LAND ADJACENT TO WARREN LANE
LOCKINGTON, DERBYSHIRE
Agricultural Land Classification
March, 1997

Resource Planning Team
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ADAS Cambridge

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AGRICULTURAL LAND CLASSIFICATION REPORT

LAND ADJACENT TO WARREN LANE LOCKINGTON, DERBYSHIRE.

Introduction

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 82.3 ha of land adjacent to Warren Lane, Lockington, Derbyshire. The survey was carried out during March 1997, except for land around Warren Farm which was surveyed in 1996.

2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) Land Use Planning Unit, Cambridge in connection with an application for mineral extraction. This survey supercedes previous surveys on this land.

3. The work was conducted by members of the Resource Planning Team in the Huntingdon Statutory Group in ADAS. 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 mainly autumn sown cereals, with oilseed rape and a small grassed area. Other land includes farm buildings and associated land, and a railway line with embankments.

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 and 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: Areas of grades and other land

Grade/Other land	Area (hectares)	% surveyed
2	27.3	33.2
3a	35.8	43.5
3b	16.4	19.9
Other land	2.8	3.4
Total agricultural land	79.5	96.6
Total survey area	82.3	100.0

7. The fieldwork was conducted at an average density of 1 boring per hectare. A total of 62 borings and 3 soil pits were described.

8. Land mapped as grade 2 (very good agricultural quality) occurs on the western side of the site, and in two broad bands in the central and northern parts, and is restricted to this grade due to a slight droughtiness limitation, or wetness due to groundwater levels. Land mapped as subgrade 3a (good agricultural quality) occurs on the western side of the site and in the northern and central parts. Land in the north is restricted to this subgrade due to a moderate wetness and workability limitation, whilst that in the central and western parts due to a moderate droughtiness limitation. Land mapped as subgrade 3b (moderate agricultural quality) occurs in the extreme north, on the western side and in the southern part of the site. Land in the north and west is restricted to this subgrade due to a significant wetness and workability limitation, whilst that in the southern part due to a significant droughtiness limitation.

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	SK 477 296
Altitude (m, AOD)	30
Accumulated Temperature (day °C, Jan.–June)	1426
Average Annual Rainfall (mm)	609
Field Capacity Days	132
Moisture Deficit, Wheat (mm)	111
Moisture Deficit, Potatoes (mm)	104
Overall Climatic 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 there are no overriding climatic limitations, and therefore the climatic grade 1 is assigned.

Site

14. The site occupies virtually flat land at an altitude of 30m AOD, although it falls gently in the north and west where land is adjacent to streams, and in the centre of the site adjacent to a ditch. The eastern part of the site is bounded by Warren Lane, the M1 motorway, and the South Derby freight railway line. Land to the west of the railway is bounded by Lockington Grounds Farm in the north, open farmland to the west, Netherfield Lane in the southwest and the M1 motorway in the south.

Geology and soils

15. The published 1:50 000 scale geology map (Geol. Survey, 1976) shows the whole site to be developed from river alluvium.

16. The 1:250 000 reconnaissance soil survey map for the area (SSEW, 1983) shows the site to comprise soils of the Wick 1 Association. These are briefly described as deep well drained coarse loamy and sandy soils, locally over gravel, with some similar soils affected by groundwater.

17. During the current survey four soil types were encountered.

Soil Type I

18. Soil Type I occurs over the majority of the site. Profiles typically comprise very slightly stony, non-calcareous sandy clay loam or medium sandy loam (occasionally medium clay loam) topsoils over, very slightly stony, non-calcareous sandy clay loam (occasionally medium sandy loam) upper subsoils. Lower subsoils are variable in both texture and depth to sand and gravel horizons. In the south of the site lower subsoils typically comprise moderately stony medium sandy loam or loamy medium sand, with sand and gravel below 50/60cm. Centrally, lower subsoils typically comprise medium sandy loam or sandy clay loam, with sand and gravel occurring below 80/90cm. To the north of this area and in the western part of the site lower subsoils typically comprise slightly stony, medium sandy loam or sandy clay loam with sand and gravel at >100 cm. The majority of profiles have manganiferrous staining which is indicative of a fluctuating groundwater table.

Soil Type II

19. Soil Type II occurs in a small area in the north of the site. Profiles typically comprise very slightly stony, non-calcareous medium clay loam topsoils (occasionally heavy clay loam) over very slightly stony non-calcareous heavy clay loam upper subsoils. Lower subsoils typically comprise stoneless non-calcareous, slowly permeable clay.

