the land in accordance with the principles of sustainability, providing the proposed after-use does not degrade the soil.

2. Check that the landform is appropriate

a. for BMV land, gradients are 1 in 8 (7 degrees) or less; for grade 3b, 1 in 5 (11 degrees) or less
   BMV land cannot be steeper than 1 in 8 (7 degrees), and grade 3b, 1 in 5 (11 degrees) (MPG7 The Reclamation of Mineral Workings (DoE 1996) Table 1). For sites filled with putrescible waste, post settlement gradients should be no flatter than 1 in 25 to ensure adequate drainage and minimise surface ponding of water in the event of localised differential settlement (Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice (DoE 1995) paragraph 6.5).

b. even slopes without backfalls
   Even slopes facilitate the use of agricultural machinery. Backfalls can lead to difficulties with drainage schemes and also to surface ponding of water.

c. site boundaries merge appropriately with adjoining land
   Site boundaries should tie in with adjoining land levels to prevent potential problems with ponding of surface water. This is essential where the restored land may in the future form a larger enclosure when combined with adjoining land.

d. no “dead - end” valley features
   Restored landforms should not include valley features forming “dead-ends”, as this may lead to drainage problems and surface water ponding.

e. reasonably shaped/sized enclosures
   Modern farm machinery tends to be large and is designed to operate in straight lines as far as possible. Restored field enclosures, particularly where arable crops are to be grown, should therefore be reasonably large (e.g. >8 ha, depending upon the part of the country) and square or rectangular. Hedgerows, particularly where it is proposed that they are allowed to grow tall, should be planted in a north - south orientation to reduce crop shading. However, these requirements
represent ideals and will need to be modified in line with site constraints and landscape requirements.

f. **low level restoration - special considerations**
   Where restoration is to a low (er) level it is important to consider the landform and the implications for land drainage. Is provision for an underdrainage system necessary and if so, is there a gravity outfall? If not, a perpetually pumped drainage scheme may be required, together with a balancing pond. The sides of the site may need to be sealed to reduce the ingress of groundwater. (Low Level Restoration of Sand and Gravel Workings (DoE 1989) Chapters 3, 5, 8 and 9). The applicants should provide details on the above matters prepared by appropriately qualified persons to demonstrate that their proposals are sound and practical.

3. Are the restoration proposals generally acceptable
   Phased restoration is generally a requirement for most sites to limit the amount of land taken for development and left unrestored at any one time. This often requires soil from the plant and stockpile areas and the first phase to be stripped at the start of the development and put into store to open up the site. From then on, soil is stripped and restored progressively as earlier phases are worked out. Exceptions to this may be chalk and rock quarries, where the mineral is worked to a considerable depth, often in a series of benches. In these cases, the soil may need to be stripped and put into long-term storage from a relatively large part of the site, with restoration being delayed for many years until the area is worked out. In these circumstances, it is particularly important that there are good records of the location, soil type and volume of the different soil bunds and that they are well managed.

   a. **is the phasing logical, generally working through the site and back to the plant site and exit**
      Phased working and restoration should be planned as a logical sequence as far as possible to work through the site finishing back at the site entrance/exit. Changes to the routing of haul roads should be avoided wherever possible, minimising the need for the additional disturbance of the site. Phase boundaries should, as far as is practical, reflect the different soil units that need to be handled separately.

   b. **does the phasing reduce the need to have haul roads across unworked/restored land**
      Phasing arrangements should avoid, as far as possible, the need for haul roads to cross unstripped or restored soil necessitating further soil stripping and possibly, delaying restoration and aftercare. *This is important where the site is to be landfilled and large quantities of waste need to be brought into the site.*
c. are the plant site/processing/storage areas appropriately located
   The location of the plant site/processing/storage areas should be such that they
   are the last areas to be restored prior to the full reinstatement and closure of the
   site and do not, therefore, delay the restoration of other areas.

d. do the proposals minimise disturbed areas throughout the life of the
   working
   The working and restoration phasing should minimise the area of land not in
   cultivation either pre-working or post restoration. This is important as the soil is
   best conserved by being farmed rather than stored where some deterioration may
   occur. Also, where land is being actively farmed, this reduces the likelihood of the
   land becoming derelict or used for storage or trafficked upon.

e. are impacts upon access, drainage and water supplies taken into account
   Proposals which interfere with agricultural drainage, water supplies (including
   irrigation) and access will require appropriate remedial works and/or temporary
   accommodation works to be provided by the applicants. The interruption of
   irrigation supplies, for example, can have very serious consequences for the
   profitability of root crops in particular.

f. are impacts upon the water environment in the area taken into account
   Where working is to take place below the water table and de-watering is carried
   out, this may have significant impacts on the water table of land in the area, and
   potentially on irrigation supplies from boreholes. Generally, the water table of
   agricultural land should be at least 1 metre below ground level and maintained at
   this level by an underdrainage scheme, where necessary. But mineral extraction
   requiring de-watering may also lower the water table of neighbouring land
   significantly, leading to increased droughtiness, reduced crop yields and water
   available for irrigation from boreholes. Low level restoration of mineral sites may
   require lining of the void and perpetual pumping: this may interrupt the movement
   of groundwater also leading to the problems identified above (Low Level
   Restoration of Sand and Gravel Workings (DoE 1989) Chapters 3 and 4). Where
   proposals may affect the water environment significantly, the applicants should
   provide an assessment of the effects of the development on the water
   environment, together with details of any remedial works proposed, prepared by
   appropriately qualified hydrologists/hydrogeologists.

g. will dust on agricultural crops be prevented
   Dust from mineral sites may be a problem, particularly when soil handling
   operations are taking place in dry conditions and adjacent to haul roads. In
   severe cases, dust may limit the palatability of grass to livestock and lead to
   problems with marketability where vegetable or fruit crops are affected.

h. are there provisions to prevent the spread of plant or animal diseases
   Plant and animal diseases may be spread from one agricultural holding to
   another through contaminated soil carried on plant and machinery, or through
   imported soil or soil forming materials and amendments. Seagulls may be
   attracted to landfill sites and to mineral sites which have large water bodies. They
often use “loafing areas” on adjoining agricultural land, which can lead to crop damage and potentially to the spread of animal diseases. Seagulls can pick up waste food from landfill sites and drop it on outdoor pig units in the vicinity, which can lead to the spread of diseases such as Swine Fever. Landfill sites may also attract vermin, such as rats and flies, which can spread animal diseases. Applicants and contractors should follow the advice given in “Preventing the Spread of Plant and Animal Diseases – A Practical Guide” (MAFF 1991 PB0486).

4. Where putrescible waste is to be landfilled check that the following have been considered

Sites which are to be landfilled with waste require additional matters to be considered to achieve a satisfactory standard of restoration to agriculture.

a. has scheme been produced holistically
In order to achieve the best standard of restoration, particularly where putrescible waste is involved, it is necessary that the requirements of the after-use are planned for from the very outset of site design. This is particularly important when arable after-uses are proposed, and advice on this is set out in “Landfill Gas and Leachate Control Applied to Arable After-use” (MAFF November 1998 PR4869).

b. is interim restoration proposed
Interim restoration may have advantages, particularly where BMV land and putrescible waste are involved. It requires delaying the restoration of some of the subsoil and all of the topsoil until after the worst of the settlement has occurred and repairs to the landfill gas and leachate control infrastructure have been carried out. A major advantage is that the majority of the soil is not trafficked over or contaminated when excavations are necessary to lay new pipework or drill new wells. (Waste Management Paper (WMP) 26E Landfill Restoration and Post Closure Management Consultation Draft (Environment Agency August 1996) paragraphs. 7.18 - 7.25). A grass cover crop is sown and managed on the subsoil to help prevent surface erosion, damage to soil structure and the build up of weeds.

c. what are the implications of landfilling on the proposed after-use
If putrescible waste is to be landfilled the Waste Management Licence will require the site to be constructed as a series of cells, on a fully contained basis, with infrastructure to collect both landfill gas and leachate. The pipework, wellheads and other controls may interfere with the agricultural after-use, particularly if this is to be arable (Landfill Gas and Leachate Control Applied to Arable After-use (MAFF November 1998 PR4869)). Surface landfill gas pipework may be proposed for a number of years, in which case a grass crop for grazing is the most that can normally be achieved as an agricultural after-use. Surface features, such as wellheads and controls, should be sited as far as practical on field boundaries and in straight, parallel lines when within the cropped area. Pipework should be at a depth to give a minimum of 1 metre of clear soil in which to install an underdrainage scheme, which will almost certainly be required on a capped
site. Where it is not proposed to utilise the gas initially but at some future date, this may have implications for the after-use, as additional gas wells may need to be drilled and the rate of settlement may increase once gas abstraction/utilisation begins. Where inert waste is being landfilled, it will be necessary to ensure that there is a sufficient depth of soil (ideally > 1 metre) above the waste to allow for deep cultivations and the installation of a drainage scheme.

d. **has an appropriate allowance been made for settlement**
   The majority of settlement takes place in the first 5 years following landfilling with putrescible waste. Post settlement gradients should be no flatter than 1 in 25 to aid drainage and limit surface ponding of water due to localised differential settlement. To take account of settlement, sites are typically surcharged by 15 - 20% (Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice (DoE 1995) paragraphs 6.5, 6.12 and 6.13). However, recent studies have shown that settlement may exceed 20%. Pre-settlement contours should also be suitable for the agricultural after-use, both to take account of the agricultural requirements at the start of the aftercare period, and also in the event that settlement is significantly less than predicted.

e. **is the site to be managed as a biological reactor**
   Sites to be managed as bio-reactors for accelerated stabilisation have special design requirements with intensive landfill gas and leachate controls enabling leachate to be re-circulated (Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice (DoE 1995) Appendix D). The management of these sites may bring advantages, such as more rapid stabilisation in terms of settlement and landfill gas production, but disadvantages in terms of rapid settlement and the need for remedial works to the sub-cap irrigation system requiring major site disturbance. These problems may be reduced with interim restoration and careful design, monitoring and liaison between staff involved in engineering, restoration and aftercare (Waste Management Paper (WMP) 26E Landfill Restoration and Post Closure Management Consultation Draft (Environment Agency August 1996) paragraphs 7.37 - 7.45).

f. **if clay is to be used for cell construction, where is it sourced from and stored**
   Where landfill cell and cap construction are to use clay sourced from the site, it will be necessary to check that this does not form part of the soil resources needed for the restoration. For example, in some circumstances, clay subsoil stripped as part of the soil profile and needed for the restoration may also be suitable for engineering of the landfill cells, and proposals may be put forward for its use as such. Where this happens, the applicants must demonstrate that they have an appropriate subsoil substitute available at the right time and in sufficient quantities, to ensure that the long-term agricultural potential of the restored land is safeguarded. A further consideration in these circumstances is that the excavation and storage of the clay material/subsoil substitute may prejudice the phased restoration of the site and require a greater area of land for storage.
g. **have the EA and the applicant’s agricultural advisers been involved in the design process and are there likely to be conflicts between Waste Management Licence and planning conditions**  
To facilitate a holistic approach to the design of the site, all interested parties should be involved from the very beginning, in pre-application consultations for example. This should include the EA and the applicant’s agricultural advisers, to minimise the potential for conflicting requirements of Waste Management Licence and planning permission conditions. The liaison should be on-going, as amendments to design and engineering of the site may be necessary following planning approval.

h. **what material is to be used for daily cover**  
The source of “daily cover” should be identified to ensure that soil resources are not used which are needed for the agricultural restoration, thus compromising standards and the long-term agricultural potential of the land. The applicants should demonstrate that they are making the most sustainable use of all soil and soil-forming materials on site.

i. **does the design and siting of the environmental controls minimise their impact on the proposed after-use**  
If putrescible waste is to be landfilled the Waste Management Licence will require the site to be constructed in a series of cells, on a fully contained basis, with infrastructure to collect both landfill gas and leachate. The pipework, wellheads and other controls may interfere with the agricultural after-use, particularly if this is to be arable crops (Landfill Gas and Leachate Control Applied to Arable After-use (MAFF November 1998 PR4869)). Surface landfill gas pipework may be proposed for a number of years, in which case a grass crop for grazing is the most that can normally be achieved as an agricultural after-use. Surface features such as wellheads and controls should be sited as far as practical on field boundaries, and in straight parallel lines when within the cropped area. Ideally pipework should be at a depth to give a minimum of 1 metre of clear soil in which to install an underdrainage scheme, which will almost certainly be required on a capped site. A minimum of 0.6 metres of clear soil cover is necessary above the top of the underdrainage pipes to allow for deep cultivations such as subsoiling. Where it is not proposed to utilise the gas initially but at some future date, this may have implications for the after-use as additional gas wells may need to be drilled, and the rate of settlement may increase once gas abstraction/utilisation begins. Where inert waste is being landfilled, it will be necessary to ensure that there is a sufficient depth of soil (ideally > 1 metre) above the waste to allow for the installation of a drainage scheme and deep cultivations such as subsoiling.

j. **have appropriate access arrangements been proposed for monitoring and maintenance of wellheads etc**  
Wellheads, pipework controls and sampling points will require access for vehicles for monitoring and maintenance purposes. These access routes should be designed and laid out to minimise disruption to the after-use and damage to the land surface. Dedicated haul routes should reduce the incidence of vehicles
driving randomly over the site, and should, wherever possible, satisfy the needs of agricultural access and be routed along boundaries.
Please see Annex AP6 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

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For more detailed information see:
• Agricultural Land Classification of England and Wales (MAFF 1988)

Cross references:
• AP 8, 9, 10
1. Are there any reports relating to the soil resources and land quality available for the site.

The ALC provides a method for assessing the productive quality of agricultural land. The Classification provides a basis to consider development when proposed on agricultural land or other ‘greenfield’ sites that could grow crops. The Classification is based on the extent to which physical and chemical characteristics impose long-term physical limitations on agricultural use. Factors affecting the grade are climate, site and soil characteristics, and the important interactions between them (soil wetness and droughtiness). It is the overriding limitation that results in the grading of the land. There are five grades, with Grade 3 subdivided into Subgrades 3a and 3b. The ‘best and most versatile land’ is defined as Grades 1, 2 and 3a by policy guidance (see PPS7 Sustainable Development in Rural Areas (ODPM August 2004 Paragraph 28). A ‘Provisional’ Series of maps was published on an Ordnance Survey base at a scale of One Inch to One Mile in the period 1967 to 1974, to provide general strategic guidance on land quality for planners. Short reports accompanied each map sheet (which are now withdrawn). Maps are now available at a scale of 1:250,000. These maps are not sufficiently accurate for use in the assessment of individual fields or development sites, and should not be used other than as general guidance.

a. has an ALC been undertaken on the site
   Information based on detailed ALC field surveys in accordance with current guidelines should be definitive. The developer should carry out a survey of the site to provide a detailed inventory of the soil and potential soil-forming materials (including topsoil and subsoil depths), and to provide an assessment of the quality of the land. It is important that this information is accurately prepared at the planning application stage, to avoid potential problems with future working and provide the basis of the proposals for handling the soil in the site working and restoration scheme.

b. has a soil report been prepared
   A soil survey would examine the soil profile and depth, soil texture, stoniness, soil structure, bulk density, soil drainage, available water capacity and nutrient status and chemical characteristics. Soil reports and ALC grading normally come from the same site survey.

c. have surveys been undertaken to an acceptable standard
   The survey should be undertaken by a competent person, such as a member of the IPSS etc. Such surveys require specialist knowledge and reports need to be in accordance with the quality, terminology and methodology within the published ALC guidelines. Maps are normally produced on an Ordnance Survey base at a scale of 1:10,000 for detailed work. ALC field surveys are a time-consuming process and should be initiated well in advance of planning applications. ALC surveys are undertaken by trained field surveyors using hand-held augers to examine soil to a depth of 1.2 metres, at a frequency of one boring per hectare for a detailed assessment. This is usually supplemented by digging occasional soil pits (by hand) to inspect the soil profile in representative ALC grades and soil types. This provides the detail for the physical characterisation. Information
obtained by these methods is combined with climatic and other data to produce the ALC map and report. The ALC reports should follow a standard format detailing the purpose of the report, who has undertaken the report, when undertaken, the land use / crops, a summary of the findings, the factors influencing the ALC grade (climate, site, geology and soil), and the details of the Classification (including maps showing distribution of the grades, position of auger borings and pits).

d. how do the reports relate to each other

The soil and land quality reports should also be considered in conjunction with any geological, hydrological studies or ecological reports. An ALC report details what the land quality is, whilst a soil report details not just the existing quality, but the physical characteristics of the differing soil resources, and how each should be dealt with through site working and restoration stages. The soil report enables soil and land quality comparisons to be made at the end of site working, and will form the basis of ensuring that the required standards have been met on the completion of the restoration and aftercare periods. The visual appearance, although important, can be misleading, especially on blighted or unmanaged land.

2. Do the working proposals have regard to the above reports

a. do the proposed soil stripping depths, areas / phases have regard to differing soil units

At all stages in the preparation of the site working proposals and subsequently the submission of a planning application, consideration should be given to the soil aspects. Any soil or land quality reports that are submitted with the application should clearly identify what exists on the site. However, in addition, the working proposals must clearly demonstrate that these findings have been incorporated into the scheme. The intended soil stripping depths will arise from the soil information. The proposals for using available soil and soil-forming materials to get the best possible restoration, ways of keeping different soil apart, methods of handling the soil (including proposals to minimise dust nuisance), the location and height of soil bunds and how long they will be present rely on the interaction and understanding of the original soil information. The proposals for replacing soil should include the intended location, depth and composition of the reinstated soil profiles, and the contours of the restored land. This should enable the likely land quality, following restoration to be considered against the existing ALC information. This would assist the MPA, at the application stage, in considering any effect the proposal may have upon both soil resources and land quality aspects.

b. is it apparent whether the soil information has been considered in formulating the working proposals
The reports would also highlight possible different working proposals for any differing soil resources. For example, clay soil retains more water than other textures, even when at the limit of drying by plants, and is easier to smear and damage. Sandy soil can normally be worked much earlier and later in the year than other types, because it does not retain much moisture and the loss of what little structure it has, does not severely affect permeability. These factors could influence the soil handling techniques, reinstatement proposals and subsequently the aftercare measures.

c. are there enough soil storage areas shown to accommodate both the overall expected volumes of stored soil but also the differing types
For sites containing a variation of soil, such as major textural differences, it will be desirable to require separate stripping (and storage and restoration) of these materials. The surface area for soil storage increases significantly if differing soil types have to be kept separate. An indication of the proposed dimensions and therefore, the intended volumes to be stored within each soil bund, should be clearly stated within the documents, together with a clear indication as to the type of soil each bund is to accommodate. The volumes and locations of the differing soil types will have to be carefully considered alongside the eventual restoration objectives for the differing parts of the site.

d. is there a single soil handling document or strategy
The information gained from the site investigations should be combined, with the site working and reinstatement proposals, in a single ‘Soil Handling Strategy’ document to aid identification and instruction during the site operations.

3. Does the site include best and most versatile quality agricultural land, a mix of qualities, and / or areas of ecological interest

Whatever the existing land quality, if land is going to be restored for agricultural use or to safeguard it’s long-term agricultural potential, soil damage must be minimised and the land restored, wherever practical, to its original quality or better. Within this overall aim there is a need to ensure that soil which may have a particular ecological significance (e.g. a seed bank from woodland soil or soil of low nutrient status), are dealt with appropriately within the soil strategy. It is important to ascertain whether re-creation of the exiting habitats is appropriate, or whether improvement is possible without compromising other restoration objectives. Similar soil on a site does not necessarily lead to the same ALC grade, as land quality also includes non-soil related factors such as slope or flood risk. A full understanding of the existing land qualities and how the existing soil and landform influence this is required in order to understand the existing land uses. This understanding should ensure informed decisions on the most appropriate after-uses and how to achieve them.

4. Is the soil also identified as the mineral resource
a. **do the calculations for available mineral reserves include the subsoil**
   There are instances, particularly associated with clay and sand and gravel workings, where the soil profile includes material identified both as subsoil within the Statement of Physical Characteristics Report, and as a commercially exploitable mineral within the geological report. If the calculations for available mineral reserves includes the subsoil, then the applicants should clarify how soil-forming material or other soil will be utilised in order to avoid prejudicing the restoration proposals.

b. **is there any physical difference between the subsoil and underlying mineral**
   It is possible for the subsoil to be the same as the underlying mineral. In these circumstances, the subsoil is still vital for the growth of crops through drainage, water holding capacity and the provision of nutrients. The soil structure is likely to be better developed in the subsoil than in the mineral due to rooting and biological activity. It is important to ascertain the resulting likely land quality following from the applicant’s proposals.

c. **does the mineral also contain resources that are well suited as soil-forming materials**
   The mineral may also contain resources that are well suited as soil-forming materials. The geological report may identify likely layers. Wherever such materials are proposed, their properties should be established by laboratory analysis of particle size, nutrient availability and pH. On-site quarry and waste products are already widely used as soil-forming materials but in each individual case, their suitability should be assessed by prior analysis. If suitable alternative material is not available, or not in sufficient quantities or at the right time, then either the restoration proposals should be re-examined or the suitable quantities of the ‘mineral’ retained for use as a ‘subsoil’. Soil-forming materials are likely to be required for hard rock quarries, landfill sites and some other long-term quarry operations.

5. **Has the land been previously worked and can it be improved**

Is the potential of the existing soil profile limited through:

a. **shallowness**
   The understanding or restoration techniques has improved and the reworking of a previously restored site may present an opportunity to correct previous limitations. These limitations may also be addressed in some sites where previous working has not occurred, but the potential for land improvement exists. The potential of the existing soil profile may be limited through shallowness. This may be overcome through the identification of additional soil-forming material, or the change of the land uses upon restoration, to enable the existing resources to be concentrated within some areas and other non-soil dependant uses (e.g. water features, ecological areas or hard development) to be identified. Disturbed land is a complex issue where a soil specialist should be employed to report on existing limitations and what, if anything, can be done to improve the situation.
b. **poor drainage**

This can be addressed through changing slopes or drainage patterns. The reworking of the site could enable the surface water and groundwater levels in the soil profile to be successfully controlled. The reconsideration of the restoration objectives could ensure that areas that frequently flood in a river floodplain are returned to nature conservation or recreational uses, to enable slightly higher areas to be used for agriculture purposes.

c. **chemical imbalances**

These may be due to previous on-site industrial uses, the regular flooding by contaminated water, or historic applications to agricultural land of excessive concentrations of some industrial wastes. In some rare instances, chemically imbalanced soil may need to be buried at depth and replaced in the restoration proposals by alternative soil-forming materials.

d. **physical factors such as stoniness, compaction**

Physical restrictions such as stoniness or compaction may not be economically feasible to remedy within normal agricultural activities. However, the reworking of the land should enable these factors to be adequately addressed.

6. **What resources are identified for restoration**

a. **is the site self-balancing**

The application documents should identify whether the site is self-balancing or whether the restoration relies on importing materials. Ideally, restoration should only be carried out using on-site soil unless there are proven shortages.

b. **is there a deficit - how is this to be rectified**

Soil should only be imported where the source of the imported soil is known, quality can be checked and precautions taken to prevent the spread of plant and animal diseases. Soil-forming materials may be available on the site, or may be recoverable from the overburden, to assist in creating suitable soil profiles for less demanding after-uses. The applicant can identify soil-forming materials through examining the soil and geological reports. The restoration plan can be adapted to utilise the available soil resources by optimising the areas of different land uses.

c. **are differing soil profiles required for differing intended after-uses**

In any calculations relating to soil quantities, it is important to remember that some soil types are more appropriate for specific uses on the site. Soil is not an homogeneous material that is interchangeable - differing soil profiles are often required for differing intended after-uses. Normally, recommended restoration depths are for 30cm of topsoil and 90cm of subsoil. Where shortages prevent these depths being achieved, it may be desirable to increase soil depth by reducing the areas to be restored to agriculture. If lower quality agricultural restoration is being considered, then shallower depths are acceptable, although alternative land uses may also be an option. It should be noted that if the natural
soil is shallow, then there is no obligation to restore to a depth of 120cm. The advice of a soil specialist should enable the best use to be made of the soil resources, taking account of the proposed after-uses.
Please see Annex AP7 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Method of working
How well do the proposals integrate mineral extraction, landfilling (where proposed), and restoration of the site? Consider:
   a. phasing arrangements
   b. arrangements for landfilling
   c. location of soil storage
   d. size of soil storage bunds and areas
   e. treatment of soil storage bunds
   f. do the proposals minimise the areas unrestored throughout the life of the working, and provide for the management of unworked areas
   g. responsibilities for work
   h. does the location of the plant site and mineral stockpiling areas take appropriate account of the phasing and restoration proposals
   i. does the location of the plant site and mineral processing areas allow for the efficient operation of the site

2. Phasing
Most sites are worked in phases to enable the minimum area of land to be disturbed at any one time. In this way, the development proceeds in a logical sequence through the site, normally depending upon the geology, starting and finishing near the site entrance with the plant/processing/storage areas. Consider:
   a. does the phasing reflect the different soil types
   b. the amount of mineral to be excavated and waste landfilled per year
   c. exceptions to phased restoration such as chalk and rock quarries

3. Flexibility of scheme
Despite pre-working site surveys, the quantity and type of mineral encountered when working the site may necessitate amendments to the working and phasing of the site. Consider:
   a. do the proposals allow for flexibility to meet the need for such changes
4. **Working life of site**

Is the proposed working life of the site reasonable and realistic? Has proper account been taken of:

a. *the need to submit restoration details for long-term sites and the effect of lower than predicted extraction rates on site restoration*

b. *the need to submit detailed schemes for landfill gas and leachate control infrastructure*

5. **Are the requirements for haul roads appropriate to the site working proposals**

The number, siting and length of haul roads required will depend upon:

a. *the location of the site working areas, soil stores and processing plant, and machinery used for hauling mineral/soil*

b. *areas of unworked or restored land which must not be trafficked by plant or machinery*

c. *the need for new access to parts of the site as working progresses*

6. **How are the haul roads to be constructed, maintained and restored**

Plant and machinery must not be allowed to run on the soil layers or on soil-forming materials. Do the proposals for forming, maintaining and restoring haul roads adequately cover:

a. *stripping of soil layers*

b. *providing a wearing course on “permanent” haul roads*

c. *drainage and maintenance*

d. *dust control*

e. *decompaction and restoration of the soil profile*

7. **How are the haul roads to be marked on site**

Haul roads should be marked on site and provisions made to prevent plant and machinery straying onto unworked or restored land. Have the operators considered and made provisions for:

a. *marking the layout and location of haul roads on plans in the site office*

b. *marking haul roads on site*

c. *preventing plant and machinery from straying off the haul roads*

8. **Control of the water table**

Where the proposals include mineral extraction or *landfilling* below the water table, the applicants should provide detailed assessments by appropriately qualified hydrologists/hydrogeologists of the impact of the development including:

a. *the need for perpetual pumping to maintain the proposed after-use*

9. **Will the development affect the water environment of other land in**
Where mineral extraction or landfilling is to take place below the water table, the applicants should provide detailed assessments by appropriately qualified hydrologists/hydro-geologists of the impact of the development including:

a. **any detrimental effects on the water table/supplies of adjoining land**

For more detailed information see:
- The Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)
- **Good Practice Guide for Handling Soils** (MAFF April 2000)
- Low Level Restoration of Sand and Gravel Workings (DoE 1989)

Cross references:
- AP 1, 3, 5, 6, 8, 9, 10
- SW 3, 5, 6, 8, 9, 10
- RN 2, 4, 5, 6, 7, 8, 10
- AC 9
1. Method of working

The proposals should properly integrate the working and restoration of the site in a way that facilitates these processes. The following matters need to be considered and planned:

a. **phasing arrangements**
   Phasing should be designed to progress in a logical way through the site, minimising the need for double handling of materials and enabling restoration to follow on promptly. Double handling of soil increases both costs for the operator and the risks of soil losses, mixing and structural damage.

b. **arrangements for landfilling**
   Where restoration involves landfilling, do the proposals allow for the logical progressive restoration of the site? What provisions have the applicants made for restoring the site in the event of a shortage of waste being available when required?

c. **location of soil storage**
   Soil storage areas need to be located where they will not be trafficked, contaminated with other materials, flooded or moved during the period of storage. They should also be readily accessible for the restoration of the relevant areas, to reduce haulage distances and the need to cross undisturbed or restored land.

d. **size of soil storage bunds and areas**
   Soil storage areas need to be of sufficient size for the separate storage of different soil types without excessively high bunds (ideal max. 3 metres for topsoil and 5 metres for subsoil/soil-forming materials). Bunds should be constructed with the minimum compaction necessary to ensure stability, with slopes to prevent water ponding. The height and slope of bunds will also need to take account of their impact upon the landscape of the area. Slopes of between 25° and 45° will normally allow for management of the bunds, whilst ensuring stability and surface drainage. (Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) Part B). If the area available for soil storage is insufficient, there will be pressure to store soil higher than is ideal, or to leave insufficient space around individual bunds for their efficient formation and management etc.

e. **treatment of soil storage bunds**
   Soil storage areas and bunds which are to remain in place for 6 months or more, or over the winter period, should be grass seeded with an appropriate mixture (i.e. low growing and yielding). Maintenance will include cutting, probably at least twice a year, and controlling weeds using herbicides if necessary.
f. do the proposals minimise the areas unrestored throughout the life of the working, and provide for the management of unworked areas
The working and restoration phasing should minimise the area of land not in cultivation, either pre-working or post restoration. This is important, as soil is best conserved by being farmed rather than stored where some deterioration may occur, or left uncultivated. Where land is being actively farmed, the likelihood of it becoming derelict or used for storage or being trafficked upon is reduced.

g. responsibilities for work
The persons responsible for carrying out the different operations should be clearly identified, and have authority to stop work when conditions become unsuitable, for example during soil handling when wet weather ensues.

h. does the location of the plant site and mineral stockpiling areas take appropriate account of the phasing and restoration proposals
The location of the plant site and mineral stockpiling areas must take account of the phasing and (progressive) restoration requirements of the site, such that the land is quarried in a logical sequence, with restoration following on behind. Inappropriate siting of these facilities may lead to more or longer haul roads, which may have implications for the site phasing and restoration, as well as the size and shape of restoration enclosures. In addition, there may be pressure to relocate the facilities to a more appropriate location, which may result in the disturbance of more land, and the interruption/amendment of phasing and restoration arrangements.

i. does the location of the plant site and mineral processing areas allow for the efficient operation of the site
Linked to the above considerations is the need to locate plant and mineral stockpiling areas where they allow for the efficient operation of the site. Generally, this will be close to the site entrance/exit, in an area that can be readily screened whilst reducing the need for long haul roads suitable for road-going traffic. The location should also take account of the phasing and restoration arrangements, such that the land is worked and restored in a logical way. Whether the mineral is to be hauled to the processing area by dumptrucks or by conveyor will also influence the location and the need for semi-permanent and temporary haul roads. Relocating the plant site is, however, unlikely to be undertaken lightly by the operator due to the disruption to the quarrying/processing of mineral and the costs entailed.

2. Phasing
This should be designed to proceed logically from opening up the site and locating the processing plant, storage areas and haul roads, through the site to finish with the restoration of these areas, minimising the length of time land is being worked/remaining unrestored. The phases should take account of:
a. does the phasing reflect the different soil types
The different soil types identified in the ALC and Statement of Physical Characteristics Report may require separate handling. As far as is practical, phase boundaries should reflect the different soil types that need to be handled separately, for example sandy loam and clay loam topsoil.

b. the amount of mineral to be excavated and waste landfilled per year
The size of phases normally relates to the amount of mineral likely to be excavated per year, which is linked to the borehole survey, and with the amount of waste that is likely to be available where landfilling is proposed, to enable progressive restoration of the site to proceed uninterrupted. Linking phase size to the annual excavation of mineral and landfilling, also allows soil stripping and restoration to be carried out once a year when the soil is at its driest.

c. exceptions to phased restoration such as chalk and rock quarries
Exceptions to progressive restoration occur particularly with chalk and rock quarries, which may be worked to a greater depth, sometimes in a series of benches. In these circumstances, soil from the working areas may be stripped and stored for many years prior to the restoration of the whole working area. In these cases, it is particularly important to maintain accurate records of the different soil types, their volumes and locations, and for the bunds to be well managed.

3. Flexibility of scheme

It may be necessary to amend the phasing once mineral extraction has begun. This may be due to barren areas, or variations in mineral type or quality not identified in the pre-working borehole survey. Consider whether:

a. do the proposals allow for flexibility to meet the need for such changes
The schemes put forward by applicants should, where practical, recognise the possibility that variations may be required and set out the procedures for agreeing them. Borehole logs cannot always accurately predict the quality and quantity of mineral present across the site. When mineral extraction commences, the quality or quantity of mineral may vary such that amendments or complete changes to the phasing are requested by the operator. The operator may wish to work more than one phase at a time to enable different minerals to be extracted and then blended. This may have very significant impacts upon phased restoration, including potentially the restored soil profiles and landform. Where mineral deposits are in an area where they are known to be very variable, the applicants should, as a minimum requirement, set out their protocols for changing the phasing (and working and restoration schemes if necessary). Where restoration is to be achieved by landfilling, this may exacerbate the difficulties, requiring early discussions between the operator, EA, MPA and the agricultural advisers, to maximise the chances of achieving the agreed restoration objectives.
4. Working life of site

Whilst it is not possible to always predict factors affecting mineral demand accurately, it is important that the proposed working life of the site should be based upon realistic estimates of extraction rates and, where relevant, landfilling of wastes.

   a. the need to submit restoration details for long-term sites and the effect of lower than predicted extraction rates on site restoration
   The proposed working life of the site should be realistic, as significant delays may result in areas being left unrestored for long periods. This is particularly important where the proposals are based upon the importation of waste to achieve restoration, where the availability may have been over-estimated. Where applicants cite operations with long timescales as reasons for not providing details of restoration, this should be resisted. In these circumstances, applicants may seek not to provide detailed information on the grounds that industry “best practice” may have changed by the time restoration begins on site. Again, this should be resisted and applicants should put forward detailed proposals based upon current “best practice”, which can subsequently be amended (if agreed with the MPA), in the light of improvements in industry practice.

   b. the need to submit detailed schemes for landfill gas and leachate control infrastructure
   On sites where restoration relies on the importation of putrescible waste but where no restoration is to take place for a number of years, applicants may state that the detail of the landfill gas and leachate control infrastructure is a matter for the Waste Management Licence, and not include details in the planning application. This is unacceptable, as it prevents a proper assessment being made of the impact upon the agricultural after-use of the landfill gas and leachate control infrastructure, which may be severe if arable cropping is proposed. However, some flexibility to change the detail of the proposals will be necessary to account for some eventualities, but any changes should be discussed as early as possible and include all interested parties, including the agricultural advisers (Landfill Gas and Leachate Control Applied to Arable After-use (MAFF November 1998 PR4869)).

5. Are the requirements for haul roads appropriate to the site working proposals

Haul roads should accord with the scheme for site working and restoration and their construction planned well in advance.

   a. the location of the site working areas, soil stores and processing plant, and machinery used for hauling mineral/soil
   Haul roads are required for hauling mineral and soil from the working areas to the processing plant or soil stores. Where landfilling is taking place, haul roads are required for transporting waste to the void and between the stores of daily cover and the area being landfilled. It is important that plant and machinery are able to move around the site in an efficient and structured way and the layout of haul
roads will, to some extent, be a compromise between taking the shortest route and not having more haul roads than necessary. Soil stripping may require temporary haul roads between the phase being worked and the soil store, whether using dumptrucks or motor-scrapers. The siting of haul roads should be well thought-out, thus reducing the likelihood of changes being required, which may impact upon restoration and aftercare. The use of conveyors for transporting mineral to the processing plant may reduce the length of haul roads required.

b. areas of unworked or restored land which must not be trafficked by plant or machinery
The location of haul roads should minimise the interference with agricultural access to both unworked and restored land, with the progressive restoration and aftercare of the site, and prevent plant and machinery taking unauthorised short-cuts.

c. the need for new access to parts of the site as working progresses
The siting of haul roads may continue to change as site working progresses. Temporary haul roads will be required between the different areas being stripped of soil and put into store. These must also be clearly marked, and measures taken to prevent plant and machinery straying onto adjacent land or taking unauthorised short-cuts.

