



GOOD PRACTICE GUIDE FOR HANDLING SOILS

Sheet 3:

Excavation of Soil Storage Mounds with Excavators and Dump Trucks

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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 consultant 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 3 EXCAVATION OF 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 used to excavate soil storage mounds. This Guidance Sheet comprises 4 pages of text, 3 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 load the soil in to dump trucks (articulated or rigid bodied) for transport to the replacement areas.

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 avoid severe deformation of the soil as trafficking is minimised. However, where the soil has been stored in multi-tier mounds there will be a need for decompaction treatment during the excavation operation (see below and Sheet 18).

The key operational points to ensure avoidance of severe soil deformation are as follows:

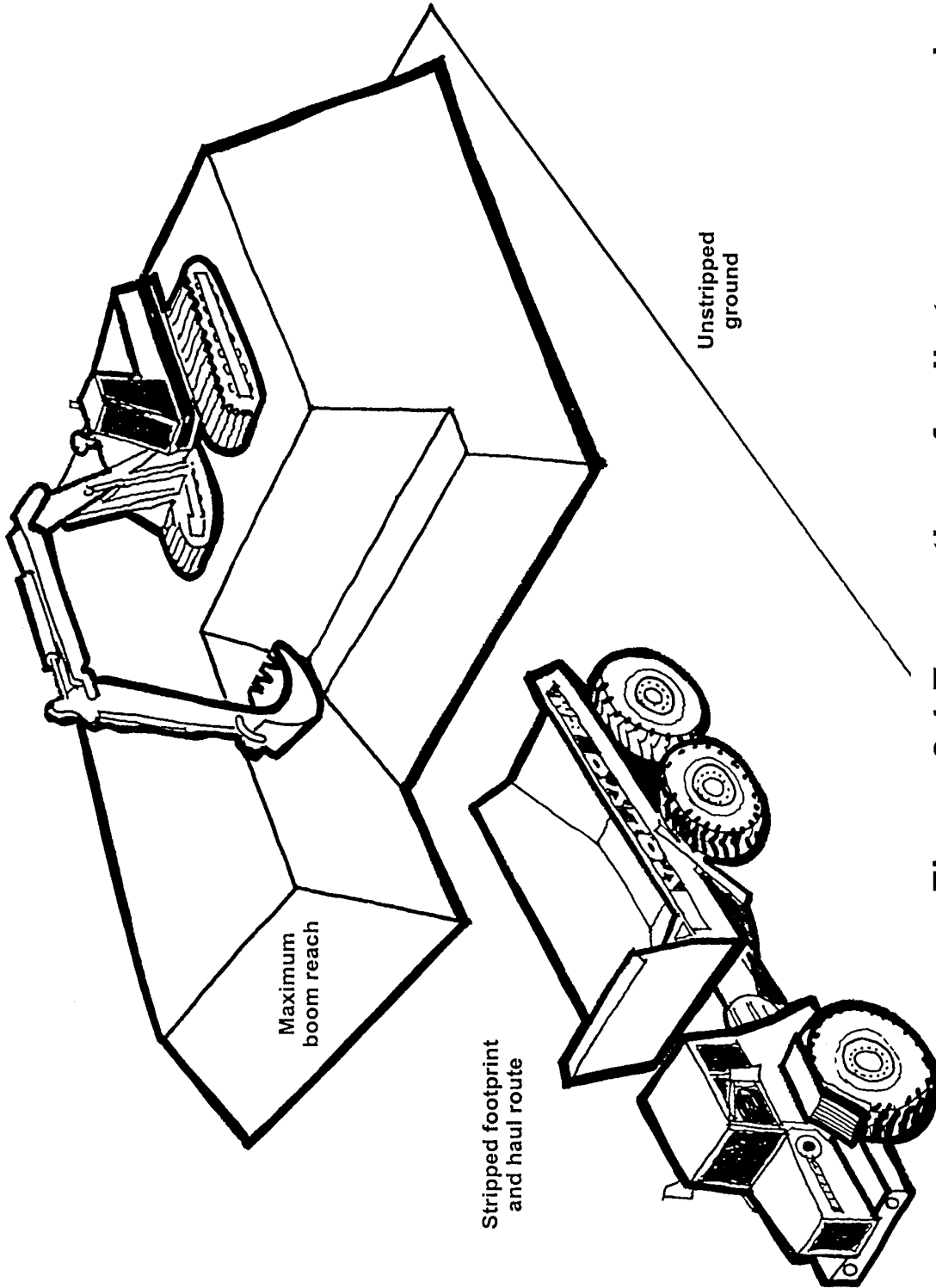
- (i) To minimise compaction:
 - the dump trucks must only operate on the 'basal'/non-soil layer, and their wheels must not on any circumstances run on to the soil in store.
 - the excavator should only operate on the soil mound.
 - the machines are to only work when ground conditions enable their maximum operating efficiency.
 - when excavating the multi-tier mounds, excavate tier by tier starting with the uppermost, trafficking is to be confined to the upper surface of the next tier.
 - if compaction has been caused then measures are required to treat it before it is loaded into the trucks (see below and Sheet 18).
- (ii) To minimise soil wetness and rewetting:
 - the mound should be shaped to shed water before rainfall occurs and whenever replacement 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 Excavation Operation

