

PHYSICAL CHARACTERISTICS REPORTS INCORPORATING AGRICULTURAL LAND CLASSIFICATION

LAND AT WOODHOUSE FARM, RIVENHALL AIRFIELD, KELVEDON, ESSEX

1.0 INTRODUCTION

- 1.1 A Soil and Agricultural Land Classification (ALC) survey was carried out over 202 ha of land at Woodhouse Farm, Rivenhall Airfield, Kelvedon, Essex in connection with a planning application to extract sand and gravel.
- 1.2 The site is located on the former wartime Bradwell airfield approximately 1 km to the north east of the village of Silver End. The land comprises an area of arable agricultural land which is dissected by a system of concrete runways, together with associated hard standing, airfield buildings, the abandoned farm steading of Woodhouse Farm and areas of scrub woodland.
- 1.3 A total of 151 auger borings were made over the whole site using a dutch auger. In addition 5 soil pits were dug to help assess subsoil conditions in greater detail. Reference was also made to the findings of a previous survey which was carried out in 1987 over the northern part of the site in which 77 auger borings were made.
- 1.4 At the time of survey the majority of the land was under winter cereal (wheat and barley) cropping, with a small area of potatoes at the eastern end of the site.
- 1.5 On the published Provisional ALC map, sheet number 149 (MAFF 1974) the whole site is shown as grade 2.

2.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

- 2.1 Climatic information for the site has been interpolated from the 5 km grid dataset produced by the Meteorological Office (Met Office, 1989). The average annual rainfall for the site is 589 mm making this one of the driest areas of the country.

The number of days that the soils are likely to be at field capacity in this area is 106.

- 2.2 The accumulated temperature for the site is approximately 1420 degrees Celsius. This parameter indicates the cumulative build-up of warmth available for crop growth and in conjunction with rainfall has an influence on the development of soil moisture deficits and susceptibility to drought. The moisture deficits for wheat and potatoes are 123 mm and 119 mm respectively.
- 2.3 Although there is no climatic limitation *per se* to the agricultural use of the site, there may be restrictions caused by the interaction between climate and soils, giving rise to droughtiness during the summer months and wetness and workability restrictions during the wetter parts of the year.

Relief

- 2.4 The site is relatively level with some very minor slopes to the south and east. The altitude ranges from 52 m AOD on the western side of the site near Sheepcotes Farm, falling to approximately 45 m AOD in the valley bottom to the south of Allshots Farm. Relief therefore does not impose any restrictions on the farming of the land.

3.0 AGRICULTURAL LAND CLASSIFICATION

- 3.1 The land has been classified in accordance with the guidelines of the Agricultural Land Classification of England and Wales (MAFF, 1988). A breakdown of the individual grades is given below:

Grade	Area	%
2	43.4	21.5
3a	115.6	57.2
Non Agricultural	6.5	3.2
Urban	36.5	18.1
Total	202.0	100.0

Grade 2

- 3.2 Three areas of grade 2 land have been identified which correlate with the better structured and consequently better drained, calcareous soils developed on the chalky boulder clays, Soil Type 1, as described in paragraphs 4.4 and 4.5. These soils have heavy clay loam topsoils and clay subsoils with moderate structure and as such have a slight droughtiness restriction. Moisture balance figures indicate that they are restricted to a grade 2 potential for both reference crops (winter wheat and maincrop potatoes).
- 3.3 In addition these soils have a minor wetness/workability restriction. Examination of auger bores in combination with soil pits, revealed that such soils were not gleyed within 40 cm, although mottling was generally present within 70 cm. Furthermore, in some cases the soils did not have slowly permeable subsoil horizons within 80 cm and they have therefore been classified either as wetness class I or II. The presence of calcareous heavy clay loam topsoil will therefore restrict the soils to a grade 2 potential.