6. How are the haul roads to be constructed, maintained and restored
Plant and machinery must not be allowed to run on soil layers or on soil-forming materials. The proposals should ensure that:

a. stripping of soil layers
Haul roads will be stripped of soil down to the mineral or overburden, and the soil put into store for subsequent restoration.

b. providing a wearing course on “permanent” haul roads
Consideration should be given to surfacing “permanent” haul roads with mineral to provide a wearing course, unless stripping the soil reveals suitable mineral, making this unnecessary.

c. drainage and maintenance
Maintenance and drainage of the haul road surface is important to reduce the temptation for plant and machinery to divert off the road onto adjoining land, which can be a problem with poorly maintained and drained haul roads. Drainage is likely to be achieved by constructing and maintaining the surface of the haul roads with an appropriate camber to shed water to roadside French drains or soakaways.

d. dust control
Dust control may be necessary during dry periods to prevent contamination of nearby crops. This is particularly important for horticultural crops and fruit, which
may be eaten unwashed, and for grass which may become unpalatable to livestock.

e. **decompaction and restoration of the soil profile**
   Restoration of haul roads is likely to include the removal of any sub-base/wearing course, subsoiling to relieve compaction, and reinstating the original soil profile.

7. **How are the haul roads to be marked on site**

Operators should address the following matters:

a. **marking the layout and location of haul roads on plans in the site office**
   Haul roads must be shown on the site plans to enable them to be accurately set out and constructed on the ground.

b. **marking haul roads on site**
   Once constructed, their boundaries should be marked to reduce the chances of plant and machinery straying off them.

c. **preventing plant and machinery from straying off the haul roads**
   Haul road boundaries should be formed/marked in such a way that plant and machinery cannot easily widen them or take short-cuts across corners etc. This may be particularly important when sub-contractors are employed to strip or restore soil.

8. **Control of the water table**

Where proposals include extraction of minerals from below the water table or landfilling of waste, it will normally be necessary to de-water the site, either during working or sometimes in perpetuity (**MPG7 The Reclamation of Mineral Workings** (DoE 1996) paragraphs A22-28). The applicants should consider the following issues and provide detailed assessments of the impact of the development prepared by appropriately qualified hydrologists/hydro-geologists:

a. **the need for perpetual pumping to maintain the proposed after-use**
   Where sites are to be worked below the water table, it will normally be necessary to de-water the site by pumping water off site via a sump. Where land is restored back to its original level by landfilling with inert waste, the water table will normally return to its original level once restoration and pumping ceases. Where restoration is to agriculture at a low level, it will be necessary to line the site with clay or an artificial liner to limit the ingress of water and install a drainage system with pumping in perpetuity. A balancing pond may also be necessary to cope with the expected variations in volume of drainage water. Perpetual pumping will require a legally enforceable agreement to safeguard the drainage of the land in the long-term (**Low Level Restoration of Sand and Gravel Workings** (DoE 1989) Chapters 3 and 4).
9. Will the development affect the water environment of other land in the area

Where proposals include extraction of minerals from below the water table or landfilling of waste, it will normally be necessary to de-water the site, either during working or sometimes in perpetuity (MPG7 The Reclamation of Mineral Workings (DoE 1996) paragraphs A22-28). The applicants should consider the following issues and provide detailed assessments of the impact of the development prepared by appropriately qualified hydrologists/hydro-geologists:

a. any detrimental effects on the water table/supplies of adjoining land

Applicants should provide detailed assessments, prepared by appropriately qualified hydrologists/hydro-geologists, of the impacts of their proposals on agricultural land in the area. This may be due to interference with water supplies and irrigation, “draw down” of the water table, as well as any changes in the water environment due to the restoration proposals. Details of any remedial works proposed should also be provided (Low Level Restoration of Sand and Gravel Workings (DoE 1989)). Where working is to take place below the water table and de-watering is carried out, this may have significant impacts on the water table of land in the area and potentially on irrigation supplies from boreholes. Generally, the water table of agricultural land should be at least 1 metre below ground level, and maintained at this level by an underdrainage scheme where necessary. But mineral extraction requiring de-watering may also lower the water table of neighbouring land significantly, leading to increased droughtiness, reduced crop yields and water available for irrigation from boreholes. Low level restoration of mineral sites may require lining of the void and perpetual pumping, which may interrupt the movement of groundwater, leading to the problems identified above (Low Level Restoration of Sand and Gravel Workings (DoE 1989) Chapters 3 and 4).
Please see Annex AP8 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Does the application propose criteria under which soil may be moved**
   a. Are there separate criteria for differing soil types
   b. Do the criteria vary according to the machinery to be used
   c. Does the criteria include reference to meteorological forecasts
   d. Is there a company statement as to the intended operator’s reaction to adverse weather conditions
   e. Are the dust control measures compatible with soil movement
   f. Is the soil to be moved during an appropriate season
   g. Are the criteria proposed unambiguous
   h. Does the proposal avoid trafficking of the soil

2. **Do the soil handling proposals include the following**
   a. The recovery of all soil
   b. Keeping different soil types separate
   c. Soil storage or direct placement
   d. The removal of excess vegetation
   e. The control of weeds
   f. Steps required in ponded / flooded areas
   g. Measures to avoid soil erosion

3. **Are the site working proposals compatible with the soil details**
   a. Is the phasing of soil movement / storage and replacement compatible with the mineral extraction programme
   b. Is sufficient space allocated for soil storage and is the soil accessible for management and recovery throughout the working programme

4. **Initial site preparation details**
   a. How does the operator intend to gain initial access to the site
For more detailed information see:
• Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) Appendix 2

Cross references:
• AP 6, 9, 10
1. Does the application propose criteria under which soil may be moved

   a. **are there separate criteria for differing soil types**
   In general, the mineral operator should plan operations so that soil stripping is normally scheduled between the drier months of April to September inclusive. The risks to soil damage are further influenced by the types of soil and the machinery intended to be utilised. Lighter soil can generally be moved when wetter and for longer periods without damage. The period when soil can be handled is longer in the drier parts of the country, typically the east and south.

   b. **do the criteria vary according to the machinery to be used**
   The period for soil stripping may be extended where the soil handling machinery or technique is such that trafficking over the soil is minimal, e.g. the dump truck and excavator loose-tipping method (where dump trucks do not traffic over soil).

   c. **does the criteria include reference to meteorological forecasts**
   The planning application should make reference to meteorological forecasts and past data to assist in determining the extent of the risks in undertaking the soil stripping in the period identified. A company statement as to the intended operator’s reaction to adverse weather conditions should avoid any ambiguity.

   d. **is there a company statement as to the intended operator's reaction to adverse weather conditions**
   The operator should state any contingency plans to determine the suitability of continued soil movement when the weather changes. The operator must understand the potential implications on the working proposals of only undertaking soil movements under suitable conditions.

   e. **are the dust control measures compatible with soil movement**
   The spraying of haulage routes, limiting of vehicle speeds, establishment of peripheral spray curtains near sensitive properties or vegetating the storage bunds should not compromise the potential of the soil when stripped, transported or replaced. If soil movement on dry, windy days was prevented to avoid a dust nuisance, then the soil programme could be compromised. In order to address both dust prevention and soil movement, it may be appropriate to redeploy equipment away from dust sensitive properties until the wind eases.

   f. **is the soil to be moved during an appropriate season**
   The criteria for when to strip soil are fully set out in Appendix 2 of the publication ‘Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture’ (DoE 1996). The primary mechanisms by which soil dries are surface evaporation and transpiration by plants. Evaporation seldom dries soil beyond a depth of 30cm, so drying of subsoil depends upon the moisture extracted by plant roots. Land due for stripping should be kept vegetated until as close as possible to the time of stripping. Evaporation and transpiration increase from spring to mid summer and soil moisture deficit builds to a maximum in July or August. Consequently, these months are the prime time to move soil. The earlier or later in the year that soil is stripped or moved, the greater the risk of causing damage.
**g. are the criteria proposed unambiguous**

Generally, there are two methods to determine whether the consistency of soil is favourable for handling. The “WormTest”, adapted for field situations, is only suited to soil with greater than 10% clay content and less than 70% sand. The method entails rolling a ball of soil on a flat surface (e.g. a glazed tile) to form a thread 0.3cm in diameter. If a 0.3cm thread cannot be formed without crumbling, the moisture content is assumed to be drier than the lower plastic limit and therefore, less prone to damage if soil handling is carried out. However, it is considered advisable that the moisture content should be 3 to 5 % drier than the lower plastic limit, especially when motor-scrapers are to be used. The alternative approach is for the prior laboratory determination of the moisture content of the soil at its lower plastic limit for each soil type. A proprietary on-site soil moisture meter is then used to assess soil moisture relative to the lower plastic limit of that particular soil type. If 80% of the samples are at or below the acceptable moisture content, then soil stripping may commence. The lower plastic limit is the point at which, for each particular soil type, the soil changes from being plastic to crumbly (dry and friable). If soil handling takes place when soil is at or wetter than its lower plastic limit, damage to soil structure is more likely to occur. The criteria for determining when soil is fit to be handled should be clearly understood by all personnel.

**h. does the proposal avoid trafficking of the soil**

Clear identification of intended haul routes and soil storage areas should avoid indiscriminate trafficking of unstripped and partly stripped soil. The soil handling method can affect the agricultural quality of the restoration through severe soil deformation (compaction and smearing). This is primarily caused through trafficking, the effects of which increase with increasing soil wetness. Haul roads must have been stripped of both topsoil and subsoil before use.

**2. Do the soil handling proposals include the following**

**a. the recovery of all soil**

Even though calculations and surveys may identify specific depths at which to strip the soil, it is advisable to recognise the variances that do occur in soil depths. A strict adherence to a stated depth may result in topsoil not all being lifted or some subsoil being lifted with the topsoil. Personnel involved in soil stripping should be trained to fully appreciate and identify the difference between topsoil and subsoil.

**b. keeping different soil types separate**

Accidental mixing might be an inevitable consequence of complex soil patterns, where uneven layer boundaries preclude the precise separation of adjacent layers. Soil mixing probably causes the greatest difficulties where it affects topsoil; lumps of contrasting subsoil in topsoil can cause workability problems and dilute the nutrient reserves. As part of the restoration strategy, it can sometimes be beneficial to amalgamate soil of different textures when carefully considered.
and managed. If this is to be undertaken it should be clearly set out within the application document. Topsoil and subsoil should not be mixed.

c. soil storage or direct placement
The extent to which soil will need to be stored and for how long should be stated within the application details. Wherever possible, direct placement of soil is preferable to being placed into store. However, this is seldom feasible during the initial stages of the site working. Also, later within the working programme, direct placement may be constrained by the mismatch between the soil currently being stripped and those areas requiring restoration. Careful planning of the phasing is necessary to ensure the efficiency of soil movements. Store soil on soil of the same type.

d. the removal of excess vegetation
Soil will be drier when stripped from under grass or immediately after the harvest of an arable crop than when stripped from fallow land, given the same soil type and weather conditions. There may be a need to harvest the arable crop early to enable a suitable soil-handling window to be available before the autumn. Leaving unharvested crops can result in excess crop residues, leading to anaerobic conditions in stored soil. Although this is a situation from which topsoil will recover, it can be avoided by the removal of excess vegetation immediately prior to soil stripping.

e. the control of weeds
Weeds should be controlled on uncropped parts of the site, otherwise soil bunds or soil replacement areas will be prone to future weed problems.

f. steps required in ponded / flooded areas
In existing ponded or flooded areas, the operator should clarify how they intend to deal with this potentially vulnerable soil. This may include pumping or drainage ditches being cut and then specific soil handling techniques. It should be recognised that in some areas prone to seasonal flooding, the period that the subsoil will be dry and friable enough to move may be very limited. In some instances, the soil may not dry out at depth.

g. measures to avoid soil erosion
The potential for soil erosion increases when vegetation is removed and therefore, the operator should outline the steps intended to deal with water that may enter or arise from the site in periods of wet weather. The application should detail the areas to be unworked, worked or restored in differing phases and the water management arrangements throughout the life of the site operations. The application should also detail how surface water from inside or outside the site is to be dealt with, and what steps would be required to establish crop cover to protect newly restored areas.
3. Are the site working proposals compatible with the soil details

a. is the phasing of soil movement / storage and replacement compatible with the mineral extraction programme
   The phasing of soil movement / storage and replacement has to be compatible with the mineral extraction programme. Minerals are usually recovered throughout the year, but soil movement is restricted to a limited season. The submitted programme has to demonstrate that sufficient new areas of the site are stripped prior to the winter season, and enough overburden replaced through the winter to ensure soil can be replaced in the summer. The flexibility in any proposal should be carefully examined against the impact of any external factors, such as availability of inert fill, flooding or differing extraction rates.

b. is sufficient space allocated for soil storage and is the soil accessible for management and recovery throughout the working programme
   Space required for soil storage can be extensive. The area required increases with the number of differing soil types that need to be kept separate. The base areas of soil bunds should be checked against the area shown on the application plans between the site boundary and any excavation area. Is the boundary a clearly defined feature, such as a fence, or is it a hedge that may extend further into the site than the plan indicates? If the heights are given for the soil bunds, then a check should be made of the proposed side slopes; the shallower the side slopes then the larger the base area required for a given soil volume. On steeply sloping sites, the area required for soil storage may be greater. The separation space between soil bunds should be clearly stated. In some instances, the use of geomembranes is acceptable to physically separate soil within linear bunds. Soil bunds are usually located at the periphery of the site to assist in noise reduction and to act as a visual screen. Space should be available between the boundary and toe of the bund to ensure access for maintenance, and for drainage measures. A stand-off of at least 5 metres is required between the toe of the bund and the excavation to ensure slope stability and access.

4. Initial site preparation details.

a. how does the operator intend to gain initial access to the site
   The working proposals should also indicate the steps to be taken to gain initial access to the site and prevent trafficking over unstripped soil.
Please see Annex AP9 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Does the application state the equipment to be used for soil movement**
   a. is a clear indication given in the planning documents as to the equipment to be used
   b. are the soil stripping and soil reinstatement operations to be undertaken using the same equipment
   c. what ancillary machinery is intended to be used for soil bund construction or regrading

2. **If using backactors and dumptrucks**
   a. does the application specify the techniques to be used

3. **If using motor-scrapers**
   a. does the application specify the techniques to be used

4. **Is the proposed machinery acceptable**
   a. is it a proven technique
   b. is it capable of undertaking the task within the time constraints
   c. is it compatible with other aspects of the planning application (e.g. noise control)

**COMMENTS**

For more detailed information see:
- Good Practice Guide for Handling Soils (MAFF April 2000)
- Evaluation of Mineral Sites Restored to Agriculture (LRA 2000)

Cross references:
- RN 5, 6
- SW 4
1. Does the application state the equipment to be used for soil movement
   a. is a clear indication given in the planning documents as to the equipment to be used
      The machinery proposed for soil stripping operations should have been agreed in advance by the mineral operator and MPA and must be specified in the planning application. The choice will be based on factors including the ALC of the site and the Statement of Physical Characteristics Report. Other factors include haulage distances, the cost and availability of machinery, the scale of the operation, the soil types to be stripped, the ground and climatic conditions under which the work will be carried out and the need to avoid compaction. The effect of all these considerations can change over the time it takes to prepare, submit and consider a planning application. However, the type of machinery to be used for handling soil and the method of its use should be tailored to site specific circumstances.
   b. are the soil stripping and soil reinstatement operations to be undertaken using the same equipment
      The equipment and techniques to be employed should be specified for each soil type for both soil stripping, storage and replacement operations. It is common for equipment to be brought onto the site to undertake a specific task and then be removed to a different site. Some mineral operators favour a particular machinery combination, as this may also be required for the extraction of the underlying mineral. However, the type of equipment must be agreed prior to the grant of permission.
   c. what ancillary machinery is intended to be used for soil bund construction or regrading
      Bulldozers fitted with a blade may be used for soil movements for short distances, such as soil removal from haul roads and storage into nearby mounds. They can be used to form heaps of soil to be picked up by other machinery. They are also used for grading soil as it is placed; however, excessive trafficking can cause soil structural damage. Graders, which are commonly used to keep the haul roads in good condition, are not suitable for soil handling except in exceptional circumstances such as for sealing areas prior to the winter period.

2. If using backacters and dumptrucks
   a. does the application specify the techniques to be used
      This soil handling method uses backacters in combination with dumptrucks (articulated or rigid bodied) (see Good Practice Guide for Handling Soils (MAFF April 2000) Sheets 1 - 4). An excavator is used to strip soil and load it into dumptrucks for transportation to replacement areas or to storage. The earthmoving operator should outline in their scheme how they will ensure they run only over mineral or overburden, and not over subsoil or topsoil. Loading machinery should stand on the lowest material available (i.e. overburden rather than subsoil, subsoil rather than topsoil). The guidance can be relaxed if the loading machinery is proposed to be relatively small and mainly static (e.g. a
tracked 360° excavator or backacter, which may be situated on topsoil or subsoil if this is operationally more convenient). There is a trend towards less compaction as one moves from motor-scaper restorations to conventional dumptruck restorations and then to loose-tipped restorations. Recent research has demonstrated that deterioration in structure is least in subsoil when it is loose-tipped and untrafficked. The planning application must therefore specify the intended equipment and the method of its use.

3. If using motor-scrapers (see also Annex RN6)

a. does the application specify the techniques to be used

The motor-scaper is capable of undertaking all soil handling operations - lifting soil, transporting it and laying it either on a stockpile or on the area being restored (see Good Practice Guide for Handling Soils (MAFF April 2000) Sheets 5 - 12). Soil handling using motor-scrapers may represent the cheapest method of moving soil for shorter distances. Their main drawback is that they usually have to spread 3-4 layers of soil to reinstate a 1.2 metre deep agricultural soil profile, and as each spreading involves travelling over the previously laid layer with a full load, this inevitably leads to compaction. This compaction also arises in the formation of soil bunds using motor-scrapers. Such equipment can achieve high quality restoration on some sites, but because of the greater risk of compaction, it should not be used for the restoration of BMV agricultural land, where loose-tipping techniques are preferred.

4. Is the proposed machinery acceptable

a. is it a proven technique

Clear guidance is given in Good Practice Guide for Handling Soils (MAFF April 2000) and the report Evaluation of Mineral Sites Restored to Agriculture (LRA 2000), as to the specific stripping and replacement techniques which have proven least damaging to the soil. Generally, these involve loose-tipping techniques using backacters and dumptrucks, whereby none of the replaced soil is trafficked. Some equipment such as draglines, are suitable only for loading dumptrucks or for direct movement of overburden, and their use for direct movement of soil is unlikely to be feasible. However, there will be difficult conditions, perhaps due to topography, where innovative approaches will be required and it will be for the applicant to demonstrate the need to deviate from good practice.

b. is it capable of undertaking the task within the time constraints

The choice of machinery should enable the task to be completed within the time constraints and should be serviceable.
c. is it compatible with other aspects of the planning application (e.g. noise control)
   The noise and dust created by different types of machinery needs to be considered in relation to, for example, the site location, Public Rights of Way and surrounding properties.
Please see Annex AP10 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Is soil storage required

2. Are the storage locations clearly identified in all documents
   a. do these locations need to change through the life of the site
   b. how long will the soil be in store
   c. are soil bunds sited to avoid damage from other operations
   d. are soil bunds located away from areas likely to be flooded
   e. are separate soil bunds identified for different soil types

3. What bund construction details are provided
   a. what time of year is the soil to be placed into store
   b. what is proposed for the soil beneath the bunds
   c. how are the bunds to be formed
   d. what are the dimensions (height, slope, volume) of the bunds

4. How are the bunds to be managed
   a. how are weeds to be controlled
   b. are the bunds to be vegetated
   c. what record keeping (and auditing) is proposed

5. What bund removal details are provided
   a. treatment of surface under the bund
   b. blending with surrounding landform

For more detailed information see:
- Evaluation of Mineral Sites Restored to Agriculture (LRA 2000)
- Good Practice Guide for Handling Soils (MAFF April 2000)

Cross references:
- RN 4, 8
1. Is soil storage required

Ideally, soil is stripped from one part of a site and immediately spread over a worked area elsewhere on site (the direct, progressive restoration method). This saves handling costs and storage problems. Soil storage necessitates additional handling that can lead to a greater risk of compaction. Risk to the soil during storage also arises through the potential mixing/dilution of the soil types, and potential chemical and biological degradation. These are fully explained in the Land Research Associates work for MAFF entitled ‘Evaluation of Mineral Sites Restored to Agriculture’ (LRA 2000). However, on most sites, soil storage is a necessity with mineral extraction occurring in a sequence of phases, each phase often representing one year’s production of minerals. Whilst one phase is being worked, another can be prepared for working and a previous phase can be undergoing reclamation. In order to get such a rolling programme underway, soil from the first 2-3 phases will need to be put into stockpiles. Soil can then be stripped from the next phase to be worked for minerals and carried directly to worked-out land that has been brought up to finished levels ready for soil placement. On longer-term hard rock or chalk quarries, soil storage will be required sometimes throughout the whole life of the site and therefore, good record keeping is vital.

2. Are the storage locations clearly identified in all documents

In examining the application details and working proposals, it is important to keep an overall picture of the effect of different operations on the soil storage proposals. Inconsistency between drawings or omissions can lead to subsequent difficulties on site.

   a. do these locations need to change through the life of the site
      A scheme that includes the relocation of soil bunds from one area to another may increase damage to soil and mixing of different soil types.

   b. how long will the soil be in store
      Stored soil may remain in the stockpiles for periods ranging from a few months to several years. Very long-term soil storage presents the danger of the bund being assimilated into the landscape and becoming a forgotten resource. Careful site planning and record keeping should ensure the soil remains available for restoration.

   c. are soil bunds sited to avoid damage from other operations
      Vehicles should be kept to prearranged routes to and from storage areas to prevent trafficking of areas still to be stripped of soil or restored land. The bunds themselves should be placed in a location where there will be no routine traffic passing over them. Storage should not be proposed too close to the excavation area where soil may be lost through slippage in to the void, or close to hedges that will result in losses. Steps should be taken to ensure that any fuel storage on the site cannot contaminate soil storage areas.
d. are soil bunds located away from areas likely to be flooded
   The bunds should be sited on dry ground, not in hollows and should not disrupt local surface drainage. Where necessary, bunds should be protected from run-off/ponding by a cut-off ditch which is linked to appropriate water discharge facilities. Within flood plains, the orientation of the bunds may require consultation with the Environment Agency.

e. are separate soil bunds identified for different soil types
   The application should clearly identify, with annotations on the plans or by cross-reference to the soil details, the specific location of each soil bund and what it is intended to contain. Bunds of differing materials should be physically separate. Separation will be required for the differing topsoil and subsoil units. In addition, specific areas should be allocated for the storage of any soil-forming material that requires separate storage from the overburden. Separate locations may be required for any contaminated soil or soil of particular ecological interest. Therefore, it is likely that there will need to be numerous separate topsoil and subsoil bunds due to the differing characteristics. The past practices of skimming subsoil and overburden bunds with topsoil to encourage growth on the bunds is not acceptable. The overlapping of soil bunds is not acceptable. On a continuous soil bund required for noise or visual attenuation, a change in soil type would be acceptable, providing a vertical interface is physically established using a geomembrane (or similar material) and marker posts are provided with locations surveyed and recorded.

3. What bund construction details are provided

a. what time of year is the soil to be placed into store
   Soil should not be put into store during winter months when the weather is unsuitable and the soil too wet to be handled without being damaged. A wet soil is likely to suffer more in a stockpile than a dry soil. A wet clay is not only considerably heavier than a dry clay, thereby increasing the load on all soil below it, but also has a lower shear strength and is thus less able to resist any applied load. A wet, sandy soil is more likely to slake (the effect of inter-particle lubrication allowing them to move and pack more closely) in storage than a dry sandy soil. Conversely, the construction of soil bunds in dry weather can create dust problems.

b. what is proposed for the soil beneath the bunds
   The general principle is that each storage bund should be stored on like material. Therefore, overburden storage areas require both the topsoil and subsoil to be removed before placement into storage; subsoil bunds require topsoil to be removed and topsoil bunds can be directly placed upon the existing topsoil. If the landform is to alter and regrading is required, then other options should be considered.
c. how are the bunds to be formed

The bunds should be stable structures from which water will run off without causing erosion or instability. Slopes in excess of 45° are usually regarded as unstable. However, slopes at angles less than 25° may reduce drainage from the bund. Soil type and climate are therefore factors to consider when determining the size and cross section for each bund. The proposals for constructing the bunds should ensure that equipment will be able to operate safely and effectively, without causing further undue compaction, yet maintain the stability of the structure. The construction of bunds using motor-scrapers which build the height up in shallow incremental layers ensures stability but results in compact bunds. The soil deposited by all techniques requires careful management to avoid undue trafficking. Further guidance is available in Good Practice Guide for Handling Soils (MAFF April 2000).

d. what are the dimensions (height, slope, volume) of the bunds

The magnitude of the compacting and consolidating forces will depend on the height of the storage bund and the length of time the soil is stored; but the effect of these forces will depend on the texture, density and moisture content of the soil within it. Soil that is placed into a bund will be subject to the consolidating load of all the soil above it. In a bund, soil is buried under a much greater weight of soil than experienced in natural conditions. The direct effect of stockpiling is, therefore, compaction, in which the air-filled pores of a soil are closed and consolidation, which involves a movement of moisture out of the finer pores, enabling the soil particles to move closer together. Both processes result in an increase in density and a reduction in porosity. The ideal storage bund from a soil protection aspect is therefore likely to be a very low and wide structure, where the total storage profile benefits from the roots of surface vegetation. It is accepted that such a scenario would require extensive areas for soil storage, and may not enable the bunds to be utilised for noise or visual attenuation. The shape and height is therefore, a compromise. There will be soil in the core of the store that will be subject to increased loads and suffer structural deterioration that will have to be addressed within the restoration and aftercare period. The application details should clearly identify the height and dimension of all the bunds, to ascertain both the likely storage effects upon the soil itself, and whether the volumes calculated can be physically stored in the space identified. The side slopes of soil storage bunds are often 1:1½, with the outer slopes being 1:3, which enables space, stability and maintenance issues to be addressed.

4. How are the bunds to be managed

a. how are weeds to be controlled

The bunds need to be accessible to undertake weeding and mechanical mowing at the appropriate time of year to prevent weed infestation.

b. are the bunds to be vegetated

If the bund is to remain for more than a few months, or over the winter period, then it should be vegetated and kept weed free. The seed mix details and
method of sowing may be different to normal grass sowing techniques – mowing should occur at least twice a year (dependant upon seed mix), and spraying undertaken to prevent a build up of weed seeds. The vegetation of the bund enables unauthorised movement of soil to be noticeable and assists in preventing soil erosion.

c. what record keeping (and auditing) is proposed
The soil handling strategy should identify all the likely future storage operations, and their approximate timing. A record should be established and maintained for each soil bund. Through the life of an operating site, the personnel involved from both the operating company and MPA is likely to change. Therefore, a clear record of operations including dates, volumes, types of soil, area from where the material originated, weather conditions during stripping and other problems encountered will assist in future decision making. The labelling of the individual bunds is good practice. All the information should be readily available to the operators on the site. The intention to undertake an annual audit will enable a clear, ongoing understanding of the quantities, qualities and locations of soil resources either stripped, remaining unstripped or replaced against the required restoration objectives.

5. What bund removal details are provided

a. treatment of surface under the bund
The application should include proposals for soil loosening under the bunds when the stored soil has been removed and a restored soil profile is being re-established.

b. blending with surrounding landform
The width of a bund can be significant and the levels may require alteration over an area greater than the excavation area in order to achieve the desired landform. The application should highlight how the bund removal, landform changes and soil replacement will be achieved.
Please see Annex AP11 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Outline aftercare
The aftercare management of the site must acknowledge the fragile nature of the restored soil profile, i.e., lack of structure, natural drainage, cropping flexibility and poor workability. MPG 7 The Reclamation of Mineral Workings (DoE 1996) (para 58. iv) advises that ‘aftercare begins from compliance with the restoration condition and an operator cannot be asked to complete steps which will stretch beyond 5 years from that point.’ It goes on to say ‘However, aftercare may be extended by mutual consent where this will enable reclamation objectives to be met.’ Although the restoration condition may well have been completed, an agreed aftercare scheme also has to be in place before formal aftercare can commence.

2. Check the proposed after-use
   a. does the application propose restoration to a specific type or types of after-use, i.e. agricultural/non-agricultural
   b. will the commencement of aftercare be on a phased basis, or will the whole site be restored in a single operation
   c. at what stage will aftercare commence
   d. will an aftercare scheme be required by condition, or will the condition include the specified steps to be undertaken

3. Agricultural aftercare information
Aftercare information needs to be supplied at two levels:
   a. an OUTLINE STRATEGY for the 5 year aftercare period (MPG 7 The Reclamation of Mineral Workings (DoE 1996), Box 5, page 28)
   b. a detailed ANNUAL PROGRAMME for each successive year (MPG 7 The Reclamation of Mineral Workings (DoE 1996), Box 6, page 29)
For more detailed information see:
- MPG 7 The Reclamation of Mineral Workings (DoE 1996)

Cross references:
- AC 3, 6
- SW 10
- RN 10
1. Outline aftercare

The need for aftercare stems from the recognition that in order for the land to be fully reclaimed, it needs not only the replacement of topsoil and subsoil or other soil making materials (through restoration conditions), it also needs to be cultivated and treated for a number of years after the initial restoration has been carried out, in order to improve the structure and stability of the soil to bring it to a satisfactory standard - (MPG 7 The Reclamation of Mineral Workings (DoE 1996) - para 57).

Aftercare can be likened to a period of physiotherapy, where careful management will, over a period of time, return the land to its most flexible and productive agricultural use, viz., to the required standard. Aftercare should not be seen as a remedy for poor restoration – often it cannot correct poor restoration techniques.

2. Check the proposed after-use

a. does the application propose restoration to a specific type or types of after-use, i.e. agricultural/non-agricultural
   It is important to remember, when considering any part of the application document, that the restoration of the site will be to a specified after-use or uses. A lack of such information at this stage may well impose severe limitations on the types of after-use which may possible, and on it’s success or failure.

b. will the commencement of aftercare be on a phased basis, or will the whole site be restored in a single operation
   This choice is normally dictated by the size of the site or the mineral being excavated. Small sites of only a hectare or so can be easily restored in a single operation. The larger and more complex sites are likely to be worked on a phased basis. This will enable not only a more efficient method of working to take place, but also facilitate the better management of internal resources. Where restoration of a site is dependent upon the importation of a fill material (inert or putrescible), a phased approach will allow the likely imbalance between outgoing and incoming materials to be managed more effectively.

c. at what stage will aftercare commence
   Aftercare begins from compliance with the restoration condition, and an operator cannot be compelled to complete steps which will stretch beyond 5 years from that point. (the 1990 Act Sch. 5 paragraph 2(7)). The actual date of commencement of the aftercare period should be agreed in writing, for completeness of records. Where the restoration is to be phased, it may be that each restored phase has its own specific aftercare period. Thus, throughout the life of the site, different restored parts of the site will be at various stages of aftercare. If individual phases are too small for practical aftercare management to be implemented, they may need to be amalgamated with other phases to produce a viable area of land. In such cases, a period of interim management (also known as ‘care and maintenance’), may be necessary until such time as a sufficient number of phases have been restored to enable formal aftercare to
begin. Interim management will be necessary to ensure weed infestation does not take hold and should include the establishment of a vegetative cover to both protect the soil surface and facilitate the removal of soil water from the restored profile.

d. will an aftercare scheme be required by condition, or will the condition include the specified steps to be taken
An aftercare condition can be imposed in one of two forms (Schedule 5 paragraph 2(3) of the 1990 Act) viz.
   i. an aftercare condition imposed at the time of granting planning permission, specifying the steps to be taken, or
   ii. a condition which requires an aftercare scheme to be submitted by the mineral operator, or other appropriate person, for approval (after modification if necessary) by the MPA

An aftercare scheme will usually be appropriate with a long-term permission where restoration and aftercare may not commence for a number of years. Where mineral working is short-term and the aftercare reasonably straightforward, or for the first phase, where progressive restoration and aftercare are to be carried out relatively quickly, it may be more appropriate to specify the aftercare steps in the aftercare condition itself.

3. Agricultural aftercare information

a. OUTLINE STRATEGY - is a broad outline of how the site will be managed throughout the aftercare period. General terms regarding the type of cropping, cultivations, drainage, nutrient applications are acceptable at this stage - (MPG 7 The Reclamation of Mineral Workings (DoE 1996) Box 5, page 28). It should also state who is responsible for carrying out the aftercare.

b. ANNUAL PROGRAMME - is the detailed information which will identify the operations/cultivations etc to be carried out. This will include types of cultivation, sowing rate, detailed fertiliser application (usually based on the results of a soil analysis) - (MPG 7 The Reclamation of Mineral Workings (DoE 1996) Box 6, page 29).

Once aftercare has commenced, annual reports should be prepared by the operator. The report, to be circulated to all parties, should record the management of the site in the previous 12 months (where applicable) and provide detailed proposals for consideration for the following 12 months. Annual aftercare meetings should be held to discuss progress to date and agree any remedial actions to be carried out. A formal record of this meeting should be made and circulated to all the parties concerned.
Please see Annex AP12 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Is the site currently in agricultural use**
   If not, any impact upon agricultural holdings is unlikely to be detrimental. If the site is in agricultural use, the considerations below may be relevant and should be considered.

2. **Is the land owner-occupied or are there agricultural tenants involved**
   Agricultural tenancies vary in the amount of security offered to tenants and in the levels of compensation available when land is taken by the landlord for development. The effects of the loss of land will normally be more significant for tenants than for owner-occupiers, who will generally receive income from the development. The effects on agricultural holdings will depend upon a number of factors such as:
   a. **area of land to be lost to the development at any one time and size of the agricultural holding**
   b. **ALC of the land**
   c. **location/special importance of the land in relation to the rest of the agricultural holding and its enterprises**
   d. **whether the tenant will farm the land again once restored**
   e. **whether any buildings are affected**
   f. **impacts upon access, drainage and water supplies**
   g. **impacts upon the water environment in the area**
   h. **dust on agricultural crops**
   i. **provisions to prevent the spread of plant or animal diseases**

3. **Is there agreement between all parties as to the objectives of the restoration and after-use**
   Clear understanding and agreement between the operator, landowner (and tenant) is required on the restoration objectives and the after-use. Due to the long-term nature of mineral development, this consensus must include parties with a future claim on the land such as trust beneficiaries, otherwise conflicts can arise when much of the future of the site is already set through schemes of working, restoration and aftercare.
For more detailed information see:

Cross references:
- AP 3, 5, 7, 11
- SW 3, 10
- RN 1, 2, 9, 10
- AC 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
1. Is the site currently in agricultural use

The specific impacts of mineral development on agricultural holdings are dealt with below, but a general consideration is the loss of the land to the agricultural holding in terms of viability, where the land is in agriculture prior to the development. There may be circumstances where the land is an old mineral void which it is proposed to restore to agriculture. In this case, not all the following impacts will need to be considered, although some will remain relevant.

It may also be appropriate to consider some of the following impacts in relation to adjoining agricultural land and holdings; for example, dust and the effect of the proposed development on the water environment in the area.

