FERRY MOOR OCCS

Agricultural Land Classification (ALC) and Statement of Physical Characteristics Report and Maps

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Resource Planning Team
Northern Region
FRCA, Leeds

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AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF PHYSICAL CHARACTERISTICS REPORT

FERRY MOOR, PROPOSED OCCS

INTRODUCTION

1. This report presents the findings of a detailed Statement of Physical Characteristics and Agricultural Land Classification (ALC) survey of 44 ha of land lying between the villages of Grimethorpe and Cudworth in South Yorkshire. Field survey work was carried out during July 1998.

2. The survey was carried out by the Farming and Rural Conservation Agency (FRCA) for the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with the proposal to extract coal from this site by opencast methods.

3. The work was conducted by members of the Resource Planning Team in the Northern Region of FRCA . The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). A description of the ALC grades and subgrades is given in Appendix I.

4. At the time of survey 97.5% of the land on the site was in agricultural use (growing wheat, barley and oilseed rape) while 2.5% consisted of non-agricultural land (scrub and a short section of railway line).

SUMMARY

5. The findings of the survey are shown on the attached ALC map. The map has been drawn at a scale of 1:10,000. It is accurate at this scale but any enlargement would be misleading.

6. The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
1			
2			
3a	15.2	35.3	34.4
3b	27.0	62.6	61.1
4	0.9	2.1	2.0
5			
Agricultural land not surveyed		N/A	
Other land	1.1	N/A	2.5
Total surveyed area	43.1	100	-
Total site area	44.2	-	100

7. The fieldwork was conducted at an average density of one boring per hectare. A total of 48 borings and 3 soil pits were described.

8. Subgrade 3a, good quality agricultural land, occurs in a band through the centre of the site and in two smaller areas in the west. In the west and north some soils are well drained, with light to medium-textured topsoils and upper subsoils overlying weathering sandstone. Soil droughtiness is the grade-limiting factor for these areas. Elsewhere most of the Subgrade 3a land consists of imperfectly drained soils with medium-textured topsoils, medium to heavy-textured upper subsoils and heavy to very heavy-textured lower subsoils which are both gleyed and slowly permeable. In this case slight soil wetness is the factor limiting the land to Subgrade 3a.

9. Subgrade 3b, moderate quality agricultural land, covers 61% of the total site area. The soils are generally poorly drained and consist of medium to heavy-textured topsoils and, in places, thin upper subsoils, overlying heavy clay loam, clay or silty clay which is both gleyed and slowly permeable within 35 cm depth. Moderate soil wetness is the grade-limiting factor in this case. Some parts of the north-west of the site are restricted to Subgrade 3b by slopes of 8° to 11°.

10. Grade 4, poor quality agricultural land, occurs in the north-west where slopes of 12° to 13° are the grade-limiting factor.

11. Other land occurs in the north-east and south-east of the site and consists of scrub and a section of railway line.

12. In terms of soil resources, three main soil types were identified on the site. The first occurs in the north-west and typically consists of a medium-textured topsoil (Unit T1, mean thickness 25 cm) overlying a light to medium-textured upper subsoil (Unit U1, mean thickness 25 cm). This soil type overlies weathering sandstone. The second soil type covers approximately 56% of the site area and consists of a medium-textured topsoil (Unit T1, mean thickness 25 cm), a heavy-textured upper subsoil (Unit U2, mean thickness 30 cm), and a very heavy-textured lower subsoil (Unit L1, mean thickness 40 cm). This soil type is also underlain by weathering sandstone. The third main soil type occurs in a band running north/south through the centre of the site. It consists of a heavy-textured topsoil (Unit T2, mean thickness 20 cm) and a very heavy-textured subsoil (Unit S1, mean thickness 100 cm).

FACTORS INFLUENCING ALC GRADE

Climate

13. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

14. The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5 km grid datasets using the standard interpolation procedures (Met. Office, 1989).

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	SE 397 091
Altitude	m, AOD	50
Accumulated Temperature	day°C (Jan-June)	1369
Average Annual Rainfall	mm	640
Field Capacity Days	days	141
Moisture Deficit, Wheat	mm	104
Moisture Deficit, Potatoes	mm	95
Overall climatic grade	N/A	Grade 1

15. The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

16. The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR), as a measure of overall wetness, and accumulated temperature (ATO, January to June), as a measure of the relative warmth of a locality.

17. The combination of rainfall and temperature at this site means that there is no overall climatic limitation on ALC grade.

Site

18. Most of the site is level to gently sloping (0-3°) with variable aspect. However, parts of the north of the site are moderately to moderately steeply sloping (8-13°). Slopes of between 8° and 11° limit the land to Subgrade 3b while slopes of between 12° and 13° limit a small area to Grade 4. Neither microrelief nor flood risk are grade-limiting factors on this site.

Geology and soils

19. The site is underlain by Carboniferous Coal Measures consisting of interbedded sandstones and shales. With the exception of locally derived Head deposits there is no drift cover. Over most of the site the soils are derived from weathering shale but weathering sandstone begins at between 35 cm and 65 cm depth in parts of the north, south-east and south-west.

