

FRCA



FARMING AND RURAL CONSERVATION AGENCY
An Executive Agency of the Ministry of Agriculture, Fisheries and Food and the Welsh Office

**Land at Nettleworth, Shirebrook,
Nr. Mansfield, Nottinghamshire**

**Agricultural Land Classification
ALC Map and Soil Physical
Characteristics Report**

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**Resource Planning Team
Eastern Region
FRCA Cambridge**

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AGRICULTURAL LAND CLASSIFICATION REPORT

Land at Nettleworth, Shirebrook, Nr. Mansfield, Notts.

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 20.9 ha of land at Nettleworth, Shirebrook, Near Mansfield. The survey was carried out during May 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 application to extract limestone. 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 under a mixture of crops, namely oil seed rape, winter wheat and barley, with the north eastern field under a grass ley. The areas mapped as 'Other' include Spring and Oxpasture Woods and a track which dissects the southern part of the site.

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 | 3.9 | 20.9 | 18.7 |
| 3a | 4.9 | 26.2 | 23.4 |
| 3b | 9.9 | 52.9 | 47.4 |
| Other land | 2.2 | N/A | 10.5 |
| Total surveyed area | 18.7 | 100 | |
| Total site area | 20.9 | - | 100 |

7. The fieldwork was conducted at an average density of 1 boring per hectare. A total of 22 borings and 3 soil pits was described.

8. The land has been graded a mix of grade 2, subgrade 3a and 3b with the latter being approximately half of the agricultural area. Land graded 2 (very good quality agricultural land) is mapped in the southeast of the site and the main limitation to this land is one of droughtiness, although in the centre of the site groundwater also imposes a slight wetness limitation. Subgrade 3a land (good quality agricultural land) is mapped in three locations on the site with the main limitation again being droughtiness. Groundwater in the central area is also likely to be an equally limiting factor. The remainder of the site is graded 3b (moderate quality agricultural land) with the main limitation on this land being one of wetness and workability.

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

| | Parameter | Value |
|----------------------------|------------------|----------|
| Grid reference | N/A | SK542661 |
| Altitude | m, AOD | 80 |
| Accumulated Temperature | day°C (Jan-June) | 1351 |
| Average Annual Rainfall | mm | 683 |
| Field Capacity Days | days | 151 |
| Moisture Deficit, Wheat | mm | 100 |
| Moisture Deficit, Potatoes | mm | 88 |
| Overall climatic grade | N/A | Grade 1 |

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. The combination of rainfall and temperature at this site mean that there is no overall climatic limitation on this land.

Site

14. The site is gently undulating with the highest land occurring on the west and east of the site at approximately 81m AOD. A shallow valley runs in a northerly direction to the north west of Ox Pasture Wood. Thus neither gradient nor altitude impose limitations to land quality.

Geology and soils

15. The published 1:63 360 scale solid and drift geology map shows the site to comprise three main geological deposits. The western and southern parts of the site are mapped as Permo - Triassic Lower Magnesian Limestone. Over the remainder of the site this is overlain by Middle Permian Marl. On the higher land in the northeast this is capped by Sandstone in Middle Permian Marl which is largely covered by glacial sand and gravel deposits.

16. The reconnaissance 1:250 000 scale soils map of the area shows two soil associations mapped. The main soil association which covers all the site except the northeast corner is the Aberford Association. This is briefly summarised as shallow, locally brashy, well drained calcareous fine loamy soils over limestone. Some deeper calcareous soils are found in colluvium. The Whimple 3 Association is mapped in the northeast corner and is summarised as reddish fine loamy or fine silty over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Some similar clayey soils are found on brows of hills. During the current more detailed survey work three main soil types have been identified (see Appendix II for soil physical characteristics report).

Soil type I

17. The first soil type has been identified in the northwest corner and in the central/southern part of the site. Profiles typically comprise very slightly calcareous medium clay loam (occasionally sandy clay loam) with similar upper subsoils. Topsoils are typically very slightly stony with upper subsoils being variable ranging from very slightly to moderately stony. Lower subsoils typically become lighter in texture comprising predominantly medium sandy loam although occasionally red clay is mixed in. Typically lower subsoils are moderately to very stony, containing weathered limestone. In the central part of the site subsoils are much less stony.

Soil type II

18. This soil type covers approximately half the site and is mapped in the southwest, northern and eastern parts of the site. Profiles typically comprise very slightly stony, non calcareous medium or heavy clay loam (occasionally clay) immediately over slowly permeable dense red clay. The latter is typically stoneless and non calcareous and contains some manganese concretions.

Soil type III

19. The third soil type occurs in a small area in conjunction with the glacial sand and gravel deposits in the northeast corner of the site. Profiles consist of slightly stony non

calcareous medium sandy loam over moderately stony non calcareous sandy clay loam. Stone content increases with depth and becomes impenetrable to auger at 50 cm.

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, page 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 graded 2 is mapped in conjunction with the slightly less stony variant of soil type I described in paragraph 17. The combination of profile stone content and relatively light soil textures in the lower subsoil act to impose a slight limitation on the available reserves of water for crop growth. As a result minor droughtiness imperfections restrict the land to grade 2 (very good quality agricultural land). In the central area of the site there is also evidence of groundwater with gleying recorded in the lower subsoil. Where this occurs the profiles have been assessed as Wetness Class II. Thus in the centre of the site wetness is also an equally limiting factor.

