



# **GOOD PRACTICE GUIDE FOR HANDLING SOILS**

## **Sheet 14:**

### **Building Soil Storage Mounds with Bulldozers 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 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 14 BUILDING SOIL STORAGE MOUNDS WITH BULLDOZERS & DUMP TRUCKS**

The purpose of this Guidance Sheet is to provide a model method for best practice where bulldozers and dump trucks are used to build soil storage mounds. This Guidance Sheet comprises 4 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 a tracked bulldozer to push the soil into and shape the mound, and dump trucks to transport the soils. The bulldozer may also be required to maintain haul routes.

The bulldozer soil handling method can significantly affect the agricultural quality of the restoration through severe soil deformation (compression and smearing). This is primarily caused through unavoidable repeated trafficking over the soils during

stripping, the building of soil mounds, and on replacement; the effects of which increases with increasing soil wetness. Consequently, for satisfactory restoration there is a need for effective decompaction treatment during the replacement operation (see Sheets 15 & 19). Decompaction treatment is an obligate requirement when soils are handled by bulldozers.

There are a number of key operational points during stripping to minimise the degree and extent of severe soil deformation, and to aid the effective treatment of the compaction on replacement:

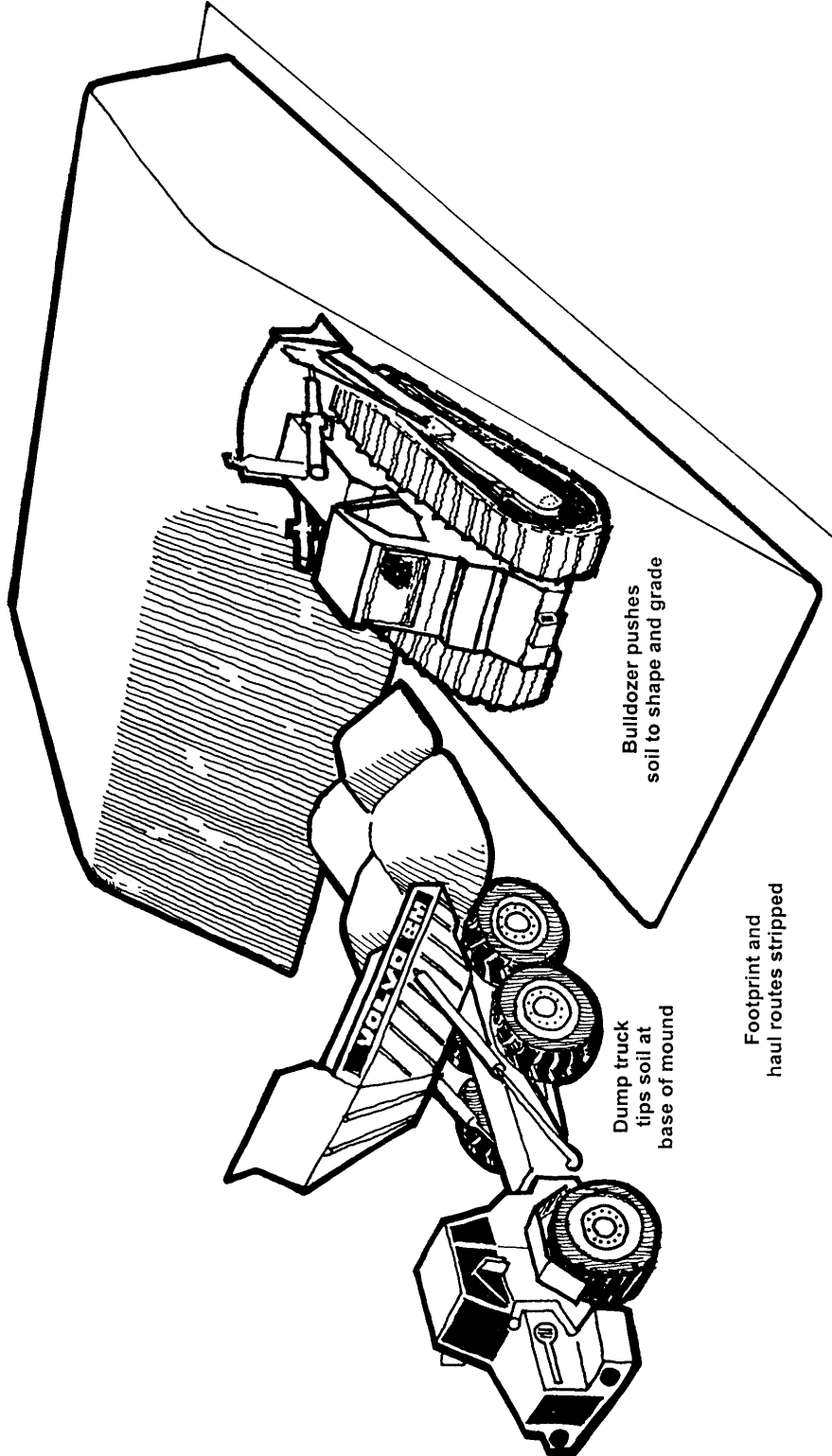
- (i) To minimise compaction:
  - strip in advance the soil to basal layer along haul routes and the operational footprint of the storage mound.
  - the soils are to be pushed by the bulldozer to form the mound in as thick layers as possible whilst maintaining their operational efficiency.
  - the machines are to only work when ground or soil surface conditions enable their maximum operating efficiency.
  - the dump trucks must only operate on the 'basal'/non-soil layer, and their wheels must not in any circumstances run on to the tipped soil.
- (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.