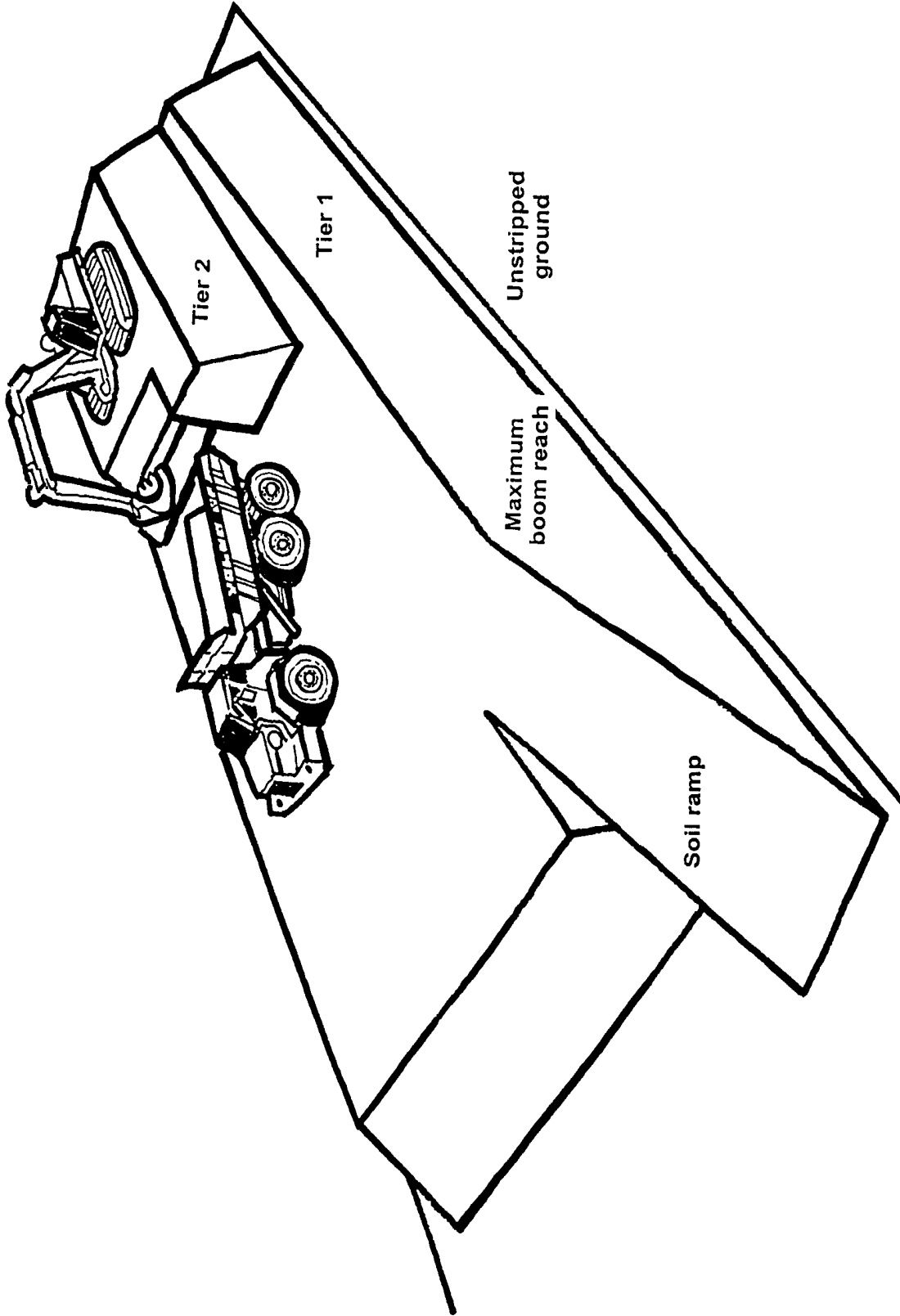
- 3.1 The dump trucks are to travel only on haul routes and in operational area, and both must be maintained. In the case of single tier mounds they must only operate on the basal layer. Detailed daily records should be kept of operations undertaken, and site and soil conditions.
- 3.2 The trucks should enter the storage area and draw alongside the active excavation face. If back-acting excavators are used, they will need to stand on top of the mound to load trucks (Figure 3.1). The mound is to be dug to the base before moving progressively back along its axis.
- 3.3 With multi-tier mounds, the soil should be excavated tier by tier starting with the uppermost tier. This will necessitate the running of the trucks on the stored soil. Excavation should be in the same height of tiers as originally built so that the same surfaces are used for trafficking to minimise further compaction (Figure 3.2). Having removed an upper tier the trafficked layer must be decompacted. This can be achieved by progressively digging the surface as described on Sheet 18 in advance of loading the next layer. It is essential that the digging is effective and this needs to be systematically tested before soil is loaded. The process is repeated for each soil tier.
- 3.4 Any exposed edges/surfaces should be shaped on the onset of rain during the day. All surfaces should be shaped to shed water at the end of each day.
- 3.5 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 layer and operating areas.