Grade 3a

23. Land graded 3a occurs in three locations on the site and is associated with the stonier variant of soil type I described in paragraph 17 and soil type 3 described in paragraph 19.

24. Land associated with the stonier variant of soil type I is limited to grade 3a as a result of moderate droughtiness which is the main limitation on the land in the northwest and centre of the site. The combination of higher profile stone content particularly in the lower subsoil significantly reduces the amount of available water for plant growth. Roots are able to penetrate through the stony horizon because of the broken nature of the weathered limestone that occurs at depth.

25. Similarly in the northeast (soil type III) because of the high gravel content in the subsoil this land is also restricted to this grade due to moderate droughtiness. Additionally in the centre of the site some profiles are affected by high groundwater levels with gleying noted in the upper subsoil horizon. Where this occurs these profiles have been assessed as Wetness Class III and wetness is an equally limiting factor on this land.

Grade 3b

26. Land graded 3b occurs in conjunction with soil type II described in paragraph 18 above. The presence of dense slowly permeable clay immediately below the topsoil result in these profiles being assessed as wetness class IV. In combination with topsoil textures this results in the land having a reduced flexibility for cropping due to fewer days when the soil is in a suitable condition for cultivation. Thus this land is excluded from a higher grade.

Other land

27. Other land comprises two areas of woodland and the access track from Nettleworth Manor.

Soil Resources

28. Three soil types have been identified within the site and their distribution is shown on the accompanying soil resource map which is illustrative of the soil resources available for restoration purposes. **This is not a soil stripping map for the site.** The thickness and volumes given in Table 3 below should be treated with some caution due to the variability in the depth to different horizons.

Table 3. Soil Resources

| | | Area (ha) | Thickness (cm) | Volume (m ³) |
|---------------|---------------|-----------|----------------|--------------------------|
| Soil Type I | Topsoil | 8.4 | 30 | 252000 |
| | Upper subsoil | 8.4 | 30** | 252000 |
| | Lower subsoil | 8.4 | 60 | 504000 |
| Soil Type II | Topsoil | 9.9 | 30 | 29700 |
| | Subsoil | 9.9 | 90 | 891000 |
| Soil type III | Topsoil | 0.5 | 25 | 12500 |
| | Upper subsoil | 0.5 | 50 | 12500 |
| | Lower subsoil | 0.5 | 45 | 22500 |

** Depth of subsoil is very variable.

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SOURCES OF REFERENCE

British Geological Survey (1966) *Sheet No. 112, Chesterfield*. 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, Midland and Western England*. SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in 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

SOIL DATA

Soil Type I

| | | |
|----------------|---------------------|--|
| Topsoil: | Texture: | medium clay loam, (occasionally sandy clay loam) |
| | Colour: | 10YR 4/2, 4/3 & 7.5YR 4/2 |
| | Stone: | very slightly stony |
| | CaCO ³ | typically very slightly calcareous, (occasionally non calcareous) |
| | Depth | 30 cm: |
| Upper Subsoil: | Texture: | medium clay loam, sandy clay loam or medium sandy loam |
| | Colour: | 7.5YR 4/4 & 6/4, 10YR 6/4, 7/4 & 4/6 |
| | Stone: | variable ranging from 5-40 %, typically limestone |
| | CaCO ³ : | calc in the south becoming slightly/non calc in the north |
| | Mottles: | typically not mottled but in the central area mottled |
| | Depth: | 50/70 cm |
| Lower Subsoil | Texture: | medium sandy loam, occasionally loamy medium sand at depth (narrow bands of red clay often present) |
| | Colour: | 10YR 5/5, 7.5YR 5/4, 5/6 and 5/3 |
| | Stone: | very variable ranging from 10-50%, often weathered limestone |
| | CaCO ³ : | calcareous where limestone present |
| | Mottles: | typically mottled where affected by groundwater |
| | Depth: | 120 cm |
| Notes: | | typically assessed as Wetness Class I except in the central area where affected by groundwater (assessed as Wetness Class II & III). |
| | | where affected by groundwater manganese concretions common. |
| | | often impenetrable to auger in lower subsoil. |

Soil Type II

| | |
|---------|--|
| Topsoil | Texture: medium or heavy clay loam, occasional clay Colour: 10YR 4/2 & 4/3, 7.5YR 4/2 Stone: typically 2-6% hard stones CaCO ³ : non calcareous Depth: 25/30 cm |
| Subsoil | Texture: clay Colour: 5YR 4/4, 2.5YR 4/6 & 4/4 Stone: typically stoneless, occasionally some weathered sandstone CaCO ³ : non calcareous Mottles: occasionally visible with 2.5Y 7/2 streaks Depth: 120 cm |
| Notes: | assessed as Wetness Class IV |

Soil Type III

| | |
|----------|---|
| Topsoil: | Texture: medium sandy loam Colour: 5YR 4/2 Stone: 5-10 % CaCO ³ : Non calcareous Depth: 25 cm |
| Subsoil | Texture: sandy clay loam Colour: 5YR 4/3 Stone: 15-30% small flints CaCO ³ : non calcareous Depth: 50 cm |
| Notes: | impenetrable to auger below 50 cm assessed at worst as Wetness Class II |