AGRICULTURAL LAND CLASSIFICATION
AND SOIL RESOURCES
LAND AT GREAT TOTHAM,
NR. MALDON, ESSEX

ADAS

CONTENTS

AGRICULTURAL LAND CLASSIFICATION AND SOIL RESOURCES

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1. INTRODUCTION

1.1 This report provides detailed information on agricultural land quality and soil resources of this 32 hectare site. The site survey was carried out during December 1991.

1.2 The Agricultural Land Classification provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can operate in one or more of four principal ways: they may affect the range of crops which can be grown, the level of yield, the consistency of yield and cost of obtaining it. The classification system gives considerable weight to flexibility of cropping, whether actual or potential, but the ability of some land to produce consistently high yield of a somewhat narrower range crops is also taken into account.

1.3 The principal physical factors influencing agricultural production are climate, site and soil. The main climate factors which are taken into account are temperature and rainfall, although account is also taken of exposure, aspect and frost risk. The site factors used in the classification system are gradient, micro relief and flood risk. Soil characteristics of particular importance are texture, structure, depth and stoniness. In some situations chemical properties may also influence the long term potential of land and are taken into account.

1.4 These factors result in varying degrees of constraint on agricultural production. They can act either separately or in combination, the most important interactive limitations being soil wetness and droughtiness. The grade or subgrade of land is determined by the most limiting factor present. Five grades of land are recognised ranging from Grade 1 land of excellent quality to Grade 5 land of very poor quality. Grade 3, which constitutes about half of the agricultural land in England and Wales is divided into two subgrades designated 3a and 3b.

1.5 Details of the Agricultural Land Classification (ALC) System are contained in MAFF's Technical Report "Revised guidelines and criteria for grading the quality of agricultural land". Description of the ALC grades and subgrades are provided in Appendix 1.

2. BACKGROUND TO THE SITE

2.1 On the Ministry's published 1:63360 scale provisional ALC Map Sheet 162 (MAFF, 1972) the site is mapped as grade 3. Since this map is of a reconnaissance nature designed primarily for strategic planning purposes, the current survey was undertaken to provide more detailed information on land quality for the site.

2.2 The site has three large enclosures and recent cropping includes cereals and oil seed rape.

2.3 A total of 33 soil inspections were made over the site using a hand held 120 cm Dutch soil auger. These inspections were supplemented by observations from two soil profile pits. In addition, riddling was carried out throughout the site to determine topsoil stone contents.

3. SITE PHYSICAL CHARACTERISTICS

Climate

3.1 Site specific climate data has been obtained by interpolating information contained in the 5km grid dataset produced by the Meteorological Office, (Met Office, 1989).

3.2 This dataset indicates that for the site's mid range altitude of 25 m AOD the annual average rainfall is 547 mm (21.5"). Soils are likely to be at field capacity for a period of 96 days. During this time the timeliness of cultivations is important to avoid structural damage to the fine textured soils within the survey area.

3.3 The accumulated temperature for this area is approximately 1452 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 (SMD)* and susceptibility to drought; soil moisture deficits of 128 mm and 126 mm are recorded for wheat and potatoes respectively.

3.4 The site is neither particularly exposed nor frost prone.

3.5 These climatic characteristics do not constitute a limitation to the agricultural land classification grade.

Altitude and Relief

3.6 The site comprises a gently sloping area, falling from the west to the east over an altitude range of 35 to 15 m AOD. Gradient and altitude do not constitute limitations to the ALC grade.

4. AGRICULTURAL LAND CLASSIFICATION

4.1 The majority of the survey area is graded 3a with a smaller area of grade 3b to the east. A precise breakdown of the ALC grades in hectares and % terms is provided below.

	AGRICULTURAL LAND CLASSIFICATION	
Grade	ha	%
3a	21.3	67
3b	10.0	31
Non Agricultural/ Urban	0.7	2
TOTAL	32.0	100

* SMD represents the balance between rainfall and potential evapotranspiration occurring during the growing season. For ALC purposes the soil moisture deficits developing under a winter wheat and maincrop potato cover are considered. These 'reference' crops have been selected because they are widely grown, and in terms of their susceptibility to drought, are representative of a wide range of crops.

Subgrade 3a

4.2 Land at higher elevations and adjacent to Catchpole Brook, to the east, have been graded 3a. Typical profiles are fully described in paragraph 5.2.1, in summary they comprise slightly stony* clay loams over clays at depth (40/50 cm^{+}). At the boundary with the subgrade 3b land subsoils typically overlie gravelly material 55/70 cm^{+}. Profile pit observations indicate that the subsoils are slowly permeable at depth (typically wetness class II or occasionally wetness class III). The occurrence of fine textures and flints throughout the soil profile has a moderate limiting effect on the available moisture capacity of this soil. Consequently droughtiness is the chief limitation to the ALC grade. Occasionally wetness and workability imperfections combine with droughtiness to exclude the land from a higher grade.