2. Is the land owner-occupied or are there agricultural tenants involved

Where the following issues are likely to be significant, the applicants’ should provide an assessment of the effects of the proposals on the agricultural holding, produced by an appropriately qualified person such as a Chartered Surveyor (Rural Faculty), or a member of the British Institute of Agricultural Consultants. Some of the impacts are common to all holdings, either owner-occupied or tenanted, and include:

a. area of land to be lost to the development at any one time and size of the agricultural holding
   The area of land taken out of production at any one time compared to the size of the agricultural holding will have implications for it’s viability, although this will normally only be an issue with tenants, as owner-occupiers will receive income from the development. The loss of land can result in the under-utilisation of buildings, equipment and labour. Land within aftercare will generally not be as productive or profitable as undisturbed land, at least in the short-term.

b. ALC of the land
   Generally, the higher the ALC of the land, the more productive and profitable it will be. The loss of high quality land may, therefore, be more serious to the holding than the loss of poor quality land (but see below).

c. location/special importance of the land in relation to the rest of the agricultural holding and it’s enterprises
   Certain parcels of land are of disproportionate importance to the agricultural holding due to factors such as their location. For example, in-byre land in upland areas, or fields near to the main group of buildings on a dairy farm, may be important for keeping stock requiring close supervision. Other fields, for example, may contain the borehole(s) for the farm’s water supply for both irrigation and general use.

d. whether the tenant will farm the land again once restored
   If the agricultural tenant is to farm the land once restored, it is essential that the person(s) responsible for the aftercare has control of the land during the aftercare period, to ensure that the aftercare objectives are met. For example, the primary
objective of aftercare is to rehabilitate the land and this may mean not managing
the land to maximise profits.

e. **whether any buildings are affected**
    Proposals which affect agricultural buildings may, for example, result in
    insufficient storage capacity for grain or livestock accommodation, causing
    serious difficulties for the holding in question.

f. **impacts upon access, drainage and water supplies**
    Proposals which interfere with agricultural drainage, water supplies (including
    irrigation) and access will require appropriate remedial works and/or temporary
    accommodation works to be provided by the applicants. The interruption of
    irrigation supplies, for example, can have very serious consequences for the
    profitability of root crops in particular.

g. **impacts upon the water environment in the area**
    Where working is to take place below the water table and de-watering is carried
    out, this may have significant impacts on the water table of land in the area, and
    potentially on irrigation supplies from boreholes. Generally, the water table of
    agricultural land should be at least 1 metre below ground level, and maintained at
    this level by an underdrainage scheme, where necessary. But mineral extraction
    requiring de-watering may also lower the water table of neighbouring land
    significantly, leading to increased droughtiness, reduced crop yields and water
    available for irrigation from boreholes. Low level restoration of mineral sites may
    require lining of the void and perpetual pumping: this may interrupt the movement
    of groundwater also leading to the problems identified above (Low Level
    Restoration of Sand and Gravel Workings (DoE 1989) Chapters 3 and 4). Where
    proposals affect the water environment significantly, the applicants should provide
    an assessment of the effects of the development on the water environment,
    together with details of any remedial works proposed, prepared by appropriately
    qualified hydrologists/hydro-geologists.

h. **dust on agricultural crops**
    Dust from mineral sites may be a problem, particularly when soil handling
    operations are taking place in dry conditions and adjacent to haul roads. In
    severe cases, dust may limit the palatability of grass to livestock and lead to
    problems with marketability, where vegetable or fruit crops are affected.

i. **provisions to prevent the spread of plant or animal diseases**
    Plant and animal diseases may be spread from one agricultural holding to
    another through contaminated soil carried on plant and machinery, or through
    imported soil or soil-forming materials and amendments. Seagulls may be
    attracted to landfill sites and to mineral sites which have large water bodies. They
    often use “loafing areas” on adjoining agricultural land, which can lead to crop
    damage and potentially to the spread of animal diseases. Seagulls can pick up
    waste food from landfill sites and drop it on outdoor pig units in the vicinity, which
    can lead to the spread of diseases such as Swine Fever. Landfill sites may also
    attract vermin such as rats and flies which can spread animal diseases.
Applicants and contractors should follow the advice given in “Preventing the Spread of Plant and Animal Diseases – A Practical Guide” (MAFF 1991 PB0486).

3. Is there agreement between all parties as to the objectives of the restoration and after-use

It is essential that all parties with an interest in the site (landowners, tenants, operator, future owners/trust beneficiaries) clearly understand the objectives of the restoration and after-use of the site, as well as their responsibilities. Due to the relatively long-term nature of mineral working, the parties who have a claim on the land may change over time along with their priorities. This may lead to conflicts where the restoration and after-use may be set and partially achieved, and new parties with a claim or the original parties with changed priorities attempt to enforce changes. As far as is possible every attempt should be made to ensure that all parties are kept up to date with the progress of the site development, and any changes to responsibilities discussed between all the parties (including the MPA) well in advance. The responsibility for carrying out aftercare must be clearly agreed in writing along with any subsequent changes.
Please see Annex SW1 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Agreed Lines of Communication**
   It is vitally important that clear lines of communication are agreed with MPA and operator staff, prior to the commencement of any new stage during site working (e.g. soil stripping), particularly if such works are to commence at short notice.

2. **Gaining Approval to Commence Work**
   The MPA should agree with the operator how approval (or otherwise) of requests to commence work will be communicated. This particularly applies if formal written approval will take too long. However, reasonable notice must be given to the MPA to allow proper consideration and if necessary consultation with others. Regardless of communication method, clear records need to be maintained.

3. **Delegated Authority**
   Has the site manager given delegated authority to other members of staff to notify and seek approval from the MPA for a new phase of work? Similarly, has the MPA case officer given delegated authority to others to give approval to the commencement of notified work?

4. **Monitoring**
   How are critical phases, such as soil stripping, going to be monitored, by whom and how frequently? Is work being carried out in accordance with the approved conditions?

5. **Internal Consultations**
   On many sites, the responsibility for restoration and aftercare may not rest with the site manager. For site working operations, such as soil stripping and storage, has the site manager consulted with those responsible for soil replacement and aftercare of the land?
For more detailed information see:

- **MPG7 The Reclamation of Mineral Workings** (DoE 1996) (Paragraphs 33-50, 97-102 and Annex A)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Pages 13-23)
- **Planning Conditions for Mineral Extraction and Waste Management Facilities**

Cross references:

- SW 2, 4, 7, 8, 9, 10
- RN 1
- AC 1
1. Agreed Lines of Communication

In most cases, there will be a planning condition which establishes how much written notice the operator should give to the MPA of the commencement of works. The standard Defra recommended condition states that the MPA shall be notified in writing at least 5 days prior to the commencement of several key stages, including each phase of soil stripping. However, it has to be recognised by all parties that often a shorter notice period may be needed for practical reasons. For example, the timing of soil stripping will largely depend on the weather and soil conditions. Additionally, there may be a requirement to deviate from the agreed phasing plans. For example, the area or depth of any given soil type may differ in reality to that shown on the statement of physical characteristics prepared at the time of the planning application. Therefore, it is good practice for the MPA, operator and other consultants (if applicable) to agree clear lines of communication prior to the commencement of site working. Matters to be agreed should include:

- the method of communication (e.g. phone, fax or e-mail)
- whom to contact (and named alternatives)
- minimum period of notice
- the issues that require prior agreement (e.g. deviation from conditions, changes in phasing etc.)

2. Gaining Approval to Commence Work

Similar to notification above, the MPA should also agree how approval (or otherwise) of short-notice requests to commence work will be communicated to the operator. For the reasons stated above, written notification may take too long. Matters to be agreed should include:

- the method of communicating MPA approval (phone, fax or e-mail)
- names of staff with authority to approve commencement of work
- where approvals should be directed (e.g. site manager)

Regardless of the method of communication, records should be kept, both in the site and MPA offices.

3. Delegated Authority

It is important to be aware of who has authority to make decisions concerning site working or requests to the MPA. If the site manager has delegated authority to another member of staff, how experienced is that person? Conversely, the operator needs to be aware of whom to contact at the MPA with requests for information or notification of work commencing.

4. Monitoring

On sites with significant areas of BMV agricultural land, or complex variations in topsoil and subsoil units across the site, it is very important that the soil is stripped, handled and stored in accordance with the approved planning conditions, soil strategy and soil stripping phasing plans.
Therefore, regular monitoring is critical at this stage. Compliance monitoring will help ensure that soil is stripped at the right time and in a manner which minimises damage, maximises the volumes recovered and that they are stored correctly in readiness for the restoration phase. Clear lines of communication between the operator and MPA are essential. For more information see SW4, SW7, SW8, SW9 and SW10.

5. Internal Consultations

With many minerals and waste operators, the responsibility for the site restoration and aftercare rests with members of staff other than the site manager. As explained previously, the operations carried out during the site working stage can have a major impact on the success of the restoration and aftercare phases. Therefore, if the site working responsibilities rest with site managers, have they consulted the person responsible for actions such as soil replacement and aftercare of the land?
Please see Annex SW2 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. What is the proposed after-use
Both the MPA and operator need to be clear what the proposed after-use is prior to the commencement of any site working. The type of after-use will have significant impacts on many of the agricultural issues that arise during the site working phase.

2. Planning documentation on site
It is essential that a full copy of all planning documentation is available and regularly referred to in the site office. This should include a copy of the planning permission, planning conditions, environmental statement, all approved plans/drawings and soil handling strategy (if applicable).

3. Reserved matters
Applicants are encouraged to submit as much detail as possible in the initial planning application. However, some issues are left as reserved matters after formal planning permission has been granted. Checks need to be made to ensure that all the appropriate documents and plans have been submitted in accordance with the planning conditions. From the agricultural perspective, this may include a detailed soil strategy, reports detailing actual soil resources and storage location on site following soil stripping and, prior to the commencement of restoration, the detailed restoration scheme/strategy.

4. Variations to approved conditions/method of working
Most planning permissions will normally specify a condition which covers requests to vary a condition or the approved method of working. However, there may be instances where the variation sought is relatively minor or a practical problem arises which requires a change and a decision is required rapidly. In such instances, the normal method of applying to the MPA for approval of a variation may not be practical. It is, therefore, recommended that the MPA and operator agree a procedure for notifying minor variations or where a decision is required urgently.
For more detailed information see:

- MPG7 The Reclamation of Mineral Workings (DoE 1996) (Paragraphs 33-50, 97-102 and Annex A)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Pages 13-23)
- Planning Conditions for Mineral Extraction and Waste Management Facilities

Cross references:
- SW 1
- RN 2
- AC 2
1. What is the proposed after-use

It is important that all those involved during the site working phase (operator and MPA staff) are fully aware of what the proposed after-use(s) of the site is. The final after-use will have a significant bearing on the operations carried out during site working. For example, if it is proposed to restore the site back to agriculture after mineral extraction or waste filling, this should dictate how soil is stripped, handled and stored. If the site has a variety of after-uses, then there may be different methods employed for soil stripping, handling and storage. On sites to be restored wholly or partially to agriculture and a high standard of restoration is required, if the wrong methods are employed at the site working stage, it could ruin any prospect of a successful reclamation.

2. Planning documentation on site

There will be many times during the site working phase where the planning documentation will need to be consulted. This may be by a member of the site staff checking an approved plan or an MPA officer wanting to clarify a particular planning condition. Therefore, it is vital that a full copy of all the planning documentation is available on site and kept up to date. If there is an approval for a variation to an approved document or planning condition, all the relevant documents should also be copied to the site office to avoid confusion and misunderstanding later on.

3. Reserved matters

Applicants are encouraged to submit as much detail as possible in the initial planning application. However, some issues are left as reserved matters after formal planning permission has been granted. Checks need to be made to ensure that all the appropriate documents and plans have been submitted in accordance with the planning conditions. From the agricultural perspective, this may include a detailed soil strategy, reports detailing actual soil resources and storage location on site following soil stripping and, prior to the commencement of restoration, the detailed restoration scheme/strategy.

4. Variations to approved conditions/method of working

The Planning Officers Society publication ‘Planning Conditions for Mineral Extraction and Waste Management Facilities’ has a recommended model policy which begins “Unless otherwise agreed in writing by the MPA, the working, restoration and aftercare of the site shall be carried out only in accordance with the working programme....” Therefore, any requests to vary the approved conditions or methods of working need to be submitted in writing to the MPA. This is the recommended approach which should be adopted in the majority of cases. However, there will be instances where the variation being sought is a very minor one or, for practical reasons, a decision needs to be taken rapidly. It would therefore be sensible for the operator and MPA to agree at an early stage how minor or urgent requests for variations are to be dealt with. Issues to be agreed should cover:
how such requests are to be communicated to the MPA
how the MPA’s decision is to be communicated to the operator, and
whether all requests and decisions are to be confirmed retrospectively in writing

From the Defra perspective, such variations could include requests to commence soil stripping earlier than the approved conditions allow, for example due to unusually dry weather in the spring, or a change in the soil stripping plans due to unexpected soil types being identified on site.

It must be emphasised that such informal arrangements should only be used exceptionally for the type of scenario described above and not used as an excuse to bypass the formal procedures.
Please see Annex SW3 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Control of dust, dirty water, noise and air pollution**  
   A check is needed to ensure that adequate controls and procedures have been put in place on the site to control excessive dust, dirty water run-off, noise or air pollution. In making such assessments, the planning conditions and approved methods of working need to be compliance monitored. Also, check that despite the controls/procedures being in place, adjoining agricultural land, watercourses or other land uses are not adversely affected by dust, water contamination, noise or smell.

2. **Dirty water storage**  
   Is the dirty water run-off being adequately stored in silt lagoons? How are the lagoons being emptied and how frequently? Where and how is the dirty water disposed of - is it allowed to flow directly into a watercourse after allowing for the settlement of silt or is it emptied by tanker and spread on agricultural land? Will the silt lagoons remain in-situ after site working or are they only temporary? Are adequate bunds in place around fuel storage tanks etc. to contain accidental spillage and leaks?

3. **Flooding**  
   On occasions, despite normally adequate controls being in place to prevent dirty water run-off, there may be times following an extremely heavy storm or prolonged spell of bad weather when there is flooding on site. Checks need to be made to ensure that in the event of flooding, it is contained on site and not allowed to flood adjoining agricultural land. Temporary drainage or pumping facilities may need to be put in place.

4. **Pumping**  
   Are there adequate pumping facilities on site to remove water from the excavated areas or other low lying areas?
### COMMENTS

<table>
<thead>
<tr>
<th>For more detailed information see:</th>
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<tbody>
<tr>
<td>• MPG7 The Reclamation of Mineral Workings (DoE 1996) (Paragraphs 33-50, 97-102 and Annex A)</td>
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<tr>
<td>• Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Pages 13-23)</td>
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<td>• Planning Conditions for Mineral Extraction and Waste Management Facilities</td>
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</tbody>
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<tr>
<td>• AP 1, 2, 3</td>
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<tr>
<td>• SW 5, 6, 7</td>
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</tbody>
</table>
1. Control of dust, dirty water, noise and air pollution

Most modern planning permissions usually contain conditions which impose strict controls in order to prevent nuisance to adjoining land users. In addition, the environmental statements that accompany detailed planning applications will have tried to assess the level of impact and, where appropriate, suggested mitigating measures. However, despite all these measures, it is important to check that all the controls and procedures, set out in the planning conditions or cited in the environmental statement, are in place and working effectively. From the agricultural perspective, problems can arise on adjoining farmland if:

- excessive dust settles on grass or crops thus reducing palatability, quality and yield
- watercourses, used for irrigation or drinking water supplies, are contaminated with dirty water
- excessive noise disturbs livestock, and
- there is an increased risk of disease due to airborne contaminants

2. Dirty water storage

Checks need to be made to ensure that the lagoons are adequately sized and not leaking. In most cases, water will pass into a nearby watercourse after allowing sediment to settle in the lagoon. Many such lagoons will remain in-situ throughout the whole working life of the site and may even form part of the long-term restoration proposals, but in other cases, they may only be temporary during a particular working phase. For other liquid storage such as fuel oil, the normal requirement is for an impermeable bund to be placed around the storage tank, which is capable of containing 110% of the tank's total volume. In all cases, the aim is to prevent pollution of groundwater and watercourses. If there any doubts, the EA should be consulted.

3. Flooding

There will, on occasions, be extremely heavy storms, prolonged spells of rain or rapidly thawing snow when, despite all the measures in place, there will be flooding of the site. Every effort should be made to contain the water on site to prevent pollution of nearby watercourses. It may be necessary to install temporary drainage facilities, such as ditches or grips. Areas of land which may be prone to flooding can be cultivated to increase water infiltration. This will also help to prevent rapid surface run-off and just as importantly, prevent soil erosion. Loosening of the soil surface should also be carried out if no more soil stripping is likely before the winter. This will help prevent run-off and soil erosion during the winter months. The same technique can also be used during restoration when soil has been replaced but no crop has been sown.
4. Pumping

Inadequate pumping facilities in excavated or low-lying areas of the site will not only hamper site operations, but also increase the risk of contaminating groundwater.
Please see Annex SW4 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Is information relating to the soil resources readily available on site
   a. are the pre-working details of the ALC and Soil Physical Characteristics Report available
   b. has the soil strategy been revised since the planning application
   c. do any planning conditions relating to soil matters refer to other documents – if so, are these available on site
   d. are the site personnel aware of the existence of all the above information and where to find it

2. Who is to undertake the soil stripping
   a. is the soil stripping to be undertaken by a subcontractor
   b. has the overall soil information been translated into instructions for the site personnel for this phase of work

3. When is the soil stripping to commence
   a. what are the current soil conditions
   b. what is the current ground condition
   c. what are the expected weather conditions
   d. is it within the correct season
   e. are there clear details as to the expected start date and duration of this phase of works
   f. has the MPA been informed

4. Are the soil handling criteria agreed
   a. are stripping units known
   b. are the target depths of each unit agreed
   c. has the Lower Plastic Limit been determined for each soil type
   d. has the moisture content been ascertained for the particular soil to be moved

5. Are other aspects of the site development ready
   a. have statutory undertakers or other service providers confirmed that their infrastructure on site will not be damaged by the soil stripping proposals
   b. have all commitments to archaeology / ecology or landowners been fulfilled
   c. have haul roads been determined
   d. is the area required for soil storage available

6. Is the site already operating
### Site Working | Considerations Prior to Soil Stripping

**a.** is the site being developed in accordance with the agreed proposals

**b.** is the area proposed to be stripped sufficient for the annual mineral output

**c.** is the rate of infilling matching the intended rate of restoration

7. Is communication working

   **a.** does everyone understand the proposals

   **b.** what contingency plans exist for wet or dry periods

   **c.** are signs required for vehicle routeing within the site and to identify different soil storage bunds

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**COMMENTS**

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For more detailed information see:
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)

Cross references:
- AP 8
1. Is information relating to the soil resources readily available on site

   a. **are the pre-working details of the ALC and Soil Physical Characteristics Report available**
      The pre-working details of the ALC and any other relevant documents should be available on site for reference by site personnel.

   b. **has the soil strategy been revised since the planning application**
      The original soil strategy may have been revised following changes, for example, to the phasing or working areas as part of the discussions since the planning application was submitted. Careful examination is required to ensure that the originally intended goals and the methods by which these will be achieved are still valid.

   c. **do any planning conditions relating to soil matters refer to other documents – if so, are these available on site**
      The planning conditions relating to soil matters may refer to other documents that should be examined by the site personnel.

   d. **are the site personnel aware of the existence of all the above information and where to find it**
      The operator should prepare a method statement to translate the working arrangements approved by the MPA into practical instructions, which can be used by those involved in the day-to-day working of the site. The operation should follow a detailed stripping plan showing soil units to be stripped, haul routes and the phasing of vehicle movements. The soil units should be defined on the site with information to distinguish types, layers and ranges of thickness. Detailed daily records should be kept of operations undertaken, site and soil conditions.

2. **Who is to undertake the soil stripping**

   a. **is the soil stripping to be undertaken by a subcontractor**
      If the soil stripping is to be undertaken by a subcontractor, then all the information, commitments and restrictions have to be incorporated in to the subcontractor’s tender document to ensure that these matters have been adequately covered. Some restrictions on the use of equipment, techniques or working periods could incur additional expense for the subcontractor.

   b. **has the overall soil information been translated into instructions for the site personnel for this phase of work**
      Ideally, the operator should employ a suitably qualified soil scientist to act as consultant/adviser on the site (such as IPSS and BIAC - see [Introduction](#)). Without such expertise, the success of the scheme depends on how well the overall soil information has been translated into instructions for site personnel. The soil stripping strategy is an essential tool for keeping on-site staff informed.

3. **When is the soil stripping to commence**
a. **what are the current soil conditions**
   Operators need to be sure that the whole profile is suitably dry and friable to enable each layer to be identified and cleanly removed. If the lower layers are wet then rutting may occur, which can result in soil mixing and smearing, damaging the structure. The wetter the soil, the greater the risk of wheel slippage with machinery such as motor-scrapers, which can significantly increase damage to the soil structure due to smearing.

b. **what is the current ground condition**
The maintenance of a transpiring crop is important and an appropriate cropping regime should be established for the year of soil stripping. Soil will be drier when stripped from under grass, or immediately after the harvest of an arable crop, than when stripped from bare land. Arrangements should be made to ensure the crop is removed prior to soil stripping operations. In the event of livestock being present, they should be relocated and the boundaries checked to ensure they are stock-proof. Wet areas should be allowed to dry out before soil stripping commences.

c. **what are the expected weather conditions**
It would be inadvisable to commence major soil stripping operations without considering the weather forecast. If rain is expected, then areas of soil that are most easily damaged when wet should be identified as priorities for initial stripping. If rainfall does commence after topsoil (and vegetation) has been removed, then it will probably result in the subsoil being in an unsuitable condition to strip when rain stops. In extreme situations, the removal of vegetation in summer periods, followed by heavy rainfall, can result in flash floods unless adequate water control systems have been established.

d. **is it within the correct season**
In general, the mineral operator should plan operations so that soil stripping is normally scheduled between the drier months of April to September inclusive. The risks to soil damage are further influenced by the types of soil and the machinery intended to be utilised. The earlier or later in the year that soil is stripped or moved, the greater is the risk of causing damage. If soil is not to be significantly trafficked by earthmoving equipment, or if it is sandy and free-draining, there may be opportunities for moving it during dry periods of the winter. However, this should only be undertaken in exceptional circumstance to address specific problems which may arise on sites if the soil is not moved.

e. **are there clear details as to the expected start date and duration of this phase of works**
The notification for soil stripping should state when the works are intended to start, the extent in area and the time required for this phase of operations. Further phases should be separately considered.

f. **has the MPA been informed**
The MPA should be informed, as these operations may constitute the commencement of the planning permission and a formal record may be required. Several working days notice is required in order to ensure the documentation and approvals are all finalised.

4. Are the soil handling criteria agreed

   a. are stripping units known
      If different soil units have been identified, then they may need to be stripped and stored separately. The extent of the differing soil units within the field may be marked by pegs prior to stripping. However, an exact indication of soil boundaries may not be possible before stripping commences. Ideally, a soil scientist should be available on site to advise earth moving contractors of the areas of different soil types.

   b. are the target depths of each unit agreed
      Topsoil and subsoil should only be stripped to the depths agreed in the planning consent. Agricultural topsoil is the dark surface layer that normally varies in depth from 20 to 40cm (but may be less). Subsoil is the underlying, usually lighter-coloured soil material, that should be removed to at least 1.2 metres below the original ground surface, unless rock or other materials make this impossible or undesirable. If the upper layers of the subsoil are of significantly better quality than the lower layers, they should also be stripped separately.

   c. has the Lower Plastic Limit been determined for each soil type
      It is advisable that the moisture content of each soil layer should be 3 to 5% drier than the Lower Plastic Limit, especially when motor-scrappers are used. The prior laboratory determination of the Lower Plastic Limit for representative samples of each soil type on the site should have been undertaken. (See AP8 1g)

   d. has the moisture content been ascertained for the particular soil to be moved
      A check should be made to confirm that the soil to be stripped is drier (3 to 5%, see above) than it’s Lower Plastic Limit before stripping commences. (See AP8 1g)

5. Are other aspects of the site development ready

   a. have statutory undertakers or other service providers confirmed that their infrastructure on site will not be damaged by the soil stripping proposals
      Underground or overhead service supplies should be checked to ensure that the operations can commence safely and that the equipment can enter the site in terms of height / weight clearances.

   b. have all commitments to archaeology / ecology or landowners been fulfilled
The soil stripping plans should have regard to any special measures agreed to ensure adequate access for archaeological investigations and to ensure that any areas identified of particular ecological interest have been dealt with. The mineral operator may have made agreements with the landowner or tenant to only strip certain areas and leave other areas until after harvest. It should be checked that such agreements do not compromise the overall soil stripping programme by delaying areas until potentially unsuitable periods.

c. **have haul roads been determined**
   The working proposals should indicate the steps the operator intends to undertake to gain initial access to the site. At this stage, the site access and plant yards may not have been formed. Temporary access points and haul roads should be clearly identified and areas particularly sensitive to damage should be fenced or physically protected.

d. **is the area required for soil storage available**
   At the start of operations, not all of the site may be available due to engineering or land access arrangements. The initial soil stripping should not deviate from the agreed programme, for example by temporary storage of soil close to the mineral working. The soil storage areas should be visited prior to any soil stripping to ensure the excess vegetation is removed and the ground conditions suitable before stripping commences elsewhere on the site. There may be a need for ground preparation in the storage areas, dependant upon the type of materials to be stored, for example stripping topsoil from areas to be used for subsoil storage.

6. **Is the site already operating**

   a. **is the site being developed in accordance with the agreed proposals**
      Site operations may have been ongoing for several phases over several years and the current soil stripping operation is a separate and distinct phase. In these circumstances, it is appropriate to check that the site is still on target and that the original working proposals have not altered.

   b. **is the area proposed to be stripped sufficient for the annual mineral output**
      Keeping the soil stripping area to the minimum necessary to ensure an annual production of mineral is ideal. This should ensure that no more soil than is necessary is placed into store and that other areas of the site can remain under vegetation for longer periods. Large stripped areas do present water control problems. However, if an insufficient area is stripped, then mineral extraction may be hindered later in the year by the unstripped soil. Pressure to agree exceptional soil handling proposals may then be presented that are unlikely to be ideal. Care should therefore be taken to ensure that only sufficient land is stripped to allow mineral extraction to take place for the forthcoming year.

   c. **is the rate of infilling matching the intended rate of restoration**
Soil can only be replaced when there is a sufficient area infilled to receive it. Delays to restoration can occur if the site is dependant upon imported inert fill to achieve restoration levels, or if the rate of silt in the lagoons changes due to differing mineral quality, specifications or marketing influences. The amount of discard or waste material may not be as high as originally expected, or else the quantity of mineral higher than expected. All these factors can lead to the carefully synchronised working plan submitted at the time of planning application becoming outdated. A common result is that additional soil storage space is requested or full agricultural restoration delayed by a number of years.

7. Is communication working
   a. **does everyone understand the proposals**
      Achieving all the conditions to undertake successful soil movement requires good weather and close supervision and monitoring of conditions by quarry managers or their consultants. If everyone understands the scheme, then there is less likelihood of mistakes occurring.

   b. **what contingency plans exist for wet or dry periods**
      The operator should state any contingency plans to determine the suitability of continued soil movement when the weather changes. The operator must understand the potential implications on the working proposals of only undertaking soil movements under suitable conditions. The haul routes and soil storage areas must be defined, and should be stripped first in a similar manner. Where the stripping operation is likely to be interrupted by rain or there is likely to be over-night rain, remove any exposed subsoil down to the basal layer before suspending operations. Make provisions to protect the base of the current or the next strip from ponding/run-off by sumps and grips, and also clean and level the basal layer. At the start of each day, ensure there is no ponding in the current strip or operating areas, and the basal layer is level with no ruts. Measures will be required to protect the face of the soil layer from ponding of water and maintain the basal layer in a condition capable of supporting dump trucks. Any area to be stripped is to be protected from in-flow of water, ponding etc. Wet sites with standing water should be drained in advance. In continuing poor conditions, equipment should be redeployed or operations halted. The definition of rainfall levels, relative to suitability for handling soil, are set out in ‘Guidance on Good Practice for the Reclamaiton of Mineral Workings to Agriculture’ (DoE 1996).

   c. **are signs required for vehicle routeing within the site and to identify different soil storage bunds**
      Signs relating to the new access or temporary roads will be required to prevent unsuitable arrangements evolving. Signs within the site should ensure vehicles keep to pre-determined routes. When soil is being stripped and placed into store, it may be advisable to ensure signs exist to direct staff to the correct soil bunds.
Please see Annex SW5 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Are there proposals to relocate the plant site and mineral stockpiling areas**
   Where not part of the original proposals, operators should consider impacts on and make appropriate provisions for:
   a. any detrimental effects on the agreed schemes of working and restoration, and how these may be minimised
   b. any additional land being disturbed, and amendments to the agreed restored soil profiles
   c. a full justification for their proposals

2. **Are there secondary facilities proposed, such as MRFs**
   Where facilities such as MRFs were not part of the original proposals, operators should consider their effect on the working and restoration of the site. Temporary proposals may become permanent and also force changes to the working and restoration of the site. Operators should consider:
   a. any detrimental effects on the agreed schemes of working and restoration, and how these may be minimised
   b. any additional land being disturbed, and amendments to the agreed restored soil profiles
   c. a full justification for their proposals

**Comments**

For more detailed information see:
- The Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Good Practice Guide for Handling Soils (MAFF April 2000)
- MPG7 Reclamation of Mineral Workings (DoE 1996)

**Cross references:**
- AP 5, 7, 12
- SW 6
- RN 3, 7, 8
- AC 3, 10
1. Are there proposals to relocate the plant site and mineral stockpiling areas

If this is planned for from the very beginning, there may be minimum disruption to the site working and restoration, although the need to relocate should be clearly demonstrated at the planning application stage. Where the proposal is put forward during the life of the site, careful consideration should be given to:

   a. any detrimental effects on the agreed schemes of working and restoration, and how these may be minimised
      Any effects on the phasing and restoration proposals and to the disturbance of unworked or restored land within aftercare. It is important to minimise any disruption and compromise in the agreed objectives. Relocation may result in new haul roads, which may cross unworked or restored land within aftercare, or lead to access difficulties for agricultural machinery or livestock.

   b. any additional land being disturbed, and amendments to the agreed restored soil profiles
      If the relocation requires the phasing to be amended, this can necessitate changes to the restored soil profiles which may compromise the restoration objectives. This may be due to amended phase boundaries no longer mirroring the soil units to be handled separately, or because changes to the order that phases are worked means that different soil units are no longer available at the appropriate times to achieve the agreed soil profile.

   c. a full justification for their proposals
      A full justification and evaluation should be carried out where changes are proposed.

2. Are there secondary facilities proposed, such as MRFs

Where facilities such as MRFs form part of the original planning application proposals, they should be properly integrated into the working and restoration of the site. However, problems can occur where such facilities are proposed subsequently, or temporary facilities are to become permanent. Operators should then consider and make appropriate provisions for:

   a. any detrimental effects on the agreed schemes of working and restoration, and how these may be minimised
      Any effects on the phasing and restoration proposals, and to the disturbance of unworked or restored land within aftercare. It is important to minimise any disruption and compromise in the agreed objectives. Relocation may result in new haul roads, which may cross unworked or restored land within aftercare, or lead to access difficulties for agricultural machinery or livestock.
b. any additional land being disturbed, and amendments to the agreed restored soil profiles
   If the relocation requires the phasing to be amended, this can necessitate changes to the restored soil profiles which may compromise the restoration objectives. This may be due to amended phase boundaries no longer mirroring the soil units to be handled separately, or because changes to the order that phases are worked means that different soil units are no longer available at the appropriate times to achieve the agreed soil profile.

c. a full justification for their proposals
   A full justification and evaluation should be carried out where changes are proposed.
Please see [Annex SW6](#) for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Are the requirements for haul roads appropriate to the site working proposals**
   The number, siting and length of haul roads required will depend upon:
   - a. [the location of the site working areas, soil stores and processing plant](#)
   - b. [machinery used for hauling mineral/soil](#)
   - c. [areas of unworked or restored land which must not be trafficked by plant or machinery](#)
   - d. [the need for new access to parts of the site as working progresses](#)

2. **How are the haul roads to be constructed, maintained and restored**
   Plant and machinery must not be allowed to run on the soil layers or on soil-forming materials. Do the proposals for forming, maintaining and restoring haul roads adequately cover:
   - a. [stripping of soil layers](#)
   - b. [drainage and maintenance](#)
   - c. [dust control](#)
   - d. [decompaction and restoration of the soil profile](#)

3. **How are the haul roads to be marked on site**
   Haul roads should be marked on site and provisions made to prevent plant and machinery straying onto unworked or restored land. Have the operators considered and made provisions for:
   - a. [marking the layout and location of haul roads on plans in the site office](#)
   - b. [marking haul roads on site](#)
   - c. [preventing plant and machinery from straying off the haul roads](#)
### COMMENTS

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<tr>
<td>• <a href="#">Good Practice Guide for Handling Soils</a> (MAFF 2000)</td>
<td>• AP 5, 7, 8, 9, 10</td>
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<tr>
<td>• The Reclamation of Mineral Workings to Agriculture (DoE 1996)</td>
<td>• SW 5, 9</td>
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<td>• RN 4, 5, 6, 7, 8</td>
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<td>• AC 3, 10</td>
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</tbody>
</table>
1. Are the requirements for haul roads appropriate to the site working proposals

Haul roads should accord with the agreed scheme for site working and their setting out and construction planned well in advance. The siting of haul roads should be well thought-out, thus reducing the likelihood of changes being required which may impact upon restoration and aftercare. Any changes should be agreed in writing with the MPA.

   a. the location of the site working areas, soil stores and processing plant

   Haul roads are required for hauling mineral and soil from the working areas to the processing plant or soil stores. It is important that plant and machinery are able to move around the site in an efficient and structured way, and the layout of haul roads will, to some extent, be a compromise between taking the shortest route and not having more haul roads than necessary.

   b. machinery used for hauling mineral/soil

   Soil stripping may require temporary haul roads between the phase being worked and the soil store or the phase being restored, whether using dumptrucks or motor-scrapers. Haul roads should be located so that machinery only runs on the overburden/infill surface. The use of conveyors for transporting mineral to the processing plant may reduce the length of haul roads required.

   c. areas of unworked or restored land which must not be trafficked by plant or machinery

   The location of haul roads should minimise the interference with agricultural access to both unworked and restored land, with the progressive restoration and aftercare of the site, and prevent plant and machinery taking unauthorised short-cuts.

   d. the need for new access to parts of the site as working progresses

   The siting of haul roads may continue to change as site working progresses. Temporary haul roads will be required between the different areas being stripped of soil and put into store, or areas being restored. These must also be clearly marked, and measures taken to prevent plant and machinery straying onto adjacent land or taking unauthorised short-cuts.

2. How are the haul roads to be constructed, maintained and restored

Plant and machinery must not be allowed to run on soil layers or on soil-forming materials. The proposals should ensure that:

   a. stripping of soil layers

   Haul roads will be stripped of soil down to the mineral or overburden, and the soil put into store for subsequent restoration.

   b. drainage and maintenance

   Maintenance and drainage of the haul road surface is important to reduce the temptation for plant and machinery to divert off the road onto adjoining land,
which can be a problem with poorly maintained and drained haul roads. Drainage is likely to be achieved by constructing and maintaining the surface of the haul roads at an appropriate camber to shed water to roadside ditches, French drains or soakaways.

c. **dust control**
   Dust control may be necessary during dry periods to prevent contamination of nearby crops. This is particularly important for horticultural crops and fruit, which may be eaten unwashed, and for grass which may become unpalatable to livestock.

d. **decompaction and restoration of the soil profile**
   Restoration of haul roads is likely to include the removal of any sub-base/wearing course, subsoling to relieve compaction, and reinstating the original soil profile.

