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Agricultural Land Classification & Statement of Site Physical Characteristics

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AGRICULTURAL LAND CLASSIFICATION & STATEMENT OF SITE PHYSICAL CHARACTERISTICS

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INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) Survey of 40.3 hectares of land at Cherry Orchard, which is at Rochford to the north of Southend. The survey was carried out in April 1996. The site is bordered to the east by Southend Airport, to the south by industrial development, to the west by playing fields and brick works and to the north by a golf course and agricultural land.

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 for proposed brickearth extraction with subsequent restoration to agriculture. The present ALC survey supersedes all previous surveys at the site, notably the provisional 1:63 360 scale ALC map (MAFF, 1972) which showed the northern part of the site to be Grade 2 and the southern part Grade 1, and a reconnaissance survey in 1983 (ADAS, 1983) which showed the majority of the land to be Grade 1 but with small areas of Grade 2 and Subgrade 3a in the east.

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 1.

4. Most of the land is in agricultural use, which at the time of the survey consisted of mainly winter cereals but with one grass field in the south-east. Other non-agricultural land which was not surveyed comprises an area of woodland and scrub in the south-east corner of the site.

SUMMARY

5. The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1 overleaf.

Table 1: Areas of grades and other land

Grade/Other land	Area (hectares)	% surveyed
1	16.1	39.7
2	14.4	35.5
3a	8.4	20.7
Other land	1.7	4.1
Total agricultural land	38.9	95.9
Total survey area	40.6	100.0

6. The findings of the survey are shown on the enclosed 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.

7. The fieldwork was conducted at an average density of one auger boring per hectare. A total of 44 soil auger borings and five soil pits were dug to assess subsoil conditions. The location of the pits and the auger borings is shown on the accompanying Sample Point Map.

8. Most of the agricultural land is of excellent (Grade 1) or very good (Grade 2) quality, having only very minor limitations or suffering from a slight droughtiness and/or a slight wetness (see Appendix II) limitation. In the north of the site there is a band of good quality (Subgrade 3a) agricultural land where the droughtiness and/or wetness constraints are more pronounced.

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

Parameter	Value
Grid reference	*TQ 864 898*
Altitude (m, AOD)	13
Accumulated Temperature (day °C, Jan.–June)	1475
Average Annual Rainfall (mm)	549
Field Capacity Days	96
Moisture Deficit, Wheat (mm)	128
Moisture Deficit, Potatoes (mm)	126
Overall Climatic Grade	1

11 The climate criteria are considered first when classifying land as climate can be an overriding factor 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 assessmant 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 forms part of a gently sloping terrace. Gradients everywhere are less than 2°. The land slopes almost imperceptibly from about 12 m AOD towards the small stream and ditch along the northern and eastern boundaries of the site, at 9 m AOD. Thus neither gradient nor altitude impose limitations to land quality.

Geology and soils

15. The published 1:50 000 scale geology map (Geological Survey, 1976) shows virtually all of the site to be underlain by Pleistocene First to Third Terrace Loam (River Brickearth). There is a thin band of recent alluvium along the northern and eastern boundary of the site.

16. There is no detailed published soils information for the site. The relevant reconnaissance scale (1:250 000) soil map and legend (Soil Survey, 1983) shows the whole site to consist of the Hamble soil association, This association is described as comprising deep, stoneless, well-drained silty soils and similar soils affected by groundwater, all derived from aeolian silty drift (ie. brickearth).

17. The present survey of the site confirms an overall cover of virtually stoneless silty soils. Two soil types, briefly described in the following paragraphs, have been identified according to their different drainage characteristics and wetness class. The distribution of the two soil types

is shown on the accompanying 1:10 000 scale Soil Resources Map and a detailed description of their physical characteristics is given in Appendix III.

Soil Type I (25.4 hectares)

18. This soil covers most of the site. The topsoil, to 30/35 cm is a brown or dark greyish brown silt loam or medium silty clay loam. Silt loam topsoils predominate in the western half of the site and silty clay loam topsoils are more widespread in the centre. The upper and lower subsoils are brown or yellowish brown medium or heavy silty clay loam with weakly or moderately developed subangular blocky structures and few to common small manganese concretions. The soils are non-calcareous throughout and are well-drained and have been assessed as Wetness Class I.

Soil Type II (13.5 hectares)

19. This soil type occurs in the north and east of the site and is differentiated from soil type I by having in its subsoil mottles and gleying associated primarily with fluctuating groundwater levels. Typically, the topsoil, to 25/30 cm, is a dark or very dark greyish brown medium silty clay loam. The upper subsoil is a brown or greyish brown medium or heavy silty clay loam with distinct ochreous mottles. The lower subsoils, below about 45/60 cm, are medium or heavy silty clay loam, medium clay loam or heavy silty clay. Colour varies between light brownish grey and yellowish brown and there are common or many ochreous mottles and few or common manganese concretions. Both upper and lower subsoil have weakly or moderately developed blocky or prismatic structures and subsoil horizons may be calcareous. Subsoils are generally permeable (slowly permeable horizons occur only locally) and the soils, depending on the depth of gleying, have been assessed as Wetness Class II or III.

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.

21. The location of the auger borings and pits is shown on the attached sample location map and the details of the soil data are preseneted in Appendix III.

Grade 1

22. Grade 1 land occurs in the western part of the site and is associated with Soil Type I (described in paragraph 18) where the topsoils are silt loam. These soils are well-drained and drought-free, in that moisture balance calculations show the soil available water capacity (AWC) to be sufficient to offset the potential climatic deficits for the reference crops. The land is of excellent quality, suffering only from the very minor limitation of weakly developed soil structures which, in the topsoil, give rise to slight slaking and capping.