Grade 2

- 3.4 Included within this grade are the lighter textured soils of Soil Type 2 which occur on the valley side to the south and east of Woodhouse Farm. These soils have non calcareous medium clay loam topsoils and are assessed as wetness class II.

Grade 3a

- 3.5 The majority of the site has been classified as grade 3a and includes the poorer structured soils of Soil Type 1 (see paragraph 4.5) as well as those mapped as Soil Type 2 described in paragraphs 4.6 and 4.7. These soils are again limited by droughtiness and wetness/workability restrictions.
- 3.6 Both soil types have clay subsoils with moderate structures in the upper subsoils and poor structures in the lower subsoil. Moisture balance calculations indicate a moderate droughtiness limitation restricting them to grade 3a for potatoes and either grade 2 or 3a for wheat depending on the depth to the poorly structured lower subsoils.

- 3.7 Within the area mapped as grade 3a, the majority of the soils of both mapping units have been assessed as wetness class II, with some profiles of wetness class III. Soils which are wetness class II and have heavy clay loam textured topsoils will be restricted to a grade 3a potential, or grade 2 if naturally calcareous. However, where profiles of wetness class III are recorded, then the soil is restricted to grade 3b, although if the topsoil is naturally calcareous as in the case of Soil Type 1, this will result in upgrading to grade 3a. The land within the grade 3a mapping unit consists of profiles which are predominately grade 3a. Although some grade 2 and 3b profiles do exist, these are not in discrete mappable areas.

Urban

- 3.8 The land which comprises the old runways and buildings has been mapped as urban.

Non Agricultural

- 3.9 Some non agricultural land has been mapped to the south west of Woodhouse Farm. This comprises areas of scrub woodland.

4.0 SOIL PHYSICAL CHARACTERISTICS

Geology

- 4.1 The entire site is mapped as Boulder Clay on the 1:50,000 geological map which covers the area (Geological Survey, 1982).

Soils

- 4.2 The reconnaissance soil survey map for the area (Soil Survey, 1984) shows the site to comprise mainly Oak 2 Association (*1) with some Hanslope Association (*2) on the northern and western sides.

(*1) Oak 2 Association: slowly permeable seasonally waterlogged fine loamy over clayey and fine silty over clayey soils. Some clayey soils with chalky subsoil.

(*2) Hanslope Association: slowly permeable calcareous clayey and fine loamy over clayey soils. Some slowly permeable non calcareous clayey soils.

- 4.3 Two soil types have been distinguished during the current survey and their distribution is shown on the attached plan.

Soil Type 1 (refer to Appendix 2 and Soil Types Map)

- 4.4 This soil type occupies the majority of the site and comprises heavy textured clayey soils developed on the Chalky Boulder Clay. A typical soil profile has a dark greyish brown heavy clay loam topsoil with few subangular flint stones, over a upper subsoil comprising a brown clay which in some profiles exhibited faint ochreous mottling. Below this horizon is the chalky boulder clay which generally has ochreous mottling and abundant chalk stones. Subsoil structures are usually moderately developed coarse subangular blocky in the upper subsoil, overlying either angular blocky or sometimes subangular blocky structures in the chalky boulder clay.
- 4.5 Soil pits indicated that where there is common distinct ochreous mottling then that layer is slowly permeable. The chalky boulder clay is typically encountered within 40-70 cm depth and the soils are generally naturally calcareous throughout. However in some parts of the site the topsoils are only very slightly calcareous, whilst in others there is evidence of liming. The soils have been assessed as wetness class II with occasional profiles of wetness class I where the boulder clay has a high proportion of soft chalk stones giving rise to better structure and improved porosity, and wetness class III where the porosity is poorer.