3. **How are haul roads to be marked on site**

Operators should address the following matters:

a. **marking the layout and location of haul roads on plans in the site office**
   Haul roads must be shown on the site plans to enable them to be accurately set out and constructed on the ground.

b. **marking haul roads on site**
   Once constructed, their boundaries should be marked to reduce the chances of plant and machinery straying off them.

c. **preventing plant and machinery from straying off the haul roads**
   Haul road boundaries should be formed/marked in such a way that plant and machinery cannot easily widen them or take short-cuts across corners etc. This may be particularly important when contractors are employed to strip or restore soil.
Please see Annex SW7 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

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<tbody>
<tr>
<td>1. <strong>Are the different soil unit boundaries being marked out prior to soil stripping and restoration in accordance with the agreed scheme</strong>&lt;br&gt;Different soil types may require separate stripping/storage/restoration. Are the operators complying with the agreed scheme?</td>
<td></td>
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<tr>
<td>2. <strong>Are the soil resources being accurately audited and are additional soil resources available</strong>&lt;br&gt;Auditing of soil resources enables the restoration objectives to be achieved and the most sustainable use to be made of the soil resources on site. Working the site may identify more soil resources/soil-forming materials available for restoration than were identified at the pre-/planning application stage.</td>
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<tr>
<td>3. <strong>Are there areas of the site that are fit for restoration</strong>&lt;br&gt;It is important that restoration progresses in step with site working to prevent areas remaining unrestored and becoming derelict. Prompt restoration brings the land into aftercare and back into productive use.</td>
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<td>4. <strong>Is soil/soil-forming material being used as daily cover</strong>&lt;br&gt;On landfill sites, there may be a shortage of daily cover materials available, leading to the unsustainable use of soil/soil-forming materials.</td>
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<td>5. <strong>Is landfilling in step with site working</strong>&lt;br&gt;If landfilling does not progress at the same rate as mineral extraction, then restoration is delayed preventing the land from being brought back as quickly as possible into productive use.</td>
<td></td>
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<tr>
<td>6. <strong>Is the predicted “bulking factor” for soil/overburden proving to be correct</strong>&lt;br&gt;If incorrect, this may mean that changes to the proposed landform/restoration depths of soil will be necessary.</td>
<td></td>
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<td>7. <strong>Are the predicted settlement rates proving to be correct</strong>&lt;br&gt;If incorrect, this may mean changes to the proposed landform will be necessary or increased/reduced surcharging.</td>
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<td>8. <strong>Is daily cover being stored separately</strong>&lt;br&gt;Materials for use as daily cover must be stored separately from soil/soil-forming materials.</td>
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</table>
For more detailed information see:
- The Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Good Practice Guide for Handling Soils (MAFF 2000)
- MPG7 The Reclamation of Mineral Workings (DoE 1996)
- Town and Country Planning Act 1990 Schedule 5

Cross references:
- AP 5, 6, 7, 8, 10
- SW 3, 4, 8
- RN 3, 4, 8, 9, 10
- AC 3
1. Are the different soil unit boundaries being marked out prior to soil stripping and restoration in accordance with the agreed scheme

To safeguard the long-term agricultural potential of land being worked for minerals, the operator will normally be required to undertake an ALC survey and produce a Statement of Physical Characteristics Report at the planning application stage. These will identify the ALC grade of the land, and the different topsoil and subsoil types. Schemes will also be agreed for the stripping/storage/restoration of these soil types, which will be described as soil units, some of which may be handled together, whilst others will need to be kept separate. For example, a sandy loam topsoil would normally need to be stripped/stored/restored separately from a clay loam topsoil. To undertake the soil handling operations in accordance with the agreed schemes for soil stripping and restoration, it is essential that the different soil units are identified, marked out on the land to be stripped, and the machinery operators are appropriately briefed and supervised.

2. Are the soil resources being accurately audited and are additional soil resources available

As part of the agreed schemes for soil stripping/storage/restoration, it is good practice for operators to maintain an audit of the different soil types in terms of their origin, type, and location for storage and for restoration. This enables the operators to confirm that the predicted volumes of the different soil units are correct, and if not, flag up at an early stage with the MPA any changes to the schemes of working and restoration that may be necessary to achieve the restoration objectives. The audit may also identify soil-forming materials that may be appropriate for use in the restoration, and enable the most sustainable use to be made of the resources on site. The location, soil type and volume of soil storage bunds must be accurately recorded on plans in the site office, and the bunds should also be marked with reference to their soil type. This is particularly important, as some soil may remain in store for a number of years, for example, at chalk and rock quarries, and changes in staff may mean that there is no certainty in identifying the different soil types within store.

3. Are there areas of the site that are fit for restoration

It is important that land is restored as promptly as possible to enable the rehabilitation process to begin within aftercare. Prompt restoration also helps to maintain good site discipline, prevents land becoming derelict, and enables the land to be brought back into active management and productive use as soon as possible. If progressive restoration is delayed while mineral extraction proceeds, soil will have to remain in store for longer periods, which may increase it’s deterioration, and larger areas of land may be needed to accommodate soil storage bunds. The condition of the soil, the land to be restored, and the forecast weather must be suitable for soil handling and restoration to take place.

4. Is soil/soil-forming material being used as daily cover
On landfill sites, there may be a shortage of daily cover, sometimes only during a relatively short period of operation, leading to the use of soil/soil-forming material. Such practice must be avoided, as it is not sustainable to use valuable soil resources needed for the restoration of the site in this way. Where significant volumes of soil are used, this may mean that the standard of restoration is compromised and that the restoration objectives cannot be achieved. It may also mean that soil has to be imported to replace that used, which may lead to a lower standard of restoration.

5. Is landfilling in step with site working

If landfilling does not keep up with mineral extraction, this leads to delays in restoration. It is important that land is restored as promptly as possible, to enable the aftercare process to begin. Prompt restoration also helps to maintain good site discipline, prevents land becoming derelict, and enables the land to be brought back into active management and productive use as soon as possible. If progressive restoration is delayed, while mineral extraction proceeds, soil will have to remain in store for longer periods, which may increase their deterioration, and larger areas of land will be needed to accommodate the storage bunds. It is important for there to be good lines of communication between operators and MPAs, enabling all parties to be aware of potential problems such as delays in restoration. This will enable agreement to be reached at the earliest possible stage for any changes in site working and restoration that may be appropriate.

6. Is the predicted “bulking factor” for soil/overburden proving to be correct

The proposals for the restored landform and restoration depths for soil will be based upon the predicted “bulking factor” for the overburden, mineral waste and subsoil. This factor is the % increase in volume of these materials once excavated and restored, compared to their volume in an undisturbed state. Typically these materials may increase in volume by around 10%, depending on the soil type, its moisture content and method of handling. For example, sandy soil may increase in volume by perhaps 5%, whilst clay soil may increase by 10-15%. It is important that operators recognise the issue and take it into account in their proposals. If the predicted “bulking factor” is incorrect, this should be recognised as early as possible, in order that any implications for the restored landform and soil depths can be discussed with the MPA at the earliest opportunity.

7. Are the predicted settlement rates proving to be correct

Sites to be restored following landfilling with putrescible waste need an allowance to be made for the settlement that occurs as the waste degrades. This occurs most significantly in the first 5 years following landfilling, and operators typically surcharge the site with waste by 15-20% (Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice (DoE 1995) paragraph 6.13) to allow for this
settlement, to achieve the agreed post settlement contours. Recent studies have found that settlement may be at least 20%. If settlement is found to be significantly different from the predictions, this should be highlighted as early as possible, to enable the operators to discuss any implications with the MPA, EA and the agricultural advisers, such as increasing/reducing the depths of waste landfilled, or amendments to the landform. Pre-settlement contours should also be suitable for the agricultural after-use, both to take account of the agricultural requirements at the start of the aftercare period, and also in the event that settlement is significantly less than predicted.

8. Is daily cover being stored separately

*Daily cover must be stored separately from soil/soil-forming material to be used in the restoration, to prevent soil being degraded and contaminated. Soil/soil-forming material bunds must be properly marked and shown on the site plan, to ensure that they are not inadvertently used for site engineering or daily cover.*
Please see [Annex SW8](#) for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

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<td>d. for daily cover of waste operations</td>
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For more detailed information see:

- Preventing the Spread of Plant and Animal Diseases – A Practical Guide (MAFF 1991 PB0486)
- Good Practice Guide for Handling Soils (MAFF April 2000)

Cross references:

- AP 8, 10
- SW 4
- RN 4
1. Is all soil accounted for

   a. has any soil gone to unplanned locations
      If restoration is taking place on the site, operators should not store soil unless it is essential. However, on many sites, immediate replacement is not always practical and soil must be stored. All movements should be in accordance with an overall agreed plan, otherwise records and future decisions relating to soil may be misguided. If soil is noted as being wrongly placed, then the operator should be questioned, as the consequences of their action may not have been fully considered.

   b. is traffic following defined haul roads and agreed soil handling practices
      The haul roads and soil storage areas must be defined and should be stripped of soil first. All work should be planned and carried out without staff or equipment going onto surrounding land. This is important to minimise soil disturbance and also to prevent any plant and animal diseases in the soil from being spread. Further guidance is given in the booklet Preventing the Spread of Plant and Animal Diseases – A Practical Guide (MAFF 1991 PB0486). As well as ensuring the correct routes are available to reach the soil storage areas, the techniques to off-load the soil and return to the stripping area should also be acceptable.

2. Are the bunds being formed in an appropriate manner

   a. are they stable and in accordance with the planning conditions i.e. location/shape
      Management of bunds can be relevant to soil health. A dry clay or heavy clay loam or silty clay loam subsoil will often enter a bund at an overall density 15-20% less than its density before excavation. Some consolidation may be necessary to ensure stability of the bund. Some operators seek to specifically compact the top and sides of the bund in order to reduce the quantity of water infiltration and to maintain the soil in a dry condition. However, sealing a bund of wet soil will exclude transfer of moisture and oxygen forming anaerobic conditions which will cause the death of many beneficial soil microbes. The magnitude of the compacting and consolidating forces will depend on the height of the storage bund and the length of time the soil is stored. The effect of these forces will depend on the texture, density and moisture content of the soil within it. Bunds should therefore be constructed with dry and friable soil and dry ground conditions, preferably to no more than 3 metres in height with side slopes of either 1:1½ on inside slopes or 1:3 on the outer slopes to ensure stability. Good Practice Guide for Handling Soils (MAFF April 2000) provides further information.

   b. are they receiving the correct soil
      The operation should follow a detailed stripping plan showing soil units to be stripped, haul roads and the phasing of vehicle movements. The soil units should be defined on the site with information to distinguish types and layers, and ranges of thickness. Detailed daily records should be kept of operations undertaken, and site and soil conditions. Topsoil, subsoil and any other soil-forming material
should be stored separately. Also, different soil types should be stored separately
 e.g. sandy soil separate from clay soil. Before the operator builds subsoil storage
 bunds, they should remove the topsoil from the area which the bund will occupy.
 Topsoil and subsoil should be removed from areas used for storing other
 materials (e.g. overburden or mineral).

c. *is the soil arriving in a suitable condition*
 A wet soil is likely to suffer more in a stockpile than a dry and friable soil. A wet
 clay is not only considerably heavier than a dry clay, thereby increasing the load
 on all soil below it, but also has a lower shear strength and is thus less able to
 resist any applied load. A wet sandy soil is more likely to move and pack more
 closely in storage than a dry sandy soil.

d. *are bunds being kept separate*
 A visual check can confirm that the soil types are being stored in separate bunds
 and that there is no overlap of soil at the base. Where a bund contains more than
 one soil type, these should be separated by a readily identifiable boundary, such
 as a layer of straw, sand or a membrane. The check should confirm that any
 instability of one bund would not affect adjacent bunds.

3. Has sufficient space been allocated for soil storage

a. *what remaining capacity is there for storage*
 Ongoing checks should be undertaken to ensure the soil is being placed as
 planned, in the location and to the dimensions agreed in the planning permission.

b. *does the quantity of soil recovered correspond to that planned*
 Variations in soil depths are often encountered across a site. The stripping
 programme includes the volume of soil intended to be moved and surveys of the
 completed soil bunds will confirm the quantities recovered. An ongoing audit of
 the differing available resources is advisable for long-term and complicated sites.

c. *is there any variation*
 The variations may be due to poor stripping techniques that have diluted or mixed
 some layers, or through poor recognition of the differing soil types. Conversely, in
 some instances additional soil may be recovered through good handling.
 Irrespective of the handling techniques, the soil encountered may not have
 matched the soil surveys undertaken prior to site operations, possibly through
 auger borings encountering unrepresentative layers (a particular difficulty with
 some soil types over chalks and limestone, which vary in depth considerably).
 The variance could be caused by a number of human decisions in the field, such
 as identification of the subsoil as a mineral and cessation of soil stripping, or due
 to difficulties encountered in particular areas, due perhaps to waterlogging or
 unsuitable ground conditions.
d. does this have any repercussions for future stripping or future restoration activities
The experience from the initial stripping should be considered against future phases. The actual results of soil depths recovered should be examined against the soil surveys, to estimate future soil recovery. The soil handling techniques may need changing or improving. The site personnel may need additional supervision or training.

e. if there are problems, is there anything that can be done about it
Once soil has been lost it cannot be recovered. However, with good audit techniques, future decisions on recovering additional soil-forming materials through selective extraction of the overburden can be made. The annual audit should focus the attention on whether there may be a need to amend target restoration depths or even the extent of some after-uses. The keeping of comprehensive records will ensure decisions are based on accurate information.

4. What management of the bunds is evident

a. is traffic being kept off
To encourage good practice, survey vehicles should be kept from driving and parking on the soil bunds. The creation of any tracks encourages other vehicles. The only vehicular access required should be for maintenance, such as cutting and spraying.

b. is the surface vegetated and being maintained
Evaporation seldom dries soil beyond a depth of 30cm, so drying of soil within the outer metre of a soil bund depends upon the moisture extracted by plant roots. The effects of plant roots cannot reach the inner core of soil. However, the healthier outer metre will continue to act as a reservoir for beneficial micro-organisms and earthworms, that will help restore soil structure following replacement. The establishment of a healthy sward also assists in preventing dust nuisance, creates more stability for the soil and becomes a clear marker if any unauthorised soil movements are occurring from the bund.

c. does the site plan correctly identify the soil by type and have the actual quantities been surveyed and recorded
When the soil stripping operations have been completed, the site personnel should ensure that records and plans are updated, and detail where soil has come from and where it is stored, including quantities and soil type.

d. are the surrounding land uses / activities a threat to the soil resource in store
A check should be made to ensure that drainage arrangements, mineral excavation and other engineering works are not a potential or actual threat to the soil resources through contamination, erosion, slippage or flooding.
5. Have other specific storage areas been identified

a. for soil-forming materials
   It is important to keep site personnel fully informed as to the difference between soil storage and the likely other storage areas that may be encountered on the site. Soil-forming materials, by their nature, will be recovered from the overburden normally in the course of the extraction process. These materials will require separate storage, but in a location that may require the incremental addition of suitable materials. Care will be required to ensure that the material can be transported to the designated storage area without compromising the quality of the other soil resources. Larger vehicles normally associated with overburden or mineral extraction, rather than soil handling, may transport the soil-forming material.

b. for imported soil
   Imported soil may be of unknown quality, and may arrive on site in various quantities. Interim storage must be available to allow for the suitability of the material to be assessed and be located near the site access, separate from known soil resources.

c. for minerals storage area
   The mineral storage areas need to be accessible throughout the life of the site and throughout each season. This material may be subject to all-year-round movement for processing and loading on to sales transport. This area should therefore be sited away from soil storage areas.

d. for daily cover of waste operations
   Soil or soil-forming material should not be taken out of storage and used as daily cover to prevent wind blow from a landfill site. Separate sources of material should be identified for such use.
Please see Annex SW9 for supporting information, and the "Introduction" for Health and Safety considerations and advice on the use of the guidance.

1. **Is the equipment to be used for soil handling as agreed in the planning documents**

2. **Is all soil handling to be undertaken by the same contractor.**
   - If not,
     a. **will this affect the timing of operations**
     b. **are they all aware of planning requirements**

3. **What ancillary machinery is intended to be used for soil bund construction or re-grading**

4. **If using backacters and dumptrucks**
   - **are appropriate techniques being used**

5. **If using motor-scrapers**
   - **are appropriate techniques being used**

6. **Is the machinery proposed acceptable.**
   - **Is it:**
     a. **a proven technique**
     b. **well maintained**
     c. **clean**
     d. **capable of undertaking the task within the time constraints**
     e. **compatible with other aspects of the planning application (e.g., noise control)**
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For more detailed information see:
- [Evaluation of Mineral Workings Restored to Agriculture](#) (LRA 2000)
- [Good Practice Guide for Handling Soils](#) (MAFF April 2000)

Cross references:
- AP 9
1. Is the equipment to be used for soil handling as agreed in the planning documents

The time between the granting of planning permission and the movement of soil on a site could be several years, during which time advice on good practice may change. The machinery available to the mineral operator should be considered against whether there is any detrimental effect upon the quality of the restoration.

2. Is all soil handling to be undertaken by the same contractor

If not,

a. will this affect the timing of operations
   The use of the operator’s own equipment usually means that the machinery is available to take advantage of periods of good weather for soil handling. The use of contractors tends to result in narrower windows of opportunity to strip the soil on a particular site. The contractor may be elsewhere immediately prior and post the intended stripping dates, resulting in pressure to move soil during inappropriate periods.

b. are they all aware of planning requirements
   When using contractors, operators should ensure that all the planning commitments are written into the contract. However, this does introduce a further set of personnel who need to fully understand the particular restrictions or characteristics of the individual site. The use of contractors may enable staff experienced in soil handling to undertake the task, rather than an employee who may not realise the different techniques required for the machinery handling the soil. It is for the mineral operator to ensure that the contract and supervision of contractors does not conflict with the planning conditions.

3. What ancillary machinery is intended to be used for soil bund construction or re-grading

Bulldozers fitted with a blade may be used for soil movements for short distances, such as soil removal from haul roads and storage into nearby bunds. They can be used to form windrows of soil to be picked up by other machinery. They are also used for grading soil as it is placed. The excessive trafficking and turning can cause soil structural damage. Graders are often used to keep roads maintained, but should not be used on the replaced soil because they cause severe compaction and smearing. In exceptional circumstances, their use may be justified if the newly replaced soil needs to be ‘sealed’ to prevent ingress of excessive rainfall in the soil profile before the next layer can be placed.
4. If using backacters and dumptrucks

a. are appropriate techniques being used

This soil handling method uses backacting excavators or other wheeled loaders in combination with dumptrucks (articulated or rigid bodied). An excavator is used to strip soil and load it into dumptrucks for transportation to replacement areas or to storage. The earthmoving contractor should ensure that the dumptrucks run only over mineral or overburden, and not over subsoil or topsoil. Loading machinery should stand on the lowest layer possible (i.e. overburden rather than subsoil, subsoil rather than topsoil). The guidance can be relaxed for non-wheeled equipment if the loading machinery proposed is relatively small and mainly static (i.e. a 360° excavator or backacter which may be situated on topsoil or subsoil if this is operationally more convenient). Loading shovels, if wheeled rather than tracked, should traffic only on overburden or mineral. There is a trend towards less compaction (less increase in bulk density and a smaller decrease in coarse porosity) as one moves from motor-scaper restorations to conventional dumptruck restorations and then to loose-tipped restorations. Recent research (Evaluation of Mineral Sites Restored to Agriculture (LRA 2000)) has demonstrated that deterioration in structure was least in subsoil which was loose-tipped and untrafficked. Any checks on site should ascertain both the equipment being used and the methods being employed. Full guidance is given within Good Practice Guide for Handling Soils (MAFF April 2000).

5. If using motor-scrapers

a. are appropriate techniques being used

The motor-scaper is capable of undertaking all soil handling operations - lifting soil, transporting it and laying it, either in a bund or on the area being restored. The motor-scaper has to travel over the soil that it is about to strip and on the land on which it is depositing soil. It operates by lowering an inclined blade 15-30 cm into the soil during forward motion, the power developed by the tractor unit providing the force to lift the soil into the box. This action tends to compress the soil. If each layer moved averages 30cm in thickness, the motor-scaper must travel over the soil four times to remove a 1.2 metre deep agricultural profile. Motor-scrapers of the type used for land restoration weigh 30-45 tonnes empty and up to 80 tonnes laden. Close supervision should ensure that the motor-scrapers run over the 'lowest' material available (i.e. overburden rather than subsoil, subsoil rather than topsoil). This can be achieved by the motor-scaper travelling to the loading point, running on the lowest possible layer, turning onto the material to be stripped, loading, then turning off as soon as practical onto the lowest possible layer. It is more important for motor-scrapers to only handle soil when dry and friable (and therefore more resistant to compaction) than it is for other soil handling machinery combinations. Full guidance is given within Good Practice Guide for Handling Soils (MAFF April 2000).
6. Is the machinery proposed acceptable

Is it:

a. **a proven technique**
   Clear guidance is given on specific stripping and replacement techniques which have proven least damaging to the soil in Good Practice Guide for Handling Soils (MAFF April 2000). Generally, loose-tipped restorations using backactors and dumptrucks give the best restorations, as compaction is minimised due to the restored soil not being trafficked. Some equipment, such as draglines are suitable only for loading dumptrucks or for direct movement of overburden and their use for direct movement of soil is unlikely to be feasible. However, there will be difficult conditions, perhaps due to topography, where innovative approaches will be required and it will be for the applicant to demonstrate the need to deviate from good practice.

b. **well maintained**
   The machinery has to be well maintained and capable of undertaking the task. Inappropriate or poorly maintained equipment may not be capable of completing the task within the comparatively short period of suitable soil and weather conditions.

c. **clean**
   Machinery entering and leaving the site should be checked for excess soil that may present a risk for the spread of disease from one part of the country to another.

d. **capable of undertaking the task within the time constraints**
   Some of the least damaging soil movement techniques may take longer than other methods. One argument for the use of motor-scrapers is on large sites, where faster soil replacement can take advantage of the prevailing weather conditions. However, these short-term gains have to be judged against the proven benefits of loose-tipping techniques.

e. **compatible with other aspects of the planning application (e.g. noise control)**
   When considering environmental impacts such as noise, it should be borne in mind that different equipment creates different noise levels, depending on it's type and standard of maintenance.
Please see [Annex SW10](#) for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Impacts on aftercare**
   There may well be occasions when the various activities on a site, unforeseen circumstances or variations to the working scheme etc. impose limitations on actions required to be carried out elsewhere. Where possible, it is important to be able to foresee such problems and to plan accordingly. It is important therefore, when considering the application, to understand how the characteristics of the site will change as work progresses, and also at a later stage, the impact any agreed changes will make.

2. **Regular site monitoring visits should therefore include**
   a. access arrangements for land remaining in agriculture
   b. access arrangements for restored areas (on sites where progressive restoration is undertaken)
   c. interim management arrangements for restored land prior to commencement of formal aftercare
   d. an assessment of water standing on the site
   e. an assessment of weed growth across the site
   f. an inspection of new and existing boundaries, viz... hedges, walls, fences etc

**COMMENTS**

For more detailed information see:
- [Weeds Act 1959](#) (Defra PB7189 and PB 7190)
- [Identification of Injurious Weeds](#) (MAFF 1999 PB 4192)

Cross references:
- AC 3, 5, 7, 9, 10
- RN 3, 8, 9
1. Impacts on aftercare

In order to enable formal aftercare to commence as soon as possible and to ensure continuity of aftercare management of the site throughout the 5 year aftercare period, it is important that other activities and/or operations on site do not conflict with or hinder aftercare obligations.

2. Regular site monitoring visits should therefore include

a. access arrangements for land remaining in agriculture
   While not strictly an aftercare issue, it is nevertheless important both at the planning application stage and throughout the working of the site, that unworked areas are not left isolated or unmanaged. Unworked land should be subject to positive management in order to maintain the land in good heart and to keep weed growth under control. Land remaining to be worked should not be treated as an area where materials and/or equipment can be stored outwith the conditions of the planning permission.

b. access arrangements for restored areas (on sites where progressive restoration is undertaken)
   Once the restoration condition(s) has been complied with satisfactorily, there is normally the opportunity for the formal aftercare period to commence. However, the working scheme needs to ensure that provision has been made for access to the restored areas. This access needs to be of sufficient quality to enable livestock and the range of normal agricultural equipment, (tractors and cultivation/crop management machinery etc) to travel safely to and from the site. In addition, the access to the site has to be uninterrupted to allow the usual range of agricultural operations to be carried out. Some operations may need to be organised in a very short period of time, perhaps due to changing weather conditions, allowing little time if any to consult with the operator. It is unlikely that formal aftercare management could be considered as in place, if the access arrangements are not as described.

c. interim management arrangements for restored land prior to commencement of formal aftercare
   Where areas/phases are restored which are too small or irregularly shaped to begin aftercare management, it may be necessary to wait until more adjacent land is restored. Also, if access to the restored areas is poor or limited, then it may be appropriate to consider interim management measures. Interim management may be necessary to ensure:
   (i) the surrounding area is not contaminated with weed seeds
   (ii) a vegetative cover is established to protect the newly restored surface from being eroded
   (iii) the established vegetation will draw soil moisture from the restored profile thus assisting in soil structural development, and reducing the risk of increasing drainage problems
Such interim measures could include the establishment of a green manure crop, such as mustard, which could be ploughed in to help condition the restored soil in advance of normal aftercare taking place.

d. **an assessment of water standing on the site**
   
   It is quite normal to see water standing on various parts of a site for a variety of reasons, most of which are perfectly natural and with no adverse effects on the working and restoration of the site. However, it is important to be able to recognise those occasions when the reasons for standing water are not normal. Where, how and why this happens can be a clear indication that something is either not right, or that certain planned operations should not take place.

   Surface ponding on restored land, when there is none on adjacent undisturbed land, may prompt an inspection of the restored profile. This may lead to the identification of a compact layer, plough pan etc. for which remedial actions such as subsoiling and/or the installation of a drainage system may be necessary. Surface ponding may also be due to a poor final landform. Final landform therefore, should be a major consideration when considering proposed after-uses. Where a drainage scheme has already been installed, a check on the outfall ditches, drain outfalls, soakaways etc. will be required in case a blockage has occurred. In simple terms, standing water should be seen as an indicator that something may be wrong and that an investigation of the cause can be fully justified. If remedial action is considered necessary, this can be formally addressed within the requirements of the agreed aftercare scheme.

e. **an assessment of weed growth across the site**
   
   Within the permitted area, it is important that weed growth is kept firmly under control. Although the vegetative cover provided by weeds may be argued as having a beneficial effect, i.e. helping to stabilise soil bunds, drawing moisture from the soil etc, the main issue is that of the production and subsequent spread of weed seeds. Weed control during the aftercare period can prove to be very expensive, and measures may be required across the whole of the restored site, although the weed seeds themselves may have been produced over a relatively small area. It is much easier and far more cost effective to control weed growth as part of an agreed programme during the life of the site, than to leave it to the aftercare scheme when the cost of all inputs will undoubtedly be higher. Ideally, soil storage bunds should be seeded with an appropriate grass seed mixture and managed.

   In addition to the cost and resource implications of uncontrolled weed growth, there may also be occasion when owners/occupiers of adjoining land make a formal complaint in respect of the Weeds Act 1959. The Act empowers Defra to take action against occupiers whose land harbours the following ‘injurious’ weeds: spear thistle, creeping or field thistle, curled dock, broad-leaved dock and common ragwort.
f. an inspection of new and existing boundaries, viz... hedges, walls, fences etc
As part of a site visit to assess progress etc., it is a relatively straightforward operation to check the condition of existing boundaries and to assess the development of new ones on restored land. Unless permitted in the planning permission, (field) boundary hedges etc. should not be damaged or removed by site operations, neither should operations impair the development of new hedges or tree planting.

NB Fencing, provision of water for livestock and management of water areas are not covered by aftercare conditions since they are not ‘treatment of the land’. Where their provision is essential for satisfactory aftercare management, alternative arrangements are needed to cover these aspects. Some aspects can be required as a separate planning condition.
Please see Annex RN1 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Agreed Lines of Communication
It is vitally important that clear lines of communication are agreed with MPA and operator staff, prior to the commencement of any new stage during restoration (e.g. replacement of overburden or soil), particularly if such works are to commence at short notice.

2. Gaining Approval to Commence Work
The MPA should agree with the operator how approval (or otherwise) of requests to commence work will be communicated. This particularly applies if formal written approval will take too long. Regardless of communication method, clear records need to be maintained.

3. Delegated Authority
It is important to be aware of who on the site has authority to make decisions concerning site working or requests to the MPA. If the site manager has delegated authority to another member of staff, how experienced is that person? Conversely, the operator needs to be aware of who to contact at the MPA with requests for information or notification of work proceeding.

4. Monitoring
During the restoration phase, the operator should agree procedures for inspecting key phases such as the landform contours after overburden and soil replacement. The MPA also needs to be sure that the on-site supervisor of key phases in restoration has sufficient knowledge and experience. (See Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Annexes A & B).

5. Awareness of the Restoration Proposals
Are the landowners or future occupiers aware of the restoration proposals?

On waste sites, the MPA should ensure that good communication exists with those persons monitoring compliance with the Waste Management Licence to ensure there are no conflicts.
For more detailed information see:

- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Pages 24-27, Annexes A & B)
- *PPG10 Planning & Waste Management* (DETR 1999) (Paragraphs 19-23)

Cross references:

- AP 5
- SW 1, 7
- RN 2
- AC 1
1. Agreed Lines of Communication

In most cases there will be a planning condition which establishes how much written notice the operator should give to the MPA of the commencement of works. The standard Defra recommended condition states that the MPA shall be notified in writing at least 5 days prior to the commencement of several key stages, including each phase of soil replacement. However, it has to be recognised by all parties that often a shorter notice period will be required for practical reasons. For example, the timing of soil replacement will largely depend on the weather. Therefore it is good practice for the MPA, operator and other consultants (if applicable) to agree clear lines of communication prior to the commencement of restoration. Matters to be agreed should include:

- the method of communication (e.g. phone, fax or e-mail)
- who to contact (and named alternatives), and
- minimum time for notifying

2. Gaining Approval to Commence Work

Similar to the notification above, the MPA should also agree how approval (or otherwise) of short notice requests to commence work will be communicated to the operator. For the reasons stated above, written notification may be too long in some instances. Matters to be agreed should include:

- the method of communicating MPA approval (phone, fax or e-mail)
- names of staff with authority to approve commencement of work
- where approvals should be directed (e.g. site manager)

Regardless of the method of communication, records should be kept both in the site and MPA offices.

3. Delegated Authority

It is important to be aware of who on the site has authority to make decisions concerning site working or requests to the MPA. If the site manager has delegated authority to another member of staff, how experienced is that person? Conversely, the operator needs to be aware of who to contact at the MPA with requests for information or notification of work proceeding.

4. Monitoring

From the agricultural perspective, monitoring of work during the restoration phase is one of the most crucial things to be done. If the restoration is not carried out properly, no matter how good the aftercare management is, it is unlikely that the site will be ever be reclaimed to its former ALC quality. On sites where the aim is to restore land which was BMV agricultural land pre-working, it is essential that regular monitoring by both the MPA and operator is undertaken. Ideally, a schedule of monitoring visits should be produced. Things to check for during monitoring visits may include:
• stone content and size - are they below the parameters established in the planning conditions
• the condition of the soil - should be dry and friable
• the correct soil types are being replaced in the right location
• the correct soil types are being replaced in the right order through the soil profile
• the different soil types are being replaced to the correct depths
• that the lower subsoil layer is not compacted before the upper subsoil layer is replaced (same applies to upper subsoil prior to the replacement of topsoil), and
• the landform and gradients are suited to the final after-use and target agricultural land quality

Following each site inspection, assuming work is satisfactory, soil replacement plans should be signed and dated by the operator and MPA, with copies held in the site office and with the MPA.

5. Awareness of the Restoration Proposals

The MPA and operator should ensure that those with a long-term interest in the site are fully aware of the final approved restoration proposals. This is necessary to ensure that what is being proposed is acceptable to the landowner or occupiers, managing or farming the land. Whilst farmers and landowners will probably have seen restoration proposals at the initial application stage, it is not necessarily the case that they will have been consulted on later amendments or where such details were left as reserved matters. The final restoration proposals are normally subject to negotiation between the MPA and operator. However, it would be practical and courteous to consult those with a long-term interest in the site, otherwise there is a danger that key components of the restoration plan may get amended or removed following the completion of formal aftercare.


On mineral sites where waste disposal is also taking place, the MPA should liaise with the Environment Agency staff who will be monitoring compliance with the approved Waste Management Licence. This is necessary to ensure that the operator(s) are not faced with apparently conflicting demands between the Waste Management Licence and Planning Conditions.
Please see Annex RN2 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Agreed Restoration Scheme**
   Before the commencement of the restoration phase, the MPA needs to ensure that there is an agreed restoration scheme in place, if this is not already covered by conditions or a previously approved scheme.

2. **Type of Restoration**
   Is the land being progressively restored or is the overburden and soil being taken from storage bunds? How is the restoration being phased?

3. **Variation to Approved Conditions/Methods of Working**
   Most planning permissions will normally specify a condition which covers requests to vary a condition or the approved method of working. However, there may be instances where the variation sought is relatively minor, or a practical problem arises which requires a change and a decision is required rapidly. In such instances, the normal method of applying to the MPA for approval of a variation may not be practical. It is therefore recommended that the MPA and operator agree a procedure for notifying minor variations or where a decision is required urgently.

4. **Planning Documentation on Site**
   It is essential that a full copy of all planning documentation is available and regularly referred to, in the site office. This should include a copy of the planning permission, planning conditions, environmental statement, all approved plans/drawings and soil handling strategy (if applicable).

5. **Completion of Restoration**
   Have all the relevant restoration planning conditions been complied with? Is the operator/farmer ready or able to commence formal aftercare upon completion of restoration? (see also AC3)
For more detailed information see:
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Page 24)
- *PPG10 Planning & Waste Management* (DETR 1999) (Paragraphs 19-23)

Cross references:
- AP 5
- SW 2, 5, 6, 8
- RN 1
- AC 2, 3
1. Agreed Restoration Scheme

It is often the case that a detailed restoration scheme is not submitted at the planning application stage. This may be due to the length of the site’s working life, or restoration may be covered by detailed planning conditions. Where the detailed restoration scheme has been left as a reserved matter, the planning conditions will normally specify the date when it should be submitted to the MPA. From the agricultural viewpoint, without an approved restoration scheme or detailed restoration conditions in place, the chances of a successful reclamation are greatly reduced.

2. Type of Restoration

The MPA needs to have a good understanding of how the site is being restored, either progressively or with overburden and soil from storage bunds. Either method of restoration has implications where agriculture is the proposed after-use. SW5, SW6 and SW8 give detailed technical advice relating to restoration. However, where land is being progressively restored, great care needs to be exercised to ensure that the correct soil profile is restored in the right location.

3. Variation to Approved Conditions/Methods of Working

The County Planning Officers Society booklet Good Practice Guide for Mineral Planning Conditions (November 1995) has a recommended model policy which begins “Unless otherwise agreed in writing by the MPA the working, restoration and aftercare of the site shall be carried out only in accordance with the working programme....” Therefore, by implication, any requests to vary the approved conditions or methods of working need to be submitted in writing to the MPA. This is the recommended approach which should be adopted in the majority of cases. However, there will be instances where the variation being sought is a very minor one or, for practical reasons, a decision needs to be taken rapidly. It would therefore be sensible for the operator and MPA to agree at an early stage how minor or urgent requests for variations are to be dealt with. Issues to be agreed should cover:

- how are such requests to be communicated to the MPA
- how the MPA’s decision is to be communicated to the operator, and
- whether all requests and decisions are to be confirmed retrospectively in writing

From the Defra perspective such variations could include requests to commence soil replacement earlier than the approved conditions allow, for example due to unusually dry weather in the Spring, or a change in the soil replacement methodology due to different types of machinery being available or trying out a new technique.

4. Planning Documentation on Site

There will be many times during the site working phase when the planning documentation will need to be consulted. This may be a member of the site staff checking an approved plan, or an MPA officer wanting to clarify a particular planning
condition. Therefore, it is vital that a full copy of all the planning documentation is available on site, regularly referred to and kept up to date. If there is an approval for a variation to an approved document or planning condition, all the relevant documents should also be copied to the site office to avoid confusion and misunderstanding later on.

5. Completion of Restoration

Before formal commencement of aftercare, it is a requirement that the restoration condition(s) has been complied with. The MPA and operator should therefore review the planning conditions to check for compliance. It is essential that all agricultural related restoration conditions are fully complied with to ensure successful aftercare management.

Upon completion of the restoration is the operator (or appointed contractor) or farmer ready or able to commence formal aftercare of the site? If not, then the site may have to be managed on a 'care and maintenance' basis until aftercare can commence. If it is agreed by the MPA and operator to manage all or part of the site on a “care and maintenance basis”, a schedule of works to be carried out needs to be produced and approved. Such situations include where:

- only a small part of the site has been restored and is not capable of being managed effectively as a separate parcel of land
- the restoration was completed late in the year and no cultivations are possible to prepare a seed bed for the first crop (grass or arable)
- agricultural operations on the restored land could disrupt operations elsewhere on the site, or
- there is not a suitable agricultural occupier or contractor able to commence aftercare

If land is to be left ‘fallow’ (i.e. with no established crop) over the winter months, the land should be disced or cultivated to prevent rapid surface water run-off and soil erosion.
Please see Annex RN3 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Are the quarry base/overburden contours correct
The levels of the prepared overburden base should be such that once the soil profile is restored the landform is as approved in the agreed restoration scheme.