Soil Type III

20. Soil Type III occurs adjacent to the stream on the north western boundary and in a broader band in the south western part of the site. Profiles typically comprise stoneless, non-calcareous clay or heavy clay loam topsoils, immediately over stoneless non-calcareous slowly permeable clay or silty clays to depth.

Soil Type IV

21. Soil Type IV occurs in a very small area near to Lockington Grounds Farm on the eastern side of the railway. Profiles typically comprise slightly stony, non-calcareous medium clay loam topsoils over varying depths of pulverised fly-ash (PFA) upper subsoils. Lower subsoil comprises moderately stony medium sandy loam or loamy medium sand with sand and gravel below 80/90cm

Agricultural Land Classification

22. 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.

23. 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 III.

Grade 2

24. Land mapped as grade 2 occurs on the western side of the site and in two areas in the northern part of the site. The areas to the west and north centre correlate with the deep fine and coarse loamy soils described in paragraph 18 and have been assessed as Wetness Class II (q.v. Appendix II). Moisture balance calculations indicate that in this relatively low rainfall area these deep, slightly stony profiles will be restricted to grade 2 by a minor droughtiness limitation

25. In the north of the site land mapped as grade 2 corresponds with the lighter textured topsoils described in paragraph 19. These soils are moderately well drained (Wetness Class II) and this combines with the topsoil textures to restrict this land to this grade due to a minor wetness and workability limitation.

Subgrade 3a

26. Land mapped as subgrade 3a occurs in the north, central and western parts of the site. The central and western areas correspond to the soils described in paragraphs 18 and 21, with sand and gravel starting at 80/90cm depth. Moisture balance calculations indicate that these soils have reduced water reserves available for crop growth due to the prescence of sand and gravel at depth. These profiles suffer from moderate droughtiness limitations in this relatively low rainfall area limiting the land to subgrade 3a.

27. The northern area mapped as subgrade 3a corresponds to the heavier textured soils described in paragraph 19. The soils are moderately well drained (Wetness Class II) but are restricted to this grade due to a moderate wetness and workability limitation.

Subgrade 3b

28. Land mapped as subgrade 3b occurs in the south, west and extreme north of the site. The southern area corresponds to the soils described in paragraph 18, with sand and gravel below 50/60cm. Moisture balance calculations indicate that the soils have a low available water capacity due to the presence of sand and gravel at shallower depths. In this relatively low rainfall area this will result in substantially reduced crop yields in dry years, and therefore the land is limited to this subgrade due to significant drought limitations.

29. The remainder of the land mapped as subgrade 3b corresponds to the soils described in paragraph 20. Soil profiles typically have a heavy clay loam or clay topsoil over a slowly permeable and gleyed subsoil, and have been assessed as Wetness Class IV. These factors combine with the result that workability will be limited considerable periods during the wetter parts of the year. Care and timeliness will need to be exercised with cultivation to avoid damage to soil structure, and there fore this land is excluded from a higher grade.

Other Land

30. Other land consists of buildings and associated land with Warren Farm and Lockington Grounds Farm.

Soil Resources

31. Four 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, but is not a soil stripping map for the site. A statement of the physical characteristics of the soil types is given in Appendix III. The table in Appendix IV shows the thicknesses and volumes of the soil types but these should be treated with some caution due to the variability of the soils,and also that some profiles were difficult to auger to 120cm due to profile stone content.

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SOURCES OF REFERENCE

British Geological Survey (1976) *Sheet No. 141, Loughborough. Solid and Drift. Scale 1:50 000.*
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. Scale 1:250 000*
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 WETNESS CLASSIFICATION

Definitions of Soil Wetness Classes

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

Wetness Class	Duration of waterlogging[1]
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years.[2]
II	The soil profile is wet within 70 cm depth for 31-90 days in most years **or**, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but only wet within 40 cm depth for 30 days in most years.
III	The soil profile is wet within 70 cm depth for 91-180 days in most years **or**, if there is no slowly permeable layer present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years.
IV	The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years **or**, if there is no slowly permeable layer present within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.
V	The soil profile is wet within 40 cm depth for 211-335 days in most years.
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years.

Assessment of Wetness Class

Soils have been allocated to wetness classes by the interpretation of soil profile characteristics and climatic factors using the methodology described in *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988).

