20264

ALC 64/97

INSPECTION OF RESTORED SOILS AT MILLHOUSES II, KINGSTOCKS AND DEARNE VALLEY OCCS

1. Introduction

This report describes the results of an inspection on 18 September 1997 of 3 adjacent recently restored OCCS in Barnsley District. Coaling on all 3 sites was conducted by MED Mining Ltd and the sites are all currently in aftercare again under the management of MED. Soils were examined at each site by way of a soil profile pit dug by mechanical excavator to a depth of about 70 cm. Three pits were examined in total, ie one per site. For each horizon standard soil parameters were described such as depth, colour and mottling, soil texture, stoniness, soil structure and consistence, porosity roots and soil fauna. Where soils were a suitable texture and moisture level a sample for bulk density determination was obtained.

2. Climatic Parameters for the Area

Factor	Units	Values
Grid reference	N/A	SE 428 045
Altitude	m, AOD	40
Accumulated Temperature	day°C (Jan-June)	1382
Average Annual Rainfall	mm	628
Field Capacity Days	days	135
Moisture Deficit, Wheat	mm	106
Moisture Deficit, Potatoes	mm	97
ALC Climatic Limitation	N/A	Grade 1

The parameters indicate in this area there is no overall climatic limitation to ALC grade. A restored profile with heavy textured, slowly permeable subsoils will typically have about 180 machinery work days a year with frequent opportunities of land work between early April and late October. A lighter textured more freely drained restored profile would have over 200 machinery work days available but may suffer from a soil droughtiness limitation.

3. Description of Soils

A full profile description for each pit is found in the appendix to this report. Below is a summary description of the key soil parameters. A full auger boring survey at 1 boring per hectare would be required to see how representative the single pit dug at each site was.

3.1 Millhouses

The profile pit was dug in an area of cereal stubble. The topsoil was 27 cm thick and a medium sandy loam with 2% sandstones. The structure was moderated, developed and the horizon contained many fine fibrous roots and no earthworms. The subsoil extended to 85 cm and was also a medium sandy loam with some clay inclusions. It contained 3% to 4% sandstones and had a weakly developed structure. Roots extended to 35 cm and no earthworms were present.

3.2 Kingstocks

The pit at this site was dug in an area left fallow and containing arable weeds. The topsoil extended to 29 cm and was a medium clay loam with less than 2% sandstones. The structure was moderately developed with common fine fibrous roots and no earthworms. The upper subsoil extended to 50 cm depth and was also a medium clay loam with about 2% sandstones. It had a massive structure and roots and earthworms were absent. The lower subsoil extended to 90 cm depth and was mottled, otherwise it was similar in nature to the upper subsoil.

3.3 Dearne Valley

This profile pit was excavated in a stubble field which had grown oilseed rape this year. The topsoil was 24 cm thick, medium silty clay loam texture with less than 2% stones. It had a weakly developed structure and common fine fibrous roots. Earthworms were absent. The subsoil extended to 70 cm depth and was heavily mottled. Stone content was below 2% and the structure was massive. There were no earthworms and a few fine fibrous roots to 43 cm only.

4. Provisional Assessment of ALC Grade

MAFF's ALC guidelines recommend land is not graded until any appropriate underdrainage is installed and aftercare is completed, by which time a more accurate picture of land quality will emerge. Also as indicated in section 4 a full auger boring survey would be needed to establish how representative the single profile pits dug at each site were. However, using the information gathered from the pit description it is possible to give a provisional assessment of ALC.

4.1 Millhouses

Climate and site factors (such as slope) do not appear to limit ALC grade. Soil and soil climatic limitations especially droughtiness are at present limiting ALC grade. The subsoil is light textured so inherently freely drained although with a relatively low waterholding capacity. Presently the subsoil has a weakly developed structure and roots do not appear to have penetrated far into this horizon. Droughtiness will presently limit this land to Subgrade 3b. However, this potentially high quality subsoil material could meet the criteria for ALC Grade 2 or Subgrade 3a were roots to penetrate further into the profile following improvements in subsoil structure.

4.2 Kingstocks

Again site factors such as climate and slope do not limit ALC grade on this site. Evidence from the soil profile pit suggested that subsoils are massively structured and likely to severely limit vertical water percolation through the profile. This slowly permeable layer will place the land in Soil Wetness Class IV and the land presently has a soil wetness and workability limitation of Subgrade 3b. Measures to improve structure of the subsoil, especially in the upper subsoil could reduce this limitation to Subgrade 3a.

