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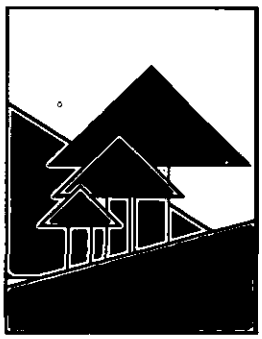

LAND
MANAGEMENT
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A D A S

AGRICULTURAL DEVELOPMENT AND ADVISORY SERVICE

Agricultural Land Classification
&
Statement of Soil Physical Characteristics

Frating Hall, Colchester,
Essex

AGRICULTURAL LAND CLASSIFICATION

LAND AT FRATING HALL, COLCHESTER, ESSEX

1.0 INTRODUCTION

1.1 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 the cost of obtaining it. The classification systems gives considerable weight to flexibility of cropping, whether actual or potential, but the ability of some land to produce consistently high yields of a somewhat narrower range of crops is also taken into account.

1.2 The principal physical factors influencing agricultural production are climate, site and soil. The main climatic 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.

1.3 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.

1.4 Details of the Agricultural Land Classification (ALC) System are contained in MAFF's Revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988). Descriptions of the ALC grades and subgrades are provided in Appendix I.

2. BACKGROUND TO THE SITE

2.1 An initial indication of land quality at Frating is available from the Ministry's 1:63,360 scale reconnaissance ALC map (MAFF 1969). This shows the majority of the site to be grade 2 with a small area of grade 3 to the south of Frating Lodge.

2.2 This information was supplemented in September 1987 by further semi-detailed survey work for the Essex County Mineral Plan. Although this refined information contained on the 1:63,360 scale ALC map, it still gave a fairly generalised impression of land quality at Frating Hall.

2.3 Consequently a detailed ALC survey was undertaken in November 1989, during which time a full inventory of soil resources was also compiled for restoration planning purposes.

2.4 At the time of survey the land was in arable use, with typical crops including potatoes, winter cereals and autumn sown onions. A total of 70 soil inspections were made over the site on a 100m grid basis giving an intensity of inspection of approximately 1 per hectare. Soils were sampled to a depth of 120cms using a hand held Dutch soil auger and data collected was supplemented by observations from 3 soil profile pits.

3. PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

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

3.2 This shows that Frating Hall has an annual average rainfall of approximately 560mm which is low by national standards. Soils are at field capacity for a relatively short period of about 96 days.

3.3 The accumulated temperature for this area is approximately 1439 degrees celsius. This parameter gives an indication of the cumulative build up of warmth available for crop growth, and influences the development of soil moisture deficits (SMD)* and hence susceptibility to drought. The soil moisture deficits for wheat and potatoes at Frating Hall are 128mm and 125mm respectively, which are slightly higher than average for lowland England.

3.4 The site is neither particularly exposed nor frost prone.

3.5 Climate itself is not limiting to agricultural land quality. However, the interaction of climate with soil texture in this relatively dry geographical area results in some soils being susceptible to drought.

Altitude and Relief

3.6 The site mainly occupies level and gently undulating land between altitudes of 22m and 29m above OD. Although more pronounced gradients were noted in the small valleys to the north west of Frating Hall, these do not constitute a limitation to agricultural land use.

* 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.

Soil Drainage

3.7 Although groundwater levels in the acquifer underlying the site are understood to be subject to slight fluctuations, this is not believed to significantly affect soil drainage on site and soils have been assessed as wetness class I and II.

Geology and Soils

3.8 No detailed published geology map is available for this area. However, the published 1:253,440 scale drift edition geology map (Geol. Surv, 1931) shows the majority of the site to comprise glacial loam deposits with the exception of land to the south and north west of Frating Hall, where glacial sands and gravels are mapped.

3.9 Field observations indicate that glacial sands and gravels extend further eastwards than the drift geology map indicates, and that they also underlie the glacial loams in the eastern part of the site.

3.10 The generalised 1:250,000 scale soil map "Soils in Eastern England" (SSEW, 1983) identifies soils of the Tendring Association* to the immediate north, and to the east of Frating Hall, with soils of the Wix Association** being mapped to the north of the reservoirs and in the northwest corner of the site.

3.11 Field survey observations broadly support this general description, but indicate that coarser textured soils of the Wix Association also extend to the east of Frating Hall. Three main soil types were identified on site:

3.12 To the north east of the site soils comprise of deep stoneless or very slightly stony profiles of sandy silt loam or fine sandy silt loam textures to between 55cm and 70cm deep overlying medium clay loam, medium silty clay loam or sandy clay loam, which in turn rests over sandy gravel or clayey gravel below 70-90cm depth.

* Tendring Association: Deep often stoneless coarse loamy soils some slowly permeable, seasonally waterlogged coarse and fine loamy over clayey soils. Patterned ground locally.

** Wix Association: Deep permeable coarse loamy soils affected by ground water. Associated with well drained sandy and coarse loamy soils and some slowly permeable seasonally waterlogged fine loamy over clayey and clayey soils giving patterned ground locally, slight risk of water erosion.