2. Is low level restoration with perpetual pumping proposed
Where the restoration is to be below the surrounding water table level, it will be necessary to safeguard the drainage of the site in perpetuity. The operators will need to address the following matters satisfactorily:
   a. lining of the site to limit the ingress of groundwater
   b. pumping in perpetuity for the land via a legally enforceable agreement

3. Is settlement likely to be significant and if so how have the operators allowed for it
Settlement is only likely to be significant for sites filled with putrescible waste. Sites filled to good practice standards with inert waste should not be subject to significant settlement. Do the proposals adequately cover:
   a. predicted settlement levels and surcharging of waste
   b. additional considerations for sites managed as bio-reactors
   c. interim restoration
   d. differential settlement
   e. pre- and post-settlement contours

4. Are the restoration contours as agreed
It is important that the operators restore the site to the agreed landform in order that the restoration and after-use objectives are achieved. The operators should provide:
   a. pre- and post-settlement surveys as appropriate
   b. where the restored contours are not as agreed, proposals to remedy the situation
   c. even slopes without backfalls to aid underdrainage
   d. site boundaries that merge appropriately with adjoining land
   e. no “dead - end” valley features
   f. reasonably shaped/sized enclosures

5. Are the landform and the design of the landfill gas and leachate control infrastructure compatible
The design of the working and restoration schemes should include consideration of the landform, after-use and landfill gas and leachate controls in a holistic way, such that conflict between differing
requirements can be minimised. Do the proposals adequately cover:

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<td>a. capping of the site</td>
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<td>b. design, location and timing of landfill gas and leachate controls</td>
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<td>c. interim restoration</td>
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<td>d. settlement rates</td>
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<td>e. increased run-off</td>
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6. **Is the provision of infrastructure as agreed**

Have the operators provided in accordance with the agreed proposals:

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<td>a. surface manholes, inspection chambers and controls for landfill gas and leachate</td>
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<td>b. appropriate access arrangements for monitoring and maintenance of wellheads etc</td>
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**COMMENTS**

For more detailed information see:

- The Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)
- **Good Practice Guide for Handling Soils** (MAFF April 2000)
- MPG7 The Reclamation of Mineral Workings (DoE 1996)
- Low Level Restoration of Sand and Gravel Workings (DoE 1989)
- Landfill Gas and Leachate Control Applied to Arable After-use (MAFF 1998 PR4869)
- Evaluation of Mineral Sites Restored to Agriculture (LRA 2000)

Cross references:

- AP 5
- SW 3
- RN 8, 9, 10
- AC 3, 9, 10
1. Are the quarry base/overburden contours correct

In order to achieve the agreed landform, it is essential to prepare the quarry base to the correct levels, such that when the soil profile is restored, the levels are as agreed in the restoration scheme. It is not acceptable to vary the depth of the soil profile because of incorrect base levels, in order to achieve the agreed landform levels. This results in areas of over-deep and shallow soil profiles, which may reduce the agricultural potential of the land, as well as not being a sustainable use of valuable soil resources. Over-deepening of topsoil may lead to anaerobic conditions at the base of the subsoil layer ([Evaluation of Mineral Sites Restored to Agriculture](https://www.gov.uk/government/publications/evaluation-of-mineral-sites-restored-to-agriculture) (LRA 2000) page 67), whilst shallow soil profiles may increase droughtiness.

2. Is low level restoration with perpetual pumping proposed

Where restoration proposals are to safeguard the long-term agricultural potential of the land, and involve restoring it at a level below the surrounding water table, the restoration must be planned from the very beginning of the design of the schemes of working and restoration ([Low Level Restoration of Sand and Gravel Workings](https://www.gov.uk/government/publications/low-level-restoration-of-sand-and-gravel-workings) (DoE 1989) Chapters 3, 5, 8 and 9). The operators will need to address the following matters satisfactorily:

   a. **lining of the site to limit the ingress of groundwater**
      The need to reduce the ingress of groundwater into the site by lining the base and sides. The operators should provide details of their proposals for agreement prepared by appropriately qualified persons to demonstrate that they are sound and practical.

   b. **pumping in perpetuity for the land via a legally enforceable agreement**
      The restored land will require an underdrainage scheme with a perpetually pumped outfall, as a gravity outfall will not be available. The legal enforceability of perpetual pumping agreements is a complex matter, and qualified legal advice should be sought as appropriate. The sustainability of restorations relying on perpetual pumping may also be called into question.

3. Is settlement likely to be significant and if so how have the operators allowed for it

   a. **predicted settlement levels and surcharging of waste**
      Significant settlement should only occur on sites filled with putrescible waste, where allowances for the settlement that occurs as the waste degrades needs to be made. Significant settlement occurs mostly in the first 5 years following landfilling, and operators typically surcharge the site with waste by 15-20% to achieve the agreed post settlement contours. Recent studies have shown that settlement rates may exceed 20%. Post settlement gradients should be no flatter than 1 in 25 to aid drainage and limit surface ponding of water due to differential settlement. ([Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice](https://www.gov.uk/government/publications/waste-management-paper-26b-landfill-design-construction-and-operational-practice) (DoE 1995) paragraphs 6.5, 6.12 and 6.13) If settlement is found to be...
significantly different from predictions, this should be highlighted as early as possible, to enable the operators to discuss any implications and amendments with the MPA, EA and agricultural advisers, such as increasing/reducing the depths of waste landfilled, or changes to the landform. It is important to recognise that settlement rates will increase where landfill gas is actively extracted. This may have implications for the landform and after-use of sites where the proposals to extract landfill gas are made after the final landform is agreed or restored.

b. additional considerations for sites managed as bio-reactors

Sites to be managed as bio-reactors for accelerated stabilisation have special design requirements with intensive landfill gas and leachate controls enabling leachate to be re-circulated (see Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice (DoE 1995) Appendix D). The management of these sites may bring advantages such as more rapid stabilisation in terms of settlement and landfill gas production, but disadvantages in terms of rapid settlement and the need for remedial works to the sub-cap irrigation system requiring major site disturbance. These problems may be reduced with interim restoration and careful design, monitoring and liaison between staff involved in engineering, restoration and aftercare (Waste Management Paper (WMP) 26E Landfill Restoration and Post Closure Management Consultation Draft (Environment Agency August 1996) paragraphs 7.37 - 7.45).

c. interim restoration

Proposals may include interim restoration, where the site is capped and up to 50cm of subsoil is spread to protect the cap and support grass growth for a period of up to 5 years. This allows for the worst of the settlement to occur and any necessary remedial works to be carried out before the land is fully restored. Advantages of interim restoration may include higher standards of final restoration, less contamination and damage to soil, and less interference to the land once fully restored. Disadvantages may include the delay of the start of aftercare (Waste Management Paper (WMP) 26E Landfill Restoration and Post Closure Management Consultation Draft (Environment Agency August 1996) paragraphs 7.18-7.25). Where interim restoration is proposed, this should form part of the original design proposals for working and restoring the site.

d. differential settlement

Differential settlement may cause greater problems than general settlement of the whole landform, leading to localised hollows, low points in land drainage pipes, and disruption of landfill gas and leachate control infrastructure. These problems may require the pipework to be excavated and repaired, and the low areas stripped of topsoil and surcharged with subsoil before replacing the topsoil, with obvious consequences to the after-use.

e. pre- and post-settlement contours

Proposals should include details of the pre-settlement contours with appropriate surcharging and post-settlement contours to show the final landform. Generally, final gradients should be no flatter than 1 in 25 to allow for adequate drainage and to minimise ponding created by local differential settlement (Waste Management
4. Are the restoration contours as agreed

The agreed landform will be designed to meet the restoration and after-use objectives and it is therefore important that it is achieved. The landfill gas and leachate control infrastructure, drainage scheme and after-use are designed on the basis of the agreed landform, and they may not always be easily amended. The operators should provide:

**a. pre- and post-settlement surveys as appropriate**

The operators should undertake pre- and post-settlement surveys where necessary, to confirm that the landform is as agreed. Where significant settlement is expected, a number of surveys may be required until the majority of the settlement has occurred. BMV land cannot be steeper than 1 in 8 (7 degrees), and subgrade 3b 1 in 5 (11 degrees) (MPG7 The Reclamation of Mineral Workings (DoE 1996) Table 1). For sites filled with putrescible waste, post settlement gradients should be no flatter than 1 in 25 to ensure adequate drainage and minimise surface water ponding in the event of localised differential settlement. The majority of settlement takes place in the first 5 years following landfilling. To take account of settlement, sites are typically surcharged by 15 - 20% (Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice (DoE 1995) paragraphs 6.5, 6.12 and 6.13). Recent studies have shown that settlement rates may exceed 20%. Pre-settlement contours should also be suitable for the agricultural after-use, both to take account of the agricultural requirements at the start of the aftercare period, and also in the event that settlement is significantly less than predicted.

**b. where the restored contours are not as agreed, proposals to remedy the situation**

Where either pre- or post-settlement contours are not as agreed, the operators should provide proposals to remedy the situation. From an agricultural point of view, any proposals will have to be assessed on the basis that, where soil has already been restored, more damage may be caused by re-stripping and replacing it than by leaving the restoration undisturbed. Interim restorations have the advantage in these circumstances as, if surcharging of waste is required, only part of the subsoil layer will need to be stripped and replaced.

**c. even slopes without backfalls to aid underdrainage**

Even slopes facilitate the use of agricultural machinery. Backfalls can lead to difficulties with drainage schemes and also to surface ponding of water.

**d. site boundaries that merge appropriately with adjoining land**

Sites boundaries should tie in with adjoining land levels to prevent potential problems with ponding of surface water. This is essential where the restored land may in the future form, with adjoining land, part of a larger enclosure.

**e. no “dead - end” valley features**
Restored landforms should not include valley features forming “dead-ends”, as this may lead to drainage problems and surface water ponding.

f. reasonably shaped/sized enclosures
Modern farm machinery tends to be large and is designed to operate in straight lines as far as possible. Restored field enclosures, particularly where arable crops are to be grown, should therefore be reasonably large (e.g. >8 ha, depending upon the part of the country) and mainly square or rectangular. Hedgerows, particularly where it is proposed that they are allowed to grow tall, should be planted in a north-south orientation to reduce crop shading. However, these requirements represent ideals, and will need to be modified in line with site constraints and landscape requirements.

5. Are the landform and the design of the landfill gas and leachate control infrastructure compatible

It is essential for a holistic approach to be taken in the design of the working and restoration of the site, including the design of the landform to take account of a number of objectives including, the after-use and the need for landfill gas and leachate controls. This holistic approach should involve continuing inputs from agricultural specialists and designers of the landfill gas and leachate control infrastructure, together with the EA to ensure that any conflicting interests between the after-use and waste management licence conditions are minimised. Do the operators proposals adequately cover:

a. capping of the site
   This will normally be using clay or a man-made impermeable membrane. If clay has been sourced from the site, has this been achieved without compromising the restoration? For example, has clay that is required for the restored soil profile been used for cell engineering, daily cover or capping?

b. design, location and timing of landfill gas and leachate controls
   The design of these controls will have a very significant impact on the success of an agricultural after-use, particularly where arable cropping is proposed. Where there are surface features such as wellheads, particularly where not arranged in parallel lines, this may significantly restrict an arable after-use, as may having less than 1 metre of clear soil above the crown of any landfill gas or leachate control pipework. Where this is the case it may not be possible to install an underdrainage scheme, which is normally a prerequisite for arable cropping on a capped site. The impacts of landfill gas and leachate control infrastructure on arable after-uses, and the ways to minimise them is complex, and is covered in detail in Landfill Gas and Leachate Control Applied to Arable After-use (MAFF November 1998 PR4869).

c. interim restoration
   Proposals may include interim restoration, where the site is capped and up to 50cm of subsoil is spread to protect the cap and support grass growth for a period of up to 5 years. This allows for the worst of the settlement to occur, and any necessary remedial works to be carried out before the land is fully restored. Advantages of
interim restoration may include higher standards of final restoration, less contamination and damage to soil, and less interference to the land once fully restored. Disadvantages may include the delay of the start of aftercare (Waste Management Paper (WMP) 26E Landfill Restoration and Post Closure Management Consultation Draft (Environment Agency August 1996) paragraphs 7.18-7.25). Where interim restoration is proposed this should form part of the original design proposals for working and restoring the site. Where proposals are to have temporary surface pipework for landfill gas, this will rule out arable after-uses and possibly agriculture altogether, at least until the pipework is installed below ground level. Where it is proposed to drill the gas wells and install pipework once restoration is complete, this may cause significant damage to the soil on site as well as its contamination with waste materials.

d. settlement rates
It is important to recognise that settlement rates will increase where landfill gas is actively extracted. This may have implications for the landform and after-use of sites where the proposals to extract the landfill gas are made after the final landform is agreed or restored. Where remedial works are required to correct differential settlement this should be carried out by stripping topsoil, surcharging the subsoil and then replacing the topsoil.

e. increased run-off
Where sites are capped it is important to understand the drainage requirements of the land. The aim should be for rainfall to percolate down through the soil profile, and not be shed from the soil surface. Where there is no impermeable barrier (i.e. cap) below the soil profile, this water should drain through the soil profile until the water table is reached, which may be several metres below ground level. With a capped site, it is necessary to have a drainage scheme to remove the water from the base of the soil profile above the cap, to prevent the soil from slumping and losing structure in very wet conditions, to enable agricultural machinery to run on the ground, and plant roots to exploit the whole soil profile. Therefore, a capped site may result in more water having to drain from the site via surface ditches etc. compared to before the site was disturbed. It is therefore necessary to consider the ability of the existing ditches/soakaways to cope with this increase in water, as well as any improvements that may be necessary. This may include new ditches, soakaways or balancing ponds.

6. Is the provision of infrastructure as agreed

Have the operators provided the following as agreed, including in the correct location:

a. surface manholes, inspection chambers and controls for landfill gas and leachate
It is important that the operators have designed, installed and located these items in accordance with the agreed proposals, otherwise they may severely limit the agricultural after-use. The design of these controls will have a very significant impact on the success of an agricultural after-use, particularly where arable
cropping is proposed. Where there are surface features such as wellheads, particularly where not arranged in parallel lines, this will in some cases significantly restrict an arable after-use, as may having less than 1 metre of clear soil above the crown of any landfill gas or leachate control pipework. Where this is the case, it may not be possible to install an underdrainage scheme, which is normally a prerequisite for arable cropping on a capped site. The impacts of landfill gas and leachate control infrastructure on arable after-uses and the ways to minimise them is complex, and is covered in detail in Landfill Gas and Leachate Control Applied to Arable After-use (MAFF November 1998 PR4869).

b. appropriate access arrangements for monitoring and maintenance of wellheads etc
Wellheads, pipework controls and sampling points will require access for vehicles for monitoring and maintenance purposes. These access routes should be designed and laid out to minimise interruption to the after-use, and damage to the land surface. Dedicated haul routes should reduce the incidence of vehicles driving randomly over the site and should, wherever possible, satisfy the needs of agricultural access, and be routed along boundaries.
Please see Annex RN4 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **What is the condition of the bunds**
   a. are weeds evident
   b. are the bunds vegetated
   c. are the soil layers in a suitable condition to be moved

2. **What are the weather conditions**
   a. is it the correct season for moving soil
   b. is there favourable weather for the soil replacement

3. **What record keeping (and auditing) has been undertaken**
   a. is the soil in store properly recorded
   b. has any soil been removed from or added to the bund since it was last surveyed

4. **Does the soil strategy document address where the soil is to be placed**

5. **What bund removal details are provided**
   a. is any treatment of the surface under the bund proposed
   b. does the storage space need re-grading to blend in with the surrounding landform

**COMMENTS**

For more detailed information see:
- Good Practice Guide for Handling Soils (MAFF April 2000)

Cross references:
- AP 8, 9, 10
- SW 4, 6, 7, 8, 9
- RN 5, 8
1. What is the condition of the bunds

   a. are weeds evident
   Weed control of soil bunds is required throughout the period of storage to avoid the creation of a weed seedbank and the spreading of weed seeds to adjacent land. The control of any weeds prior to soil replacement is particularly important, as otherwise the respread soil will provide an ideal opportunity for the weeds to germinate.

   b. are the bunds vegetated
   Any excess vegetation on the bund should be removed prior to the stripping/replacement operations to assist in the creation of a suitable seedbed for aftercare.

   c. are the soil layers in a suitable condition to be moved
   Various layers within the soil bund are likely to be at varying soil moisture levels. Stored soil may remain in the bund for periods ranging from a few months to several years. Very long-term soil storage presents the danger of the bund being assimilated into the landscape and becoming a forgotten resource. Careful site planning should ensure the soil remains available for restoration.

2. What are the weather conditions

   a. is it the correct season for moving soil
   The soil replacement process should have been planned well in advance in order to minimise the risks of encountering adverse weather conditions.

   b. is there favourable weather for the soil replacement
   The soil replacement programme should be carefully supervised with the personnel having the authority to suspend operations if conditions are unfavourable. Soil should only be handled when in a dry and friable condition and when the land is in an appropriate condition for trafficking by plant and machinery.

3. What record keeping (and auditing) has been undertaken

   a. is the soil in store properly recorded
   Before the soil is moved a check should be undertaken to ensure the actual soil corresponds to the plans and documentation. The quantities and location of the particular soil type should have been recorded.

   b. has any soil been removed from or added to the bund since it was last surveyed
   An annual audit of soil is recommended and between such surveys it is possible for material to be added or removed either in accordance or contrary to the intended soil strategy. Either way a visual check should highlight any changes to the bund from the survey (lack of vegetation, change in shape – bulge/hollow).
4. Does the soil strategy document address where the soil is to be placed

The soil handling strategy should identify all the likely soil operations and their approximate timing. A record should have been established and maintained for each soil bund that provides a clear record of operations including dates, volumes, types of soil, area from where the material originated, weather conditions during stripping and any problems encountered. This information will assist in ensuring the soil is replaced in the correct area.

5. What bund removal details are provided

a. is any treatment of the surface under the bund proposed
   The general principle is that each storage bund should be stored on like material. Therefore subsoil bunds once removed will require topsoil to be replaced. Soil loosening will be required under the location of bund when the soil in store has been removed.

b. does the storage space need re-grading to blend in with the surrounding landform
   A bund could occupy a width of 30 metres and extend much further linearly. This is a significant area that has to be restored in conjunction with the adjacent mineral extraction area. Levels may require alteration due to the permanent diversion around the periphery of the site of water features such as rivers or streams or roads. Levels may also require changing due to new drainage patterns or adjacent land uses. The restoration details for the site should clearly show how the soil storage areas are to be restored. The building up of adjacent land levels prior to the removal of the soil could compromise the soil resource through contamination from, for example, overburden materials.
Please see Annex RN5 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Is the area to be restored ready to accept the soil
   a. is the landform as approved
   b. has the overburden surface been loosened/stone picked
   c. are there depth boards available

2. What has determined where soil is placed
   a. is the soil replacement based on original land quality
   b. is the soil replacement based on soil types

3. Have the target depths for the soil layers been agreed
   a. does this differ depending upon intended land use
   b. are specific areas to be restored using higher quality materials
   c. have the areas for placement of soil-forming materials been identified
   d. has any allowance been made for bulking

4. Is the soil suitable for handling
   a. are the criteria different for various soil types
   b. do the criteria vary according to the machinery to be used
   c. do the criteria include reference to meteorological forecasts
   d. is there a company statement covering the actions required with the onset of adverse weather conditions
   e. are the dust control measures compatible with soil movement
   f. is the soil to be moved during an appropriate season
   g. are the criteria proposed unambiguous

5. Are the site operations compatible with soil replacement
   a. is the phasing of soil replacement compatible with the mineral extraction programme
   b. is the soil to be replaced from store or from original in-situ locations

6. Are the waste disposal operations compatible for soil replacement
   a. is the landfilling being undertaken by a different company to the mineral operation
   b. who is responsible for the restoration of the site
   c. are the landfilling and mineral operations compatible
   d. can landfill traffic be controlled to prevent damage to restored areas
For more detailed information see:
- Code of Good Agricultural Practice for the Protection of Soil (MAFF 1998 PB0617)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) Appendix 2
- Good Practice Guide for Handling Soils (MAFF April 2000)

Cross references:
- AP 6, 8
- SW 7, 8
- RN 4, 6, 7, 8
1. Is the area to be restored ready to accept the soil

a. **is the landform as approved**
   Agricultural machinery works most efficiently and safely on level or gently sloping ground, and best and most versatile land is limited to slopes less than 7° (1 in 8). Flooding, particularly in summer, limits land quality by destroying crops. Restoration to a lower level within a floodplain or below the groundwater table will increase the flood risk unless mitigated by pumping. Restoration levels and contours therefore need to be carefully planned in order to maintain the ALC.

b. **has the overburden surface been loosened/stone picked**
   Before the operation starts the basal layer should be graded to the correct level and be free from extraneous materials. The machines are to only work when ground conditions enable their maximum operating efficiency. The operation should only be carried out when the basal layer supports the machinery without ruts. Ripping should have been undertaken to enable the removal of any oversized material on the surface prior to the subsoil being placed.

c. **are there depth boards available**
   Level boards and soil pits should be used to verify overall levels and soil thickness in each replaced strip.

2. What has determined where soil is placed

a. **is the soil replacement based on original land quality**
   If land is to be restored for agricultural use or to maintain its long-term agricultural potential, then soil damage must be minimised and the land restored wherever practical to its original quality or better. Similar soil on a site does not necessarily lead to the same restored ALC, as land quality also includes non-soil related factors such as slope or flood risk. Therefore, a full understanding of the soil and the proposed landform should ensure the most appropriate after-uses are chosen and how to achieve them. The soil replacement operation should follow a detailed plan, showing soil units to be restored, haul roads and the phasing of vehicle movements. The soil units should be defined on the site as either still in-situ and yet to be stripped or in designated soil storage areas.

b. **is the soil replacement based on soil types**
   It should be possible to ensure soil with a particular ecological significance (e.g. a seed bank from woodland soil or soil of low nutrient status) is dealt with appropriately within the soil strategy.

3. Have the target depths for the soil layers been agreed

a. **does this differ depending upon intended land use**
   For an agricultural after-use, recommended restoration depths are normally 30cm of topsoil and 90cm of subsoil to give a total profile of 1.2 metres combined. This
is not always achievable, particularly where prior to working, subsoil was not present to this depth. Where shortages prevent these depths being achieved, it may be desirable to increase soil depth by reducing the areas to be restored to agriculture. If lower quality agricultural restoration is being considered, then shallower depths may be acceptable, although alternative land uses may also be an option. In any calculations relating to soil quantities, it is important to remember that some soil types are more appropriate for specific uses on the site. Soil is not an homogeneous material that is interchangeable; different soil profiles are often required for different intended after-uses. The proposals for reinstating the soil should include the location, depth and composition of reinstated soil profiles, and the contours of the restored land.

b. are specific areas to be restored using higher quality materials
Soil depth is important, not only in determining the available water capacity of the soil, but it also has a direct effect on the range and type of cultivation which can be carried out and the types of crop to be grown. Soil texture and structure have a major influence on water retention, water movement and aeration of the soil. In areas with dry climates where droughtiness is the overriding limitation to ALC, deeper topsoil can be shown to raise the water-holding capacity of the profile and thus improve the ALC grade. However, any topsoil depths greater than 40cm may cause future difficulties due to anaerobism and should be resisted. Therefore careful attention is required to achieve the correct soil profile for the intended after-use.

c. have the areas for placement of soil-forming materials been identified
The Code of Good Agricultural Practice for the Protection of Soil (MAFF 1998 PB0617) (paragraph 172) states that ‘Subsoil … should be removed to at least 1.2 metres below the original ground surface’ but that ‘In some cases there are advantages for restoration in utilising soil-forming materials identified at greater depths than 1.2 metres’. The use of soil-forming materials should have been considered at the application stage and steps taken throughout the site working period to recover the appropriate material. In a high quality agricultural restoration, soil-forming material is very unlikely to be suggested as a topsoil replacement. However, there are circumstances where soil-forming material in the lower subsoil layers can improve upon the original subsoil material. Therefore the use of soil-forming material does not necessarily result in lower quality restoration schemes.

d. has any allowance been made for bulking
A “bulking factor” allowance should be made for any subsequent settlement that may occur in the replaced soil, as restored soil bulks-up and may give the impression of a thicker soil layer. The loose replaced soil will settle, thus reducing the thickness of the replaced soil. This ‘bulking factor’ can be between 5% and 15% of the apparent soil thickness.
4. Is the soil suitable for handling

a. are the criteria different for various soil types
   The earlier or later in the year that soil is moved, the greater is the risk of causing damage. In general, the mineral operator should plan operations so that soil replacement is normally scheduled between the months of April to September inclusive. Replacement by late August enables any remedial works, underdrainage and seedbed preparation to be undertaken before the autumn weather hinders further operations. The risk of soil damage is further influenced by the type of soil and the machinery to be used. Lighter soil can generally be moved at a higher moisture content without damage than a heavy soil. The period when soil can be safely handled is longer in the drier parts of the country, typically the east and south.

b. do the criteria vary according to the machinery to be used
   The period for soil stripping may be extended where the soil handling machinery or technique is such that trafficking over the soil is minimal e.g. the ‘dump truck and excavator’ method (where dumptrucks do not traffic over soil). For guidance see Good Practice Guide for Handling Soils (MAFF April 2000).

c. do the criteria include reference to meteorological forecasts
   The operator should make reference to meteorological forecasts and past data to assist in determining the extent of the risks in undertaking the soil replacement in the period identified. Prior to commencing operations, a Meteorological Office forecast should be obtained which gives reasonable confidence of soil replacement proceeding without interruptions from rainfall events.

d. is there a company statement covering the actions required with the onset of adverse weather conditions
   If significant rainfall occurs during operations, the soil replacement must be suspended. Replacement must not restart after significant rainfall until the ground has had at least a full dry day and the agreed criteria can be met. The suitability criteria of when to move soil are fully set out in Appendix 2 of the publication Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996).

e. are the dust control measures compatible with soil movement
   A common method of dust control is to dampen the ground surfaces with water. This can be incompatible with good practice on soil replacement. However the use of agreed haul roads, suspending particularly dusty operations such as soil replacement in dry windy conditions and limiting vehicle speeds may be appropriate.

f. is the soil to be moved during an appropriate season
   The earlier or later in the year that soil is moved, the greater is the risk of causing damage. It is particularly important on large restoration projects to ensure that soil is replaced early in the restoration season, in order that sufficient time exists
in late August and September to undertake any subsoiling, drainage works, cultivation and sowing prior to the onset of winter.

**g. are the criteria proposed unambiguous**

The moisture content of each soil layer should be 3 to 5% drier than the Lower Plastic Limit, especially when motor-scrapers are used. Generally, there are two methods to determine whether the consistency of soil is favourable for handling. The “WormTest”, adapted for field situations, is only suited to soil with greater than 10% clay content and less than 70% sand. The method entails rolling a ball of soil on a flat surface (e.g. glazed tile) to form a thread 0.3cm in diameter. If a 0.3cm thread cannot be formed without crumbling, the moisture content is assumed to be drier than the lower plastic limit and therefore less prone to damage if soil handling is carried out. However, it is considered advisable that the moisture content should be 3 to 5% drier than the lower plastic limit, especially when motor-scrapers are to be used. The alternative approach is for the prior laboratory determination of the moisture content of the soil at it’s lower plastic limit for each soil type. A proprietary on-site soil moisture meter is then used to assess soil moisture relative to the lower plastic limit of that particular soil type. If 80% of the samples are at or below the acceptable moisture content, then soil stripping may commence. The lower plastic limit is the point at which, for each particular soil type, the soil changes from being plastic to crumbly (dry and friable). If soil handling takes place when soil is at or wetter than its lower plastic limit, damage to soil structure is more likely to occur. The criteria for determining when soil is fit to be handled should be clearly understood by all personnel.

5. Are the site operations compatible with soil replacement

**a. is the phasing of soil replacement compatible with the mineral extraction programme**

Site operations may have been ongoing for some time and it is appropriate to check that the site is still on target and that the original working proposals have not altered. Soil can only be replaced when there is a sufficient area infilled or restored to replace them upon. Delays to restoration can occur if the site is dependant upon imported inert fill to achieve restoration levels, or if the rate of silt accumulation in the lagoons changes due to differing specifications or marketing influences. The amount of discard or waste material may not be as high as originally expected, or else the quantity of mineral higher than expected. All these factors can lead to the carefully synchronised working plan submitted at the time of the planning application becoming outdated.

**b. is the soil to be replaced from store or from original in-situ locations**

The soil movements should be examined against the overall strategy, whether originating from store or by direct placement.
6. Are the waste disposal operations compatible for soil replacement

   a. is the landfilling being undertaken by a different company to the mineral operation
      On sites where controlled wastes are to be imported as fill, the filling operation can affect the restoration of the site to agricultural use. On these sites, landfilling operations may be carried out by a different company from that involved in mineral extraction.

   b. who is responsible for the restoration of the site
      The responsibility for monitoring and engineering of the waste site is likely to be with the waste operator. A clear understanding of the respective responsibilities of mineral operator and landfill operator is required to ensure restoration activities are well co-ordinated and planned.

   c. are the landfilling and mineral operations compatible
      The design of leachate and landfill gas control systems must meet engineering requirements, but also be compatible with the proposed after-use. Efforts should be made to position landfill gas collection pipes so as not to interfere with soil replacement and subsequent cultivation. (See Landfill Gas & Leachate Control Applied to Arable After-use (MAFF November 1998 PR4869.) The depth of soil, which will accommodate underdrainage, should be at least 1 metre. If extensive settlement is likely and future re-engineering proposed, then the possibility of interim restoration should be examined. This would involve the placement of some overburden and subsoil material over the cap or final fill material and the seeding of this layer. If further engineering operations are then required, they can be carried out with no damage to the bulk of the soil material, which can be kept in store until needed.

   d. can landfill traffic be controlled to prevent damage to restored areas
      There will need to be long-term access for maintenance and monitoring of leachate and landfill gas control systems. Any vehicles used for this should be routed and controlled to prevent damage to restored soil.
Please see Annex RN6 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Is the equipment to be used for soil movement as agreed in the planning documents**
   a. have there been any changes, or are any proposed

2. **Is the soil movement to be undertaken by a separate subcontractor**
   a. will this affect the timing of operations
   b. are they aware of planning requirements

3. **What ancillary machinery is intended to be used for ripping/subsoiling**

4. **If using backacters and dumptrucks**
   a. are the techniques being used appropriate

5. **If using motor-scrapers**
   a. are the techniques being used appropriate

6. **Is the machinery proposed acceptable**
   a. is it a proven technique
   b. is the machinery well maintained
   c. is it clean
   d. is it capable of undertaking the task within the time constraints
   e. is it compatible with other aspects of the planning application (e.g. noise control)

7. **Is acceptable agricultural equipment proposed**
For more detailed information see:
- [Evaluation of Mineral Sites Restored to Agriculture](#) (LRA 2000)
- [Good Practice Guide for Handling Soils](#) (MAFF April 2000)

Cross references:
- AP 9
- SW 4, 6, 7, 9
- AC 6
1. Is the equipment to be used for soil movement as agreed in the planning documents
   a. have there been any changes, or are any proposed
      Account should be taken of the condition of the soil when considering the suitability of the proposed machinery and when to use it. The time between the granting of planning permission and the movement of soil on a site could be several years, during which time advice on good practice may change. However, sometimes a clear choice of machinery is available to the mineral operator and the effect upon the quality of the restoration should be a factor at the forefront of the decision making process.

2. Is the soil movement to be undertaken by a separate subcontractor
   a. will this affect the timing of operations
      The use of the operator’s equipment can ensure that the machinery is available during periods of unexpected good weather, whilst the use of sub-contractors tends to result in narrower windows of opportunity to replace the soil on a particular site. The availability of the sub-contractor may result in pressure to move soil during inappropriate periods.
   b. are they aware of planning requirements
      The use of sub-contractors should enable all the planning commitments to be written into the contract. However, this does introduce a further set of personnel who need to fully understand the particular restrictions or characteristics of the individual site. The use of competent sub-contractors may enable staff experienced in soil handling to undertake the task, rather than an employee, who may not realise the different techniques required for handling soil.

3. What ancillary machinery is intended to be used for ripping/subsoiling
   Ancillary machinery has to be controlled to avoid undoing the benefits of careful soil placement. Graders are often used to keep roads maintained, but should not be used on the replaced soil because they cause severe compaction and smearing of the soil. In exceptional circumstances, their use may be justified if the newly replaced soil needs to be temporarily ‘sealed’ to prevent ingress of excessive rainfall into the soil profile before the next layer can be placed. Where compaction occurs, this will need treatment during the replacement process. In addition it may be necessary to integrate the removal of stones or damaging materials with the replacement process. In order to be effective, ripping should be carried out when the soil is sufficiently dry and friable in order to allow a lifting and shattering effect of the whole mass of soil above and between the ripper tines. Ripping when wet simply draws a slot or mole channel that may improve drainage and aeration directly above, but leaves the surrounding material undisturbed. Overall, relying on ripping to alleviate subsoil compaction is a less successful strategy for creating loose soil than avoiding compaction in the first place.
4. If using backacters and dumptrucks

a. are the techniques being used appropriate

There is a trend towards less compaction as operators move from motor-scraper restorations to conventional dumptruck restorations and then to loose-tipped restorations. Recent research (Evaluation of Mineral Sites Restored to Agriculture (LRA 2000)) has demonstrated that deterioration in structure was least in subsoil when loose-tipped and untrafficked. Any checks on site should ascertain both the equipment being used and the methods being employed. The soil should be lifted by a backacter in separate layers, transported in a dumptruck and loose-tipped in heaps at the site of the restoration. Often bulldozers are used to move the tipped soil short distances and level them. Subsequent layers are normally tipped from the dumptrucks, though this method cannot avoid the machines running over the previous layer. An improved method uses similar loading and transporting equipment, but no traffic is allowed on the restored layers (see Good Practice Guide for Handling Soils (MAFF April 2000) Sheets 1 - 4). The soil is reinstated in strips that are no wider than the reach of a backacter (generally 6 metres). The first subsoil layer is back-tipped and spread out by the bucket of the backacter rather than the bulldozer. Subsequently, topsoil is tipped from the trucks onto the base layer, lifted onto the subsoil layer by the backacter and levelled by its bucket. The advantages of the loose-tipped dumptruck and backacter method has been further strengthened by recent research and it is increasingly being specified in planning conditions for the reclamation of BMV agricultural land.

5. If using motor-scrapers

a. are the techniques being used appropriate

The motor-scraper is capable of undertaking all soil handling operations - lifting soil, transporting it and laying it, either on a stockpile or on the area being restored (see Good Practice Guide for Handling Soils (MAFF April 2000) Sheets 5 - 12). Soil handling using motor-scrapers may represent the cheapest method of soil moving for shorter distances. Their main drawback is that they usually have to spread 3-4 layers of soil to reinstate a 1.2 metre deep agricultural soil profile and as each spreading involves travelling over the previously laid layer with a full load, this inevitably leads to compaction. This compaction also arises in the formation of soil bunds using motor-scrapers. Such equipment can achieve high quality restoration on some sites, but because of the greater risk of compaction, it should not be used for the restoration of BMV agricultural land, where loose-tipping techniques are preferred.

6. Is the machinery proposed acceptable

a. is it a proven technique

Clear guidance is given in Good Practice Guide for Handling Soils (MAFF April 2000) and the report on the Evaluation of Mineral Sites Restored to Agriculture
(LRA 2000) as to the specific stripping and replacement techniques which have proven least damaging to the soil. Generally, these involve loose-tipping techniques using backacters and dumptrucks, whereby none of the replaced soil is trafficked. Some equipment such as draglines are suitable only for loading dumptrucks or for direct movement of overburden and their use for direct movement of soil is unlikely to be feasible. However, there will be difficult conditions, perhaps due topography, where innovative approaches will be required and it will be for the applicant to demonstrate the need to deviate from good practice.

b. **is the machinery well maintained**
   The machinery has to be well maintained and therefore capable of undertaking the task. Inappropriate or poorly maintained equipment may not be capable of completing the task within the comparatively short period of suitable soil and weather conditions.

c. **is it clean**
   Machinery entering and leaving the site should be checked for excess soil that may present a risk for the spread of disease from one part of the country to another.

d. **is it capable of undertaking the task within the time constraints**
   Some of the least damaging soil movement techniques may take a longer period to undertake. One argument for the use of motor-scrapers is on large sites, where faster soil replacement can take advantage of the prevailing weather conditions; these short-term gains have to be judged against the proven benefits of loose-tipping techniques.

e. **is it compatible with other aspects of the planning application (e.g. noise control)**
   The noise and dust created by different types of machinery needs to be considered in relation to, for example, the site location, Public Rights of Way and surrounding properties.

