PROPOSED MOTORWAY SERVICE AREA, NEWTON, CAMBRIDGESHIRE.

Agricultural Land Classification
ALC Map and Report

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AGRICULTURAL LAND CLASSIFICATION REPORT

PROPOSED MOTORWAY SERVICE AREA, NEWTON, CAMBRIDGESHIRE.

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 70.7 ha of land located to the west and east of the M11 motorway at Newton in Cambridgeshire. The survey was carried out during October 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 a proposal by Halham Land Management Ltd to develop motorway service areas to the west and east of the M11 and to landscape adjoining land. 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, with the exception of a narrow band of maize pheasant cover, all the agricultural land east of the M11 was being cultivated and sown with winter wheat. Land west of the M11 comprised a recently emerged winter wheat crop. The area of the motorway itself is not included in the survey area.

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)	% site area
2	26.7	38
3a	37.4	53
3b	6.6	9
Total surveyed area	70.7	100
Total site area	70.7	-

7. The fieldwork was conducted at an average density of one auger boring per hectare. A total of 72 auger borings and 3 soil pits was described.

8. Approximately two fifths of the site has been graded 2 (very good quality agricultural land) and is restricted to this grade by a minor droughtiness limitation. About half the site has been assessed as subgrade 3a (good quality agricultural land) due to a moderate droughtiness constraint. A small area in the middle of the site is significantly droughty and has been graded 3b (moderate quality agricultural land).

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 5 km grid datasets using the standard interpolation procedures (Met. Office, 1989).

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	TL 455 495
Altitude	m, AOD	25
Accumulated Temperature	day°C (Jan-June)	1444
Average Annual Rainfall	mm	580
Field Capacity Days	days	102
Moisture Deficit, Wheat	mm	122
Moisture Deficit, Potatoes	mm	118
Overall climatic grade	N/A	Grade 1

11. The climatic criteria are considered first when classifying land as climate can be overriding because 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 it is relatively warm and dry during the critical crop growing period. The site is therefore of climatic grade 1.

Site

14. The site straddles the M11 motorway. To the north it adjoins a Bridlepath, to the west and east open fields or roads (Newton Road and Whittlesford Road respectively) and to the south open fields or woods. The highest point on site occurs in the centre, just west of the motorway, and has an altitude of 28 m AOD. From here the land slopes gently to the north, east, south and west, to reach the lowest points on site adjacent to the roads in the west and east, where the altitude is 18 m AOD. Nowhere on site do gradient or altitude impose any limitation to the agricultural quality of the land.

Geology and soils

15. The published 1:63 360 scale drift edition geology map, sheet 205 (Geological Survey of Great Britain [England and Wales], 1952) maps most of the site as Cretaceous Lower Chalk, with a narrow band of Valley Gravels ('lowest' and intermediate terraces) in the extreme east.

16. At a reconnaissance scale of 1:250 000 the Soil Survey of England and Wales (Sheet 4, Soils of Eastern England, 1983) maps the site as the Swaffham Prior Association, adjoining soils of the Milton Association in the extreme east, adjacent to Whittlesford Road. These two associations are briefly described as:

- Swaffham Prior: Well drained calcareous coarse and fine loamy soils over chalk rubble. Some similar shallow soils. Deep non-calcareous loamy soils in places. Striped and polygonal soil patterns locally. Slight risk of water erosion.
- Milton: Deep permeable calcareous fine loamy soils variably affected by groundwater. Some similar shallower well drained soils over gravel in places. Complex soils patterns in places.

17. The current detailed survey identified four soil types, all of which are well drained and calcareous throughout.

Soil Type I (36.3 ha)

18. Soil Type I occurs in three distinct areas, the largest of which is in the east, with smaller areas in the south and west. Topsoils typically comprise very slightly stony, medium sandy loam (occasionally sandy clay loam) and extend to 30/35 cm depth. Upper subsoils are very slightly stony and extend to 50/80 cm. They mostly comprise sandy clay loam textures, with medium sandy loam and occasionally medium clay loam occurring to a lesser extent. Lower subsoils mainly comprise sandy clay loam, medium or heavy silty clay loam or occasionally medium sandy loam textures. Profiles are typically very slightly stony (occasionally slightly to moderately stony) and mostly augerable to depth. The stone content comprises a mix of flints and chalk pieces, the latter increasing with depth and occasionally making profiles impenetrable to auger at 70/90 cm.

