MAFF Ministry of Agriculture Fisheries and Food

# GOOD PRACTICE GUIDE FOR HANDLING SOILS

## Sheet 2:

## Building Soil Storage Mounds with Excavators and Dump Trucks

**Issued by the Farming and Rural Conservation Agency, Cambridge**

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## MAFF FOREWORD

Standards of restoration of minerals and waste sites have steadily improved in recent years, with operators increasingly aware of their environmental responsibilities. The industry is putting forward more imaginative restoration concepts to a variety of afteruses, and is more aware than ever that it will be judged on the standard of that restoration, and the sustainability of the development.

Sustainable mineral development means balancing economic, environmental and social needs, whilst using resources wisely. The UK Strategy for Sustainable Development recognises the importance of safeguarding agricultural land to meet the needs of future generations, and minimising the loss of soils to new development*.

Improved restoration standards have sometimes enabled planning permission to be given for best and most versatile agricultural land to be worked for minerals, on the basis that it can be restored in a way that safeguards its long-term agricultural potential**. Inherent in these high standards of restoration is the requirement to handle soils in such a way that damage to their structure is minimised. It is the aim of this Guide to provide comprehensive advice on soil handling "Good Practice" to operators, soil moving contractors, consultants and planning authorities.

The Guide is in the form of 15 Sheets giving advice on soil stripping, the forming and taking down of soil storage mounds, and soil replacement operations using excavators, earth scrapers or bulldozers. There are also four Guidance Sheets on remedial works involving the removal of stones and damaging materials, and decompaction during the replacement operations.

This document should be cited as MAFF (2000), Good Practice Guide for Handling Soils (version 04/00). FRCA, Cambridge.

**Any views expressed in the guidance are those of the consultants and do not necessarily represent the view of the Ministry of Agriculture, Fisheries and Food.**

*(DETR, A Better Quality of Life, May 1999, paragraphs 6.66 and 8.50)

**MPG7 (November 1996, paragraph 3).

**Acknowledgements**

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# SHEET 2 BUILDING SOIL STORAGE MOUNDS WITH EXCAVATORS & DUMP TRUCKS

The purpose of this Guidance Sheet is to provide a model method for best practice where excavators and dump trucks are to be used to build soil storage mounds. This Guidance Sheet comprises 5 pages of text, 2 figures and a user response form.

The model may need to be modified according to site conditions or requirements of the Planning Authority. Where this is the case, deviation from the model should be recorded with reasons. The guidance does not specify the type, size or model of equipment, but this should have been agreed as part of the planning conditions or as a reserved matter. The machines should be of a kind which will cause the minimum compaction whilst being operationally efficient (eg wide tracked), and must be well maintained at all times.

Persons involved in the handling of soils, overburden etc., and in the construction or removal of mounds or tips, must comply with the Health and Safety at Work Etc. Act 1974 and its relevant statutory provisions, and in particular those aspects which relate to the construction and removal of tips, mounds and similar structures. This requirement takes preference over any suggested practice in the Sheets.

The user of these guidelines 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.

This soil handling method uses back-acting excavators to build the storage mound in combination with dump trucks (articulated or rigid bodied) to transport the soil.

The soil handling method can affect the agricultural quality of the restoration through severe soil deformation (compression and smearing). This is primarily caused through trafficking, the effects of which increases with increasing soil wetness.

The advantage of this model method, if correctly carried out, is that it should minimise severe deformation of the soil as trafficking is minimised. However, compaction due to trafficking will be unavoidable in mounds where the height of the mound exceeds the effective reach of the excavator boom and the trucks have to travel on mounded soil. Such compaction will need treatment during the excavation operation (see Sheets 3 and 18).