7. **Is acceptable agricultural equipment proposed**

Power-driven cultivation equipment can leave fine seedbeds that develop a surface cap. This may stop seedlings emerging or lead to surface run-off and erosion. Large agricultural machinery is not necessarily a greater risk for work on disturbed soil. This is because faster work rates allow the work to be completed under better soil moisture conditions. Using low ground-pressure tyres, dual wheels or tracked vehicles can be of great benefit. However, when conditions are unsuitable, such as on a newly restored site, work should stop as large machinery can cause deep compaction that is difficult and expensive to correct.
Please see Annex RN7 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Are the requirements for haul roads appropriate to the restoration proposals**
   The number, siting and length of haul roads required will depend upon:
   a. **the location of the soil stores/areas being stripped of soil and the land being restored**
   b. **areas of unworked or restored land which must not be trafficked by plant or machinery**
   c. **the need for new access to parts of the site as restoration progresses**
   d. **the type of machinery to be used and the method of its use**

2. **How are the haul roads to be constructed, maintained and restored**
   Plant and machinery must not be allowed to run on the soil layers or on soil-forming materials. Do the proposals for forming, maintaining and restoring haul roads adequately cover:
   a. **stripping of soil layers**
   b. **drainage and maintenance**
   c. **dust control**
   d. **decompaction and restoration of the soil profile**

3. **How are the haul roads to be marked on site**
   Haul roads should be marked on site and provisions made to prevent plant and machinery straying onto unworked or restored land. Have the operators considered and made provisions for:
   a. **marking the layout and location of haul roads on plans in the site office**
   b. **marking haul roads on site**
   c. **preventing plant and machinery from straying off the haul roads**

4. **Is there a requirement for access roads post restoration**
   a. **for agricultural access and to monitor and maintain wellheads etc**
For more detailed information see:
- Good Practice Guide for Handling Soils (MAFF April 2000)
- The Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)

Cross references:
- AP 7, 8, 9, 10
- SW 6, 9
- RN 4, 5, 6, 8
- AC 3, 10
1. Are the requirements for haul roads appropriate to the restoration proposals

Haul roads should accord with the agreed scheme for restoration and their setting out and construction planned well in advance. The siting of haul roads should be well thought-out, thus reducing the likelihood of changes being required which may impact upon restoration and aftercare. Any changes should be agreed in writing with the MPA. The number, siting and length of haul roads will depend upon:

a. the location of the soil stores/areas being stripped of soil and the land being restored
   Haul roads are required for hauling soil from soil stores/areas being stripped to the land being restored. Where landfilling is taking place, haul roads are required for transporting waste to the void and between the stores of daily cover and the area being landfilled. It is important that plant and machinery are able to move around the site in an efficient and structured way and the layout of haul roads will, to some extent, be a compromise between taking the shortest route and not having more haul roads than necessary. Soil stripping and restoration may require temporary haul roads between the soil stores and phases being restored, whether using dumptrucks or motor-scrapers.

b. areas of unworked or restored land which must not be trafficked by plant or machinery
   The location of haul roads should minimise the interference with agricultural access to both unworked and restored land, with the progressive restoration and aftercare of the site, and prevent plant and machinery taking unauthorised short-cuts.

c. the need for new access to parts of the site as restoration progresses
   The siting of haul roads may continue to change as restoration progresses. Temporary haul roads will be required between the different areas being stripped of soil and being restored. These must also be clearly marked, and measures taken to prevent plant and machinery straying onto adjacent land or taking unauthorised short-cuts.

d. the type of machinery to be used and the method of its use
   The type of machinery to be used and the method of its use will also determine the layout of haul roads. For example, with loose-tipped restorations, dumptrucks delivering soil will travel on the overburden to the strip being restored and therefore their passage across the overburden may not be critical, unless it is to be decompacted before the soil is spread. Where motor-scrapers are used, this will require the machines to run on previously placed soil before discharging their loads and normally in the same wheelings as the previous machine. This method requires discipline to adhere to the haul roads which will be moved as restoration progresses across the area (Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) Annex pages 24-26 and Appendix 3 and the Good Practice Guide for Handling Soils (MAFF April 2000)).
2. How are the haul roads to be constructed, maintained and restored

Plant and machinery must not be allowed to run on soil layers or on soil-forming materials. The proposals should ensure that:

   a. **stripping of soil layers**
      Haul roads will be stripped of soil down to the mineral or overburden and the soil put into store for subsequent restoration.

   b. **drainage and maintenance**
      Maintenance and drainage of the haul road surface is important to reduce the temptation for plant and machinery to divert off the road onto adjoining land, which can be a problem with poorly maintained and drained haul roads. Drainage is likely to be achieved by constructing and maintaining the surface of the haul roads at an appropriate camber to shed water to roadside ditches, French drains or soakaways.

   c. **dust control**
      Dust control may be necessary during dry periods to prevent contamination of nearby crops. This is particularly important for horticultural crops and fruit, which may be eaten unwashed, and for grass which may become unpalatable to livestock.

   d. **decompaction and restoration of the soil profile**
      Restoration of haul roads is likely to include the removal of any sub-base/wearing course, subsoiling to relieve compaction, and reinstating the original soil profile.

3. How are the haul roads to be marked on site

Operators should address the following matters:

   a. **marking the layout and location of haul roads on plans in the site office**
      Haul roads must be shown on the site plans to enable them to be accurately set out and constructed on the ground.

   b. **marking haul roads on site**
      Once constructed, their boundaries should be marked to reduce the chances of plant and machinery straying off them.

   c. **preventing plant and machinery from straying off the haul roads**
      Haul road boundaries should be formed/marked in such a way that plant and machinery cannot easily widen them or take short-cuts across corners etc. This may be particularly important when sub-contractors are employed to strip or restore soil.
4. Is there a requirement for access roads post restoration

a. for agricultural access and to monitor and maintain wellheads etc

Where agricultural access is required to enclosures post restoration, and access for monitoring and maintenance of wellheads etc. for many years, it may be possible to construct permanent roads that will serve both during the restoration and aftercare periods and for the long-term management of the land. This may enable better standards of road to be built, in the knowledge of the long-term need, and for time and money to be saved when compared to constructing and maintaining more temporary roads. The siting and layout of roads would need to be considered at the planning stage to minimise the interference with the after-use.
Please see Annex RN8 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

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<tr>
<td>a. is the site progressing to plan</td>
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<td>b. is sufficient area available to commence restoration</td>
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<td>c. is the soil being moved from the correct parts of the site to the correct restoration areas</td>
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<td>d. can landfill traffic be controlled to prevent damage to restored areas</td>
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For more detailed information see:
• British Standard Number 3882 Specification for Topsoil (1994)
• Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)

Cross references:
• AP 5, 6, 7, 8, 9, 10
• SW 8, 9
• RN 6, 7
1. Does the working method for the soil replacement appear logical /feasible

   a. is the site progressing to plan
   Site operations may have been ongoing for some time and it is appropriate to check that the site is still progressing to plan and that the original working proposals have not altered.

   b. is sufficient area available to commence restoration
   Soil can only be replaced when there is a sufficient area infilled or restored. Delays to restoration can occur if the site is dependant upon imported inert fill to achieve restoration levels, or if the rate of silt settlement in lagoons changes due to differing specifications, mineral quality or marketing influences. The amount of discard or waste material may not be as high as originally expected, or else the quantity of mineral higher than expected. All these factors can lead to the carefully synchronised working plan submitted at the time of planning application becoming outdated.

   c. is the soil being moved from the correct parts of the site to the correct restoration areas
   It is a sensible precaution to check that the soil strategy is still valid and that the soil is being used in accordance with it.

2. Is the soil in good condition

   a. is the soil from bunds
   The soil from store should be of a known type (having been stripped, stored and recorded). A visual inspection should be undertaken to ensure that the operations are not down-grading the material by lifting in unsuitable conditions or through mixing with other dissimilar soil types.

   b. is the soil being directly placed
   In circumstances where soil is being directly placed elsewhere on the site for restoration, any deterioration or change in the soil types arriving at the area being restored should be immediately noted and appropriate action taken. The direct placement of soil avoids any potential deterioration caused by storage.

   c. is the soil imported
   Imported soil should be stored separately. This should give the opportunity to examine the suitability of the soil for the intended use. British Standard Number 3882 Specification for Topsoil (1994) provides specific guidance for topsoil. It establishes three grades of material and gives recommendations for their use and handling. It is important to consider the physical characteristics or contamination (including any glass or foreign objects). The soil needs to be visually examined before placement.
3. Is the soil being replaced in the correct sequence

The operation should follow a detailed replacement plan showing soil units to be replaced, haul routes and the phasing of vehicle movements. The soil units should be defined on the site with information to distinguish types, layers and thickness. Detailed daily records should be kept of operations undertaken (including the removal of stones and other damaging materials, the results of any assessment of the need for additional decompaction and the effectiveness of decompaction work undertaken), and site and soil conditions.

4. Are measures to avoid compaction being rigorously applied

Ideally, every effort should be made to ensure the soil is replaced, avoiding compaction by the use of loose-tipping methods (Sheets 1 – 4 Good Practice Guide for Handling Soils (MAFF April 2000). However, if compaction does occur within replaced soil layers or in overburden, this needs to be relieved, including within overburden where this is being used as subsoil substitute. If left untreated, the compaction will restrict the volume of soil able to be exploited by the plants to satisfy their requirement for moisture and nutrients, and can lead to drought symptoms in dry periods. The key depths in assessing agricultural land quality are 70cm, the assumed moisture extraction depth of the potato crop, and 120cm, the corresponding depth for winter wheat. Agricultural subsoiling is generally only effective to depths up to 45cm. It is therefore important to avoid or remove compaction sequentially for each soil layer as replaced. Any compaction in the lower soil layers and the top of the replaced overburden will otherwise remain untreated.

5. Are stones being removed

Stoniness of topsoil affects cultivation, seed germination and harvesting. Stoniness of topsoil and subsoil reduces their water retention and can affect the ALC of the restored land. It may be necessary to remove stones or damaging materials at each stage of the soil replacement process. Ripping of the overburden may have been undertaken to enable the removal of any oversized material prior to the subsoil being placed. Stoniness is a particular problem where the original soil is shallow over rock with a variable depth (e.g. limestone or shallow gravel). The size of stones to be removed, if appropriate, would have been determined at the application stage.

6. Is the work on target for completion

a. **Is there time available to undertake drainage and cultivation activities**

In general, the mineral operator should plan operations so that soil replacement is normally scheduled between the months of April to September inclusive. The risks to soil damage is further influenced by the type of soil and the machinery intended to be utilised. The earlier or later in the year that soil is moved, the greater is the risk of causing damage. It is particularly important on large restoration projects to ensure that soil is replaced early in the restoration season in order to ensure that sufficient time exists in late August and...
September to undertake any subsoiling, drainage works, cultivation and sowing prior to the onset of winter.

b. are there contingency plans for adverse weather conditions
If significant rainfall occurs during operations, the replacement must be suspended. Replacement must not restart after significant rainfall until the ground has had at least a full dry day and the agreed criteria can be met. The suitability criteria for moving soil are fully set out in Appendix 2 of Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996).

7. Is the replaced soil to be vegetated over winter

a. is there time to establish a crop
Soil erosion may be a major problem on newly replaced soil. The newly restored land is even more vulnerable if no crop is established over the winter period. Soil replacement should stop to enable the cultivation and establishment of a crop by September. Any later than this and the potential options to protect the soil are reduced. Grass sown in September provides good protection for restored soil over the winter period. From late September onwards crops such as cereals may be sown. In extreme circumstances a crop such as mustard to provide green cover may be sown, which will be ploughed in the following season.

b. how will the land be managed over winter
All crops should have established prior to winter. Leaving land fallow over the winter period is not a suitable option as this may lead to unacceptable soil damage. Spring sown crops are also unsuitable for the same reason. The established cover will protect the soil and help to dry the land during the growing season. No vehicles or livestock should be allowed onto the site over the winter period. However, if grass is well established in the autumn on dry soil, a light grazing regime by sheep will assist tillering.

c. are interim measures required if the whole soil profile is not replaced
It may be necessary to cease the soil replacement operations before the weather actually deteriorates. If overburden or subsoil has been replaced but no topsoil, it will still be advisable to establish an overwinter crop. Suitable drainage grips should be established to prevent ponding and erosion through the interception of surface water. Wherever possible, the ‘dirty’ water with suspended solids should be kept separate from the drainage of any restored areas to comply with any water discharge conditions.

8. Are the waste disposal operations compatible with soil replacement
a. **Is the landfilling being undertaken by a different company to the mineral operation**
   On sites where controlled wastes are to be imported as fill, the filling operation can affect the restoration of the site to agricultural use. On these sites, landfilling operations may be carried out by a different company from that involved in mineral extraction.

b. **Who is responsible for the restoration of the site**
   The responsibility for monitoring and engineering of the waste site is likely to be with the waste operator. A clear understanding of the respective responsibilities of mineral and landfill operator is required to ensure restoration activities are well co-ordinated and planned.

c. **Are the landfilling and mineral operations compatible**
   The design of leachate and landfill gas control systems must meet engineering requirements but also be compatible with the proposed after-use. Efforts should be made to position landfill gas collection pipes so as not to interfere with soil replacement and subsequent cultivation. The depth of soil, which will accommodate underdrainage, should be at least 1 metre. If extensive settlement is likely and future re-engineering proposed, then the possibility of partial restoration should be examined. This would involve the placement of some overburden and subsoil material over the cap or final fill material and the seeding of this additional layer. If further engineering operations are then required, they can be carried out with no damage to the bulk of the soil material, which can be kept in store until needed.

d. **Can landfill traffic be controlled to prevent damage to restored areas**
   There will need to be long term access for maintenance and monitoring of leachate and landfill gas control systems. Any vehicles used for this should be routed and controlled to prevent damage to restored soil.
Please see Annex RN9 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Remedial Issues**
   As part of the restoration process carried out in accordance with the restoration condition, are there any remedial actions and/or issues which need to be considered prior to the commencement of aftercare.

2. **As part of the compliance with the restoration condition, the site should be checked for**
   a. stone content and distribution in the restored soil profile
   b. foreign objects within the soil profile
   c. whether the areas and shape of the restored land are conducive to the commencement of aftercare
   d. is the restored area now more vulnerable to trespass etc
   e. is the restored profile as per the planning permission and if applicable, in accordance with the Statement of Physical Characteristics Report
   f. the restoration contours are as agreed

### COMMENTS

For more detailed information see:
- Agricultural Land Classification of England and Wales (MAFF 1988)

Cross references:
- AP 5, 6, 7, 8, 10, 11
- RN 8
1. Remedial Issues

As a result of the requirement of the restoration condition, it is essential to establish whether any remedial works are necessary before agreeing the commencement of the formal aftercare period. Although the aftercare period itself will provide opportunities for remedial works to be carried out, once aftercare cropping is in progress, the window of opportunity for carrying out such works is greatly reduced if crop damage is to be minimised, or the timing of normal agricultural operations is not to be delayed.

2. As part of the compliance with the restoration condition, the site should be checked for:

a. stone content and distribution in the restored soil profile

Stones of various shapes and sizes within the restored profile cannot only cause costly damage to farm machinery and thus perhaps delay vital cultivations, but their presence also reduces the water holding capacity of the soil, which in turn has a direct and adverse effect on crop growth. It is important, therefore, that where the original soil is used for the restoration, it is not contaminated from an external source i.e., the stone content following restoration should be no greater than which existed prior to the soil being disturbed.

Where restoration is dependent upon imported soil, there may be a degree of control of stone content, either in being able to choose the source of the material, or if a number of sources are available, managing the incoming material so that the stonier material is placed as deep as possible within the restored profile, or by screening the soil.

If doubts exist about the stone content of a restored profile where in-situ soil has been used, it may be possible to look at the soil details submitted as part of the planning application. If an ALC survey was undertaken to determine land quality, a stone content assessment would have been part of that process, and the report will provide the necessary detail. Additional information may be available if a Statement of Physical Characteristics Report has been prepared. With such background information it is then a relatively straightforward task to make a ‘before and after’ assessment.

b. foreign objects within the soil profile

These are usually a result of the soil being contaminated from an external source. This type of contamination may include wire, cables, concrete, metal posts, bricks, household waste etc. The damage to both equipment and people by these materials can be significant and they should be removed from the site before normal (agricultural) operations commence. Once removed, they must of course be disposed of appropriately. If it is considered that these materials are also located within the soil profile, repeated deep ripping may be required, followed by the removal of materials brought to the surface. Clearly, it is better if the potential danger of contamination is identified at the outset and action taken accordingly.
c. whether the areas and shape of the restored land are conducive to the commencement of aftercare
The commencement of aftercare is commensurate with the re-introduction of normal agricultural operations using standard agricultural equipment. It is important, therefore, that the process of restoring land acknowledges this fact and leaves an area fit, in all respects, for such operations to be carried out without hindrance. This includes not only the condition of the restored surface, but the shape of the restored area: irregular shapes can be extremely difficult to manage agriculturally (cultivate, fertilise, spray, harvest etc), and the cost of doing so will be a reflection of these difficulties. Reference to the phasing plan and working/restoration scheme should give clear guidance. Where remedial works are considered necessary, these should only be carried out when the risk of damaging the soil surface/profile is at a minimum and normal soil handling and trafficking best practice should apply. This could lead to a period of significant delay, especially if the site has to overwinter before any work can be carried out, or if sowing is delayed in the autumn as a result of work being carried out during the summer.

d. is the restored area now more vulnerable to trespass etc
Newly restored land often has an open, unused and unmanaged appearance. Where this occurs adjacent to or near the public highway, it can prove a strong attraction to joyriders, motorcyclists, travellers, fly-tippers etc. While it is simply not possible to deter all such types, the attraction does lessen once it is clear that the land is being used. It obviously helps if boundary ditches and/or hedges/fences are installed during the restoration process, or as quickly as possible afterwards.

e. is the restored profile as per the planning permission and if applicable, in accordance with the Statement of Physical Characteristics Report
At this latter stage of completing the restoration condition, this is perhaps one of the last remaining opportunities for significant remedial works to be carried out prior to the commencement of aftercare. Whatever the proposed after-use, the restoration condition will have required a specified restored soil profile depth. If BMV agricultural land is involved, it may be that a comprehensive pre-working soil description was submitted, viz... a Statement of Physical Characteristics Report. The restored profile can be checked by either hand-digging a profile pit, or requiring the contractor to use on site equipment (Hydraulic Excavator etc.), so that a number of pits are available across the site in advance of an inspection being made. Alternatively, hand augering can be carried out. The latter method will allow a higher density of observations to be made in a given time. Normally, it will simply be a case of measuring the total depth of the restored profile and identifying the soil layers - topsoil and subsoil(s). Topsoil is usually much darker than the subsoil due to the higher organic matter content, and the point at which the two soil layers meet therefore is often quite clear. It is then simply a case of measuring the restored soil depths and comparing them with the pre-working survey.
Soil textures may also be important and specialist advice may be necessary should a dispute arise. However, if the Soil Physical Characteristics Report indicated, for example, a sandy texture and the restored profile contains soil of an obviously clayey nature or, vice versa, it will be clear to the non-soil specialist that the restoration condition has (to a degree which will need to be assessed) not been fully complied with.

Where imported and/or screened soil is used in the restoration, then clearly there is likely to be a greater variation in the soil profile textures and layer depths across the site than where in-situ soil is used. This will especially be the case where the soil is sourced from a variety of places. In such circumstances, a considerable degree of flexibility will be required when assessing the restored profile.

In cases where BMV agricultural land is involved, the long term potential of the land may well be compromised if the restoration condition is not fully complied with.

f. the restoration contours are as agreed

Although the final topography of the site may well be as proposed, this does not necessarily mean that the final levels in relation to Ordnance Datum are correct. This is particularly important where the final levels, and perhaps levels on adjacent (and possibly undisturbed) land, need to complement each other in order to allow a drainage system to be installed. In addition, frost (air) drainage needs to be taken into account particularly where soft fruit/orchards are involved. Contours which do not allow frost pockets to drain away can cause significant crop damage and losses. The impact of new contours can have a significant impact on both land upslope and downslope of the restored areas. The operator should be able to provide details of the final levels - indeed, they cannot be achieved without the relevant survey work being carried out. For sites filled with putrescible waste, post-settlement gradients should be no flatter than 1 in 25 to ensure adequate drainage and to minimise ponding in the event of localised differential settlement (Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice (DoE 1995) para.6.5). Sites to be managed as bio-reactors for accelerated stabilisation have special design requirements with intensive landfill gas and leachate controls enabling leachate to be re-circulated (see Waste Management Paper (WMP) 26B Landfill Design, Construction and Operational Practice (DoE 1995) Appendix D). The management of these sites may bring advantages such as more rapid stabilisation in terms of settlement and landfill gas production, but disadvantages in terms of rapid settlement and the need for associated remedial works. These problems may be reduced by adopting an interim restoration approach (see Waste Management Paper (WMP) 26E Landfill Restoration and Post Closure Management Consultation Draft (Environment Agency August 1996) paras 7.37 - 7.45).
Please see Annex RN10 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Drainage**
   Most restored mineral sites will require underdrainage where agriculture is the proposed after-use. Even on sites where the soil prior to being worked was free draining, this may not be the case once it has been disturbed. Indeed, what may have made the site free-draining, i.e. sand, gravel, chalk etc. may well be the very material extracted. The drainage of a restored site requires more detailed consideration than the under drainage of an undisturbed soil.

2. **Drainage details should be checked for the following**
   a. **is underdrainage to be installed while restoration is in progress**
   b. **do ditches need lining to prevent erosion**
   c. **are there any temporary water management arrangements**
   d. **does the site need to be sealed against the inflow of water**

### COMMENTS

For more detailed information see:
- MPG 7 The Reclamation of Mineral Workings (DoE 1996)
- The Design of Field Drainage Systems (MAFF Booklet 345)

Cross references:
- RN 4, 5, 8
- AC 9
1. Drainage

Most restored mineral sites will require and benefit from the installation of an underdrainage system where a restoration to agriculture is proposed. Restored soil is disturbed soil, having lost its natural structure which provides channels for drainage water and root penetration. Thus, sites in their pre-working state may have been considered free-draining, but may no longer be so once disturbed. In addition, what may have been a significant factor in making the site free-draining, i.e. the underlying sand and gravel, chalk etc. will have been the very material removed. To add to the problem, the underlying mineral may well have been replaced by a much less permeable layer. It is the restored profile, therefore, that dictates the drainage need and not the pre-working natural state of the soil.

2. Drainage details should be checked for the following

a. is underdrainage to be installed whilst restoration is in progress

   The most common method of installing land drains (continuous lengths of perforated plastic pipe) is from the surface using a machine which cuts a narrow trench into which is fed the pipe and permeable backfill (if required). Thus, on restored land, the work is carried out once all the soil has been replaced. However, some operators choose to drain as part of the restoration process. In practice, this means that as soil is replaced in, for example, 20 metre strips, the drainage pipe is laid on the overburden/fill/cap surface and perhaps then covered with a permeable backfill (usually washed gravel). Although a number of operators employ this system, it is not without its problems, viz...

   (i) the gradients on the pipe are dictated by the gradient of the surface on which they are laid, whereas when installed from the surface, there can be a considerable degree of flexibility.

   (ii) once the pipe has been laid, damage can occur by the tipping/movement of soil above it, or by indiscriminate trafficking by operators machinery. If this damage goes unnoticed, it may have long-term effects.

   (iii) where a permeable backfill is required, it is normally laid over the pipe to within 22.5cm of the ground surface. This allows a good connection to be made by the subsoiler leg which will usually operate at a depth of 30-37.5cm. To achieve this depth by simply tipping over the laid pipes can be both difficult and expensive to achieve.

   (iv) the design and layout of such a scheme needs to follow the restoration phasing as it is laid in front of the restored soil. It may well be that the final topography of the larger area demands a very different type of drainage layout. Where any doubts exist about this method of draining, specialist advice should be sought.
b. **do ditches need lining to prevent erosion**

Newly cut ditches, especially in recently restored ground, are particularly prone to erosion and slippage of the banks. Care therefore needs to be taken in both their design and location.

With regard to their design, this should be undertaken by a competent person who is able to assess likely flows, which may be generated from inside and outside the permitted area. The design should have the capacity to deal with expected flows, provide sufficient freeboard for any underdrainage outfalls and banks at a batter (slope) calculated to provide stability. Vegetation is extremely important in stabilising ditch banks and thought should be given to seeding the banks to accelerate the natural (and slow) process of colonisation. Depending on the location, aspect, after-use etc. of the site, a conservation type seed mix may be an option.

Insofar as the location of the ditch is concerned, this is likely to be determined by the final topography of the site. Quite clearly, steep gradients, sharp bends and numerous changes of direction should be avoided where possible to reduce the risk of erosion. There may be options for where a ditch is to be located and the above factors need to be taken into account. If steep gradients are unavoidable it may be an option to consider piping the worst sections.

c. **are there any temporary water management arrangements**

During the process of restoration, there may be aspects of operations being carried out elsewhere on the site which may impact, albeit temporarily, on the drainage of restored areas. These operations should be kept to a minimum, but where unavoidable or unplanned, due to unforeseen circumstances, it is important to reduce their impact. Although it may be known that the effects will only be temporary, the design of any channels or underdrainage systems may need to follow the same design criteria as if the situation was permanent. If the impact is relatively small, it may still be possible to proceed with the planned drainage/ditch programme for the restored area.

If the impact is great, then it may be advisable to postpone any planned works rather than to make a permanent design change to overcome a temporary problem.

d. **does the site need to be sealed against the inflow of water**

Depending on how the site is to be restored, i.e., proposed after-use, final levels, topography etc. the site may need to be sealed along certain sections to prevent the ingress of water from outside the site. This may be necessary on either a temporary or a permanent basis. The need for such work and its design requires specialist knowledge. However, the reason for this type of work, and its impact (if any) on the site should be clearly explained in non-technical terms, and there should be a willingness to amend the scheme if necessary.

Where a site is restored to a permanently lower level, the need for pumping may become a necessity if the site is to retain the agreed land-based after-use. Due
to the costs and commitment involved with such schemes, it is unlikely to be a realistic option on anything other than a major scheme. Further guidance can be found in MPG 7 The Reclamation of Mineral Workings (DoE 1996) paragraphs A22-A28 (incl.) - Low Level Restoration in Areas with a High Water Table.

The issue of balancing lagoons may need to be taken into account either as temporary measures or more long-term features in a final restoration scheme. As a temporary measure, they can offer storage facilities to control flows both inside and outside the site until such time as they are no longer necessary, perhaps due to the completion of other works within the application site, which makes their function no longer relevant.

In the case of more permanent structures, these enable drainage (underdrainage and surface water drainage/run-off) flows to be controlled. This may be necessary if existing off-site ditches/culverts/pipes/soakaways etc. are unable to cope with any long-term increase in flow intensity. Whether these balancing lagoons are of a temporary or long-term nature, the need for them is likely to be identified at the application stage. The detailed calculation on flows/storage capacities needs to be prepared by someone with the necessary competencies, as it is unlikely that an unqualified person will be able to assess the technical issues involved.
Aftercare

Communication

Ref: 

Please see Annex AC1 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Agreed Lines of Communication
   It is vitally important that clear lines of communication are agreed with the MPA, those responsible for aftercare (operator, landowner or farmer), the landowner/farmer, Defra representatives and any others with an interest in the site (e.g. Forestry Commission, environmental organisations).

2. Technical Support to the MPA
   The MPA should inform Defra if there are specific technical issues they need advice upon or wish Defra to attend aftercare meetings.

3. Who is Responsible for Aftercare
   Depending on the legal agreements between the mineral operator and the agricultural landowners, the aftercare responsibilities may rest with the operator, landowner or farmer. The MPA, therefore, needs to ensure that whoever is responsible for aftercare of the site is aware of any obligations set down in the aftercare conditions, approved aftercare scheme or other legal agreements in place.

4. Agricultural Set-Aside
   The landowner or farmer may wish to set-aside agricultural land in aftercare under the Arable Area Payment Scheme (administered by the Rural Payments Agency). If this is the case, they will need to be reminded of their aftercare obligations.

COMMENTS

For more detailed information see:
- MPG7 The Reclamation of Mineral Workings (DoE 1996) (Paragraphs 56-74, 97-102 and Annex A)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Pages 28-33, Annex A (MPA's) & Annex B (Operators))

Cross references:
- AP 11
- SW 1
- RN 1
- AC 2, 3
1. Agreed Lines of Communication

At the aftercare stage of a restored mineral or waste site, there can often be several parties with an interest in the site such as:

- the MPA
- the mineral/waste operator and/or their consultants
- landowner(s)/farmer(s) and their agents
- Defra
- Forestry Commission
- Environmental organisations

Normally, the aftercare conditions will specify those who will be invited to the annual aftercare meeting (usually the MPA, Operator and Landowner plus Defra or the Forestry Commission depending on the after-use of the site). However, the MPA needs to establish good lines of communication with all those with an interest in the site to avoid later confusion.

2. Technical Support to the MPA

Following the refocusing of MAFF’s input to land use planning work, Defra may not always be present at the formal aftercare meetings where agriculture is the main or sole after-use of the site. However, the MPA may seek technical advice from Defra prior to the aftercare meetings if a Defra representative is not going to be present. The MPA should discuss with Defra at which sites the MPA would wish to have Defra representation.

3. Who is Responsible for Aftercare

In most cases, the mineral or waste operator will retain control of the aftercare of the site following restoration. However, depending on the legal agreement between the operator and landowner(s), it may be the landowner or farmer who is responsible for aftercare. If the aftercare responsibilities rest with someone other than the mineral or waste operator, the MPA should ensure that everyone is aware of the obligations set out in approved planning conditions, aftercare scheme or any other legal agreements in place. If the aftercare will be undertaken by the landowner or farmer, they may need to be reminded that the primary objective of aftercare is the rehabilitation of the land and not economic considerations. If the aftercare management is carried out sensitively, it should be possible, over a period of time, for the land to be treated in the same way as undisturbed land.

4. Agricultural Set-Aside

Under the Arable Area Payment Scheme (AAPS), farmers can claim area payments on cereals, oilseeds and protein crops. Normally, in order to qualify for these payments, the farmer has to ‘set-aside’ a percentage of their land. Set-aside land has to be maintained in a good agricultural condition.
There is no objection in principle for land in aftercare to be set-aside, but the farmer and operator should be aware that set-aside management conditions do not exempt them from aftercare obligations. On occasions, there may be conflicts between the set-aside management conditions and aftercare obligations. Farmers should, therefore, be advised to check that they can fulfil both the aftercare obligations and set-aside management rules before putting aftercare land into set-aside. If land has to be subsequently withdrawn from set-aside, it may lead to the imposition of penalties.
Please see Annex AC2 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Planning Conditions or Aftercare Scheme**
   Is the aftercare management of the site governed by planning conditions or is it set out in an approved aftercare scheme?

2. **Reserved Matters**
   Have all the aftercare items left as reserved matters been submitted in accordance with the deadlines imposed in the planning conditions (e.g. aftercare scheme or drainage scheme details)?

3. **Variations to Aftercare Conditions/Approved Aftercare Scheme**
   Is there an agreed mechanism in place between the MPA and those responsible for aftercare, to deal with requests for variations to the planning conditions or approved aftercare scheme?

4. **What is the Restoration Standard**
   The 1990 Act sets out different standards of restoration in Schedule 5. Is it a Schedule 5 Paragraph 3 (1) or Paragraph 3 (2) standard?

5. **Agricultural Management**
   Where the land is being restored to agriculture, is the land being managed as arable or grassland. Are these uses still appropriate?

6. **Detailed Annual Strategy/Aftercare Report**
   Has the detailed annual strategy and aftercare report been submitted, and on time?

7. **Annual Aftercare Meeting**
   Is there a date, at an appropriate time of year, for the annual aftercare meeting and have all relevant parties been invited? If appropriate, has the excavation of soil profile pits been arranged prior to the meeting?

8. **Funding**
   Are there sufficient funds available to complete the aftercare obligations?
For more detailed information see:

- **MPG7 The Reclamation of Mineral Workings** (DoE 1996) (Paragraphs 56-74, 97-102 and Annex A)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Pages 28-33, Annex A (MPA's) & Annex B (Operators))

Cross references:

- AP 11
- SW 2
- RN 2
- AC 1, 3
1. Planning Conditions or Aftercare Scheme

The 1990 Act Schedule 5 Paragraph 2 (3) states that aftercare conditions can be imposed in one of two forms, either:

- aftercare conditions established at the time of planning approval which specify the steps to be taken, or
- a condition which requires an aftercare scheme to be submitted at a later date to the MPA for approval

An aftercare scheme will normally be more appropriate where restoration and aftercare may not commence for several years once site working has commenced. Aftercare conditions are unlikely to be suitable, as it will be impossible to predict accurately what may happen during the working period or allow for changes in aftercare management techniques. For shorter working life sites, or sites where progressive restoration is carried out, conditions specifying the detailed steps to be taken and establishing appropriate parameters may be more suitable. This enables all parties to be clear about what is required from the outset and means the operator does not have to produce an aftercare scheme during the working phase of the site in a relatively short space of time.

If an Aftercare Scheme is to be submitted, MPG7 The Reclamation of Mineral Workings (DoE 1996), Annex A - Boxes 5 and 6, detail what the submitted scheme should include.

2. Reserved Matters

If the provision of an aftercare scheme is specified in the planning conditions, the MPA should check to see if it has been submitted on time. The Defra recommended ‘model’ condition states - “An agricultural aftercare scheme outline strategy shall be submitted for the written approval of the MPA at least 3 months before spreading of subsoil commences…”. From the agricultural perspective, it is important that an approved aftercare scheme is in place before formal aftercare commences. The absence of an approved scheme could lead, not only to confusion for all parties concerned, but also reduce the prospects of a successful land rehabilitation programme. The aim of the agricultural management during aftercare should be to assist with the rehabilitation of the land in terms of soil structure and stability. Failure to carry out the correct agricultural management may not only slow the rehabilitation process but, in some cases, cause irreparable damage. Examples where severe damage could occur would include arable cultivations being carried out when soil conditions are too wet, or livestock allowed to graze too early or late in the season, causing ‘poaching’ (severe damage to the grass by cattle or sheep hooves - normally occurs when the land is too wet or when livestock concentrate in a small area, such as around a feeder or water trough), or large, heavy livestock may also causing poaching of the land even in relatively dry conditions.

Similarly, the submission of detailed plans for a land drainage system need to be submitted a few months in advance of when the system is due to be installed. For agricultural restorations, the normal practice is to install underdrainage during the first or second summer of formal aftercare. Therefore, detailed plans should be submitted to the MPA for approval during the preceding late winter or spring.
3. Variations to Aftercare Conditions/Approved Aftercare Scheme

The County Planning Officers Society booklet Good Practice Guide for Mineral Planning Conditions (November 1995), has a recommended model policy which begins “Unless otherwise agreed in writing by the MPA the working, restoration and aftercare of the site shall be carried out only in accordance with the working programme...”. Therefore, by implication, any requests to vary the approved conditions need to be submitted in writing to the MPA. This is the recommended approach which should be adopted in the majority of cases. However, there will be instances where the variation being sought is a very minor one or, for practical reasons, a decision needs to be taken rapidly. It would therefore be sensible for the operator and MPA to agree at an early stage how minor or urgent requests for variations are to be dealt with. Issues to be agreed should cover:
- how are such requests to be communicated to the MPA
- how the MPA’s decision is to be communicated to the operator; and
- whether all requests and decisions are to be confirmed retrospectively in writing

Major changes, such as changing the agricultural management of the land from a grassland to an arable regime, should be formally submitted to allow for full consideration of the request.

4. What is the Restoration Standard

The 1990 Act establishes two standards of restoration in Schedule 5, paragraph (3). Where restoration to agriculture is carried out in accordance with Schedule 5, paragraph 3 (1), a ‘Statement of Physical Characteristics Report’ will have been prepared describing in detail the physical characteristics of the land when it was last used for agriculture. The aim is to restore the land to its original physical characteristics, as far as it is reasonably practicable to do so. If achieved, this should safeguard the site’s original agricultural land quality. For poorer quality agricultural land or where a site contains despoiled or derelict land, it will be more appropriate to aim to return the land to a standard where it is fit for the use specified in the aftercare conditions (Schedule 5, paragraph 3 (2) to (4)). It must be emphasised that although 3 (2) to (4) standards are not as high as 3(1), they may not be any easier to achieve.

Where the proposals are to improve the standard of restoration by, for example, swapping impermeable original subsoil with more permeable overburden, then the 3(2) standard is appropriate, as the original physical characteristics are not being restored.