Soil Type II (29.4 ha)

19. Soil Type II occurs in a single large unit which surrounds Soil Type III. Topsoils comprise very slightly (occasionally slightly) stony medium sandy loams or medium clay loams which typically extend to 30 cm depth. Upper subsoils typically comprise medium clay loam

or medium silty clay loam textures (occasionally medium sandy loam or sandy clay loam) and extend to 50/70 cm. This horizon is mostly very slightly to slightly stony but occasionally becomes very stony, the stones consisting of chalk pieces. The lower subsoil typically comprises a predominantly chalk matrix which becomes impenetrable to auger at 55/90 cm. Where chalk does not predominate, the lower subsoil comprises medium clay loam, medium silty clay loam or heavy silty clay loam textures and is typically moderately to very stony (chalk stones) and augerable to depth.

Soil Type III (4.0 ha)

20. Soil Type III occurs in a small unit just west of the middle of the site. Topsoils comprise slightly to moderately stony medium clay loam which typically extends to 25/30 cm. Solid chalk is typically encountered immediately beneath the topsoil.

Soil Type IV (1.0 ha)

21. Soil Type IV occurs in a small wedge adjacent to the Whittlesford Road in the east, and corresponds to the Valley Gravel geology. Topsoils comprise moderately stony (flints) medium sandy loams which typically extend to 25 cm. Subsoils comprise moderately to very stony sandy clay loam or medium sandy loam to depth.

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.

Grade 2

24. The grade 2 land on site corresponds with the more moisture retentive slightly better bodied profiles within Soil Type I and the better bodied and deeper profiles (where chalk is only encountered at depth) within Soil Type II. These soils retain a good supply of water for crop growth but the relatively high moisture deficits in this locality mean the land is precluded from grade 1 by a minor droughtiness constraint.

Subgrade 3a

25. Land mapped as subgrade 3a mostly corresponds to the predominantly coarse loamy textured profiles within Soil Type I where chalk is sometimes encountered at depth, and to the profiles within Soil Type II which contain coarse loamy horizons and/or where chalk is encountered at moderate depth. The ability of these soils to retain water for crop growth is slightly limiting and this factor, combined with the moisture deficit figures, imposes a moderate droughtiness constraint which restricts the land to subgrade 3a.

26. Soil Type IV has also been graded 3a. The moderately stony coarse textured topsoils and moderately to very stony coarse loamy or fine loamy subsoils mean this land also suffers

from a moderate droughtiness constraint. Locally within this soil type 3b land occurs, but at the scale of this survey, these small pockets cannot be delineated separately.

Subgrade 3b

27. The area mapped as subgrade 3b corresponds to Soil Type III and to a small proportion of Soil Type II where solid chalk is encountered at shallow depth beneath a thin upper subsoil. From pit information it has been assessed that crop roots can only explore the top 20/30 cm of the solid chalk for water. In these profiles the combination of texture, chalk content and limited rooting depth mean that droughtiness is a significantly limiting factor. This land is thus restricted to subgrade 3b.

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SOURCES OF REFERENCE

Geological Survey of Great Britain (England and Wales), 1952, *Sheet 205, Saffron Walden* 1:50 000 scale.

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 4, Soils of Eastern England,* 1:250 000 scale, SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in Eastern England,* SSEW: Harpenden

APPENDIX I

DESCRIPTION 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 that 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 (eg. 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 that restricts use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

