

**CROWHILL FARM
WATNALL, NOTTINGHAMSHIRE**

**Agricultural Land Classification and Soil Resources
Report, Semi-detailed Validation Survey**

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Eastern Region
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AGRICULTURAL LAND CLASSIFICATION AND SOIL RESOURCES REPORT SEMI-DETAILED VALIDATION SURVEY

Crowhill Farm, Watnall, Nottinghamshire

INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 24.52ha of land at Crowhill Farm, Watnall, Nottinghamshire. The survey was carried out during July 1997.
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 an application for opencast coal extraction. The area was mapped at a semi-detailed level to confirm the consultant's (ADAS) ALC grading and soil resource mapping. This survey supersedes previous ALC information for this land.
3. The work was conducted by members of the Resource Planning Team in the Eastern 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 the land use on the site was predominantly permanent pasture with barley being grown in fields to the southeast.

SUMMARY

5. The findings of the survey are shown on the enclosed 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
2	5.7	23	23
3a	11.9	49	49
3b	6.9	28	28
Other land	0.02	-	<1
Total surveyed area	24.5	100	
Total site area	24.52	-	100

7. The fieldwork was conducted at an average density of 0.7 borings per hectare. A total of 15 borings and 3 soil pits was described.

8. The agricultural land within the site has been assessed as Grade 2 (very good quality land) in the east, with bands of subgrade 3a (good quality land) and 3b (moderate quality land) running north to south over the remainder of the site. To the east the presence of sandstone at depth imposes a slight droughtiness limitation which restricts the land to grade 2. In a band running through the centre of the site gradient limits the quality of the land to subgrade 3b. Land over the remainder of the site is limited by moderate or poor wetness/workability limitations (graded 3a and 3b respectively).

FACTORS INFLUENCING ALC GRADE

Climate

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

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

Table 2: Climatic and altitude data

Factor	Units	Values	
		SK 500 471	SK 501 474
Grid reference	N/A	SK 500 471	SK 501 474
Altitude	m, AOD	114	130
Accumulated Temperature	day°C (Jan-June)	1322	1303
Average Annual Rainfall	mm	701	714
Field Capacity Days	days	160	161
Moisture Deficit, Wheat	mm	95	93
Moisture Deficit, Potatoes	mm	83	80
Overall climatic grade	N/A	Grade 1	Grade 2

11. 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.

12. 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.

13. Rainfall and accumulated temperature combine to produce a slight climate limitation, in the northeast of the site, at elevations of 120m AOD or more. This restricts the land to grade 2. The rest of the site has a climatic grade of 1.

Site

14. The site lies approximately 95m AOD in the southwest/west and rises to approximately 130m AOD in the northeast. The land comprises a relatively level plateau which does not impose a limitation to the ALC grade. In contrast, running north/south, in a band through the centre of the site, gradient exceeds 7° (to a maximum of 10 degrees). Gradient therefore limits this area to subgrade 3b.

Geology and soils

15. The published 1: 63 360 scale geology map, sheet 125 (Geological Survey, 1963) shows Carboniferous Coal Measures to the west and Magnesium Limestone to the east.

16. The 1: 250 000 scale reconnaissance soil map of the area (Soil Survey, 1983) shows the site to comprise Aberford Association to the east and the Dale Association to the west. The Aberford Association soils are briefly described as shallow, locally brashy, well drained calcareous fine loamy soils over limestone and the Dale Association soils as slowly permeable seasonally waterlogged clayey, fine loamy over clayey and fine silty soils over soft rock, often stoneless.

17. The current more detailed survey of the site identified two main soil types (see Appendix II and soil resources map).

Soil Type I (14ha)

18. This soil type principally occurs to the west and in a small area to the southeast. Typically the profile consists of a medium clay loam (occasionally medium silty clay loam) topsoil over similar textured upper subsoils which overlie slowly permeable clay or heavy clay loam (occasionally silty clay) lower subsoils. Most horizons are stoneless or contain very few shale and coal fragments.

Soil Type II (10.5ha)

19. This soil type occurs in the east of the site and consists of very slightly stony medium sandy loam topsoils over similar textured (or occasionally sandy clay loam) upper subsoils. This subsoil overlies fractured sandstone material, with interstitial material of medium sandy loam or sandy clay loam. This material is typically rootable. The depth to the sandstone is variable across the area but is generally shallower on the steeper slopes towards the centre of the site.

AGRICULTURAL LAND CLASSIFICATION

20. 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.

21. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II.