3.13 The second main soil type occurs north of Rectory Road, west of Frating Lodge and in a small area south of Holly Farm. Soils within this area are variable texturally, both laterally over short distances, and vertically within the soil profile. In very general terms they comprise sandy loam, sandy silt loam or medium clay loam topsoils over medium loamy subsoils (typical textures include sandy loam, sandy silt loam, sandy clay loam, medium clay loam and medium silty clay loam). Subsoils occasionally extend to one metre depth, but typically overlie sandy, or impenetrable clayey and gravelly horizons below 50-80cm. Profiles range from stoneless or very slightly stony towards the southeast of the site, to moderately stony in small areas immediately north east of Frating Hall.

3.14 The third main soil group occurs northwest of Frating Hall. Profiles in this area are generally slightly stony and comprise of sandy loam, or sandy clay loam textures overlying sand or gravelly sand below 35-45cm depth.

4.0 AGRICULTURAL LAND CLASSIFICATION

Land in this site has been graded 1, 2, 3a and 3b. Land quality has been assessed on the basis of agricultural potential in an irrigated state, since irrigation from an adequate and assured water supply is currently practised on site. A breakdown of land quality in hectares and percentage terms is provided below.

ALC	Ha	%
1	29.6	41.4
2	16.8	23.5
3a	18.5	26.0
3b	4.7	6.6
NA	1.8	2.5
Total	71.4	100.0

Grade 1

4.1 This is mapped in two locations:

Firstly to the northeast of the site where it occurs as an area of deep water retentive fine sandy silt loam and sandy silt loam soils which are more fully described in paragraph 3.12. Secondly to the southeast of the site, where it is mapped in area of stoneless or very slightly stony fine sandy silt loam or medium silty clay loam soils which typically overlie impenetrable gravelly horizons below 70-80cm depth (see paragraph 3.13).

4.2 Soils in these areas are mainly assessed as wetness class I, and with the benefit of irrigation water this land has no overriding limitation to agricultural use.

Grade 2

4.3 This is mapped in areas of deeper and/or less stony soil variants, which are more fully described in paragraph 3.13. Profiles are typically stoneless or slightly stony and comprise of fine sandy silt loam, sandy silt loam or medium clay loam textures overlying impenetrable gravelly horizons below 60-70cm depth. Although areas of increased surface stone do occur immediately north east of Frating Hall, topsoil riddling indicates that no more than 5% of total stones are in the size range 2cm and above, consequently these areas remain eligible for grade 2. Land of this type is usually assessed as moderately droughty, however, the availability or irrigation water, effectively alleviates a substantial part of this droughtiness limitation and the land is consequently graded 2.

Grade 3a

4.4 This is mapped to the south and east of Frating Hall, and in a small area in the northwest of the site, in areas of shallower, stonier, and/or more coarse textured soil types, which are more fully described in paragraph 3.13. The land is limited by moderate droughtiness imperfections which are only partly alleviated by the availability of irrigation.

Grade 3b

4.5 This is mapped in an area of particularly shallow, light textured soils northwest of Frating Hall which are more fully described in paragraph 3.14.

November 1989

Resource Planning Group
Cambridge RO

Sources of Reference

MAFF, (1988). Agricultural Land Classification of England and Wales. Revised guidelines criteria for grading the quality of agricultural land.

MAFF, (1969). 1:63,360 scale Agricultural Land Classification Sheet No 162 (Provisional).

METEOROLOGICAL OFFICE, (1989). Grid point meteorological data for ALC of England and Wales, and other climatological investigations.

GEOLOGICAL SURVEY, (1931). 1:253,440 scale drift edition geology map, sheet number 16.

SOIL SURVEY OF ENGLAND & WALES (1983). 1:250,000 scale soil map, sheet 4, Eastern England.

SOIL SURVEY OF ENGLAND & WALES (1984). Bulletin Number 13, Soils and their use in Eastern England.

APPENDIX I

DESCRIPTION OF THE GRADES AND SUBGRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. In practice, the grades are defined by reference to physical characteristics and the grading guidance and cut-offs for limitation factors in Section 3 enable land to be ranked in accordance with these general descriptions. The most productive and flexible land falls into Grades 1 and 2, and Subgrade 3a land collectively comprises about one-third of the agricultural land in England and Wales. About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4. Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in Grade 5, which mostly occurs in the uplands.

Descriptions are also given of other land categories which may be used on ALC maps.