20. The soils on the site have been mapped as belonging to the Rivington 1 association (*coarse loamy soils on gentle or moderate slopes on sandstone*) and the Bardsey association, consisting of slowly permeable soils over Carboniferous mudstones and shales (Soils of England and Wales, Sheet 1).

AGRICULTURAL LAND CLASSIFICATION

21. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1, page 1.

Subgrade 3a

22. Subgrade 3a, good quality agricultural land, occurs in a band running north/south through the centre of the site and also in two separate areas in the far west. In the far west and in the north many of the soils are well drained, falling into Wetness Class I. Typically either medium clay loam or occasionally medium sandy loam topsoils and subsoils overlie weathering sandstone at around 50 cm depth, and the land is limited to this subgrade by soil droughtiness.

Elsewhere on the site most of the soils in the Subgrade 3a area are imperfectly drained (Wetness Class III) although in a few places moderately well drained (Wetness Class II) profiles are found. In most cases medium clay loam topsoils overlie medium clay loam or heavy clay loam upper subsoils and, at between 40 cm and 70 cm depth, gleyed and slowly permeable heavy clay loam, clay or silty clay. Although the moderately well drained soils meet the criteria for Grade 2 they form no apparent pattern and cannot be mapped as a separate unit. The remaining areas are limited to Subgrade 3a by slight soil wetness.

Subgrade 3b

23. The remainder of the site falls in Subgrade 3b, moderate quality agricultural land. The soils are generally poorly drained, falling in Wetness Class IV. Typically medium clay loam or heavy clay loam topsoils and, in places, thin upper subsoils, overlie gleyed and slowly permeable heavy clay loam, clay or silty clay at between 20 cm and 35 cm depth. The ALC grade of these areas is limited by moderate soil wetness. In parts of the north of the site some better drained profiles are found but these occur on slopes of 8° to 11° and the land is limited to Subgrade 3b by its gradient.

Grade 4

24. A small area of Grade 4 land occurs in the north-west of the site. The slopes here are 12° to 13° and this significantly restricts the safe and efficient use of agricultural machinery to the extent that it falls in Grade 4 (poor quality land).

Other land

25. Other, non-agricultural, land on this site occurs in the north-east and south-east and consists of scrub and a short section of railway line.

STATEMENT OF PHYSICAL CHARACTERISTICS

26. Three main soil types were identified on the site, descriptions of which are given below. Topsoil and subsoil resources are shown on the accompanying maps along with soil thickness and volume information. Representative pit descriptions are given in Appendix II.

a. Soil Type 1 (T1/U1/Sandstone)

This soil type occurs in the north western corner of the site and typically consists of a medium-textured topsoil and a light to medium-textured subsoil overlying weathering sandstone at around 50 cm depth.

b. Soil Type 2 (T1/U2/L1)

This soil type is the most widespread on the site. It consists of a medium-textured topsoil overlying a heavy-textured upper subsoil and a very heavy-textured lower subsoil.

c. Soil Type 3 (T2/S1)

This soil type occurs in a band running north/south through the site. It consists of a heavy-textured topsoil directly overlying a very heavy-textured subsoil.

Topsoils

27. Topsoil T1 covers most of the site. It is generally medium-textured, consisting of medium clay loam, and very slightly stony containing between 2% and 5% very small to medium angular sandstones in most cases. It typically has a moderately developed subangular blocky structure and a mean thickness of 25 cm.

28. Topsoil T2 occurs in a band running through the middle of the site from north to south. It is heavy-textured (heavy clay loam) and stoneless to very slightly stony, containing up to 2% very small to medium angular sandstones. Topsoil T2 has a weakly to moderately developed coarse subangular blocky structure and a mean thickness of 20 cm.

Upper/Whole Subsoils

29. Upper subsoil U1 underlies topsoil T1 in the north of the site. It is light to medium-textured, consisting of medium sandy loam or medium clay loam, and has a moderately to strongly developed, medium to coarse, subangular/angular blocky structure. This upper subsoil unit is very slightly to slightly stony, containing up to 15% very small to large angular sandstones. Mean thickness is 25 cm and this upper subsoil overlies weathering sandstone.

30. Upper subsoil U2 occurs over 56% of the site and underlies topsoil T1. It is typically heavy-textured (heavy clay loam or heavy silty clay loam) although medium-textured horizons (consisting of medium clay loam or medium silty clay loam in most cases) also occur in places. Upper subsoil U2 is very slightly stony, containing between 2% and 5% very small to medium angular sandstones in most cases. It has a range of structures which vary between weakly developed medium prismatic and moderately developed coarse angular and subangular blocky. The mean unit thickness of U2 is 30 cm and it is underlain by Lower Subsoil L1.

31. Whole subsoil S1 underlies topsoil T2 in the centre of the site. It is very heavy-textured, consisting of clay or silty clay, and is typically stoneless. It has a weakly to moderately developed coarse prismatic structure and a mean thickness of 100 cm.