Soil Type 2 (refer to Appendix 2 and soil types Map)

- 4.6 Two areas of this soil type occur on the site, with the largest area occupying the southern part of the site and a small area to the south of Maxey's Spring. These soils have decalcified upper layers over chalky boulder clay at depth. A typical soil profile has a non calcareous heavy clay loam topsoil to approximately 30 cm depth over a non calcareous brown or grey brown heavy clay loam or clay upper subsoils with faint ochreous mottling. Below about 50 cm depth the soils generally become slightly greyer with common distinct ochreous mottling before the chalky boulder clay is encountered between 70-100 cm depth. On the valley side to the south and east of Woodhouse Farm, topsoil textures were typically medium clay loam.

4.7 The soils have been assessed as wetness class II although very occasional profiles with gleying above 40 cm were found giving rise to wetness class III.

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Huntingdon Statutory Group

REFERENCES

- GEOLOGICAL SURVEY OF GREAT BRITAIN (1982). Solid and Drift Edition
Geology Map Sheet No. 223 (Braintree) 1:50,000 scale.
- MAFF (1974). Agricultural Land Classification Map (provisional) Sheet No. 149
1:63,360 scale.
- MAFF (1988). Agricultural Land Classification of England and Wales - Revised
guidelines and criteria for grading the quality of agricultural land.
- METEOROLOGICAL OFFICE (1989). Climatological Data for Agricultural Land
Classification.
- SOIL SURVEY OF ENGLAND AND WALES (1984). Soils and their Use in Eastern
England.

Appendix 1

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 include 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 and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable crops. The level of yields is generally high but may be lower or more variable than Grade 1.

Grade 3 - good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where 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 winter 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 levels of yields. It is mainly suited to grass with occasional arable crops (eg. cereals and forage crops) the yield of which are variable. In most 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 very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

Appendix 2

SOIL PHYSICAL CHARACTERISTICS

WOODHOUSE FARM, RIVENHALL AIRFIELD, KELVEDON, ESSEX

SOIL TYPE 1 (155 ha)

Topsoil	Texture	:	heavy clay loam
	Colour	:	10YR4/3 grey brown
	CaCO ₃	:	<i>slightly calcareous or calcareous</i>
	Stones	:	2-3% small flints
	Depth	:	25-35 cm typically 30 cm
Subsoil 1	Texture	:	clay
	Colour	:	10YR5/4 yellowish brown
	Mottles	:	few faint ochreous, occasionally none
	CaCO ₃	:	calcareous
	Structure	:	moderate coarse subangular blocky
	Consistence	:	firm
	Stones	:	few small flints and occasional chalks
	Depth	:	40-70 cm typically 60 cm
Subsoil 2	Texture	:	clay
	Colour	:	2.5Y6/3 light brownish grey
	Mottles	:	common distinct ochreous and few grey.
	CaCO ₃	:	strongly calcareous
	Structure	:	moderate coarse angular occasionally subangular blocky.
	Consistence	:	10-20% chalk stones
	Stones	:	variable

Wetness class II with occasional profiles of wetness class I and III.

SOIL TYPE 2 (47 ha)

Topsoil	Texture	:	medium or heavy clay loam
	Colour	:	10YR4/3 grey brown
	CaCO ₃	:	non calcareous
	Stones	:	2-3% small flints
	Depth	:	25-35 cm typically 30 cm
Subsoil 1	Texture	:	heavy clay loam
	Colour	:	10YR5/4 yellowish brown
	Mottles	:	few faint occasionally common distinct ochreous
	CaCO ₃	:	non calcareous
	Structure	:	moderate coarse subangular blocky
	Consistence	:	firm
	Stones	:	3-5% flints
	Depth	:	40-60 cm
	Subsoil 2	Texture	:
Colour		:	2.5Y6/3 light brownish grey
Mottles		:	common distinct ochreous
CaCO ₃		:	slightly calcareous
Structure		:	moderate coarse angular blocky
Consistence		:	firm
Stones		:	3-5% flints
Depth		:	60-100 cm
Subsoil 3		Chalky boulder clay as per Subsoil 2 horizon of Soil Type 1.	

Wetness class II, occasionally wetness class III.