Subgrade 3b

4.3 The remainder of the site has been graded 3b. The soils are described in full in paragraph 5.2.2; in summary they generally comprise moderately stony clay loams of shallow depth over gravelly material. The presence of many flints throughout the soil profile imposes a significant restriction on this land to retain water for crop growth. As a result droughtiness imperfections restrict the land to subgrade 3b (moderate quality agricultural land).

Non Agricultural/Urban

4.4 Woodland and a cemetery have been mapped as Non Agricultural and urban respectively.

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* Small areas of moderately stony top soils outcrop adjacent to the northern track, however they cover too small an area to delineate separately at this survey scale.

5. SOIL PHYSICAL CHARACTERISTICS

Geology

5.1 The published 1:50,000 scale geology sheet 241 (Chelmsford, Geol. Survey 1975) and Mineral Assessment Report 72/6 (1:25000, IGS 1972) show the site to comprise mainly head deposits with smaller deposits of sand and gravel, London Clay and alluvium.

5.2 The current detailed soil survey shows the occurrence of two main soil types on site.

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

5.2.1 These soils cover the majority of the site, equating to an area of approximately 19 hectares (59%). They typically comprise medium or heavy clay loam topsoils over heavy clay loam (or occasionally clay) upper subsoils which merge into clays 40/50 cm^{+}. At the periphery of this soil type subsoils overlie gravelly material at depths 55/70 cm^{+}. Profiles are slightly stony throughout with stones generally comprising small and medium flints.

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

5.2.2 These soils are stonier and cover an area of approximately 13 hectares(41%). They generally comprise moderately stony medium or heavy clay loams of relatively shallow depth over gravelly material. At the boundary of this soil with soil type 1 the depth to the gravel increases.

REFERENCES

GEOLOGICAL SURVEY OF GREAT BRITAIN 1975, Solid and drift edition geology Sheet 241 (Chelmsford) 1:50,000 scale.

INSTITUTE OF GEOLOGICAL SCIENCES, 1972 'The sand and gravel resources in the country around Witham, Essex'. Mineral Assessment Report No 72/6, Sheet TL81 1:25,000 scale.

MAFF, 1972. Agricultural Land Classification Sheet 162 Provisional. Scale 1;63360.

MAFF, 1988. Agricultural Land Classification of England and Wales. (Revised Guidelines and Criteria for grading the quality of Agricultural Land) Alnwick.

METEOROLOGICAL OFFICE, 1989. Published climatic data extracted from the agroclimatic dataset, compiled by the Meteorological Office.

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 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 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 root crops. The level of yield 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. 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 3a - 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 level 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 RESOURCES

LAND AT GREAT TOTHAM, NR MALDON, ESSEX

SOIL TYPE 1 (approximately 19 hectares)

TOPSOIL	Texture	:	medium clay loam or heavy clay loam, occasionally sandy clay loams.
	Stone	:	ranges from 5 to 15%* small and medium flints, typically 10% total stone mainly medium in size.
	Depth	:	30/35 cm
UPPER SUBSOIL	Texture	:	heavy clay loam or occasionally clay
	Stone	:	ranges from 5 to 15% small and medium flints, typically 7%.
	Structure	:	moderately developed coarse subangular blocky, tending towards angular blocky where ped faces are gleyed.
	Consistence	:	firm
	Roots	:	common fine and very fine
	Porosity	:	approximately 0.1% biopores
	Depth	:	40/50 cm
LOWER SUBSOIL	Texture	:	clay or occasionally clay loam**
	Stone	:	ranges from 5 to 10% small flints
	Structure	:	moderately developed coarse angular blocks
	Consistence	:	firm
	Roots	:	common fine and very fine
	Porosity	:	approximately 0.1% biopores
	Depth	:	120 cm

* Small areas of moderately stony top soils outcrop adjacent to the northern track, however they cover too small an area to delineate separately of this survey scale.

** Subsoils overlie gravelly material 55/70 cm^{+} at the periphery of this soil type.

APPENDIX 2 (cont)

SOIL TYPE 2 (approximately 13 hectares)

TOPSOIL	Texture	:	medium clay loam or heavy clay loam
	Stone	:	10 to 25% small and medium flints, typically 15% total stone predominately medium in size.
	Depth	:	30 cm
UPPER SUBSOIL	Texture	:	medium or heavy clay loam
	Stone	:	as for topsoil, mainly medium in size
	Structure	:	too stony to assess, tending towards blocky
	Roots	:	common fine and very fine
	Depth	:	40 cm
LOWER SUBSOIL/ PARENT MATERIAL	Gravelly material: typically comprises approximately 45% flints in a matrix of medium sand and clay loam. Common fine and very fine roots throughout.		

Great Totham, Nr Maldon
Essex

Map 1: Agricultural Land Classification

Map 2: Soil Types

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