Grade 2

23. Grade 2 land occurs in the eastern part of the site. This is associated with Soil Type I where the topsoils are medium silty clay loam, and with Soil Type II where the effects of groundwater are less (wetness class II). In both cases, moisture balance calculations indicate a slight droughtiness limitation, where the soil AWC is somewhat inadequate for crop potential requirements. In addition, Soil Type II suffers from a slight wetness and workability limitation. Within the area of Soil Type II there may occur more poorly drained and therefore Subgrade 3a land, but such areas are localised and cannot be delineated separately at the scale of survey.

Subgrade 3a

24. Subgrade 3a land occurs in the north of the site close to the small stream that forms the northern boundary. This land includes those soils where the effects of groundwater are more severe in Soil Type II (wetness class III). There is a moderate wetness and workability limitation, requiring care with cultivations and harvesting to avoid structural damage to the soils. The Subgrade 3a land also includes better drained variants of Soil Type II (Wetness Class II) that, on account of texture and poor structural condition, have a moderate droughtiness limitation. Within the area mapped as Subgrade 3a there may be inclusions of Grade 2 land, but such areas are small and cannot be delineated separately at the scale of survey.

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SOURCES OF REFERENCE

ADAS (1983) *Agricultural Land Classification, Southend-on-Sea area.* Resource Planning Group, Land and Water Services, ADAS, Cambridge.

GEOLOGICAL SURVEY OF GREAT BRITAIN (1976) *Sheet 258/259, Southend & Foulness, Solid and Drift edition, 1:50 000 scale.*

MAFF (1972) *Agricultural Land Classification Map, Sheet 162, Provisional, 1:63 360 scale.*

MAFF (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 (1983) *Soils of England and Wales, Sheet 4, Eastern England, 1:250 000 scale map and legend.* Soil Survey of England and Wales: 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

Soil Type I

Topsoil	Texture	:	Medium silty clay loam; silt loam
	Colour	:	Brown (10YR4/3); dark greyish brown (10YR4/2)
	Stone	:	<1% small and medium, rounded
	Roots	:	Many and common, fine and very fine
	$CaCO^3$	:	Non-calcareous
	Depth	:	35/35 cm
	Boundary	:	Abrupt or clear, smooth
Upper subsoil	Texture	:	Medium or heavy silty clay loam
	Colour	:	Brown (7.5YR4.5/4, 4/3); yellowish brown (10YR5/4, 5/5)
	Mottles	:	None
	Concretions	:	None or few small manganese
	Stone	:	<1% small and medium, rounded
	Structure	:	Weak and moderate very coarse angular and subangular blocky
	Consistence	:	Friable
	Structural condition	:	Moderate
	Pores	:	>0.5%
	Roots	:	Common fine and very fine
	$CaCO^3$	:	Non-calcareous
	Depth	:	50/60 cm
	Boundary	:	Clear or abrupt, smooth
Lower subsoil	Texture	:	Medium or heavy silty clay loam
	Colour	:	Brown (7.5YR4.5/4, 4/3, 5/5); yellowish brown (10YR5/5)
	Mottles	:	None, or few faint yellowish brown (10YR5/8)
	Concretions	:	Few or common small manganese
	Stone	:	<1% small and medium, rounded
	Structure	:	Weak coarse and very coarse subangular blocky
	Consistence	:	Friable or firm
	Structural condition	:	Moderate
	Pores	:	<0.5%
	Roots	:	Few or common fine and very fine
	$CaCO^3$	:	Non-calcareous
	Depth	:	120 cm

Wetness Class: I

Soil Type II

Topsoil	Texture	:	Medium silty clay loam
	Colour	:	Very dark greyish bown (10YR3/2); dark greyish brown (10YR4/2)
	Stone	:	<1% small and medium, rounded; +/- occasional small chalky fragments
	Roots	:	Many and common, fine and very fine
	$CaCO^3$	:	Non-calcareous to slightly calcareous
	Depth	:	25/30 cm
	Boundary	:	Abrupt smooth
Upper subsoil	Texture	:	Medium or heavy silty clay loam; heavy silty clay
	Colour	:	Brown (10YR5/3, 4/3); dark greyish brown (10YR4/2); greyish brown (10YR5/2); yellowish brown (10YR5/4)
	Mottles	:	Few or common distinct ochreous
	Concretions	:	None or few small manganese
	Stone	:	<1% small and medium, rounded; +/- occasional small chalky fragments
	Structure	:	Weak and moderate coarse and very coarse subangular blocky
	Consistence	:	Friable or firm
	Structural condition	:	Moderate, occasionally poor
	Pores	:	+/- 0.5%
	Roots	:	Few or common fine and very fine, few medium
	$CaCO^3$	:	Non-calcareous to very calcareous
	Depth	:	45/60 cm
	Boundary	:	Clear or gradual, smooth
Lower subsoil	Texture	:	Medium or heavy silty clay loam; heavy silty clay; medium clay loam
	Colour	:	Brown (10YR5/3, 4/3); dark greyish brown (10YR4/2); greyish brown (10YR5/2); yellowish brown (10YR5/4); light brownish grey (10YR6/2); very pale brown (10YR7/3); pale brown (10YR6/3)
	Mottles	:	Many or common, distinct and prominent, ochreous
	Concretions	:	Few or common small manganese
	Stone	:	<1% small and medium, rounded; +/- up to 5% small chalky fragments
	Structure	:	Weak and moderate coarse and very coarse subangular blocky, prismatic
	Consistence	:	Friable or firm
	Structural condition	:	Moderate or poor

	Pores	:	+/- 0.5%
	Roots	:	Few or common fine and very fine, few medium
	$CaCO^3$	:	Non-calcareous to very calcareous; usually very calcareous at depth
	Depth	:	120 cm
Wetness Class:	II or III		