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. 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 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 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 very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

FRATING HALL, COLCHESTER, ESSEX

SOIL TYPE I

TOPSOIL	Texture :	sandy loam or sandy silt loam, occasionally medium silty clay loam or medium clay loam.
	Colour :	10YR 4/3 dark brown
	Stone :	in the range 0-15%, typically 2-3% comprising very small to medium subangular flints and subrounded pebbles. (Approximately one third of total stone is > 2cm)
	Depth :	35-40 cm
	Structure :	cultivation zone - not applicable
	Boundary :	clear smooth.
	Roots :	common fine and very fine.
SUBSOIL*	Texture :	variable:- sandy loam, sandy silt loam, sandy clay loam, medium clay loam and medium silty clay loam.
	Colour :	variable, typically 10YR 5/4 yellowish brown also includes 10YR 6/6 brownish yellow; 10YR 6/4 light yellowish brown; 7.5YR 5/3 and 10YR 5/3 brown
	Stone :	in the range 0-15%; typically 5-10%; often concentrated at the topsoil, subsoil interface. Size distribution as above.
	Depth :	typically in the range 50-80 cm.
	Structure :	moderately developed coarse and very coarse subangular blocky tending towards coarse and very coarse platey 40-50 cm; where compacted.
	Consistence :	typically firm, occasionally friable.
	Porosity :	approximately 5% biopores, plus common very fine pores.
	Boundary :	clear smooth
	Roots :	few fine and very fine; often in pores or worm holes.

MINERAL/ LOWER SUBSOIL*	Texture :	variable - ranges from sand/coarse sand (may be loose or cemented) to clay. May contain varying quantities of gravel.
	Colour :	variable, includes 7.5YR 5/4 brown; 7.5YR 5/6 and 7.5YR 4/6 strong brown; 5YR 5/4 reddish brown.
	Stone :	variable, in the range 0-50%, size distribution as above.
	Depth :	120 cm plus
	Structure :	variable, dependent on texture and stone content. Likely to include loose, coarse blocky, platey and massive structures.
	Consistence :	dependent on structure
	Porosity :	dependent on texture/structure
	Roots :	rare fine and very fine roots.

* may contain more than one discrete horizon.

SOIL TYPE II

TOPSOIL	Texture :	Sandy silt loam or fine sandy silt loam
	Colour :	10YR 4/3 dark brown
	Stone :	0-2% comprising very small and small subrounded pebbles and subangular flints.
	Depth :	35-40 cm
	Structure :	cultivation zone - not applicable.
	Boundary :	clear smooth
	Roots :	common fine and very fine roots.
UPPER SUBSOIL*	Texture :	sandy silt loam or fine sandy silt loam.
	Colour :	typically 10YR 5/4 brown
	Stone :	in the range 0-5%; size distribution as above.
	Depth :	in the range 55-70 cm
	Structure :	moderately developed coarse and very coarse subangular blocky, tending towards coarse platey 40-50 cm where slightly compacted.
	Consistence :	firm, occasionally friable
	Porosity :	typically slightly in excess of 5% biopores plus common very fine pores (also common worm holes filled with topsoil and subsoil).
	Boundary :	clear wavy
	Roots :	common to many fine and very fine.

* may contain more than one discrete horizon.

LOWER SUBSOIL	Texture :	medium clay loam, medium silty clay loam or sandy clay loam.
	Colour :	typically 10YR 5/4.
	Stone :	typically 5-10%, size distribution as above.
	Depth :	in the range 70-90 cm
	Structure :	moderately developed coarse subangular blocky.
	Consistence :	firm
	Porosity :	typically in excess of •5% biopores, plus common fine and very fine pores.
	Boundary :	clear wavy
	Roots :	common fine and very fine roots.
MINERAL		description as Soil Type I.

SOIL TYPE III

TOPSOIL	Texture :	sandy loam
	Colour :	10YR 4/3, dark brown
	Stone :	5-15% total stones, comprising very small to medium subangular flints and subrounded pebbles. (Approximately one third of stones are > 2 cm).
	Depth :	35-40 cm
	Structure :	Cultivation zone - not applicable.
	Boundary :	smooth abrupt.
	Roots :	common fine and very fine roots.
*SUBSOIL/ MINERAL	Texture :	sand, occasionally loamy sand, sandy loam or coarse sand.
	Colour :	variable:- 10YR 7/4 very pale brown; 10YR 5/4 yellowish brown; 10YR 6/2 light brownish grey; 7.5YR 4/6 strong brown.
	Stone :	0-50% (size distribution as above).
	Depth :	120 cm plus
	Structure :	too stony to assess, likely structureless.
	Consistence :	friable or loose.
	Roots :	common to many fine and very fine roots.

* may contain more than one discrete horizon.

FRATING HALL, COLCHESTER, ESSEX

LABORATORY ANALYSIS:
PARTICLE SIZE DETERMINATIONS

	Sand				Silt		Clay
	CS	MS	FS	VFS	CS	FS	C
PIT 1							
Topsoil (0-40 cm) Lab No. 21900 **Texture:** Sandy loam	20	22	6	3	22	17	10
Subsoil (40-55 cm) Lab No. 21901 **Texture:** Sandy silt loam	10	23	9	3	30	17	8
PIT 2							
Topsoil (0-40 cm) Lab No. 21902 **Texture:** Sandy silt loam	5	12	8	4	36	22	13
Subsoil (40-63 cm) Lab No. 21903 **Texture:** Sandy silt loam	6	15	10	7	30	18	14
PIT 3							
Topsoil (0-40 cm) Lab No. 21904 **Texture:** Sandy loam	20	39	6	2	12	10	11
Subsoil (40-55 cm) Lab No. 21905 **Texture:** Loamy coarse sand	35	39	4	1	7	6	8