Grade 2

22. Land of grade 2 quality is associated with the deep sandstone derived soils described in paragraph 19 (i.e. soil type II). These soils are well drained (Wetness Class I) and hence have no wetness or workability constraints. The presence of sandstone at depth slightly reduces the available water resource for crop growth. Consequently a slight droughtiness limitation prevails and restricts the land to grade 2. On land at, or above, 120m AOD (to the northeast) climate is equally limiting.

Subgrade 3a

23. Land graded 3a occurs in two situations and is associated with the better drained variant of Soil Type I (paragraph 18) and the shallower variant of Soil Type II (paragraph 19).

24. West of Crowhill Farm profiles are slowly permeable at depth and consequently have been assessed as Wetness Class III. This wetness class combines with the fine textured topsoils to impose a moderate wetness/workability limitation which restricts the land to subgrade 3a (good quality agricultural land).

25. Conversely, where subgrade 3a land is associated with Soil Type II the moderate depth to the sandstone material limits the reserves of water available for the crops. The resulting moderate droughtiness limitation precludes the land from a higher grade.

Subgrade 3b

26. Land graded 3b occurs in two main situations as two bands running from north to south.

27. To the west, alongside the small stream, the land is associated with the poorly drained variant of Soil Type I (see paragraph 18). In these profiles a slowly permeable layer occurs directly below the topsoil resulting in a wetness class assessment of IV. This wetness class combines with the fine topsoil textures to impose a significant wetness and workability limitation.

28. The remaining subgrade 3b land runs through the centre of the site and is associated with strongly sloping land with gradients above 7 degrees (maximum of 10°). Such slopes effect the efficient operation of machinery and hence restrict the quality of the land to subgrade 3b (moderate quality agricultural land).

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SOURCES OF REFERENCE

British Geological Survey (1963) *Sheet No. 25*, Derby. 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 3, Soils of Midland and Western 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

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE I (14ha)

Topsoil	Texture	: medium clay loam (occ. medium silty clay loam)
	Colour	: 7.5YR4/2, brown or 10YR4/2, dark greyish brown.
	Mottles	: occasional rusty root mottles
	Stone	: stoneless
	Roots	: many fine and very fine
	Calcium carbonate	: non calcareous
	Boundary	: clear, smooth
	Depth	: 20 cm
Upper subsoil	Texture	: medium clay loam
	Colour	: 7.5YR5/4, 7.5YR5/3, brown
	Mottles	: typically none, occ. many
	Concretions	: few
	Stone	: stoneless
	Structure	: weakly developed medium and coarse sub-angular blocky
	Consistence	: friable, occ. firm
	Structural condition	: moderate, occ. poor
	Pores	: >0.5% biopores
	Roots	: many fine and very fine
	Calcium carbonate	: non calcareous
	Boundary	: clear, smooth
	Depth	: 35/55 cm
Lower subsoil	Texture	: clay, occasionally heavy clay loam or silty clay
	Colour	: variable - 10YR5/3, 5/2, 5/1, 2.5Y6/3
	Mottles	: many ochreous
	Concretions	: few
	Stone	: very slightly stony (2%) small and medium sandstone fragments
	Structure	: weakly developed coarse angular blocky
	Consistence	: firm
	Structural condition	: poor
	Pores	: <0.5% biopores
	Roots	: common fine and very fine
	Calcium carbonate	: non calcareous
	Depth	: 120 cm

Wetness Class: Typically III, occasionally IV.

SOIL TYPE II (10.5ha)

Topsoil	Texture	:	medium sandy loam
	Colour	:	5YR3/2, dark reddish brown
	Mottles	:	none
	Stone	:	very slightly stony (3%) small and medium rounded and subangular quartzite and sandstone fragments
	Roots	:	many fine and very fine
	Calcium carbonate	:	non calcareous
	Boundary	:	abrupt, smooth
	Depth	:	30 cm
	Upper subsoil	Texture	:
Colour		:	5YR4/4, reddish brown
Mottles		:	none
Concretions		:	none
Stone		:	very slightly stony (3%) small and medium quartzite and sandstone fragments
Structure		:	weakly developed coarse subangular blocky.
Consistence		:	very friable
Structural condition		:	moderate
Pores		:	>0.5% biopores
Roots		:	many fine and very fine
Calcium carbonate		:	non calcareous
Boundary		:	wavy, clear
Depth		:	50/90 cm

Lower subsoil: Fractured sandstone (typically 75% of soil volume) with interstitial medium sandy loam or sandy clay loam (which is rootable).

Wetness Class: I