[1] The number of days is not necessarily a continuous period.
[2] 'In most years' is defined as more than 10 out of 20 years.

APPENDIX III

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE I

Topsoil	Texture	:	sandy clay loam/medium sandy loam (occasionally medium clay loam)
	Colour	:	7.5YR4/2+4/3
	Stone	:	1-5%
	$CaCO^3$	:	non-calcareous
	Depth	:	35cm
Upper subsoil	Texture	:	sandy clay loam (occasionally medium sandy loam)
	Colour	:	7.5YR4/3+4/4
	Mottles	:	FDOM 7.5YR5/8
	Concretions	:	Few
	Stone	:	1-5%
	$CaCO^3$	:	non-calcareous
	Depth	:	variable 50-90cm*
Lower subsoil	Texture	:	loamy sand/sand
	Colour	:	7.5YR5/3+5/4
	Mottles	:	Variable 7.5YR5/8
	Concretions	:	Few/common
	Stone	:	40% small and medium gravel
	$CaCO^3$	:	non-calcareous
	Depth	:	120cm
Wetness Class:			II

*N.B. The depth to gravel in the upper subsoil is very variable, but in general it shelves in a northerly direction from the south of the site.

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE II

Topsoil	Texture	:	Medium clay loam (occasionally heavy clay loam)
	Colour	:	10YR4/3+3/3
	Stone	:	1-5%
	$CaCO^3$	:	non-calcareous
	Depth	:	35cm
Upper subsoil	Texture	:	heavy clay loam
	Colour	:	10YR4/4
	Mottles	:	FDOM 10YR5/8
	Concretions	:	*none*
	Stone	:	<1%
	$CaCO^3$	:	non-calcareous
	Depth	:	50cm
Lower subsoil	Texture	:	clay
	Colour	:	10YR5/3
	Mottles	:	common 10YR5/8+6/1
	Concretions	:	common
	Stone	:	<1%
	$CaCO^3$	:	non-calcareous
	Depth	:	120cm
Wetness Class:			II

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE III

Topsoil	Texture	:	heavy clay loam/clay
	Colour	:	10YR4/2+&.5YR4/3
	Stone	:	<1%
	$CaCO^3$	:	non-calcareous
	Depth	:	35cm
Upper subsoil	Texture	:	clay
	Colour	:	10YR5/2+7.5YR5/3
	Mottles	:	MDOM 7.5YR5/8 CDGM 7.5YR6/1
	Concretions	:	none
	Stone	:	<1%
	$CaCO^3$	:	non-calcareous
	Depth	:	70cm
Lower subsoil	Texture	:	clay
	Colour	:	7.5YR5/1
	Mottles	:	CDOM 10YR5/8
	Concretions	:	many
	Stone	:	<1%
	$CaCO^3$	:	non-calcareous
	Depth	:	120cm
Wetness Class:			III/IV

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE IV

Topsoil	Texture	:	medium clay loam
	Colour	:	7.5YR4/3
	Stone	:	5-7%
	$CaCO^3$	:	non-calcareous
	Depth	:	30cm
Upper subsoil	Texture	:	PFA
	Colour	:	10YR5/1
	Stone	:	<1%
	$CaCO^3$	:	calcareous
	Depth	:	variable, 80-90cm
Lower subsoil	Texture	:	sandy loam/ loamy medium sand/ sand
	Colour	:	7.5YR4/6
	Mottles	:	FDOM 10YR5/6
	Stone	:	25-35% small gravel
	$CaCO^3$	:	non-calcareous
	Depth	:	120cm
Wetness Class:			II

Appendix IV

Soil Resources

		Area(ha)	Thickness(cm)※	Volume(m^3)
Soil Type I	Topsoil	62.7	35	219450
	Upper Subsoil	62.7	35	219450
	Lower Subsoil	62.7	50	313500
Soil Type II	Topsoil	10.7	35	37450
	Upper Subsoil	10.7	15	16050
	Lower Subsoil	10.7	70	74900
Soil Type III	Topsoil	4.7	35	16450
	Upper Subsoil	4.7	35	16450
	Lower Subsoil	4.7	50	23500
Soil Type IV	Topsoil	1.4	30	4200
	Upper Subsoil	1.4	35	4900
	Lower Subsoil	1.4	55	7700

※ These values are taken as an average across the site and therefore should be treated with some caution.