The key operational points to minimise the degree and extent of severe soil compaction (and for the effective treatment of compaction) are as follows:

(i) To minimise compaction:

- strip in advance the soil to basal layer along haul routes and the operational footprint of the storage mound.
- dump trucks are only to stand and travel on the basal layer (unless raising the next level in multi-tier mounds).
- the machines are to only work when ground or soil surface conditions enable their maximum operating efficiency.
- single-tier mounds are preferred to multi-tier mounds as it avoids the need for trafficking on the soil being stored.
- raise the soil using only the excavator and maximise the mound height before trucks allowed to access upper surface.
- in the raising of multi-tier mounds, trafficking is to be confined to the upper surface of the lower tier. [This layer will require decompaction on excavation of the mound. Sheets 3 & 18]

(ii) To minimise the wetting of soils:

- site soil mounds in dry locations and protect from run-off from adjacent areas. Drain if a wet location.

- raise the soil mound to maximum height progressively along the axis of the mound, and shape the mound as it is being built to shed water and whenever stripping is suspended.

- measures are 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.

The Storage Operation

2.1 The mounds should be sited on dry ground, not in hollows and should not disrupt local surface drainage. Where necessary mounds should be protected from run-off/ponding by a cut-off ditch which is linked to appropriate water discharge facilities. Where the storage mound is in a hollow due to the removal of surface soils, measures should be undertaken to ensure that water is not able to pond within the storage area.

2.2 All machines must be in a safe and efficient working condition at all times. The machines are to only work when ground conditions enable their maximum operating efficiency. The operation is to be suspended before traction becomes a problem or the integrity of the basal layer and haul routes fails; haul routes must be maintained.

2.3 The operation should follow a detailed soil stripping/storage plan showing soil units to be stripped and stored, haul routes and the phasing of vehicle movements. The soil units should be defined within the site with information to distinguish types and layers, with information about ranges of thickness. Detailed daily records should be kept of operations undertaken, and site and soil conditions.

2.4 Remove topsoil and subsoil to basal layer from the haul routes, footprint of the storage mound and any other operating area in advance; adopting the practices outlined in Sheet 1. These soils should be stored in their respective mounds.

2.5 The dump trucks must only travel within the haul route and operational areas. The trucks should enter the storage area, reverse and back-tip the soil load starting at the furthest point of the mound from the point of access. The back-acting excavator pulls up the soil into a mound of the required dimensions. The excavator operates by standing on the mound (Figure 2.1). The excavator bucket can be used to shape and firm the sides as the mound is progressively formed to promote the shedding of rain; particularly at the end of each day, but also on the onset of rain during the day. This should include any exposed incomplete surfaces.

2.6 The process is repeated with the tipping of soil against the forming mound, and without wheels traversing onto previously tipped material. The operation continues progressively along the main axis of the mound.

2.7 Without the trucks rising onto the soil mound, the maximum possible height is related to the boom reach of the excavator (typically 3-4m).

2.8 To raise the mound higher, the trucks will have to travel on the upper surface of the mounded soils. In this case the mound should be raised to its maximum height (Figure 2.2). A ramp will have to be provided for the trucks to rise onto the surface of the first tier, which should be capable of trafficking without difficulty. The next tier would be formed repeating the process described above. If further tiers are required, the process would be repeated.

2.9 Any exposed edges/surfaces should be shaped using the excavator bucket on the onset of rain during the day. All surfaces should be shaped to shed water

at the end of the day. The final outer surface should be progressively shaped using the excavator bucket to promote the shedding of rain.

2.10 Work should stop in wet conditions with measures undertaken to prevent ponding at the base of the mound and on the basal layer. At the start of each day ensure there is no ponding on the basal layers and operating areas.

Operational Variations

2.11 If front loading machines are to be used to excavate multi-tier mounds (Sheet 3), then the compacted inter-tier layer must be sequentially decompacted at the building stage by the method described in Sheet 18.