APPENDIX II

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

Soil Type I

Topsoil	Texture	medium sandy loam (occasionally sandy clay loam)
	Colour	10YR 4/2 (occasionally 10YR 4/3)
	Stone content	typically very slightly stony
	Roots	abundant very fine and fine
	Calcium carbonate	calcareous
	Boundary form	abrupt wavy
	Depth	30/35 cm
Upper subsoil	Texture	sandy clay loam (occasionally medium sandy loam or medium clay loam)
	Colour	typically 10YR 4/4 (occasionally 10YR 5/4, 5/6) very occasionally with a few 2.5Y 8/2 chalk fragments
	Stone content	very slightly stony (mostly flints)
	Structure	coarse and very coarse subangular blocky becoming more weakly developed with depth
	Consistence	friable
	Porosity	>0.5%
	Roots	many very fine
	Calcium carbonate	calcareous
	Concretions	none
	Boundary form	abrupt/clear, wavy
	Depth	50/80 cm
Lower subsoil	Texture	sandy clay loam, medium or heavy silty clay loam (occasionally medium sandy loam)
	Colour	variable, 10YR 6/4, 6/6, 7/6 and 5/6, often with 2.5Y 8/2 chalk fragments (typically few)
	Stoniness	typically very slightly stony (chalks and flints), occasionally slightly to moderately stony (mainly chalks) and increasing with depth
	Structure	massive
	Consistence	friable/firm
	Porosity	<0.5%
	Roots	common, decreasing to few, very fine
	Calcium carbonate	calcareous
	Concretions	none
	Depth	120 cm

Notes: Profiles are free draining and therefore Wetness Class I.

Soil Type II

Topsoil	Texture	medium sandy loam (occasionally medium clay loam)
	Colour	10YR 4/2, 4/3 (occasionally 10YR 5/3)
	Stone content	very slightly stony (occasionally slightly stony)
	Roots	many very fine and fine
	Calcium carbonate	calcareous
	Boundary form	abrupt wavy
	Depth	30 cm
Upper subsoil	Texture	medium clay loam or medium silty clay loam (occasionally medium sandy loam or sandy clay loam)
	Colour	typically 10YR 4/4, 5/4, 6/4 and 5/5 often with 2.5Y 8/2 chalk fragments
	Stone content	very slightly to slightly stony (mix of flints and chalks), occasionally becoming very stony where the chalk increases
	Structure	weakly developed medium and coarse subangular blocky
	Consistence	friable
	Porosity	>0.5%
	Roots	many very fine and fine
	Calcium carbonate	calcareous
	Concretions	none
	Boundary form	clear, wavy
	Depth	50/70 cm
Lower subsoil	Texture	typically a predominantly chalk matrix. Where chalk does no predominate textures include medium clay loam and medium or heavy silty clay loam
	Colour	typically 2.5Y 8/2 (chalk) with 10YR 6/4 (occasionally 10YR 5/4, 7/4 and 7/6) inclusions
	Stoniness	either classed as solid chalk or moderately to very stony (comprising chalk stones)
	Structure	massive
	Consistence	firm
	Porosity	<0.5%
	Roots	few, very fine (roots only penetrate 20/30 cm into solid chalk)
	Calcium carbonate	calcareous
	Concretions	none
	Depth	120 cm

Notes: Profiles are free draining and therefore Wetness Class I.

Soil Type III

Topsoil	Texture	medium clay loam
	Colour	10YR 5/3
	Stone content	slightly to moderately stony (variable proportions of chalk and flints)
	Roots	many very fine and fine
	Calcium carbonate	calcareous
	Boundary form	abrupt, wavy
	Depth	25/30 cm
Subsoil	Texture	typically predominantly chalk matrix from immediately beneath the topsoil.
	Colour	2.5Y 8/1 and 8/2 with occasional small 10YR 6/4 (occasionally 10YR 5/4) inclusions and staining mainly in upper 20/30 cm
	Stoniness	solid chalk (slightly weathered and fissured in upper 20/30 cm)
	Structure	initially moderately developed medium subangular blocky to approximately 40 cm, then chalk rubble to 60 cm, fissured solid chalk to 75 cm, then solid chalk with only the occasional crack to depth
	Consistence	friable (to 40 cm) then increasing from firm to extremely firm with depth
	Porosity	<0.5%
	Roots	many very fine and fine to 40 cm, then very few very fine to 60 cm. Very occasional very fine root found in fissures to 75 cm, no roots below this depth.
	Calcium carbonate	calcareous
	Concretions	none
	Depth	120 cm

Notes: Profiles are free draining and therefore Wetness Class I.

Soil Type IV

This soil type occurs in a very limited area in which no full size pit was dug. A small 'pitette' was however dug to assess topsoil and upper subsoil stone contents. Topsoils comprise moderately stony (flints) medium sandy loams which typically extend to 25 cm. Subsoils comprise moderately to very stony sandy clay loam or medium sandy loam to depth.

Notes: Profiles are free draining and therefore Wetness Class I.