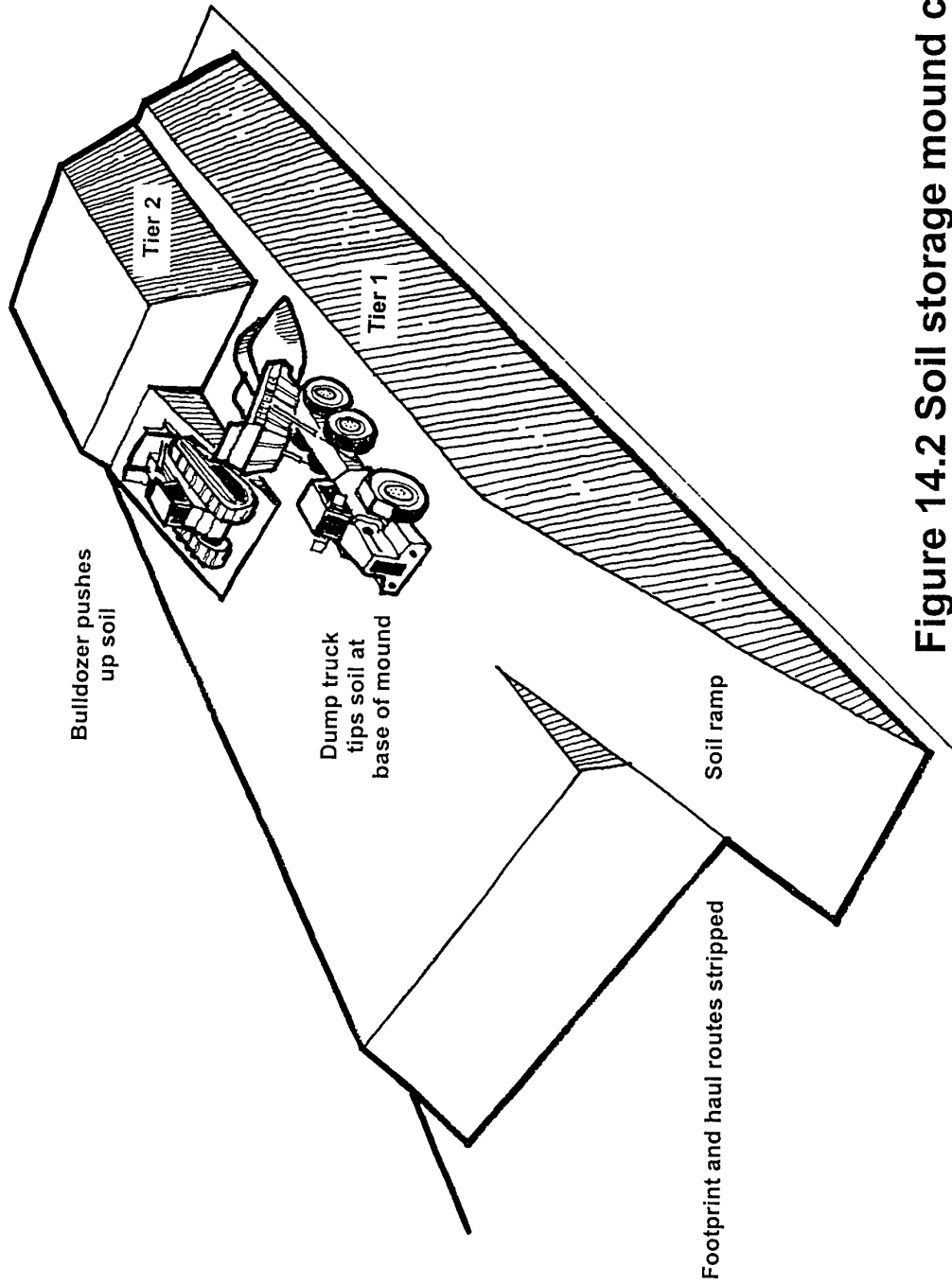
## The Storage Operation

- 14.1 The mounds should be sited on dry ground and 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.
- 14.2 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.
- 14.3 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, and ranges of thickness. Detailed daily records should be kept of operations undertaken, and site and soil conditions.
- 14.4 Remove in advance topsoil and subsoil to overburden/basal layer from the haul routes and from the foot print of the storage mound and 'operating area' by adopting practices outlined in Sheet 13. The soils removed from the haul routes and foot print of the storage mound should be stored in their respective mounds.

- 14.5 The dump trucks must only travel within the haul route and operational area. 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 bulldozer pushes the soil into a mound of the required dimensions (Figure 14.1). The bulldozer is used to shape 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.
- 14.6 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.
- 14.7 Without the trucks rising onto the soil mound, the maximum possible height of a mound raised by bulldozer is in the order of 4-6m.
- 14.8 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 14.2). 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 again.
- 14.9 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 bulldozer blade to promote the shedding of rain.
- 14.10 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.



**Figure 14.1 Soil storage mound construction with bulldozers and dump trucks: Single tier mound**



**Figure 14.2 Soil storage mound construction  
with bulldozers and dump trucks:  
Multi-tier mounds**

**SHEET 14**

**Version: 04/00**

**FEEDBACK**

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