4.3 Dearne Valley

Site factors wee not limiting and as with Kingstocks profile pit evidence would suggest that massive, poorly structured subsoils will place a considerable impediment upon downward movement of water through the soil profile. The profile was assessed as Wetness Class IV and ALC Subgrade 3b due to wetness and workability problems. Subsoil textures at the pit were clayey and this material is inherently reluctant to produce a freely drained medium.

It is unlikely ALC grade will improve in future and Subgrade 3b is a probable long term grade.

5. Conclusions

5.1 The evidence available suggests that of the 3 sites inspected the highest quality restoration is likely to be achieved at Millhouses. This is because the subsoil material at this site is light textured and less likely to suffer from soil wetness and workability problems, subject to the installation of suitable underdrainage scheme.

5.2 At Kingstocks poorly structured subsoils have produced potential drainage problems although with improved structure the medium textured upper subsoil could become permeable with potential for ALC Subgrade 3a.

5.3 The Dearne Valley profile pit contained clayey, poorly structured subsoils with reduced potential for a restoration better than ALC Subgrade 3b. However, soils such as these are typically limited to ALC Subgrade 3b due to soil wetness even in an undisturbed situation.

5.4 There was no, or very little, evidence in any of the profile pits of problems such as mixing of topsoils and subsoils or severe subsoil anaerobic activity which can occur on badly managed sites.

5.5 Roots had started to penetrate all the subsoils but earthworms were not noted in any of the pits.

5.6 The key to maximising the final quality of restoration at each site is improving the structure of subsoils. Poorly structured subsoils both reduce soil drainage and lower the water holding capacity of the soil. Root penetration is also reduced in poorly structured subsoils. Measures to improve subsoil structure, such as subsoiling should be encouraged at all 3 sites.

Resource Planning Team
File Ref: RPT 20,264

Profile Pit at:	Dearne Valley OCCS
Weather:	Dry, cloudy (18.9.97)
Slope:	3° S
Land Use:	Arable - OSR stubble

Horizon depth	**Description**
0-24 cm	Very dark greyish brown (10 YR 3/2) unmottled, medium silty clay loam; <2% sandstones; slightly moist; weakly developed medium subangular blocky; friable; >0.5% biopores; no earthworms; common fine fibrous roots; no severe anaerobism; abrupt wavy boundary.
24-70 cm	Grey (10 YR 5/1) with common distinct yellow (10 YR 8/6) mottles; clay; <2% sandstones; slightly moist; massive, extremely firm; <0.5% biopores; very few fine fibrous roots to 43 cm none below, no earthworms; no severe anaerobism.

Profile Pit at:	Kingstocks OCCS
Weather:	Dry and cloudy (18.9.97)
Slope:	2° N
Land Use:	Fallow with arable weeds

Horizon depth	**Description**
0-29 cm	Very dark greyish brown (10 YR 3/2) unmottled, medium clay loam; <2% sandstones; slightly moist; moderately developed medium angular blocky; firm; >0.5% biopores; common fine fibrous roots; no earthworms; no severe anaerobism; abrupt wavy.
29-51 cm	Brown (10 YR 4/3) unmottled, medium clay loam; <2% sandstones; slightly moist; massive; extremely firm; <0.5% biopores, no roots; no earthworms; no severe anaerobism; abrupt wavy.
51-90 cm	Pale brown (10 YR 6/3) with common distinct grey (10 YR 6/5) and yellow (10 YR 7/8) mottles; heavy clay loam; <2% sandstones; slightly moist; massive; extremely firm; <0.5% biopores; no roots; no earthworms; no severe anaerobism.

Profile Pit at:	Millhouses II
Weather:	Cloudy and dry (18.9.97)
Slope:	2° NE
Land Use:	Cereal stubble

Horizon depth	**Description**
0-27 cm	Dark greyish brown (10 YR 3/2) unmottled, medium sandy loam; <2% sandstones; moist; moderately developed medium subangular blocky; friable; >0.5% biopores; many fine fibrous roots; no earthworms; no severe anaerobism; abrupt smooth.
27-85 cm	Brownish yellow (10 YR 6/8) unmottled, medium sandy loam with few (2%) clay inclusions; 4% total sandstones; slightly moist; weakly developed medium subangular blocky; firm; <0.5% biopores; few fine fibrous roots to 35 cm none below; no earthworms; no severe anaerobism.