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VALIDATION SURVEY
Agricultural Land Classification Report and Statement of Soil Physical Characteristics.

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Resource Planning Team
Eastern Region
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AGRICULTURAL LAND CLASSIFICATION REPORT AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

WILLIAM WOOD FARM, MANSFIELD WOODSIDE, NOTTS

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) validation survey of 35.3ha of land at William Wood Farm, Nr Mansfield in Nottinghamshire. The survey was carried out during January 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 an application by RMC Roadstone Ltd to extract limestone from the site. 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 agricultural land on site comprised a mix of grassland fields and arable fields growing winter cereals. The main area of 'Other land' on site is situated in the south and comprises concrete hard standings, roadways and the remains of former buildings, all associated with the colliery. The remaining 'Other land' comprises William Wood Farm, William Wood Lane and the route of the proposed access road to the east.

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
3a	7.4	28	21
3b	17.0	63	48
4	2.5	9	7
Other land	8.4	N/A	24
Total surveyed area	26.9	100	76
Total site area	35.3	N/A	100

7. The fieldwork was conducted at an average density of 1 auger boring per hectare. In total 27 auger borings and 3 soil pits were described.

8. Most of the agricultural land on site has been graded 3b (moderate quality agricultural land). It is restricted to this subgrade because the shallow soils over solid limestone suffer from a significant droughtiness constraint. In the west and east of the site, areas of subgrade 3a (good quality agricultural land) have been mapped. This land suffers from moderate wetness and workability and/or moderate droughtiness constraints. In the middle of the site an area of grade 4 (poor quality agricultural land), which suffers from severe droughtiness, has been mapped.

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
Grid reference	N/A	SK 541 685
Altitude	m, AOD	80
Accumulated Temperature	day°C (Jan-June)	1350
Average Annual Rainfall	mm	677
Field Capacity Days	days	149
Moisture Deficit, Wheat	mm	101
Moisture Deficit, Potatoes	mm	90
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 it is relatively warm and dry during the critical crop growing season. The site is therefore of climatic grade 1.

Site

14. The site is located east of Shirebrook and to the north-west of Warsop Vale. To the north and west it adjoins woodland, to the east it is bounded by William Wood Lane immediately east of which lie the spoil heaps from the former colliery. The south of the site abuts an old mineral railway and derelict land associated with the colliery. The site slopes very gently from 85m AOD in the north-west to 75m AOD in the east. Gradient and altitude do not therefore impose any limitation.

Geology and soils

15. The published 1:63 360 scale solid and drift edition geology map, sheet 112 (British Geological Survey, 1963) maps the entire site as Permo Triassic Lower Magnesian Limestone.

16. At a reconnaissance scale of 1:250 000 the Soil Survey of England and Wales, (Sheet 3, Soils of Midland and Western England, 1983) maps the whole site as the Aberford Association, which is briefly described as: Shallow, locally brashy, well drained calcareous fine loamy soils over limestone. Some deeper calcareous soils in colluvium.

17. The current survey identified the presence of two main soil types.

Soil type I

18. This soil type predominates the site and typically comprises slightly stony, non-calcareous, medium clay loam topsoils over similar upper subsoils which are frequently very thin and occasionally absent. Limestone rock is typically encountered at 30/35cm depth. The upper 15cm of the limestone rock is comprised of densely packed slabs. These are 2/4cm thick and up to 20/30cm across. Vertical fissures are very narrow, whilst horizontal fissures are 2/3mm in depth and often contain rootable soily infill. Below this the limestone is effectively solid and impenetrable to roots.

Soil type II

19. This soil type occurs mainly in the western part of the site but also in a narrow band along the eastern boundary. The very slightly stony, non-calcareous, medium clay loam topsoils are 25/30cm deep and typically overlie similarly stony heavy clay loam upper subsoils which extend to 40/50cm depth. The lower subsoil is comprised of slowly permeable reddish clay, beneath which, typically at 65/100cm depth, limestone rock is encountered.

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.