5. Agricultural Management

Where agriculture is an after-use on part or all of the site, the proposed agricultural management regime needs to be known from the outset. This may have been established in agricultural aftercare conditions at the time of planning approval, or it may form part of the aftercare scheme left as a reserved matter. If the latter, the management regime will dictate all of the steps proposed in the aftercare scheme.
The choice of crop should be matched to the physical nature and state of the restored soil, the local climate and the skills of the person farming the land. Again, it must be emphasised that the aim is to facilitate the rehabilitation of the land and not simply to grow what is most economic or profitable at that time. Traditionally, grass has been the initial aftercare crop and in wetter climates or areas with a relatively short growing season, this is probably still the most suitable. However, in dryer and warmer parts of the country, arable cropping - normally cereals - has become more popular, particularly on sand and gravel sites. Crops which leave the soil bare over winter, require harvesting late in the year because of crop type (e.g. maincrop potatoes, field beans, sugar beet and forage maize) or climatic constraints, or have a limited root depth, are not normally appropriate.

6. Detailed Annual Strategy/Aftercare Report

**MPG7 The Reclamation of Mineral Workings** (DoE 1996) recommends that the annual aftercare report be submitted to the MPA not less than one month before the formal aftercare meeting. Annex A, Box 6 provides detailed guidance on what should be included in the aftercare report. However, the report should cover three broad areas:

- expand upon the outline aftercare scheme to provide detail of work to be undertaken during the coming year
- whether there are any variations to the original proposals, as set out in the aftercare scheme or conditions, and
- confirm what work has been carried out during the preceding year and, if applicable, include the results of any soil analysis or details of fertiliser/spray applications

In the first year of aftercare the details of work proposed during the coming year should be included in the aftercare scheme.

It is important that the aftercare scheme is submitted on time, to allow the MPA and other parties attending the annual aftercare meeting time to consider its contents. Presenting the report at the meeting is unacceptable.

7. Annual Aftercare Meeting

The MPA will need to decide whether an aftercare meeting is necessary to review the steps undertaken the previous year and discuss the steps proposed during the coming year. In most cases there will be at least one formal aftercare meeting per year, to which the MPA, operator (or landowner/farmer if they are responsible for the aftercare) and any expert advisers, should be invited to attend. There may be instances when it is appropriate to have more frequent site meetings, particularly if a problem has arisen.

If there is to be an inspection of the soil profile, for example, to investigate the development of soil structure or it’s suspected that poor crop growth or establishment is due to a soil problem, such as compaction or poor drainage, the operator should ensure that adequate pits have been dug prior to the aftercare meeting.
8. Funding

The 1990 Act Schedule 5, paragraph 6 provides for the last person using the land for winning and working of minerals to be financially liable for the aftercare of the land, unless an alternative legal agreement is in place. The operator should therefore ensure that there is provision of sufficient funding to cover the aftercare costs. Alternatively, the MPA may seek a 'bond' at the outset, to ensure the site can be adequately reclaimed.
Aftercare | Commencement of Aftercare

Ref:

Please see Annex AC3 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Has the Restoration Condition Been Completed on the Relevant Part of the Site**
   Before aftercare on the site (or smaller manageable blocks of land as may be agreed between the MPA and operator) can commence, checks need to be made that all of the restoration conditions have been fully discharged. (See Town & Country Planning Act 1990, Schedule 5 Sec. 3 (7) and MPG7 The Reclamation of Mineral Workings (DoE 1996) Para. 58 iv.)

2. **Aftercare on Parts of the Site**
   Where only part of the site has been restored, a judgement has to be made as to whether it is appropriate for formal aftercare to commence or not. The ‘rule of thumb’ should be that the block of land must be capable of being managed in its own right and not dependent on other pieces of land still to be fully restored. If it is agreed that it would not be appropriate for a block of land to commence formal aftercare, then it should be managed on a ‘care and maintenance’ basis until aftercare can proceed. Unless otherwise agreed with the MPA, the period of time that land is managed on a ‘care and maintenance’ basis should not count towards the aftercare period (normally 5 years where agriculture is an after-use)?

3. **Date of Commencement of Aftercare**
   To avoid confusion and misunderstanding, it is important that all parties agree the commencement date for formal aftercare of the site. If individual blocks of land commence aftercare at different stages, commencement dates should be given for each block?

COMMENTS
### For more detailed information see:
- **MPG7 The Reclamation of Mineral Workings** (DoE 1996) ( Paragraphs 56-74, 97-102 and Annex A)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Pages 28-33, Annex A (MPA’s) & Annex B (Operators))

### Cross references:
- AP 11
- RN 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
- AC 1
1. Has the Restoration Condition Been Completed on the Relevant Part of the Site

Aftercare normally begins when the restoration condition(s) have been fully discharged. On sites where progressive restoration is being undertaken, aftercare will commence once the restoration condition(s) has been fully discharged for the relevant part of the site. Most restoration conditions where agriculture is a proposed after-use, will cover aspects such as:

- landform
- replacement of overburden
- replacement of subsoil
- replacement of topsoil
- stoneworking, and
- provision of surface features (e.g. water supplies, ditching, stock-proof fencing or walls). **NB.** For some planning permissions, ‘surface features’ may appear in the aftercare conditions or in the aftercare scheme.

Therefore, before approving the commencement of aftercare, the MPA needs to be satisfied that all the relevant conditions have been satisfactorily completed. It should be borne in mind that depending on the exact nature of the problem, any problems arising from poor restoration, can be difficult to rectify once aftercare has commenced.

2. Aftercare on Parts of the Site

Past experience has shown that one of the most difficult areas for the MPA and operator to agree upon is whether a small area of the site, which has been restored, should commence formal aftercare. Legally, the aftercare should commence once the MPA is satisfied that the restoration condition(s) has been satisfactorily discharged (See the **1990 Act**, Schedule 5, Sec.3 (7)). However, for practical reasons, if the area restored forms only a small part of the site, or lies isolated amongst areas still to be restored, it may be sensible to delay the start of formal aftercare until the rest of the site, or a larger area, has been restored. Examples of practical problems which might arise where only a small or isolated area has been restored could include the following. It may not be possible to:

- enclose the land
- provide access for agricultural machinery or livestock, or
- install the underdrainage for some time, until adjoining areas of land have been restored.

Therefore, Defra would advise that for an area to commence formal aftercare, it should be capable of being managed as an agricultural enclosure on its own. For restored areas, where it is not appropriate for aftercare to commence, the land should be managed on a ‘care and maintenance’ basis. If possible, a cover crop (preferably grass) should be sown and maintained with periodic cutting. The main aim should be to ensure that soil is not left exposed and liable to erosion, by wind or surface water run-off. It is also important that the established crop is managed to avoid excessive growth and a build up of weeds. The period of time that land is managed on a care and maintenance basis should not count towards the formal aftercare period. Otherwise, you could have a situation where different parts of the same agricultural enclosure are at very different
Aftercare | Commencement of Aftercare

stages of aftercare. The period of care and maintenance may range from just a few months to several years. However, it is acceptable to have complete agricultural enclosures within the same site at different stages of aftercare. If this is the case, each field should have a clear reference number on an accurate site plan, which can then be used in subsequent aftercare reports to help avoid confusion.

3. Date of Commencement of Aftercare

To avoid confusion and misunderstanding, it is important that all parties agree the commencement date for formal aftercare of the site. If individual blocks of land commence aftercare at different stages, commencement dates should be given for each block. In such situations, an accurate plan giving clear field reference numbers should ideally be produced, with an accompanying schedule providing the commencement date alongside each field reference number. Such a plan and schedule would also be useful for annual aftercare reports.
Please see Annex AC4 for supporting information, and the "Introduction" for Health and Safety considerations and advice on the use of the guidance.

1. **Rehabilitation of the Land**  
The primary objective of aftercare must be the rehabilitation of the land, in order to improve the physical characteristics of the soil and rectify any problems with careful agricultural management.

2. **Local Agricultural Systems**  
Local agricultural systems may, to some extent, limit the agricultural management options for a site in formal aftercare.

3. **Off-site Constraints**  
Is there anything off-site which constrains how the agricultural land in aftercare on site is managed?

4. **Level of Experience**  
The skills and expertise of the operator, landowner or farmer may limit the agricultural options. It must be borne in mind that restored agricultural land needs very careful management.

5. **Site Assessment**  
Is there a need for an independent assessment of any aspect of the land during the aftercare period?

6. **Codes of Good Agricultural Practice**  
As with undisturbed agricultural land, the Codes of Good Agricultural Practice for the Protection of Air, Soil, and Water and the Green Code relating to pesticides should be adhered to.

7. **Landfill Gas Wells**  
The layout of landfill gas wellheads should have been designed so as to cause minimum disruption to the agricultural use of the land following restoration. Inevitably however, gas wells will cause some disruption to agriculture or may limit the agricultural systems that can be practised.

8. **Landfill Gas Monitoring**  
Monitoring of landfill gas will take place all year round. Access to wellheads needs to be controlled carefully to avoid indiscriminate trafficking.
For more detailed information see:
• MPG7 The Reclamation of Mineral Workings (DoE 1996) (Paragraphs 56-74, 97-102 and Annex A)
• Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996) (Pages 28-33, Annex A (MPA’s) & Annex B (Operators))
• Code of Good Agricultural Practice for the Protection of Soil (MAFF 1998 PB0617)
• Code of Good Agricultural Practice for the Protection of Water (MAFF 1998 PB0585)
• Code of Good Agricultural Practice for the Protection of Air (MAFF 1998 PB0618)
• Green Code - Code of Practice for the Safe Use of Pesticides on Farms and Holdings (MAFF 1998 PB3528)
• Controlling Soil Erosion (MAFF 1999 PB4262)
• Landfill Gas & Leachate Control Applied to Arable After-use (MAFF 1998 PR4869)

Cross references:
• AP 11
• AC 1, 2
1. Rehabilitation of the Land

It must be borne in mind by all parties with an interest in the formal aftercare of restored mineral and waste sites, that the primary objective must always be the rehabilitation of the land, through the improvement of the soil’s physical characteristics and rectifying problems though careful agricultural management and remedial works. Economic considerations should not be allowed to outweigh this primary objective. There may be requests, particularly from the farmer, to allow particular crops to be grown that are not in an approved aftercare scheme or conditions. Whilst all such requests should be given reasonable consideration, if there is a risk that the soil could be damaged by certain agricultural operations, the request should not be permitted. Examples may include a request for a crop to be grown which has a very late harvest date - hence increasing the risk of trafficking when soil is wet, or allowing livestock to graze before or beyond the permitted dates set out in the aftercare scheme or conditions.

2. Local Agricultural Systems

Local farming systems may constrain what agricultural system can be followed during the formal aftercare of a restored site. For example, there may be little chance of growing a crop which isn’t grown locally, as there may be little availability of specialist machinery or farmers with the knowledge or skills of growing that crop. Observing local agricultural systems will also give good clues as to what system is most likely to work on the restored site. For example, the topography, soil or climate may restrict what type of agriculture can be practised.

3. Off-Site Constraints

There may be other limitations as to what type of agriculture may be undertaken on the site. For example, if the site is close to an urban area, there may be an increased risk of theft, trespass or disturbance of livestock.

4. Level of Experience

Similar to paragraph 2 above, the skills and expertise of the operator, landowner and farmer may limit agricultural operations. The farmer may have limited experience of farming restored land. Farming recently restored land requires more careful management, as disturbed soil is at greater risk of damage than an undisturbed soil of a similar type. Therefore, it is always safer to choose an agricultural system which the operator or farmer is familiar with.

5. Site Assessment

It is rare for a site to pass through 5 years or more of aftercare without there being some disagreement between the parties with an interest in aftercare. From time to time, it may
be useful to be able to call upon an independent expert to assess the site and offer impartial advice. For example, there may be a problem with the establishment of a crop, or a drainage problem and the parties cannot agree on the cause and/or remedial measures required.

6. Codes of Good Agricultural Practice

Defra has produced a series of Codes of Good Agricultural Practice covering:
- air
- soil
- water
- controlling soil erosion
- sewage sludge, and
- pesticides

All farmers should adhere to these Codes on restored sites where agriculture is an after-use. The Soil Code and Controlling Soil Erosion guidance document also offer specific guidance relevant to restored land.

7. Landfill Gas Wells

The design and layout of gas wells should take into account the final after-use of the site following restoration. If agriculture is the after-use, the wells should ideally be located around the periphery of the site. If this is not possible, then they should be located in rows with even spacing in between. This should help minimise the disruption to agricultural machinery and operations. Detailed guidance can be found in the publication Landfill Gas and Leachate Control Applied to Arable After-Use (MAFF 1998 PR4869).

8. Landfill Gas Monitoring

As part of the Waste Management Licence, the Environment Agency will almost certainly require regular monitoring of landfill gas emissions from the wellheads. Monitoring is likely to be at any time of the year, including times when the land is saturated and prone to soil damage. Access to the wellheads, particularly if by vehicle, should be carefully controlled with agreed access routes, to avoid indiscriminate trafficking.
**Aftercare | General Condition of Site**

Ref: CHECKED

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1. **Does the land in aftercare appear to be in good condition**
   
The aftercare of a site involves the carrying out of various activities, some of a general nature, others more specific, viz. soil analysis, fertiliser applications, pest/disease/weed control etc. However, the importance of the general appearance and overall condition of the site should not be underestimated - sometimes this aspect of the site management can be the most informative.

2. **During aftercare meetings or visits a visual inspection should include the following**
   
   a. is the general management of the site acceptable
   b. is there a likelihood of unauthorised access (urban-fringe etc)
   c. whether the site is being trafficked unnecessarily
   d. are unauthorised materials (plant/equipment etc) being stored on site
   e. is differential settlement a problem
   f. is crop growth even and consistent in appearance
   g. does weed growth seem to be a problem
   h. are grazing livestock on site
   i. is there evidence of rabbit or pigeon damage

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For more detailed information see:
- MPG 7 The Reclamation of Mineral Workings (DoE 1996)
- Weeds Act 1959 (Defra PB7189 and PB7190)
- Green Code - Code of Practice for the Safe Use of Pesticides on Farms and Holdings (MAFF 1998 PB3528)
- Identification of Injurious Weeds (MAFF 1999 PB4192)

Cross references:
- AP 7, 11
- SW 10
1. Does the land in aftercare appear to be in good condition

Operations on site are normally those required by the agreed aftercare scheme or condition. At the annual aftercare meetings, it is against this background that the management of the site is assessed, i.e., have the agreed cultivations been carried out, has the right crop been sown (variety, seed rate etc) has a soil analysis been carried out etc. While it is important that the approved scheme is implemented (and amended where agreed), it is equally important that the site is viewed as a whole and not simply as an area for which a set of tick-boxes exists. It is perhaps worthwhile at this stage to quote MPG7 The Reclamation of Mineral Workings (DoE 1996) about the purpose of aftercare, viz. ‘The ultimate aim behind the concept of aftercare is that, over time, the land will be brought to a standard whereby it does not have to be treated differently from undisturbed land.’ Annual aftercare meetings, the implementation of the agreed scheme, the carrying out of remedial works, the overall cared-for and well-managed appearance of the site are all key factors for achieving this objective.

2. During aftercare meetings or visits a visual inspection should include the following:

a. is the general management of the site acceptable
   Notwithstanding those actions which are required to be carried out, this can best be described as the ‘first-impression’ when going on to the site. Does the site look neat and tidy, does it give the impression it is being managed in a positive way to achieve the aftercare objectives. If the site is to be restored to a similar after-use to that which exists on neighbouring land, is it beginning to blend in with the local landscape? A site which gives the appearance of being well-managed and cared for, usually is. A site which has clearly had a number of remedial works or actions carried out immediately prior to the aftercare meeting may give a different impression.

b. is there a likelihood of unauthorised access (urban-fringe etc)
   Newly restored land often attracts joyriders, travellers, vandals etc. Sites on the edge of urban areas can suffer severe urban-fringe problems. The establishment of good hedges/fences and particularly ditches, can often deter all but the most determined. Operators are well aware of the vandalism which occurs to machinery/equipment when left on site and wherever possible, remove it to a safe location, which might further reduce the attractiveness of the site. Quite clearly, criminal damage is a matter to be taken up with the relevant authorities.

c. whether the site is being trafficked unnecessarily
   There is often the temptation to use restored land as a short cut for on-site traffic. This is particularly so on the larger sites, where a number of phases are at different stages of working and accessing different parts of the site can become difficult. It is an easy option, therefore, to simply drive straight across restored areas. Where the aftercare crop is grass and the area is under the management of the operator the problem can be particularly bad. Where such trafficking
becomes established over a period of time, permanent crop damage occurs, the surface becomes rutted and severe soil compaction can result. This is an issue which should be taken up with the operator and proper routes defined for site traffic. Rutting can also be caused by agricultural operations, independent of and separate to any trafficking by operator’s machinery. The cause of this may be poor agricultural management e.g. bad timing of cultivations. Such instances will need to be addressed if the situation is not to deteriorate.

d. are unauthorised materials (plant/equipment etc) being stored on site
As with the problem of trafficking over restored areas, these same areas are often used as temporary areas for storing equipment, imported materials (soils, inert fill etc). It is unlikely that the approved working scheme will have permitted these operations and thus a breach of the planning permission will have taken place. Large areas of restored land can be damaged this way, causing long term problems, expensive remedial works and delays to the aftercare period itself, perhaps requiring additional years to be added.

e. is differential settlement a problem
Differential settlement is not always predictable and is not always a problem. However, early identification is necessary and the situation needs to be monitored regularly in order to assess both the area involved and the rate of settlement. Differential settlement is seldom a problem on sites backfilled with inert materials. Once the extent of the problem has been identified and assessed, it normally requires specialist advice to prepare any remedial measures. As any remedial works will invariably require trafficking across the site, either to place more soils (in order to raise levels), or more major works involving the stripping of the restored soil profile to place more fill material in the void, normal good practice soil handling criteria should be followed at all times. Where this occurs during the aftercare period, there will also be an obligation to either re-seed or implement interim management measures on any disturbed areas. It is important to realise that repairing minor areas of differential settlement may cause greater damage to the land than leaving it alone.

f. is crop growth even and consistent in appearance
Although crop husbandry and crop management require specialist knowledge and skills, it is reasonable to assume that any crop, throughout its various stages of growth, should look even and consistent in appearance. It is important, therefore, to walk through and/or around the crop in order to make this assessment. Areas where crop growth/appearance is not consistent require further investigation. It is at this stage that good site and aftercare records can play a significant role. Good records and a methodical approach are the most likely ways of identifying the problem. The most common reasons for patchy crop growth are:

- compaction
- poor drainage
- variation in soil type (especially where imported soil was used in the restoration)
- lime/nutrient deficiency
• contaminated soils
• pest/disease
• rabbit, pigeon and deer grazing, especially where close to boundaries with woodland, areas of scrub, open neglected areas etc
• landfill gas in the soil profile

An inspection of the restored profile is likely to identify any compaction/drainage problems. A soil analysis may also be required, normally included as part of the aftercare scheme.

g. does weed growth seem to be a problem
Where arable cropping is being followed, weed control should be a normal part of the overall crop management. Effective weed control assists in both the yield and quality of the crop. Weed growth is more likely to be a problem in under-utilised grassland. Grass is a common crop during the first few years of aftercare, but for the grassland to develop into a useful and productive sward, it has to be carefully and positively managed. Without such inputs, weed growth can soon become established, rapidly displacing the less competitive grasses and subsequently spreading greater quantities of weed seeds. Weed growth can be a major and persistent problem throughout the aftercare period and should not be ignored. Advice on which herbicides to use should be given by someone who is BASIS qualified.

h. are grazing livestock on site
It is normally inadvisable to introduce grazing livestock onto a site in the first year or so of aftercare, unless they are sheep or young cattle. During the first few years of establishment, the sward and soil surface are very prone to poaching (damage by the feet of livestock; including sheep and young cattle, especially when the ground is wet). The introduction of livestock is best achieved by discussion at the annual aftercare meeting when the state of the sward can be assessed.

Perhaps the two main issues to consider once the introduction of grazing animals (usually sheep) has been agreed is:
(i) ensure that sufficient numbers are available to allow the whole area to be grazed satisfactorily, and
(ii) because restored land is more prone to poaching than undisturbed land, it is preferable to have alternative grazing land available if weather conditions deteriorate. With very little notice it should be possible for stock to be moved off the aftercare area(s) to other established grassland, where the risk of poaching is significantly less.

i. is there evidence of rabbit or pigeon damage
Rabbits feed primarily on grassland or cereals but they will eat a wide range of other crops. Roots, brassicas and market garden crops can suffer severe damage, both to the growing plants, and the marketable end-product. Rabbits are a major pest and serious crop losses can occur if left uncontrolled. Occupiers of land have certain statutory obligations regarding rabbits that are harboured on
their land. They have a legal responsibility to control infestations and prevent them from causing damage to neighbouring crops. Advice on rabbit control can be obtained by contacting the local Defra office. Pigeons can cause significant damage, particularly on oilseed rape crops and should be controlled or deterred as necessary.
Please see Annex AC6 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Check the pre-working soil details before visiting the site
   a. what was the land quality
   b. is the restored soil profile intended to be the same as pre-working

2. How to dig a soil pit
   a. safety aspects
   b. when to dig a pit
   c. how deep to dig a pit
   d. is the location representative of the site
   e. is it affected by any previous farming practices

3. Can a soil pit be easily dug
   a. are there specific layers that create digging difficulties
   b. are there excess stones or other obstructions
   c. is compaction evident

4. What is visible in the soil pit
   a. are the roots penetrating the full profile
   b. are there any ‘plough pans’ or ‘thatch’
   c. is water seeping out of the side of the profile from a distinct layer
   d. are earthworms present

5. How does the soil compare with pre-working details
   a. have slopes changed
   b. are stones more evident
   c. are soil depths as intended

6. Undertake a visual check
   a. is soil erosion evident
   b. are areas waterlogged or free draining

7. What steps are now required
   a. drainage
   b. subsoiling
   c. cropping
For more detailed information see:
- Statement of Physical Characteristics Reports
- Pre-working Agricultural Land Classification Report

Cross references:
- RN 8, 9, 10
- AC 3, 5, 7, 10
1. Check the pre-working soil details before visiting the site

a. what was the land quality
   Depending on the extent of BMV agricultural land within the site prior to working, determine whether the proposed standard is acceptable. The objective will normally be to restore the land to its previous agricultural quality, or better if reasonably practicable under the standards specified in 1990 Act:
   - 3(1) standard - This is where the physical characteristics are restored, as far as is practicable, to what they were when the land was last used for agriculture.
   - 3(2) standard - This is where the land should be brought to a standard where it is reasonably fit for either arable or grass regimes depending on the pre-working cropping of the site and the pattern of agriculture in the area. In line with the principles of sustainability, the aim should be to put back land of equivalent quality to that occurring before site working. For example, this would not normally mean fit only for amenity grassland.
   On proposed agricultural after-uses, where a survey of the pre-working physical characteristics of the soil has been undertaken, the aim should be to return the land as far as practicable to those original characteristics (3(1) standard). In other circumstances, where the site was previously derelict or the previous characteristics were unknown, it may be appropriate to define performance criteria to ensure the land is fit for agricultural use. These could cover soil thickness, texture, stoniness or degree of compaction. In any event, the objective should be to achieve the best possible standard of reclamation. This will keep the widest number of options open for the future use of the land. It may be necessary for the MPA to employ a suitably qualified soil scientist to consider these issues.

b. is the restored soil profile intended to be the same as pre-working
   It is advisable to check the soil strategy to determine what you expect to find on site and the reasons for any variances from the pre-working Soil Physical Characteristics Report.

2. How to dig a soil pit

a. safety aspects
   Everyone undertaking soil examination should ensure that they follow the appropriate Health and Safety guidelines when handling soil and crops, e.g. tetanus injections, COSHH guidelines, correct posture for digging etc. Checks should also be made to establish the location of any underground services or other features that may be encountered.

b. when to dig a pit
   An assessment of soil and crop development is very difficult from a single inspection. However, the best time for detailed annual visits over most of the country is probably March to May. Crop and root development will be active; some weed/disease/pests may be in evidence; fertiliser effects should be
noticeable; and the soil should be dry and friable enough to examine, yet not too hard to excavate by spade to get the “feel” of the structure.

c. how deep to dig a pit
Examination of the soil profile by digging a pit with a spade and/or auger is necessary to fully assess soil structure and drainage condition. This is a time consuming exercise and can be avoided if arrangements are made with the operator to provide an excavator on the day or pre-dig representative profiles. This will not provide a ‘feel’ of the ease of digging the soil that a hand dug soil pit can provide. A soil pit should ideally be rectangular with a longer side facing the sun or direction of maximum light. Initially, it will be normal to dig pits to a depth of 60cm. In subsequent years, this may be restricted to 45cm where it is deemed unrealistic to achieve soil structural improvements by subsoiling below this depth. Only in exceptional circumstances will it be necessary to dig pits to one metre depth. This is most likely to be required at the pre-aftercare inspection, where restoration is poor and it is necessary to check that restoration conditions have been satisfactorily implemented, e.g. evidence of use of inadequate depths of suitable subsoil.

d. is the location representative of the site
At the initial site inspection and subsequent aftercare meetings, at least 1 soil pit should be excavated for every 10 hectares or for each aftercare phase, whichever is greater. In addition, it will be necessary to “turn over” several soil spits (spade depths to assess the upper subsoil structure and root penetration). The level of inspection needs to be sufficient to assess the uniformity of soil development within each phase and to highlight problem areas, where more detailed investigation may be warranted. These investigations must be supplemented by auger borings, together with assessments of the uniformity of crop growth, sufficient to ensure that soil pit information provides a representative picture for the area investigated. In subsequent visits, it will be necessary to check the effectiveness of remedial treatments.

e. is it affected by any previous farming practices
Avoid headlands, gateways or areas used for offloading equipment that may give an unrepresentative picture of the soil structure within the field. Attention should also be given to what the location was used for during the mineral extraction process (e.g. silt lagoon, plant site etc.). For instance, the examination of an area previously under a topsoil bund would not be as representative as an area previously in the middle of the excavation area.

3. Can a soil pit be easily dug
a. are there specific layers that create digging difficulties
These should be noted for closer visual inspection.
b. are there excess stones or other obstructions
When digging any pit, stones should not be encountered which exceed the dimensions allowed in each layer as indicated in the planning permission. Individual oversized stones are to be expected throughout the aftercare process, but the scale of such occurrence should be limited. The extent of a stony profile is also important, as lower quality materials may have been used compared to the intended profile. However, reference to the original Statement of Physical Characteristics Report will enable comparisons with the original soil profile.

c. is compaction evident
Compact soil will restrict the rooting volume and may limit the yield potential and nutrient requirement of crops. Nutrients are used inefficiently in these conditions. Compaction can be identified by examining the soil and root structure. When the soil is broken by hand, large, dense, angular soil units (peds) with few micropores are signs of compaction. Some other indications of compaction are:
- “horizontal” layering of the profile as opposed to vertical cracking
- discontinuity of vertical cracks
- sparse root penetration to depth in well established crop, i.e. very few vertical cracks for the roots to follow (e.g. cereals root typically to a depth of 1metre+)
- anaerobic layer (smell or blue/grey colour)
- water seeping out of the profile face at a fairly uniform depth in the upper layers (say 0-50cm). This frequently occurs at the interface of the topsoil and subsoil layers
- roots turning horizontal
- resistance to spade, auger or trowel penetration

4. What is visible in the soil pit

a. are the roots penetrating the full profile
Rooting depth may be influenced by:
- depth to impermeable rock
- compact soil layer
- chemical pans (e.g. anaerobic layer)
- ground watertable
- the depth of roots visible will also be dependent upon the rooting characteristics of the crop type

b. are there any ‘plough pans’ or ‘thatch’
These should be removable through normal agricultural activities.

c. is water seeping out of the side of the profile from a distinct layer
Wet or waterlogged soil will cause poor root development and reduced yields. The seepage may indicate an impermeable layer, or the underdrainage system may not be effective.
d. are earthworms present  
   The presence of earthworms is an indication of the health of the soil and that it’s biota are recovering. This is particularly relevant with soils that have been stored for several years.

5. How does the soil compare with pre-working details

   a. have slopes changed  
      It is important to be aware that irrespective of any good soil placement, the land quality may be limited by over-steep slopes. Slopes in excess of 7° (1 in 8) will not be BMV agricultural land. Slopes that are too shallow may create surface drainage difficulties.

   b. are stones more evident  
      The occasional oversized stone can be removed by hand picking through the aftercare period. Stones greater than 15cm in any dimension may require a stone picking operation. The proportion of stones in the soil profile should be ascertained by reference to the Statement of Physical Characteristics Report, as the removal of a significant quantity of stones may influence the soil profile depths. However, removal of some stone from the soil may be beneficial.

   c. are soil depths as intended  
      Both overdeepened and shallow soil can result in problems. The replacement to the target depths should enable the proposed after-use to be successfully undertaken without compromising other uses. In serious examples of inappropriate depths being replaced, it may be feasible to restrip and replace the soil profile. Each operation does pose a further risk of soil damage. All of these issues should have been addressed during the restoration stage. However, appropriate remedial actions may have to be taken in order to achieve the required standard by the end of the aftercare period.

6. Undertake a visual check

   a. is soil erosion evident  
      In the long-term, loss of soil by erosion can reduce crop yields. In the short-term, run-off and sediment can have serious off site effects, particularly on roads and in rivers where it can cause flooding, pollution and harm to fisheries. Early establishment of vegetation is especially important for newly restored soil to assist stability. Where soil erosion occurs, early remedial treatment is important to prevent problems becoming worse. This may involve appropriate control measures such as surface grips. Excessive grazing pressure can lead to severe poaching and/or erosion of the surface and compaction in the upper layers. Choose crops that can grow in these conditions; spring sown cereals should generally be avoided except on well-drained land in dry areas. This precaution is due to the increased risk of erosion from uncropped land over winter, damage to soil structure by cultivation in the spring and the problem of establishing a
satisfactory crop in wet years. Do not grow root crops such as potatoes and sugarbeet, as late harvesting will normally prevent remedial subsoiling and may result in bare land over the winter. There is also the risk of causing serious damage to the soil structure when harvesting in wet years.

b. are areas waterlogged or free draining
Is this due to landform, soil structure or seepage from elsewhere. Subsoiling the soil profile without providing a proper connection to a drainage system may result in a waterlogged soil profile.

7. What steps are now required

a. drainage
It is likely that the majority of mineral sites, once restored, are going to require underdrainage whether or not there was artificial drainage before the soil was disturbed. The timing of the drainage installation is particularly important to the success of the aftercare scheme, as effective soil rehabilitation can only begin with the control of the soil water regime. Underdrainage should normally be installed in the summer following the year of soil replacement, which may influence the crops to be grown before and after this operation. It may be appropriate to put aftercare on hold in an early phase of restoration or a part of the site, if it is reliant upon a drainage scheme for the whole site that will not be installed for a number of years. In such circumstances, it is still appropriate to establish vegetative cover to protect soil from erosion. Drainage will reduce the risk of the soil structure deteriorating further in wet conditions.

b. subsoiling
Remedial action will often require a subsoiling (soil loosening) operation. The base of the compacted layer should be accurately defined and the depth of the operation set accordingly to achieve decompaction. The ideal spacing of the operation is approximately 1½ times the working depth when using winged subsoilers. Generally speaking, subsoiling is unlikely to be effective below 45-50cm depth (60cm on lighter soil, especially in S England). If the profile is compacted below this depth, it may be advisable to consider mole drainage on the heavier textured soil, as an initial remedy to reduce waterlogging above the impermeable layer. Subsoiling without more permeable strata below, or an effective underdrainage scheme with permeable backfill to remove water, may not provide an effective remedy. It may either saturate more of the profile or just move water to low spots or depressions to form localised ponding.

c. cropping
For agricultural aftercare schemes, the primary objective of aftercare cropping is to assist soil structural redevelopment. Therefore, the choice of crop should aim to minimise the cultivation, harvesting or trafficking operations when soil is wet. Grass may be the preferred option for aftercare cropping; however, grazing must be carefully controlled and livestock removed when the soil is wet. It is recognised that local practice is relevant to the consideration of the appropriate crops to be
grown in the aftercare period. If grass is not appropriate, then in most circumstances winter cereals will usually be the most suitable arable crop, due to their deep rooting, which assists in drying the soil profile at depth and encouraging the re-establishment of the subsoil structure. Crops that leave the soil bare over the winter period, or have a limited root system, or require late harvesting, would not be appropriate.
Please see Annex AC7 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Is suitable cropping proposed**
   The management of aftercare crops is a crucial element of the final stage of reclamation. Whilst good aftercare management cannot compensate for a poor standard of restoration, poor aftercare management can certainly undo some of the positive elements of the restoration process. In extreme circumstances, poor aftercare management could inflict serious and long-term soil structural damage, which in turn could affect the long-term potential (land quality) of the area concerned.

2. **At annual aftercare meetings, the following points need to be addressed/considered**
   a. what cultivations have taken place, including dates, ground and weather conditions
   b. has the correct crop been drilled/sown, including variety, seed mix (where applicable) sowing rate, fertiliser analysis/application, use of herbicides etc
   c. what livestock are on/to be introduced to the site, including type, numbers, grazing period (if any)
   d. will a silage/hay crop be taken
   e. will the site have adequate winter crop cover
   f. does the farmer/operator/contractor have access to any specialised machinery
   g. the appropriateness of introducing industrial/pharmaceutical/innovative crops into the aftercare period
   h. will harvest dates compromise other important aftercare steps i.e. drainage
### COMMENTS

For more detailed information see:

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1. **Is suitable cropping proposed**

This is a crucial element in the overall reclamation of a site and the choice of crop and its subsequent management therefore needs careful consideration. It is important to remember that the objective is to manage and improve the soil structural development and not to grow the most profitable crop. Of course, common sense and practicability will play a considerable part in the choice of aftercare cropping. It is counter-productive to require the growing of particular crops, if they do not fit in with the established rotation or current farm practices, the expertise is not available or specialist equipment is required.

