

**NORTH FEN
SUTTON GAULT, CAMBRIDGESHIRE**

**Agricultural Land Classification
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AGRICULTURAL LAND CLASSIFICATION REPORT
NORTH FEN, SUTTON GAULT, CAMBRIDGESHIRE

Introduction

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 23.6ha of land at North Fen, Sutton Gault, Cambridgeshire. The survey was carried out during March 1997.
2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with an application for an irrigation reservoir. This survey supersedes previous ALC surveys on this land.
3. The work was conducted by members of the Cambridge Resource Planning Team, 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 peas, set-aside and winter cereals. Towards the centre of the site, a small irrigation reservoir has been mapped as other land.

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)	% Total site area
2	18.2	77
3b	5.2	22
Other land	0.2	1
Total surveyed area	23.6	100

7. The fieldwork was conducted at an average density of 1 boring per hectare. A total of 24 borings and three soil pits were described.

8. The agricultural land at the site has been graded mainly 2 (very good quality land), with a smaller area of 3b (moderate quality land) in a northwest/southeast band through the site. The grade of the land has been determined by the degree of droughtiness limitation, which is influenced by the soil textures present and the depth of soil over the gravel deposits.

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	TL405815
Altitude (m, AOD)	0
Accumulated Temperature (day °C, Jan.–June)	1460
Average Annual Rainfall (mm)	540
Field Capacity Days	89
Moisture Deficit, Wheat (mm)	119
Moisture Deficit, Potatoes (mm)	115
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 (AT0, 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 it is relatively warm and dry during the critical growing season therefore imposing no overall limitation to land quality. As a result the site has a climate grade of 1.

Site

14. The site occupies fairly level land at an altitude of 0m AOD. Neither gradient nor altitude impose a limitation on the ALC grade.

Geology and Soils

15. The published 1:50 000 scale geology map, sheet 173, (Geological Survey, 1980) covers the eastern part of the site and shows first and second terrace river gravels. The adjacent geology map is not available but it is probable that these geological deposits continue to the west.

16. The soils in the area have been mapped at a scale of 1:63 360 (Sheet 135, Soil Survey of England and Wales, 1976). This map shows the site to mainly comprise the Isleham Association which is described as sandy terrace drift and fen peat. To the west small areas of Adventurers' A and Downholland/Adventurers' A Associations have been mapped. These associations are described as fen peat and clayey, marine alluvium/fen peat respectively.

17. The current detailed survey of the site identified three main soil types (see Appendix III).

Soil type I

18. Most of the site generally comprises organic loam topsoils over medium sandy loam upper subsoils. At depth, subsoils may merge into gravel deposits (40% small and very small flint stones in a medium sand or loamy medium sand matrix) or occasionally become lighter textured and slightly stonier (10-15%) Topsoils are typically very slightly stony and upper subsoils range from very slightly to slightly stony. Profile pHs were recorded as being in the range of 5 to 7.

Soil type II

19. In a northwest/southeast band an area of non-organic soils outcrop. These typically comprise sandy clay loam or medium sandy loam topsoils over gravel deposits (40% small and very small flint stones in a medium sand or loamy medium sand matrix). Occasionally a slightly stony layer may occur between the topsoil and the gravel horizon. Profile pHs typically range from 6 to 7 and topsoils tend to be very slightly or slightly stony (typically small and very small flints).

Soil type III

20. Along the western edge of the site a small area of acid organic fen soils outcrop. These profiles typically comprise organic loams or peaty loams over marine clay or medium sandy loam upper subsoils. Gravel may be encountered below 70/85cms or profiles may become slightly stony at these depths. The profile pHs measured indicate that the subsoils are acid (c. pH 4). These acid horizons are formed by the oxidation of pyrite (ferrous disulphide) which is a stable constituent of some anearobic marine sediments (MAFF, 1983). When drained, the air is allowed to penetrate the soil mass and the pyrite oxidises to form sulphuric acid, which often impairs the development of plant roots through the soil profile.

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.

22. The location of the auger borings and pits is shown on the attached sample location map. This map, along with a detailed description of each of the soil types, is presented in Appendix III.

Grade 2

23. The majority of the site has been graded 2. Most land coincides with the soils described in paragraph 18 (*soil type I*), while a smaller area, to the west, is associated with the acid fen soils described in paragraph 20 (*soil type III*). In these fenland subsoils the presence of a dense network of inter-linking vertical and horizontal relic reed channels makes these soils very porous. Consequently there is no impediment to drainage and the wetness class has been assessed as I (see Appendix II).

24. For most of the grade 2 land the combination of relatively light subsoil textures and gravel horizons or stones at depth, 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).

25. To the southwest, subsoil acidity prevents the roots from fully exploiting the soil profile. Profile pit examination indicates that a dense root mat occurs at the topsoil/subsoil interface and below this rooting is concentrated in the relic reed channels. This suggests that the crops cannot fully exploit the subsoil water reserves and thus may suffer a degree of drought stress in dry periods of the year. This restricts the available water for crop growth but it is counter-balanced to a degree by the presence of organic topsoils which hold large reserves of water. The resultant minor droughtiness imperfection excludes the land from a higher grade.