Lower Subsoils

32. Lower subsoil L1 underlies topsoil T1 and upper subsoil U2. In all respects it is the same as whole subsoil unit S1, with the exception of its mean thickness (40 cm). This lower subsoil is also underlain by weathering sandstone in places.

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SOURCES OF REFERENCE

British Geological Survey (1976) *Sheet No. 87 (Barnsley), Solid and Drift.*
BGS: London.

Ministry of Agriculture, Fisheries and Food (1988) *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.* MAFF: London.

Met. Office (1989) *Climatological Data for Agricultural Land Classification.*
Met. Office: Bracknell.

Soil Survey of England and Wales (1983) *Sheet 1, Soils of Northern England, 1:250,000 scale.*
SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in Northern England*
SSEW: Harpenden.

APPENDIX I

DESCRIPTIONS OF THE GRADES AND SUBGRADES

Grade 1: Excellent Quality Agricultural Land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2: Very Good Quality Agricultural Land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural or horticultural crops can usually be grown but on some land of this grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1 land.

Grade 3: Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When more demanding crops are grown, yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a: Good Quality Agricultural Land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b: Moderate Quality Agricultural Land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4: Poor Quality Agricultural Land

Land with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5: Very Poor Quality Agricultural Land

Land with severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

APPENDIX II

SOIL PROFILE DESCRIPTIONS

Soil Type 1: Light to medium-textured soil overlying sandstone (T1/U1/Sandstone)

Location: Grid Reference SE 3962 0933

Land Use: Cut oilseed rape

Slope: Level

Recent Weather: Warm, showery

Depth (cm)	**Horizon Description**
0-25	Brown/dark brown (10YR 4/3) medium clay loam; no mottles; very slightly stony, containing approximately 3% very small and small angular sandstones; slightly moist; moderately developed coarse subangular blocky structure; firm; moderately porous; many very fine fibrous and few medium and coarse fleshy roots; non-calcareous; clear smooth boundary.
25-45	Yellowish brown (10YR 5/6) medium clay loam; no mottles; very slightly stony, containing approximately 3% very small and small angular sandstones; slightly moist; strongly developed medium to coarse subangular blocky structure; firm; moderately porous; common very fine fibrous roots; non-calcareous; gradual, smooth boundary.
45-58	Yellowish brown (10YR 5/4) medium sandy loam; no mottles; slightly stony, containing around 15% very small to large angular sandstones; slightly moist; moderately developed coarse angular blocky structure; firm; very porous; common very fine fibrous roots; non-calcareous; clear, smooth boundary.
58+	Weathering Coal Measures sandstone.

Soil Type 2:	Medium-textured topsoil overlying heavy-textured upper subsoil and very heavy-textured lower subsoil (T1/U2/L1)
Location:	Grid Reference SE 3970 0930
Land Use:	Cut oilseed rape
Slope:	2° South
Recent Weather:	Warm, overcast

Depth (cm)	**Horizon Description**
0-31	Dark greyish brown (2.5YR 4/2) medium clay loam; no mottles; very slightly stony, with around 3% very small to medium angular sandstones; moist; moderately to strongly developed fine and medium subangular blocky structure; firm; moderately porous; common fine and very fine fibrous roots; non-calcareous; sharp smooth boundary.
31-56	Brown (10YR 5/3) and light yellowish brown (10YR 6/4) heavy clay loam; common indistinct yellowish brown (10YR 5/8) and strong brown (7.5YR 4/6) mottles; very slightly stony, containing approximately 3% very small to medium angular sandstones; moist; weakly developed medium prismatic breaking to coarse angular and subangular blocky structures; firm; moderately porous (<0.5% pores >0.5 mm); common very fine fibrous roots; non-calcareous; sharp, smooth boundary.
56-120	Light grey (10YR 7/1) silty clay; common distinct reddish yellow (7.5YR 6/8) mottles; stoneless; moist; moderately developed coarse prismatic structure; extremely firm; slightly porous (<0.5% pores >0.5 mm); common very fine fibrous roots; non-calcareous

Soil Type 3:	Heavy-textured topsoil overlying very heavy-textured subsoil (T1/S1)
Location:	Grid Reference SE 3964 0878
Land Use:	Barley
Slope:	Level
Recent Weather:	Warm, overcast

Depth (cm)	**Horizon Description**
0-22	Very dark greyish brown (10YR 3/2) heavy clay loam; no mottles; very slightly stony, containing approximately 2% very small to medium subangular sandstones; moist; weakly to moderately developed coarse subangular blocky structure; firm; moderately porous; few very fine fibrous roots; non-calcareous; abrupt, wavy boundary.
22-120	Grey/light grey (2.5YR 6/0) clay; common strong brown (7.5YR 5/8) mottles; stoneless; moist; weakly developed coarse prismatic structure; extremely firm; very slightly porous (<0.5% pores >0.5 mm); common very fine fibrous roots; non-calcareous.