



GOOD PRACTICE GUIDE FOR HANDLING SOILS

Sheet 11:

Excavation of Soil Storage Mounds with Self-Propelled Earth Scrapers

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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

The Guide was written and prepared by Dr R N Humphries of Humphries Rowell Associates, Charnwood House, Loughborough, LE11 3NP, UK. The art work was by R Shenton of H J Banks & Co.

SHEET 11 EXCAVATION OF SOIL STORAGE MOUNDS WITH SELF-PROPELLED EARTH SCRAPERS

The purpose of this Guidance Sheet is to provide a model method for best practice where self-propelled earth scrapers are used to excavate soil mounds. This Guidance Sheet comprises 3 pages of text, 1 figure 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, 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 self-propelled 'box' earth scraper to excavate the soils from the storage mound and transport to the replacement area. An auxiliary bulldozer may be required to assist in the traction of the scraper unit in the extraction of the soil, and to shape the mound and maintain haul routes

The self-propelled earth scraper soil handling method in particular 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 the lifting and the building and excavating 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 Sheet 19). Decompaction treatment is an obligate requirement when soils are handled by self-propelled earth scrapers.

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

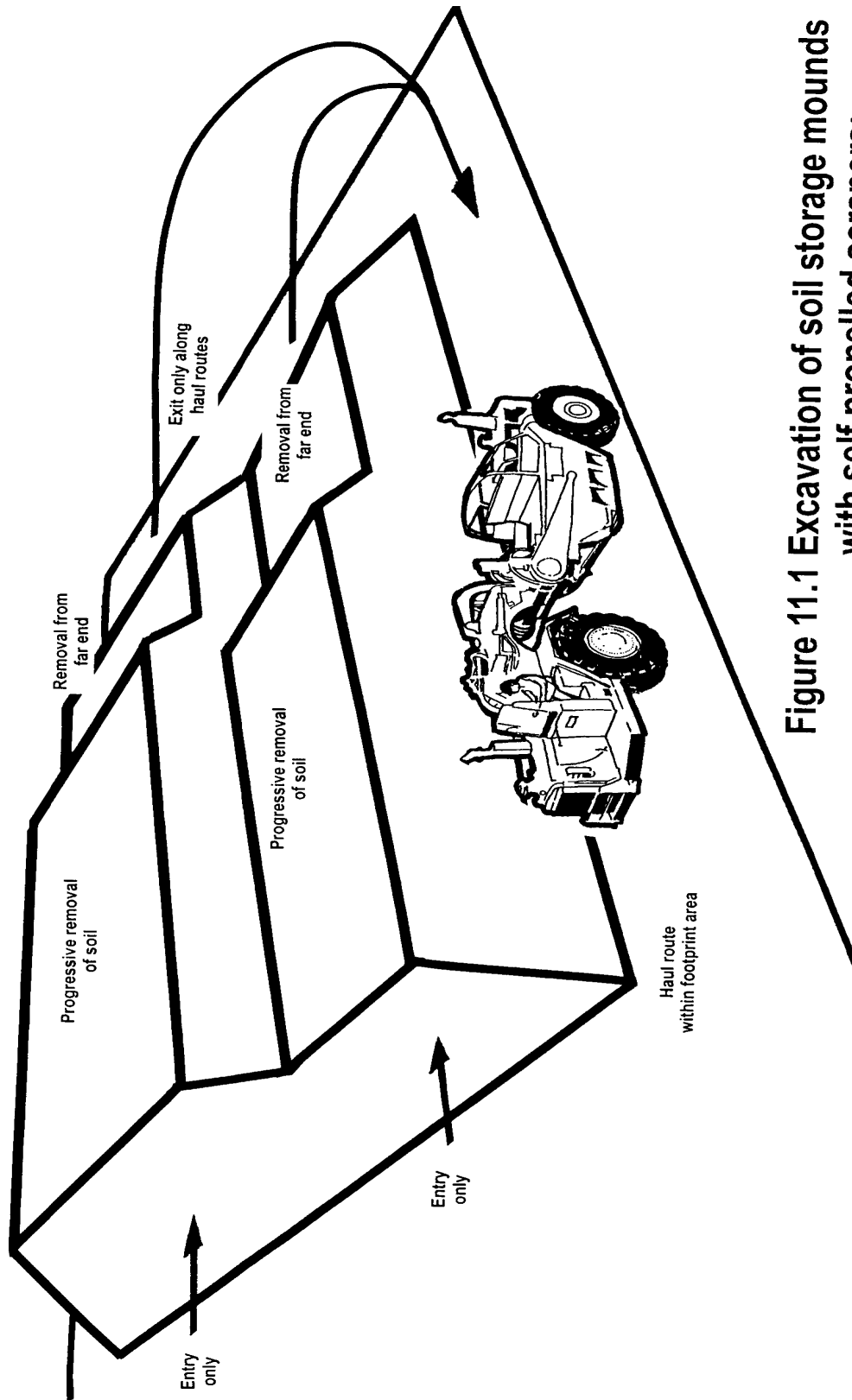
- (i) To minimise compaction:
 - the earth scrapers are to only travel and stand on the basal layer along haul routes and the operational footprint of the storage mound.
 - the adoption of an 'in-out' only at the end of the mound minimises trafficking.
 - the soils are to be picked up in as thick layer as possible whilst maintaining their operational efficiency, using an auxiliary bulldozer to push if necessary.
 - the machines are to only work when ground or soil surface conditions enable their maximum operating efficiency.

- (ii) To minimise the wetting of soils:
 - extract the soil mound progressively along the axis of the mound, and shape the mound as it is being extracted 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 the earth scrapers.

The Excavation Operation

- 11.1 The scrapers must travel only along the haul route and in the operational area, and enter and leave the storage mound footprint by the 'in-out' designated routes. The retained haul routes at each end and alongside the soil mound will need to be used in the excavation and transport of soil by the scrapers. Haul routes must be maintained. Detailed daily records should be kept of operations undertaken, and site and soil conditions.
- 11.2 The soil should be lifted in as thick wedges as possible (300mm) over the shortest distance. The lifting of soil should start along the crest of the mound and preferably remove one side of the storage mound first (starting at the far end of the mound) with the scraper travelling in the same tracks where possible (Figure 11.1). The objective is to minimise the exposure of soil to rain events by progressively removing the mound along the axis. An auxiliary bulldozer may be required to push to maintain traction during mound removal, it is also used to shape and firm the mound.
- 11.3 Any exposed edges/surfaces should be shaped using a bulldozer blade on the onset of rain during the day. All surfaces should be shaped to shed water at the end of the day.
- 11.4 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.



**Figure 11.1 Excavation of soil storage mounds
with self propelled scrapers:
Single and multi tier mounds**

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