Subgrade 3b

26. The remainder of the site has been graded 3b and is associated with the gravelly soils described in paragraph 19 (*soil type II*). The presence of gravel at shallow depths and the lack of organic matter in the topsoils combine to make the land significantly droughty. This significant droughtiness limitation restricts the land to subgrade 3b (moderate quality agricultural land).

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SOURCES OF REFERENCE

British Geological Survey (1980) *Sheet No 173, Ely*.
BGS: London.

Ministry of Agriculture, Fisheries and Food (1983) *The Management of Acid Fen and Marsh Soils in East Anglia. Unpublished report by Soil and Water Management Panel, Eastern Region*.

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 (1976) *Sheet 135, Cambridge and Ely*. 1:63 360 scale.
SSEW: Harpenden.

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

SOIL DATA

Contents:

Sample location map

APPENDIX III (continued)

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE I (15.7ha)

Topsoil	Texture	:	organic loam
	Colour	:	10YR2/1
	Mottles	:	*
	Concretions	:	*
	Stone	:	1-2% small and very small flints
	Roots	:	many fine and very fine
	CaCO ³	:	non
	Depth	:	35/40cm, occasionally 50cm
	Boundary	:	abrupt smooth
Upper subsoil	Texture	:	medium sandy loam
	Colour	:	10YR5/2
	Mottles	:	many 7.5YR5/6, coincides with relic reed channels
	Concretions	:	*
	Stone	:	typically 5%, occasionally up to 10% flints
	Structure	:	weakly developed very coarse angular blocky
	Consistence	:	firm
	Structural condition	:	moderate
	Pores	:	2%, due to many relic reed channels
	Roots	:	many
	CaCO ³	:	non
	Depth	:	50/80cm
	Boundary	:	smooth
Lower subsoil	Texture	:	gravel horizon (40% flints in medium sand or loamy medium sand matrix) or occasionally medium sandy loam (MSL) or loamy medium sand
	Colour	:	5YR4/6
	Mottles	:	staining around relic reed channels
	Concretions	:	*
	Stone	:	10-15% where no gravel horizon
	Structure	:	structureless or as above where MSL
	Consistence	:	loose, firm if MSL
	Structural condition	:	moderate
	Pores	:	2%, due to many relic reed channels
	Roots	:	common
	CaCO ³	:	non
Depth	:	120cm	

Wetness Class: I

SOIL TYPE II (5.2ha)

Topsoil	Texture	:	medium sandy loam or sandy clay loam
	Colour	:	10YR3/2
	Mottles	:	*
	Concretions	:	*
	Stone	:	5-10% small and very small flints
	Roots	:	many fine and very fine
	CaCO ₃	:	non
	Depth	:	35cm
	Boundary	:	abrupt smooth
Subsoil	Texture	:	gravel horizon (40% flints in medium sand or loamy medium sand matrix)
	Colour	:	10YR6/6
	Mottles	:	*
	Concretions	:	*
	Stone	:	see texture, occasionally 15% band above gravel
	Structure	:	structureless
	Consistence	:	loose
	Structural condition	:	moderate
	Pores	:	>0.5%
	Roots	:	common
	CaCO ₃	:	non
	Depth	:	120cm

Wetness Class: I

SOIL TYPE III (2.5ha)

Topsoil	Texture	:	organic loam
	Colour	:	10YR2/1
	Mottles	:	*
	Concretions	:	*
	Stone	:	1-2% small and very small flints
	Roots	:	many fine and very fine
	CaCO ₃	:	non
	Depth	:	35/40cm
	Boundary	:	sharp broken
Upper subsoil	Texture	:	medium sandy loam or clay
	Colour	:	10YR5/2
	Mottles	:	many (10YR6/8), around reed channels
	Concretions	:	*
	Stone	:	2-5% small and very small flints

	Structure	:	natural laminations
	Consistence	:	firm
	Structural condition	:	moderate
	Pores	:	2%, due to many reed channels
	Roots	:	many, some matting to 45cm, less common 45cm+ and concentrated in the relic reed channels
	CaCO ³	:	non
	Depth	:	70/85cm
	Boundary	:	smooth broken
Lower subsoil	Texture	:	gravel horizon (40% flints in medium sand or loamy medium sand matrix) or medium sandy loam (MSL)
	Colour	:	10YR5/6
	Mottles	:	many associated with reed channels
	Concretions	:	*
	Stone	:	see texture or 10% where MSL
	Structure	:	structureless or natural laminations
	Consistence	:	loose or firm
	Structural condition	:	moderate
	Pores	:	>0.5%, due to relic reed channels
	Roots	:	common in reed channels, occasional 70cms+. Rooting is affected by subsoil acidity
	CaCO ³	:	non
	Depth	:	120cm
Wetness Class:			I