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**LAKENHEATH FEN, LAKENHEATH,
SUFFOLK**

**Agricultural Land Classification
& Statement of Site Physical Characteristics
May 1996**

**Resource Planning Team
Huntingdon Statutory Group
ADAS Cambridge**

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AGRICULTURAL LAND CLASSIFICATION & STATEMENT OF SITE PHYSICAL CHARACTERISTICS

LAKENHEATH FEN, LAKENHEATH, SUFFOLK

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) Survey of 246.9 hectares of land at Lakenheath Fen, Lakenheath, Suffolk. The survey was carried out during May 1996.
2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) Land Use Planning Unit, Cambridge in connection with a planning application to convert the land from agricultural use to a nature reserve. This survey supersedes any previous ALC 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 as fallow land following cropping of wheat and carrots. Some areas had been recently planted with potatoes and wheat, whilst areas of poplar plantations are also present on the site (denoted by tree symbols on the maps accompanying this report). In the centre of the site is an area of disturbed land which is shown as other land, as is the very wet land adjacent to the river in the northwest of the site.

SUMMARY

5. 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)	% Total site area	% Surveyed area
1	185.5	75	96
2	2.8	1	1
3a	5.8	2	3
Other land	52.8	22	-
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Total survey area	194.1	79	100
Total site area	246.9	100	-

6. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:20 000, it is accurate at this scale but any enlargement would be misleading.

7. The fieldwork was conducted at an average density of 1 boring per hectare. A total of 204 borings and eight soil pits were described.

8. The majority of the agricultural land is of excellent quality (Grade 1) with very small areas of very good or good quality land (Grade 2 and Subgrade 3a). Therefore the majority of the land has no limitations for agriculture. However, where slightly lower quality land does occur this is due to a droughtiness limitation which is a function of climate and soil water holding capacity.

FACTORS INFLUENCING ALC GRADE

Climate

9. Climate affects the grading of the 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 dataset using the standard interpolation procedures (Met. Office, 1989).

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	TL698858
Altitude	m, AOD	3
Accumulated Temperature	day°C (Jan-June)	1448
Average Annual Rainfall	mm	590
Field Capacity Days	days	110
Moisture Deficit, Wheat	mm	120
Moisture Deficit, Potatoes	mm	116

11. The climate 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 climate 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. Climate imposes no overall limitation at this site and the climate grade is Grade 1.

Site

14. The land at the site is virtually flat and lies at an altitude of between 3 and 5 m AOD, and therefore neither gradient nor altitude impose limitations to land quality.

Geology and soils

15. The published 1:253 440 scale geology map, sheet 16 (Geological Survey of England and Wales, 1907) maps the whole site as comprising entirely alluvium and peat deposits. However, the published 1:50 000 scale geology map, sheet 173, Ely (Geological Survey of Great Britain, 1980) covers the west of the site in more detail. This shows the majority of the area covered by the map comprising Nordelph peat over Lower Chalk, with small deposits of shell marl intermittently located throughout the site and a thin band of marine alluvium (salt marsh deposits - Terrington beds) running through the centre of the area, from east to west.

16. The 1:63 360 scale published soils map, sheet 135, Cambridge and Ely (Soil Survey of England and Wales, 1976) shows the majority of the site as comprising soils of the Adventurers' B Association (Adventurers' Series with organic matter >90 cm thick). Corresponding with the shell marl deposits, Willingham A Association (Willingham Series) soils are mapped. In the north of the site, within the Washes adjacent to the Little Ouse River, soils of the Padney Association are mapped.

17. The present survey of the site identified three soil types. These soil types have been mapped on the accompanying soil resources map. This map is not necessarily a soil stripping map but illustrative of the soil resources available for restoration. A detailed description of their physical characteristics is given in Appendix III. It should be noted that the depths and volumes quoted for these soil types should be treated with caution due to soil variability.

Soil Type I (77.5 hectares)

18. Soil type I occurs in the west of the site and generally comprises deep peaty textured soils. Typically loamy peat, peaty loam, peat or occasionally organic loam or sandy peat topsoils overlie humose peat or occasionally loamy peat or peaty loam upper subsoils which become fibrous peat with depth. Rarely, within the area covered by this soil type, medium sand may be present within the subsoil, but these profiles do not form a distinct area which could be mapped separately. These soils are stoneless and free-draining (wetness class I).