Subgrade 3a

22. Land mapped as 3a occurs in a wide band to the west and in a narrower band to the east of the site, corresponding with the areas of soil type II (described in paragraph 19). Land is typically restricted to this subgrade by moderate wetness and workability constraints. The fine loamy topsoil textures combine with the Wetness Class III assessment, associated with the presence of a slowly permeable layer at moderate depth, to impose a moderate wetness and workability constraint. Occasionally this land is equally limited by droughtiness. This occurs where limestone rock is encountered at 65/70cm, therefore reducing the amount of water reserves available for crop growth.

Subgrade 3b

23. Land graded 3b corresponds predominantly to soil type I (described in paragraph 18) and occupies the majority of the site area. Very occasionally 3b land corresponds with soil type II, (described in paragraph 19). The former is restricted to this subgrade by significant droughtiness. The fine loamy topsoils and subsoils (where present), their stone content and the limited depth of soil over limestone rock combine to significantly restrict the available water for crop growth. In the latter situation, the fine loamy topsoil textures combine with the slowly permeable clay subsoil, assessed as Wetness Class IV, to impose a significant wetness and workability constraint. In both cases the limitations described restrict the land to subgrade 3b.

Grade 4

24. The grade 4 land on site falls within the area of soil type I (described in paragraph 18), and occurs in the middle of the site. Limestone rock is encountered at 25/30cm depth beneath the slightly to moderately stony fine loamy soils. The available water capacity for crop growth is therefore severely limiting and restricts this land to grade 4.

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SOURCES OF REFERENCE

British Geological Survey (1963) *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, Soils of 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

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

Soil type I (18.8ha)

Topsoil	Texture	typically medium clay loam (very occasionally heavy clay loam)
	Colour	typically 5YR 3/3 or 4/4, occasionally 7.5YR 4/3 or 3/3.
	Stone content	typically 8–10% (range 1–25%)
	Roots	many very fine and fine
	Calcium carbonate	non calcareous
	Boundary form	smooth, abrupt
	Depth	typically 25/30cm
Upper subsoil *	Texture	typically medium clay loam (occasionally heavy clay loam or sandy)
	Colour	5YR 3/4 or 4/4, occasionally 2.5YR 3/4 or 4/4
	Stone content	typically 5–10% (range 2–25%)
	Structure	too shallow to assess
	Consistence	-
	Porosity	-
	Roots	few very fine and fine
	Calcium carbonate	non calcareous
	Concretions	-
	Boundary form	smooth, abrupt
	Depth	typically 30/35cm (range 30–50cm)

Lower subsoil: The lower subsoil is typically comprised of large densely packed limestone slabs. For about 15cm, vertical and horizontal fissures and voids between the limestone slabs (equivalent to about 5% of the volume) are filled with soily infill which is exploited by a few roots. Below this, solid limestone, which is impenetrable to roots is encountered.

Notes: Profiles are typically assessed as Wetness Class I.
Profiles are typically impenetrable to auger at 30/35cm depth.

* Occasionally the upper sub-soil is absent

Soil type II (8.2ha)

Topsoil	Texture	medium clay loam
	Colour	5YR 3/3 and 4/3 and 7.5YR 4/3
	Stone content	2–6% pebbles and limestone fragments
	Roots	common very fine and fine
	Calcium carbonate	non calcareous
	Boundary form	smooth, abrupt
	Depth	typically 25/30cm
Upper subsoil*	Texture	heavy clay loam (occasionally clay or silty clay)
	Colour	2.5YR 4/4 and 3/4 and 5YR 4/4 and 4/6
	Stone content	typically 0–3% pebbles (occasionally layers containing up to 20% pebbles encountered)
	Structure	moderately developed coarse subangular blocky
	Consistence	friable
	Porosity	>0.5%
	Roots	common very fine and fine
	Calcium carbonate	non calcareous
	Concretions	common manganese
	Boundary form	irregular, abrupt
	Depth	typically 40/50cm
Lower subsoil	Texture	clay
	Colour	typically 2.5YR 4/4
	Stoniness	typically stoneless, occasionally up to 8% pebbles and limestone pieces
	Structure	moderately developed coarse angular blocky and coarse prismatic
	Consistence	firm
	Porosity	<0.5%
	Roots	common very fine
	Calcium carbonate	non calcareous
	Concretions	few (<2%) to many (>20%) manganese
	Depth	65/100cm

Notes:

*The upper subsoil is occasionally absent
Profiles are typically wetness class III (occasionally IV)
Limestone rock is encountered beneath the clay