2. **At annual aftercare meetings the following points need to be addressed/considered**

   a. **what cultivations have taken place, including dates, ground and weather conditions**
      
      It is important, for reasons of keeping an accurate record, that this information is made available. If problems occur later on with, for example, crop development, it is the methodical approach of looking through the site records which may identify the cause of the problem. It may be that weather and/or ground conditions at the time of the cultivations was less than satisfactory. Any subsequent crop problems may, therefore, have nothing to do with the standard of quality of the restoration, but are seasonal due to poor weather conditions, which may have affected neighbouring (and undisturbed land) in a similar way.

   b. **has the correct crop been drilled/sown, including variety, seed mix (where applicable) sowing rate, fertiliser analysis/application, use of herbicides etc.**
      
      The detailed annual programme should include agreement on these cropping details. Any deviation from the programme will need to be agreed by the parties involved in the aftercare. Whilst it is important that the aftercare scheme is flexible enough to accommodate changes, it is also important that changes are agreed and properly recorded in the annual statement. With regard to herbicide use and fertiliser applications, advice should only be sought from those persons with appropriate qualifications, i.e. BASIS and FACTS respectively.

   c. **what livestock are on/to be introduced to the site, including type, numbers, grazing period (if any)**
      
      Where grazing livestock are to be introduced, this should only follow the agreement of all the aftercare parties and an assessment of the ground surface and sward. Poaching can be a severe problem on new grassland, especially on restored soil. It is important that stock can be removed quickly (albeit temporarily) if ground conditions deteriorate, or are likely to deteriorate as a result of expected adverse weather conditions. The availability of alternative grazing land, for example on a more mature sward on undisturbed land, may be an important factor when the introduction of grazing animals is being considered. There should be sufficient stock numbers on site, thus avoiding over- or under-grazing, each of which can create their own specific problems. It may be useful to specify
the grazing period, i.e. from 1 April - 31 October. Where stock are introduced to a site, it is essential that they are looked after by a competent stock person and that all the requirements of proper stock husbandry and animal welfare are fully met.

d. will a silage/hay crop be taken
It is important at the outset when planning grassland in the aftercare period to know how the grass will be utilised. This will, to a large extent, dictate the grass seed mixture sown. It is also necessary to know whether the agricultural holding has the facilities/equipment and expertise to make hay or silage. The whole process from start to finish must be thoroughly thought through if it is to be successfully implemented. Where mowers, balers etc. are to be used, it should be remembered that these machines work very close to the ground and may therefore be damaged by surface stones and debris. Surface conditions therefore need to be free of these obstructions.

e. will the site have adequate winter crop cover
In the interests of soil structural development, removal of soil moisture from the profile etc., it is important to establish crop cover as soon as possible after restoration. Crop cover is also important in preventing or reducing the risk of erosion. Even a young sward or the early growth of a cereal crop, can play a major role in protecting the soil surface. Where the site has a good grass sward that has perhaps been grazed and/or cut for hay/silage during the year, it is important that the height of the sward does not exceed 10 - 15cms through the winter, as this will cause some of the grass to die back and impede the spring growth. It may be necessary therefore to cut or ‘top’ any excess growth and remove it from the site.

f. does the farmer/operator/contractor have access to any specialised machinery
When planning cropping in the aftercare period, it is important to be aware of the availability or otherwise of specialised equipment and the skills to operate it. Unforeseen circumstances may dictate the need for this type of machinery and there will be a financial cost for hiring it etc. Aftercare should generally be a period of low risk and care should therefore be taken to avoid creating atypical situations.

g. the appropriateness of introducing industrial/pharmaceutical/innovative crops into the aftercare period
While innovation, new techniques etc. need always to be encouraged, without which progress/levels of efficiency etc. may be stifled, the aftercare period is not necessarily the best time to experiment, at least not on large areas where the success or failure of a restoration plan might be affected by such techniques. However, new ideas must be given an opportunity to develop and in this respect it must be expected that on occasions new ideas will be put forward. For example, short rotation coppice is being trialled as an aftercare crop on a number of sites. If new techniques or novel crops are put forward, it is important to establish a proper trial and take the advice and/or work with outside organisations whose
own expertise may prove invaluable. It may be that external funds or grants are available. Innovation should not be stifled or discouraged, but needs to be considered carefully, and if implemented, monitored properly so that the maximum benefit and knowledge results.

h. will harvest dates compromise other important aftercare steps, i.e. drainage

Aftercare can be likened to a form of physiotherapy for the restored profile. Any aftercare operations, cropping etc. should therefore be aimed at improving, or at worst, not damaging the replaced soil. In this respect, there may be occasions when the carrying out of essential aftercare operations will have an adverse impact on the growing crop. Such works may include remedial actions (settlement), installation of a drainage system (when ground weather conditions are conducive to the site being trafficked by heavy machinery), subsoiling, cutting of ditches and so on. In some cases therefore, some crop loss and/or damage will have to be accepted. It is thus important that when an aftercare scheme is being drafted, those persons responsible for the implementation of the aftercare works fully understand this position. So often when the land is returned to the farmer for the start of aftercare, the first they become aware of these obligations is at the first aftercare meeting. Good communication (see AC1) should avoid such problems.
Please see Annex AC8 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Are appropriate details included in the annual aftercare report**
   - [ ]

2. **Have samples been taken for soil analysis**
   - a. **is it up to date**
     - [ ]
   - b. **does it identify samples for specific fields**
     - [ ]
   - c. **do the results include any recommendations**
     - [ ]

3. **Has a suitably trained person prepared the reports**
   - a. **have they been able to verify the fertiliser applications made to the crops**
     - [ ]
   - b. **are they able to ensure that organic fertilisers have been taken account of**
     - [ ]
   - c. **are they aware of the current and proposed cropping details**
     - [ ]

4. **Have details of current nitrogen (N), phosphorous (P), potassium (K), magnesium (Mg) and pH status been provided**
   - a. **what are the target indices**
     - [ ]

5. **What are the recommended rates and types of fertiliser application**
   - [ ]

6. **Have the results and recommendations been made available to all with an interest in the land**
   - [ ]

7. **Who has the responsibility to apply the fertilisers**
   - [ ]

8. **What checks are possible**
   - [ ]

9. **Other environmental aspects**
   - a. **proximity to watercourses or boreholes**
     - [ ]
   - b. **ecological areas**
     - [ ]
   - c. **potential leaching**
     - [ ]
   - d. **application of other wastes**
     - [ ]
   - e. **nitrate vulnerable zones**
     - [ ]

10. **What are fertilisers**
    - a. **organic fertilisers**
      - [ ]
    - b. **inorganic fertilisers**
      - [ ]
    - c. **importance of pH**
      - [ ]
For more detailed information see:

- [Fertiliser Recommendations for Agricultural and Horticultural Crops](http://example.com) (The Stationary Office 2000 RB209)
- [Waste Management Licensing Regulations 1994](http://example.com) (SI 1056)
- [Code of Good Agricultural Practice for the Protection of Water](http://example.com) (MAFF 1998 PB0585)
- [Code of Good Agricultural Practice for the Protection of Air](http://example.com) (MAFF 1998 PB0618)
- [Code of Good Agricultural Practice for the Protection of Soil](http://example.com) (MAFF 1998 PB0617)

Cross references:

- [AC 6, 7, 9]
1. Are appropriate details included in the annual aftercare report

The purpose of the annual meetings is to assess progress towards achieving the required standards of restoration. These meetings are more effective for all parties if the information required to be discussed has been circulated and considered a month prior to the meeting. Typically, a scheme would include details of land management: cropping, cultivations, seed mixes, fertiliser rates, stocking levels and grazing periods; soil analysis, land drainage proposals, secondary treatments e.g. sub-soiling and mole drainage and, for subsequent years, any remedial work. The fertiliser requirements of replaced soil that may have been in storage for a number of years need individual consideration. Soluble compounds may have been leached during the storage of soil and therefore, the fertiliser and liming characteristics could have altered. Soil pH and available nutrient contents, especially phosphorus, can fall if soil is stored for a long time. As it is important to establish crop cover as quickly as possible, lime or nutrient deficiencies should be corrected by applying lime, fertilisers and organic manures. To ensure appropriate applications, the soil should be analysed immediately after soil replacement and repeated every two years throughout the aftercare period.

2. Have samples been taken for soil analysis

For most nutrients, laboratory analysis of soil and/or plant tissue can be used to predict nutrient shortages or diagnose crop deficiencies. For some nutrients (e.g. soil P analysis), different analytical methods may be used by different laboratories. The interpretation of analytical data requires knowledge of the analytical method used as well as many other factors.

   a. is it up to date
   The soil analysis results are needed primarily as tools to use for land management - they are not merely a requirement of the planning process. Therefore the results must be reported and acted upon.

   b. does it identify samples for specific fields
   There is variability of nutrient levels in agricultural fields and it is, therefore, essential that representative samples are taken in a standard manner for submission to the laboratory. Key points of soil sampling are to ensure no sample should represent more than 10 ha. The area must have a uniform history and soil type. Do not sample within 3 months of lime, fertiliser or manure application. Avoid headlands and unusual areas (e.g. trees, feeding areas) and sample to correct depth for the crop.

   c. do the results include any recommendations
   In drawing up the details for the aftercare for the forthcoming year, the basis for decisions should be clearly understood.
3. Has a suitably trained person prepared the reports

A knowledge of the soil characteristics and the local climate is essential when assessing the growth and yield potential of crops, and when giving fertiliser recommendations. Consultants providing plant nutrition advice should be FACTS qualified.

a. have they been able to verify the fertiliser applications made to the crops
   The person providing the advice is reliant on information being forthcoming from other parties, such as the mineral operator and farmer. Good records are important to develop a picture as to the applications and take-up of the fertilisers in each field. Good records may assist in identifying particular problems.

b. are they able to ensure that organic fertilisers have been taken account of
   The nutrient content of organic manures is extremely variable even for the same type of manure. The livestock feeding regime and the manure handling and storage system both have large influences of the nutrient content. Refer to the Defra publication *Fertiliser Recommendations for Agricultural and Horticultural Crops* (The Stationery Office 2000 RB209), for values of the nutrient content of different types of organic manures.

c. are they aware of the current and proposed cropping details
   Any proposed fertiliser recommendation given by a qualified person would take into account the existing and proposed cropping regimes. This should be as detailed in the aftercare programme and should not be deviated from, unless for good reason and with the full understanding of all parties. The responsibility for verifying the application, quantity and timing of fertiliser application should rest with the mineral operator.

4. Have details of current nitrogen (N), phosphorous (P), potassium (K), magnesium (Mg) and pH status been provided

Soil analysis should be carried out for soil pH, P, K and Mg nutrient levels. Soil nutrient concentrations change only very slowly. Large quantities of surplus nutrient above crop off-take are needed to raise the soil nutrient status. The Soil Index system for P, K and Mg provides a simple classification of the precise laboratory value (mg/litre). Indices range from 0 (deficient) to 9 (very high). For outdoor crops, it is rare to encounter Indices above 5. For nitrogen, there are 3 Indices. These are not based on soil analysis, but rather on previous cropping and manuring. For full details, refer to Defra’s *Fertiliser Recommendations for Agricultural and Horticultural Crops* (The Stationery Office 2000 RB209), or other similar publications.

a. what are the target indices
   The necessary soil nutrient indices provided by the soil nutrient and pH analysis should be considered against the target indices that will be related to the soil type and after-use as described in *Fertiliser Recommendations for Agricultural and Horticultural Crops* (The Stationery Office 2000 RB209). Defra experience is that a target index of 2 for phosphate and potash is reasonable for most soil, except
very sandy soil or amenity grassland, where an index of 1 may be all that can be achieved.

5. What are the recommended rates and types of fertiliser application

The report will specify the quantity of nutrient required for the crop. Fertiliser may be applied to a crop for one of two purposes - either to obtain extra yield and/or quality of the crop being grown, or to maintain or improve the existing level of soil fertility. A good fertiliser policy developed for a restoration scheme will aim at building up or maintaining satisfactory soil nutrient levels. However, nutrients such as nitrogen that can be readily leached from the soil must be applied at rates and at the time of year appropriate to the crop. Advice should be sought from FACTS qualified advisers.

6. Have the results and recommendations been made available to all with an interest in the land

The results must be provided to and understood by those who are responsible for applying the fertiliser to the land.

7. Who has the responsibility to apply the fertilisers

The objective of applying fertiliser during the aftercare period is to achieve good crop establishment, as protection against soil erosion, assist root development to aid soil structural recovery, and build up nutrient reserves to levels suitable for normal cropping at the end of the aftercare period. The mineral operator should not discharge his responsibility merely by paying a lump sum to the tenant or landowner to apply fertilisers as they see fit. The quantities being applied may be in excess of the annual crop requirements. Whilst this may build up nutrient levels, it may not be economically viable in the short-term, except as part of an agreed aftercare programme.

8. What checks are possible

Appropriate records of fertiliser applications should be provided. An additional check might be the visual condition of the crop, the crop yield and subsequent soil analysis results.

9. Other environmental aspects

It is necessary to be aware of the responsibility to ensure that the site is being managed during aftercare in an environmentally responsible manner. For some of the operations set out below, a risk assessment may be appropriate.
a. **proximity to watercourses or boreholes**
   There are recommended distances that should separate watercourses (10 metres) and boreholes (50 metres) from areas spread with organic manure. There are situations in which the farmer should not spread slurries or fertilisers, e.g. frozen or sloping ground. Care must be taken to prevent any fertiliser from polluting watercourses, ditches and surface water bodies.

b. **ecological areas**
   Special requirements are necessary near areas of ecological interest. Raising the fertility of soil in natural or semi-natural habitats, or altering the pH, may reduce the range of species living there. This should be avoided on all protected sites and, wherever possible, in other sensitive habitats. Advice should be sought from English Nature or other similar organisation as necessary.

c. **potential leaching**
   On restored sites, water may move quickly to the drains rather than going slowly through the soil profile. This could lead to potential leaching/loss of fertilisers and pesticides via drain-flow, as well as the more obvious surface run-off. Management of the aftercare programme of fertiliser and pesticide applications should take this factor into account by following agricultural good practices.

d. **application of other wastes**
   Sewage sludge and industrial wastes can provide fertiliser nutrients and improve soil physical conditions. Ensure the relevant legislation is followed when wastes are applied, and that the wastes and the soil is monitored by full analysis.

e. **nitrate vulnerable zones**
   These zones cover surface as well as groundwater sources of drinking water. There is a single compulsory national prescription that must be followed in such designated areas.

10. **What are fertilisers**

   There are many different types of fertiliser each with their own characteristics, advantages and disadvantages.

   a. **organic fertilisers**
      These contain variable quantities of nutrients that should be effectively utilised. Careful application to land will reduce the risk of environmental pollution and can lead to substantial savings on purchased fertilisers. There are numerous types of organic manures including dirty water, neat or diluted excreta, farmyard manure, poultry manures, sewage sludge, and industrial wastes. Industrial wastes include materials such as abattoir waste, ink sludge waste and vegetable-washing waste, which are commonly applied to land. The nutrient and toxic element content of these materials will vary and each material needs to be assessed individually before application to land. Industrial waste materials must be shown to be beneficial before they can be applied to land. Full details can be found in the [Waste Management Licensing Regulations 1994](https://www.gov.uk/government/statutory-struments/si-1994-1056) (SI 1056).
Fertilisers should be applied during periods of rapid crop growth and nutrient uptake. Applications of materials with a high available N content (e.g. poultry manures, pig/cow slurries) should be avoided during autumn and winter, since losses of N through nitrate leaching will be high, particularly on sandy and shallow soil.

b. **inorganic fertilisers**

Most nutrients can be applied relatively easily as inorganic fertilisers. Compound fertilisers contain more than one nutrient and straight fertilisers contain only a single nutrient. The physical quality of fertilisers is very important and the analysis of all European Union fertilisers is declared in a prescribed manner. Therefore, following soil analysis, the most appropriate fertiliser to apply to the land can be determined.

c. **importance of pH**

The pH of a soil is a way of expressing how acidic or alkaline it is. It is usually measured using a water extract. A pH of 7 is neutral; soil with lower values are said to be acid and those above pH 7 are alkaline. Most agricultural soil, other than peats, are maintained at a pH of between 6.0 and 7.5. Although 5.5 is adequate for grass and some crops, clovers are more sensitive to acid conditions. If growing clover, other legumes or cereals, a pH of at least 6.0 is required. Peat soil may be maintained at a rather lower pH than the majority of soil. The correct pH is important as it influences the availability of many plant nutrients. Some soils are naturally rich in lime (e.g. chalky soils) and may never need liming. Others may gradually become acid due to natural processes and the use of high levels of nitrogen fertiliser, and may require applications of lime to correct acidity.
Aftercare | Drainage

Ref:

Please see Annex AC9 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. Is underdrainage proposed
Most restored mineral sites will require underdrainage where agriculture is the after-use. Even on sites where the soil pre-working was free draining, drainage is usually impaired following restoration. Prior to underdrainage, have additional measures been proposed to mitigate against drainage and erosion problems?

2. Have the drainage proposals been submitted in accordance with the planning conditions

3. Check drainage proposals for the following details
   a. timing of underdrainage
   b. soil type
   c. drain spacing, design and layout, drain size, depth, and gradient
   d. adequate outfalls
   e. permeable backfill proposed
   f. secondary treatments proposed (e.g. subsoiling and mole drainage)
   g. what surface drainage is proposed (e.g. ditches)
   h. ensure drainage proposals do not adversely affect adjoining land

4. Following underdrainage, monitor the following at aftercare/site meetings
   a. are the drain outfalls clear and unobstructed
   b. are ditches of adequate capacity
   c. is the ditch clear, unobstructed and properly graded
   d. is there surface evidence of poor drainage. If yes, investigate further
   e. is the site in appropriate condition for normal agricultural operations to proceed
   f. has a final plan (to scale) been submitted
   g. check the potential for erosion
   h. check for problems caused off site (e.g. water run-off, inadequate surface water drainage)
**COMMENTS**

For more detailed information see:

- Workmanship and Materials for Land Drainage Schemes (ADAS 1995)
- Code of Good Agricultural Practice for the Protection of Water (MAFF 1998 PB0585)
- Code of Good Agricultural Practice for the Protection of Soil (MAFF 1998 PB0617)
- The Reclamation of Mineral Workings to Agriculture (DoE 1996)
- Guidance on Good Practice for the Reclamation of Mineral Workings to Agriculture (DoE 1996)
- The Design of Field Drainage Systems (MAFF Booklet 345)

Cross references:

- AP 5, 6
- RN 3, 8, 10
- AC 3, 6
1. Is underdrainage proposed

The purpose of underdrainage (also referred to as field drainage) is to remove excess soil water in order to provide a suitable soil environment and soil surface conditions for cultivation, harvesting and/or grazing by livestock. The need for underdrainage should not be confused with proposals to deal with surface water run-off.

In agricultural terms the soil needs to maintain:

- chemical fertility
- favourable physical conditions

Both of these factors are dependent on the soil retaining an adequate, but not excessive, amount of water within the rooting depth of the crops to be grown. Throughout the farming year the soil must be:

- capable of supporting heavy machinery or stock without being damaged
- ‘workable’ to allow the preparation of a seed bed
- ‘open’ enough to permit root development, good drainage and aeration

Restored soil has lost its natural structure and cracking which facilitates natural drainage and root development. It can often be compacted, making favourable conditions for cropping much more difficult to achieve. Poorly drained land reduces the cropping flexibility, workability and general efficiency of the soil. This in turn has a direct influence on land quality, a significant factor to be taken into account on many sites.

2. Have the drainage proposals been submitted in accordance with the planning conditions

Proposed final levels of the restored site should assume that underdrainage will be required. This should ensure, if considered necessary, that the whole of the site can be underdrained. Final restoration proposals should identify and make available adequate outfall facilities for the underdrainage scheme, viz. new ditches, soakaways, existing drains etc. Without a satisfactory outfall, an effective drainage system cannot be installed.

It is important that detailed drainage proposals are submitted allowing the maximum period of notice in order to allow consultation and discussion to take place. This will permit amendments to be made to the proposed scheme as necessary. The drainage plan needs to be to scale, show sufficient levels to demonstrate the effectiveness of the design, and identify the different pipe sizes to be used, normally through colour coding. Outfalls and the use of a permeable backfill (sometimes referred to as porous fill) will also need to be shown where appropriate.

3. Check drainage proposals for the following details

a. timing of underdrainage

The need for underdrainage may arise at anytime following completion of restoration. There is some debate on whether drainage should be installed at the
Annex

Aftercare

| Draining | AC9

beginning of aftercare, and risk the potential effects of settlement, or left for a few years until the worst of the settlement has been achieved. Each case needs to be considered on its merits. A sacrificial type scheme may be necessary if the situation is so severe that other agricultural aftercare obligations cannot properly be met. Drainage schemes are often installed after harvest, when ground conditions are conducive to being trafficked by heavy machinery. In this respect, the timing of the operation is crucial, as significant soil structural damage can occur if work is carried out during poor weather and/or ground conditions.

b. soil type
On undisturbed land, drainage is usually only carried out on those soils with a significant clay content, i.e. the texture of the soil is such that water cannot percolate through the profile quickly enough to prevent growing plants from experiencing stress. However, where soil has been disturbed, drainage problems can occur over most soil types, including those which in their normal undisturbed state would be classed as free draining, due to the loss of the natural soil structure and possible effects of compaction.

c. drain spacing, design and layout, drain size, depth and gradient
A typical scheme may be made up of lateral drains (continuous lengths of perforated plastic pipe - of 8, 10 and 15cms diameter) laid across the main slope of the site to be drained, either outfalling directly into a ditch, or connected to a main drain laid along the headland (or through a valley feature), which will carry the water to the nearest ditch or outfall point. The lateral drains will normally be laid to a minimum depth of 60cms and covered with permeable backfill (usually washed gravel - size 0.5-5cms) laid to within 22cms of the ground surface. An average spacing between the lateral drains would be in the region of 20-40 metres, depending on soil type, gradient, topography etc. A secondary treatment, such as mole drainage and/or subsoiling will then be carried out at right angles to the drains (down the main slope) with the foot of the subsoiler/mole drain passing through the gravel layer above the drains. The actual depth of this secondary treatment is a crucial aspect of the drainage scheme and will need to be determined by an examination of the restored soil profile. Again, this will be part of the whole drainage design as described earlier. Underdrainage schemes should be designed by a competent and experienced person. All schemes should take into account the guidance given in The Design of Field Drainage Systems (MAFF Booklet 345). A poor scheme design and layout may actually make the situation worse. Land Drainage contractors will normally design their own schemes, and the Land Drainage Contractors Association (LDCA) based at the National Agricultural Centre, Stoneleigh, Warks. can provide details of their members for any given area.

d. adequate outfalls
Underdrainage outfalls, particularly where laid into a newly cut ditch, should be fitted with a headwall and splash plate to avoid the risk of eroding the newly cut ditch banks, especially where dug into restored soil and before vegetation has had the chance to become established. Colourful stakes or some other form of marker should be placed at the top of the ditch bank, to identify the outfall points for future ditch maintenance works etc.
e. permeable backfill proposed
Permeable backfill is a material which allows rapid water movement through it to the drains. The most commonly used materials are washed gravel, (sometimes available from the site itself), crushed stone, granite chippings etc. The material should be clean, free of fines and not contaminated with soil. The cost of using permeable backfill can amount to half the cost of the whole drainage scheme and is sometimes omitted from the design for this very reason. The reasons for its use need to be carefully considered and clearly understood. Its main function is to assist the passage of water by making a positive connection to the drain following mole drainage or subsoiling. These secondary treatments create channels and/or fissures to improve water movement within the soil profile.

f. secondary treatments proposed (e.g. subsoiling and mole drainage)
Subsoiling and mole drainage are known as secondary treatments, and are carried out after the drainage system has been installed when soil conditions are favourable. The aim of mole drainage is to create an underground channel which will collect water and feed it to the permeable backfill above the drains. A stable soil structure with a high clay content is normally required for this to be successful, and it is therefore unlikely to be carried out on restored soil, particularly where imported soil of different textures have been used. Subsoiling is the more common treatment on restored land and is carried out mainly to relieve the effects of soil compaction, creating a heave in the restored profile, again allowing water down through the profile and into the permeable backfill. The depth and spacing of each of these operations can only be determined by an examination of the restored profile. To carry out the work as a routine operation is costly and can, in some circumstances, make a drainage problem worse.

g. what surface drainage is proposed (e.g. ditches)
New ditches should be dug to such a depth as to provide a sufficient outfall for the drainage system (see earlier comments re. drain depth). The ditch banks should be graded so that they do not easily slip into the ditch bottom. Newly cut ditches are particularly prone to slippage/erosion, especially where dug in restored soil. In such circumstances, consideration should be given to seeding the banks to create a mat of vegetation, which will help stabilise the ditch sides. Depending on the after-use of the site, there may be an opportunity to seed the banks with a conservation type mix, which may establish well in a low nutrient environment.

h. ensure drainage proposals do not adversely affect adjoining land
The restored site can have an impact on adjoining land in two ways. Firstly, the newly created contours of the restored area may require the creation of a new outfall, which may impact on the adjacent land. This should have been taken into account when the restoration proposals were being prepared. If not, then discussions may be necessary with the landowner in order to arrange for an outfall across his/her land. Secondly, if the restored site lies downslope of adjacent land and provided an outfall for that land prior to the development, then discussions will need to take place to establish continuity of flows.
4. Following underdrainage, monitor the following at aftercare/site meetings

a. are the drain outfalls clear and unobstructed
Ditch bank slippage, vermin, vandalism, vegetation etc. can all cause significant damage to the drain outfalls, which need to be kept clear at all times. A blockage of the outfall could cause severe problems in the field causing waterlogging/surface ponding etc., leading to crop damage and if left uncorrected, crop losses.

b. are ditches of adequate capacity
If the main function of the ditch is simply to act as the outfall for the drainage of the site, it need normally be no greater in dimension than necessary to allow the drains to outfall a few centimetres above the ditch bed, with side slopes graded to prevent slippage. However, it may be that the ditch has an additional function, i.e. carrying water from outside the site, in which case the design may be more crucial and professional advice should be sought. The drainage designer should take this into account as part of the design of the scheme.

c. is the ditch clear, unobstructed and properly graded
Regular maintenance of the ditch is essential if the field drainage system is to operate effectively. Such maintenance will involve regular inspections to remove general rubbish etc., repair of bank slips, re-alignment of the outfall pipes themselves if they have dropped, and mowing/flailing of the vegetation to keep the channel clear. With regard to mechanical operations, it is important to have the high visibility outfall stakes (as referred to earlier) in place, so that the outfall pipes themselves are not broken/damaged. Depending on the location of the site, its after-use and the vegetation on the ditch bank, the timing of maintenance operations may be crucial from a wildlife/conservation interest and this factor should be taken into account when arranging this type of operation.

d. is there surface evidence of poor drainage. If yes, investigate further
There may be many reasons why there is surface evidence of poor drainage following the installation of a drainage system. A methodical approach is more likely to lead to the most obvious causes. First of all, check the site records to ensure that all the work planned has indeed been carried out, and if it has, was it completed in good conditions and were there any problems. Check the drain outfalls and the condition of the outfall ditch/pipe/soakaway etc. for damage/blockages etc. Has differential settlement caused some drains to flow backwards; a level survey may be required to prove this. Examination of the soil may indicate severe compaction or a different soil type in this particular area, requiring additional remedial works.

e. is the site in appropriate condition for normal agricultural operations to proceed
There may be obvious reasons why this may not be the case, i.e. restoration not yet be complete, site too uneven, materials/equipment left on site, poor access to the area etc. Reasons such as these can easily be documented and the remedial
work put in hand. It is also important to have the farmer/landowner or contractor who will be carrying out the agricultural cultivations on site. They are probably in the best position to make more detailed and relevant comments on whether the land can be returned to normal agricultural operations. Their opinions and co-operation in these cases can be crucial.

f. has a final plan (to scale) been submitted
   It is essential for future reference that a final plan is produced of where the drains have been laid. This needs to be to scale, normally 1:2500, with clear measurements and tie-lines. Thus, in years to come, when all surface evidence of the drainage work has disappeared, if a drainage problem is suspected, the final plan can be used to determine whether a drain is at fault and if so, where to locate it. Copies should be provided to the MPA, the landowner and one should be held with the site operators aftercare record.

g. check the potential for erosion
   The risk of erosion is at its worst when the ground is bare and sloping, a condition common to restored sites. It is important, therefore, to establish vegetation as quickly as possible, both on the restored areas and the ditch banks. If the time of year prevents normal agricultural cropping, a green manure crop, e.g. mustard, may provide the necessary cover until such time as the seasonal cultivations can take place. The installation of drainage headwalls and splash plates in the ditch bank will significantly reduce the risk of ditch bank erosion.

h. check for problems caused off site (e.g. water run-off, inadequate surface water drainage)
   Allied to the previous point, run-off/erosion is not confined to within the boundaries of the site. Severe damage can be caused to neighbouring land and property if water from within the site is not managed properly. Adequate drainage, ditches and managed vegetation will all help reduce the level of risk associated with restored sites.
Please see [Annex AC10](#) for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Ancillary matters**
   As part of the overall return to agriculture, there are a number of aspects which may also need to be checked/verified, which do not fall within the requirements of the formal aftercare scheme. Thus:

2. **Sites should be checked for the following**
   a. are field access points in the correct place
   b. are gates correctly positioned and of the right size
   c. are the correct surface features in place
   d. are field sizes and boundaries of the correct size and type
   e. has the required hedge/tree planting taken place
   f. has a water supply system been installed

### Comments

For more detailed information see:

- [AP 3, 4](#)
1. Ancillary Matters

The overall reclamation of the site to an agricultural after-use is likely to require the completion of other aspects of the planning permission which fall without the formal requirements of aftercare. MPG7 The Reclamation of Mineral Workings (DoE 1996) (para 58iii) states - ‘An aftercare condition can require only the treating of land - such as planting, cultivating, fertilising, watering, draining or other steps for treating the land (Schedule 5 para 2(5)). It cannot deal with such matters as the erection, construction or maintenance of fencing, gates, paths etc. (These issues may however, be dealt with under other conditions).’

At the planning application stage, particularly on larger sites where a mix of after-uses may be proposed, detailed drawings are often submitted showing the fully restored area with hedges, trees, ponds etc. This is quite often little more than an artists impression, and as a consequence, unlikely to have been drawn up with the needs of modern agriculture in mind. Thus, while the overall view presented at the application stage may well be desirable and acceptable, the final detail has to be based on what is practical and workable. The planning conditions should be clear about the stage at which the final restoration plan will be approved.

2. Sites should be checked for the following

a. are field access points in the correct place
   It is important that access points are in the correct place, not only to enable the passage of modern agricultural equipment, but also for the efficient working of the restored and adjacent land. If the restored area is part of a larger block of land, the location of new access points may be dictated by existing access arrangements on surrounding land. If a site is to be restored to a variety of uses, this may also influence the installation of access points.

b. are gates correctly positioned and of the right size
   Field gates are not always necessary, and where proposed, should have a specific use in mind, e.g. to prevent access from a public highway, livestock control, general vehicle thoroughfare etc. They need to be designed to accommodate the machinery/equipment and/or livestock on the holding and limitations on opening circle, in either direction, needs to be avoided.

c. are the correct surface features in place
   On sites where a variety of after-uses and features are proposed, there can be a number of actions to be completed. Where formal agricultural aftercare is able to commence, it is important that these additional features such as trees, small wooded areas, ponds etc. are installed prior to the commencement of aftercare cropping where possible. Otherwise, contractors vehicles and machinery may need to cross cultivated areas at various times of the year, which may result in compaction and rutting problems.
d. are field sizes and boundaries of the correct size and type

If the land is being returned back with a larger agricultural enclosure, there may be little choice about field size or shape. Where there is more flexibility, perhaps due to there being a variety of after-uses, a much greater variation in field size may be possible. Where field shapes, boundaries, hedges etc are imposed, or agreed without consultation with the farmer/landowner, it is often found that once the formal aftercare period has ended, many of the features which made the restored site ‘more’ attractive, are removed, simply because they do not fit within the farming system being operated. Full consultation at the planning stage will help to ensure new hedgerows, wooded field corners, ponds etc. remain in place once all the planning requirements have been met.

e. has the required hedge/tree planting taken place

On a large site, this can demand a significant time input to check the details. Where there is a range of hedgerows, wooded field corners, fencing (post and wire, wooden etc.) gates and so on, the specifications need to be checked against the approved details.

f. has a water supply system been installed

Any in-field system is likely to be for the supply of water to troughs for sheep and cattle drinking. From a practical point of view, if the water supply system can be designed and installed as a single operation, then disturbance of the restored profile is kept to a minimum and the route of any pipework can be planned more carefully. This will avoid any damage to, or conflict with, other ancillary operations, such as post hole digging, ditching, drainage etc., which may take place after the water supply has been installed. It is also helpful if the route of any pipework can be plotted onto a scale plan for future reference, e.g. location of leaks (which might be interpreted as a drainage problem) or for new connections to be made. The installation of, and the type of equipment installed, must meet all current standards for this level of supply.

If water supply is required for irrigation purposes, the design and layout of underground services will also need to be considered at an early stage as above.
Please see Annex AC11 for supporting information, and the “Introduction” for Health and Safety considerations and advice on the use of the guidance.

1. **Continuity and record keeping**
   Once a formal aftercare meeting has been held, there are a number of actions required to complete the course of events, if continuity and consistency is to be maintained throughout the aftercare period.
   a. continuity
   b. record keeping

2. **Following the meeting, a formal record should be circulated to the relevant aftercare parties.** This should include
   a. a record of the names (and job titles) of those present at the meeting
   b. ground and weather conditions on the day of the meeting, and prior to the meeting if considered relevant
   c. the remedial actions to be taken and by whom
   d. agree the management of the site to date
   e. agree the management of the site for the next year of aftercare
   f. comment on crop growth

3. **Has a certificate of compliance been requested**

**COMMENTS**

For more detailed information see:  

Cross references:
1. Continuity and record keeping

Once a formal aftercare meeting has been held, it is important both for continuity and good record keeping that written confirmation of the issues discussed is circulated to all the relevant aftercare parties.

a. continuity
As the aftercare period will normally run for 5 years, experience has shown that it is highly unlikely that the same people will attend throughout the aftercare period. It is important therefore, that each party understands its role and records sufficient information to enable new parties to be properly briefed concerning their respective responsibilities etc. Also, where it is agreed at an aftercare meeting that certain remedial works may be necessary during the next annual aftercare period, e.g., dealing with differential settlement, weed growth, stone picking, reseeding etc, then a change in personnel should not affect the awareness or the assessment of the need to carry out such works. A lack of continuity in carrying out agreed actions, or in the acceptance of responsibility, can have an adverse affect on the stated objective of the aftercare period.

b. record keeping
At the annual aftercare meeting, the previous year's site/phase management will be discussed, as will the proposals for the forthcoming year. Sometime prior to the meeting, the operator (or other party by agreement), will have submitted the detailed annual aftercare programme which will cover all these aspects. It is important that a record is kept and circulated of the issues raised and discussed, so that each party is clear on what actions are necessary prior to the next meeting. It may be that certain actions need to be carried out within a specified timescale, e.g., weed control measures, seeding, cultivations etc. Specialist advice may need to be sought from, for example, an underdrainage contractor, agronomist and so on.

2. Following the meeting a formal record should be circulated to the relevant aftercare parties. This should include

a. record of the names (and job titles) of those present at the meeting
It is important to recognise those who were present at the meeting and the contribution they made. If decisions were made requiring specific actions to be undertaken, it is essential that the record identifies those person(s) responsible.

b. ground and weather conditions on the day of the meeting, and prior to the meeting if considered relevant
Weather conditions can have a major impact on the progress of a site and the agreed timetable of agricultural operations. Timing is a crucial element when carrying out cultivations. Where land has been returned to the farmer, who is on site and able to react quickly when favourable ground and weather conditions are present, the successful completion of
essential works is far more likely than when the land is managed from a distance and agricultural contractors are called in to do the necessary works. Conditions can be so severe that to abandon or cancel proposed operations is a good management decision. This aspect of land management has to be fully understood. If there has been heavy rainfall in the days leading up to the meeting, it may be quite normal to observe surface ponding on the site. To be aware of this will help avoid assuming a drainage problem where one may not exist. Indeed, a look over the hedge onto undisturbed ground may well show exactly the same symptoms. Site conditions need to be put into context.

c. the remedial actions to be taken and by whom
The meeting needs to agree not only what remedial/normal site operations are required to be carried out, but agreement has to be reached on who will be responsible for carrying out that work and ensuring it is completed to a satisfactory standard. This can often lead to problems on site when the farmer/landowner does not appreciate their own responsibilities in this matter, particularly when they were not involved in the preparation of the aftercare scheme.

In this respect, it is worth noting that MPG7 The Reclamation of Mineral Workings (DoE 1996) (para.70) states the ‘1990 Act provides for the person last using the land for the winning and working of minerals to be financially responsible for aftercare of the land, unless an alternative, legally binding agreement with another party has been made (Schedule 5 paragraph 6).’ It is important that the likely aftercare requirements are made clear at the outset, so that operators are aware of the cost implications involved and can make provision for them.

d. agree the management of the site to date
Generally speaking, this will confirm that the detailed annual aftercare proposals submitted 12 months or so earlier have been successfully completed. Any agreed actions not undertaken, or actions taken which were not on the agreed scheme, should be fully recorded.

e. agree the management of the site for the next year of aftercare
The ‘look forward’ also needs to be recorded in detail. This will normally follow the outline aftercare scheme, usually submitted with the planning application. Amendments to the outline proposals are quite common, and provided they are sensible within the objectives of aftercare as a whole, should be considered sympathetically.

f. comment on crop growth
It is important to record the state of the crop or grass sward. Although specialist knowledge may not be available at the meeting, the general appearance of the crop and evenness of growth can easily be assessed. If there are patchy areas, these should be identified on a plan and specialist knowledge sought if the cause is unexplained or the problem persists.
3. Has a certificate of compliance been requested

Schedule 5 paragraph 5 of the 1990 Act states: ‘If, on the application of any person with an interest in land in respect of which an aftercare condition has been imposed, the mineral planning authority are satisfied the condition has been complied with, they shall issue a certificate to that effect.’

It is important to note that the issuing of such a certificate only confirms that the aftercare condition has been complied with, and it does not automatically mean that the standards set out in Schedule 5, paragraph 3(1) to (4) have been attained.

The ‘certificate’ itself need only be a short letter from the MPA confirming that the condition has been complied with. When considering whether to issue such a certificate, a simple check of the agreed aftercare scheme and the annual aftercare records should show whether the main requirements have been complied with. Where certain actions could not be carried out due to circumstances beyond the applicant’s control, e.g. adverse weather conditions, failure of machinery etc., common sense should be used in coming to an overall view.