Soil Type II (108.0 hectares)

19. Soil type II occurs in the east and centre of the site and generally comprises profiles with peaty textures overlying medium sand at depth in the subsoil. Topsoils typically consist of loamy peat, peat, peaty loam or occasionally peaty sand, organic loam or organic sand. These overlie upper subsoils of humose peat, fibrous peat, peaty loam or occasionally medium sand. Lower subsoils typically comprise medium sand, although occasionally fibrous peat may extend throughout the profile, however, these profiles do not form distinct areas which can be mapped separately. In the north of the site a small area comprises silt loam and medium silty clay loam topsoils overlying peaty upper subsoils which also overlie medium sand at depth. This also forms too small an area to delineate separately. These soils are stoneless and well to moderately well drained (wetness class I/II).

Soil Type III (8.6 hectares)

20. Soil type III occurs in the central north and south of the site and typically comprise organic sand topsoils which overlie medium sand directly below the topsoil. Occasionally, organic sand textures may extend into the upper subsoil. These soils are stoneless and well drained (wetness class I).

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 and the details of the soils data are presented in Appendix III.

Grade 1

23. The majority of the site is graded 1 and this land corresponds with profiles of Soil Types I and II (paragraphs 18 and 19). These soils have enough depth of peaty textured materials, which have very high water holding capacities, to alleviate any drought stress which may be encountered due to the relatively dry climate (see paragraph 13). Some profiles show signs of acidity (e.g. gypsum crystals) within the subsoils but this does not appear to obstruct rooting within these layers. These soils are well drained and assessed as wetness class I (for definitions of Wetness Classes see Appendix II). Therefore, this land has no or very minor limitations to agricultural use and thus is classified as grade 1 (excellent quality agricultural land)

Grade 2

24. Grade 2 land occurs in the central north of the site and is associated with the deep organic sand textured soils of Soil Type III (paragraph 20). These soils have minor droughtiness limitations caused by the reduced available water capacities of the profile textures, as compared to the peaty textured soil of land graded 1 (see paragraph 23). This restricts the land to grade 2 (very good quality agricultural land).

Subgrade 3a

25. Land graded as 3a occurs in two small areas in the central north and south of the site and corresponds with the very sandy textured profiles of Soil Type III (paragraph 20). These soils have only good to moderate reserves of soil water due to their sandy nature and are therefore limited to subgrade 3a (good quality agricultural land) due to moderate droughtiness limitations.

Ruth Tarrant
Resource Planning Team
Huntingdon Statutory Group
ADAS Cambridge

SOURCES OF REFERENCE

GEOLOGICAL SURVEY OF ENGLAND AND WALES (1907) *Sheet 16, drift edition, 1:253 440 scale.*

GEOLOGICAL SURVEY OF GREAT BRITAIN (England and Wales) (1980) *Sheet 173, Ely, solid and drift edition, 1:50 000 scale.*

HODGSON, J.M. [Ed](1976) *Soil Survey Field Handbook.* Soil Survey Technical Monograph No. 5: Harpenden.

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.

METEOROLOGICAL 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.*

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 <i>or</i> , 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 <i>or</i> , 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 <i>or</i> , 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

Soil type I (77.5 hectares)

