Forest Research

# BPG

## NOTE 4

**Best Practice Guidance for Land Regeneration**

# LOOSE TIPPING

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## Introduction

Reinstatement of soil materials has been recognised as one of the most crucial operations in restoration. Poor practice at this stage can cause irreparable damage, especially compaction, and consequently greater risk of vegetation failure and soil erosion. There has been much discussion on methods of handling soil materials for replacement during restoration. Two methods are commonplace in the UK:

1. Using motor-scrapers to drop soils followed by dozers to spread them.
2. The 'loose tipping' method using truck and shovel (Figure 1): dump trucks are used to transport and drop soil materials, and a tracked hydraulic 360º excavator is used to spread them. The excavator stands on the overburden, and the re-laid soil is not traversed by earth-moving machinery.

Considerable research since the 1980s for government departments responsible for setting reclamation standards has shown the value of the loose tipping approach over the motor-scraper method (see for example: Bending *et al.*, 1999; Land Research Associates, 1997, 2000; Moffat and Bending, 2000).

**Figure 1** Reinstatement of soil materials using the loose tipping method.

## Advantages of loose tipping

There are many wide-ranging advantages:

- A constructive reclamation ethos is encouraged. There is no need to undo damage caused by trafficking (compared with compaction caused by motor-scrapers).
- A more open, less dense soil structure is formed. Resistance to penetration by roots of vegetation is low.
- Infiltration is encouraged, reducing the risk of water erosion.
- A loose profile of any desirable thickness can be constructed in a one-pass operation.
- Profiles containing two layers can be constructed, e.g. soil over soil-forming materials, without compacting the lower layer.
- There is no need for ripping or decompacting operations.
- There are greater opportunities for operations under wet weather, compared to spreading using motor-scrapers. Time between the end of restoration and the beginning of aftercare (planting) can be saved.
- The operation is easier to monitor and supervise.
- There is greater opportunity to remove stone and obstructions.
- There is more opportunity to incorporate inorganic and organic amendments such as biosolids or composts. For further details, see BPG Note 6: *Application of sewage sludges and composts.*
- Improved vegetation establishment reduces costs of repair, replacement and maintenance. In tree planting schemes, reduced beating up leads to a shorter period when weed control is necessary.

## Planning: the strip system

As with soil stripping, a detailed plan and method statement should be prepared in order to ensure smooth working and co-ordination between excavator and dump truck. The method entails working to a strip system, and replacing soils sequentially across the site (see Figure 2 a–f). The underlying material is cultivated prior to loose tipping with a wing-tined industrial ripper (Figure 2a). In each strip, soil materials are replaced to replicate the original soil, with soil-forming materials and subsoil followed by topsoil materials. Only when the strip has been completed is the next one started. Dump trucks bring soil materials to the area where they are to be replaced. Soils are dropped from the back of the truck against the strip completed last. The excavator stands on the overburden next to the newly dropped soil and spreads this into a layer. The width of the strip is determined by the excavator arm length and is typically 5–8 m. If there is to be more than one soil layer (i.e. if both topsoil and subsoil are available for replacement) then the whole length of the strip should be restored with subsoil before the process is repeated with topsoil.

If materials are massive in structure, the spreading operation can be used to break up the blocks, using the excavator bucket to smash or slice them up. Large stones can be removed during the levelling operation and collected on the overburden for later removal, or placed so that they are buried by the next drop of subsoil.

Research has demonstrated that loose tipping can take place in wetter soil conditions than conventional soil replacement using earth-scrapers without harm to soil physical properties. Nevertheless, it is advisable to restrict activities to times when soils are dry and to cease operations during and for some time after rainfall. It is important to recognise that the benefits of truck and shovel restoration will be lost if dump trucks are permitted to traverse across laid soils as such trafficking will cause soil compaction. Further information on the loose tipping method is given in *Soil replacement with excavators and dump trucks* (MAFF, 2000).

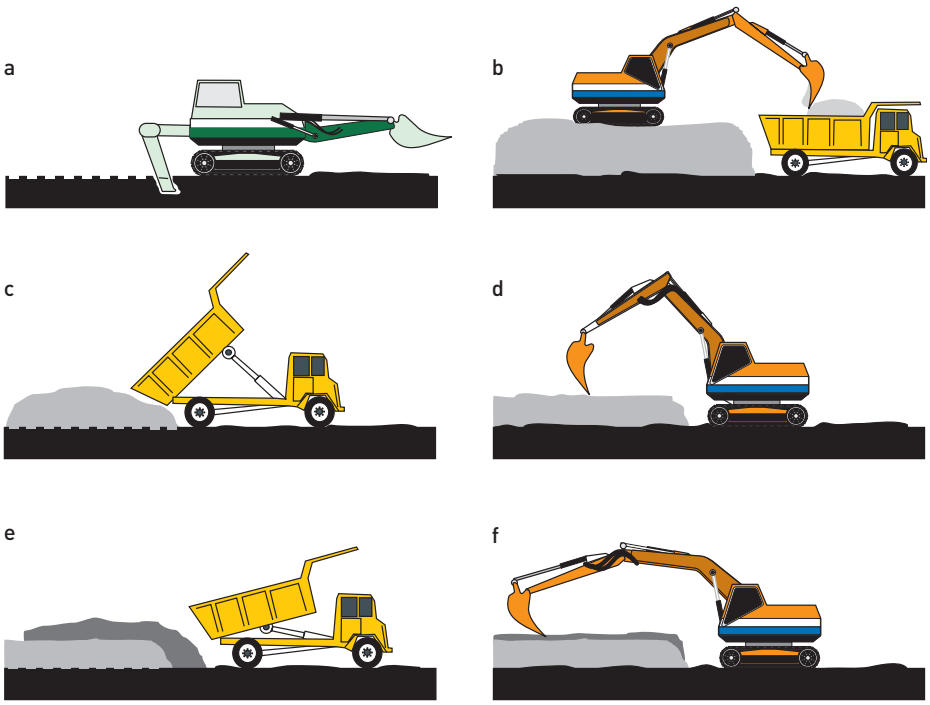


**Figure 2** Schematic diagram of loose tipping.

## Further reading

Bending, N.A.D., McRae, S.G. and Moffat, A.J. (1999). *Soil-forming materials: their use in land reclamation.* The Stationery Office, London.

Doick, K.J. and Ashwood, F. (2011). Brownfield regeneration to a soft-end use: Barriers to using a quality planting medium. *Reclamation.* British Land Reclamation Society.

Land Research Associates (1997). *Agricultural quality of restored land at Bush Farm.* Land Research Associates, Derby.

Land Research Associates (2000). *Evaluation of mineral sites restored to agriculture.* MAFF, London.

MAFF (2000). *Good practice guide for handling soils. Sheet 4: Soil replacement with excavators and dump trucks.* FRCA, Cambridge.

Moffat, A.J. and Bending, N.A.D. (2000). Replacement of soil and soil-forming materials by loose tipping in reclamation to woodland. *Soil Use and Management* **16**, 75–81.

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