Operational Variations

- 3.6 Front loading machines may be used to excavate single tier soil mounds provided that they only operate on the basal layer with the dump trucks (Figure 3.3).
- 3.7 Front loading machines are only to be used for multi-tier mounds if the compacted inter-tier layer has been decompactated at the building stage.



**Figure 3.1 Excavation of soil storage mound with excavators and dump trucks:
Single tier mound**



**Figure 3.2 Excavation of soil storage mound with
excavators and dump trucks:
Multi-tier mounds**

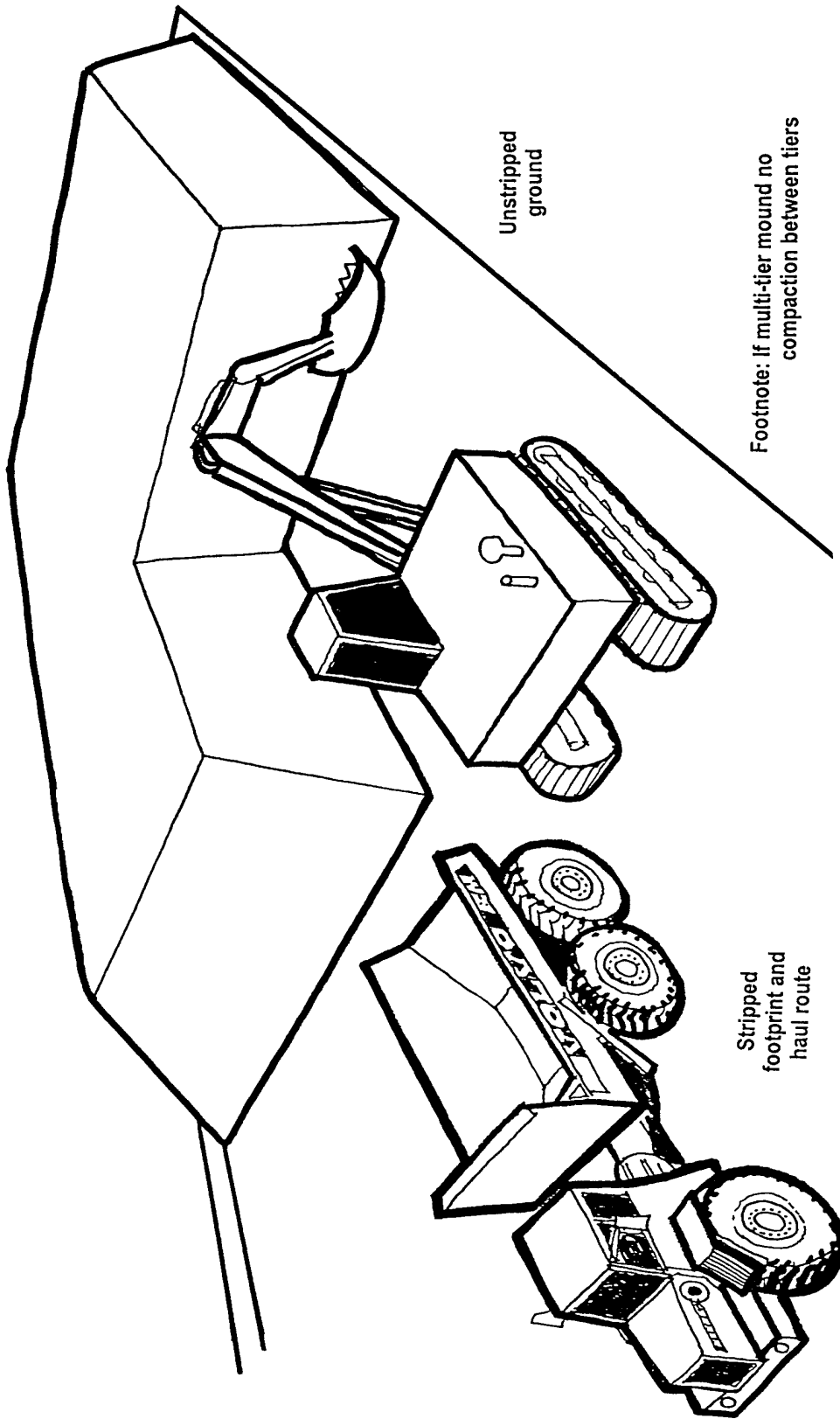


Figure 3.3 Excavation of soil storage mounds with front loading shovels and dump trucks: Single and multi-tier mounds

SHEET 3

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