Topsoil	Texture	: Loamy peat, peaty loam, peat or occasionally organic loam or sandy peat
	Colour	: Black (10YR 2/1 and 7.5YR 2.5/1) or very dark brown (10YR 2/2)
	Depth	: Typically 40 cm, range 30 cm to 50 cm
	Stoniness	: Stoneless
	Structure	: Not determined - plough layer
	Consistence	: Not determined - plough layer
	Porosity	: Not determined - plough layer
	Roots	: Common fine and very fine
	Calcium carbonate	: Typically non-calcareous, occasionally calcareous
	Boundary form	: Abrupt, smooth
Upper subsoil	Texture	: Humose peat or occasionally loamy peat or peaty loam
	Colour	: Black (10YR 2/1) or very dark brown (10YR 2/2)
	Depth	: Typically 70 cm, range 60 cm to 90 cm
	Stoniness	: Stoneless
	Structure	: Not determined as peaty textures
	Consistence	: Not determined as peaty textures
	Porosity	: Not determined as peaty textures
	Roots	: Common to few fine and very fine
	Calcium carbonate	: Typically non-calcareous, occasionally slightly calcareous
	Boundary form	: Clear, smooth
Lower subsoil	Texture	: Fibrous peat
	Colour	: Black (10YR 2/1), dark brown (10YR 3/3 and 5YR 3/2)
	Depth	: 120 cm plus
	Stoniness	: Stoneless
	Structure	: Not determined as peaty texture
	Consistence	: Not determined as peaty texture
	Porosity	: Not determined as peaty texture
	Roots	: Few fine and very fine
	Calcium carbonate	: Non- calcareous, typically pH 5.5
	Boundary form	: Not seen

Wetness Class: I

Soil type II (108.0 hectares)

Topsoil	Texture	: Loamy peat, peat, peaty loam or occasionally peaty sand, organic loam or organic sand
	Colour	: Black (10YR 2/1 and 7.5YR 2.5/1) or very dark brown (10YR 2/2)
	Depth	: Typically 40 cm, range 30 cm to 50 cm
	Stoniness	: Stoneless
	Structure	: Not determined - plough layer
	Consistence	: Not determined - plough layer
	Porosity	: Not determined - plough layer
	Roots	: Many fine and very fine
	Calcium carbonate	: Typically non-calcareous, occasionally calcareous
	Boundary form	: Clear, smooth
Upper subsoil	Texture	: Humose peat, fibrous peat, peaty loam or occasionally medium sand
	Colour	: Black (10YR 2/1/) or pale brown (10YR 6/3)
	Depth	: Typically 70 cm, range 50 cm to 90 cm
	Stoniness	: Stoneless
	Structure	: Not determined in peaty textures, otherwise single grain, massive
	Consistence	: Loose
	Porosity	: Undetermined
	Roots	: Common fine and very fine
	Calcium carbonate	: Typically non-calcareous, occasionally slightly calcareous
	Boundary form	: Sharp, smooth
Lower subsoil	Texture	: Medium sand
	Colour	: Yellowish brown (10YR 5/6), pale brown (10YR 6/3), light grey (7.5YR 7/1)
	Depth	: 120 cm plus
	Stoniness	: Stoneless
	Structure	: Single grain, massive
	Consistence	: Loose
	Porosity	: Undetermined
	Roots	: Very few fine and very fine
	Calcium carbonate	: Non-calcareous, typically pH 6
	Boundary form	: Not seen
Wetness Class:	I or II depending upon depth to medium sand	

Soil type III (8.6 hectares)

Topsoil	Texture	:	Organic sand
	Colour	:	Black (10YR 2/1)
	Depth	:	Typically 30 cm, range 20 cm to 35 cm
	Stoniness	:	Stoneless
	Structure	:	Not determined - plough layer
	Consistence	:	Not determined - plough layer
	Porosity	:	Not determined - plough layer
	Roots	:	Few very fine and fine
	Calcium carbonate	:	Non-calcareous
	Boundary form	:	Gradual, smooth
Upper subsoil	Texture	:	Medium sand or occasionally organic sand
	Colour	:	Light brownish grey (10YR 6/2), Very pale brown (10YR 7/3), if organic then black (10YR 2/1)
	Depth	:	Typically 45 cm, range 45 cm to 60 cm
	Stoniness	:	Stoneless
	Structure	:	Single grain, massive
	Consistence	:	Very friable
	Porosity	:	Undetermined
	Roots	:	Very few fine and very fine
	Calcium carbonate	:	Non-calcareous
	Boundary form	:	Gradual, smooth
Lower subsoil	Texture	:	Medium sand
	Colour	:	Yellowish brown (10YR 5/6), brown (10YR 4/3 and 5/3)
	Depth	:	120 cm plus
	Stoniness	:	Stoneless
	Structure	:	Single grain, massive
	Consistence	:	Very friable
	Porosity	:	Undetermined
	Roots	:	None seen
	Calcium carbonate	:	Non-calcareous
	Boundary form	:	Not seen

Wetness Class: I