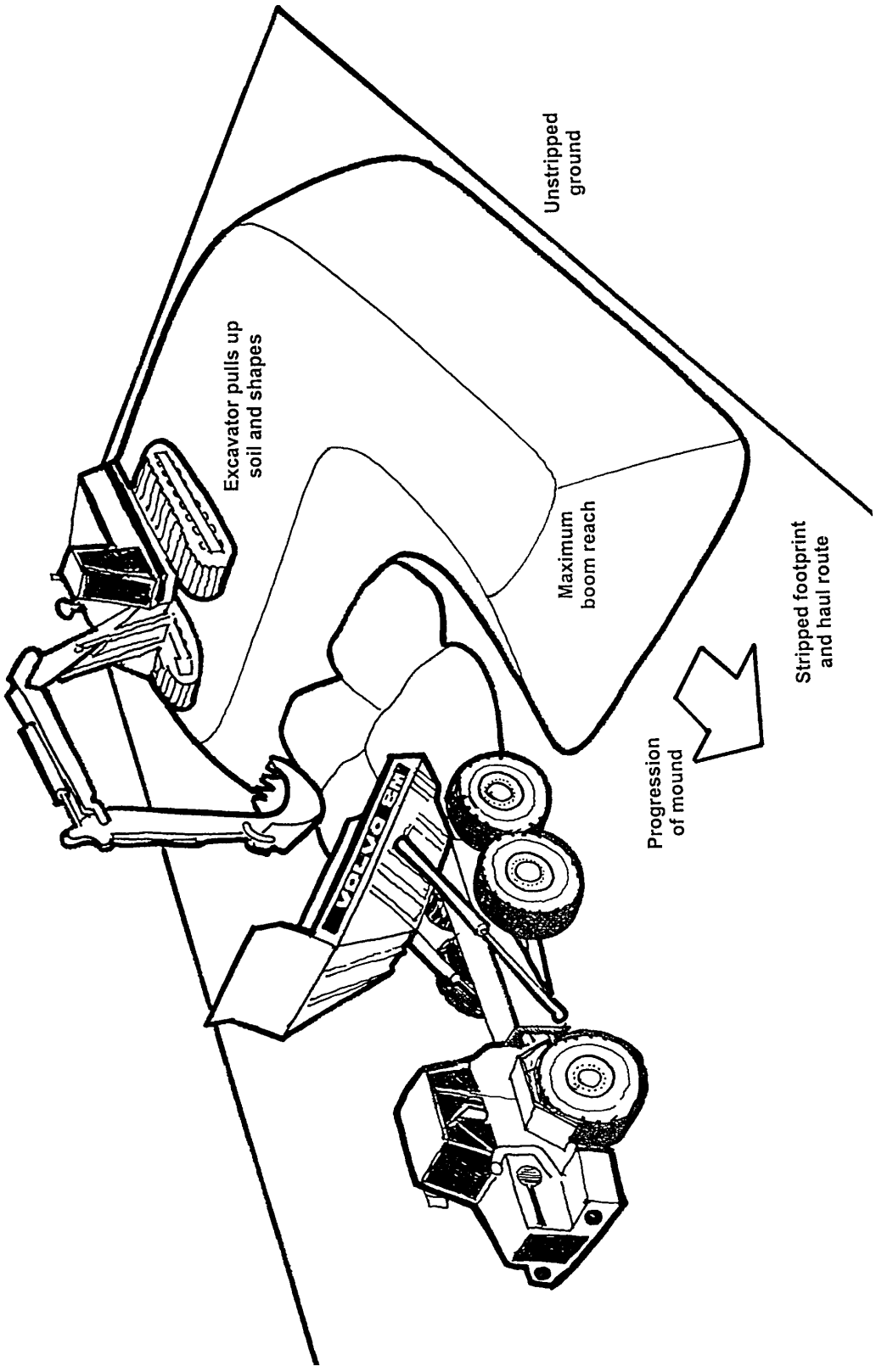


**Figure 2.1 Soil storage mound construction with excavators and dump trucks: Single tier mound**

**Figure 2.2 Soil storage mound construction with excavators and dump trucks: Multi-tier mound**

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