

AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

LAND AT DENHAM PARK FARM, DENHAM GREEN, BUCKINGHAMSHIRE

1.0 BACKGROUND

- 1.1 The site, covering 38.7 hectares is the subject of a planning application to extract sand and gravel.
- 1.2 In January 1992, ADAS Statutory Resource Planning Team (Guildford) undertook a detailed Agricultural Land Classification (ALC) and soil physical characteristics survey of the site at an auger boring density of approximately one per hectare. The data from borings was supplemented by three soil inspection pits to provide more detailed information on subsoil (structural) conditions. Furthermore, topsoil ridding was carried out extensively throughout the site to assess topsoil stone content.
- 1.3 At the time of survey, the majority of the land was under arable production; cereals and oilseed rape being the crops grown. Two small areas of woodland were identified; one in the southwest corner and one on the northern boundary.
- 1.4 On the published provisional ALC map, sheet 160 (MAFF, 1970), the entire site is shown 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.
- 1.5 The area was surveyed previously in 1983, since which time the ALC guidelines have been revised. Using the Revised ALC Guidelines (MAFF, 1968), slightly more best and most versatile land was identified in the 1992 survey (2.5 ha).

2.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

- 2.1 *Climatic data for the site was interpolated from data contained in the published 5 km grid dataset produced by the Meteorological Office (1989). This indicates that for an average altitude of 70 m AOD average annual rainfall is 698 mm (27.2"). It also shows that field capacity days are 147 and that moisture deficits for wheat and*

potatoes are 106 mm and 98 mm respectively. These climatic characteristics do not impose any limitation to the ALC grading of the site.

Altitude and Relief

- 2.2 The highest land, at around 85 m AOD, lies in the southwest of the site immediately adjacent to the M25. Land falls, in places, to minimum heights of 60 m AOD in a valley feature in the extreme north of the site and 65 m AOD in the southeast. Altitude does not constitute a limitation to the ALC grading of the site. However, gradients of up to 10° limit sections of the north and southeast of the site to subgrade 3b.

Geology and Soils

- 2.3 The published 1:63,360 scale drift edition geology map (sheet 255, GSEW 1948) shows the site to comprise glacial gravels (with Bunter Pebbles) over Cretaceous Upper Chalk, which outcrops on valley sides in the north and southeast of the site.
- 2.4 The Soil Survey of England and Wales have mapped the area at a reconnaissance scale of 1:250,000 (1983, Sheet 6). This map indicates that over the majority of the site soils of the Marlow Association (*1) are found, while soils of the Coombe Association (*2) may be found on the extreme eastern boundary.
- 2.5 During the current, more detailed survey, two soil types were identified which broadly correspond to the mapped drift geology and soils.

Soil Type 1 (described in more detail in Appendix 1)

- 2.5.1 This gravelly soil is found predominantly in the east and west, covering the majority of the site and overlies the gravel deposits. Topsoils are fine loamy and coarse loamy and are slightly or moderately stony. These overlie similarly stony

(*1) Marlow Association - Well drained fine loamy over clayey and clayey soils. Some coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

(*2) Coombe 1 Association - Well drained calcareous fine silty soils, deep in valley bottoms, shallow to chalk on valley sides. Slight risk of water erosion.

upper subsoils, which are coarse or fine loamy. Lower subsoils are similar or absent as flint gravel is encountered at depths in the range of 35 to 90 cms, although more typically 40/50 cms. Occasionally gravel is not encountered within 120 cms depth. These soils are assessed as mainly wetness class I, although, in a few profiles, slight gleying or gleying is evident in the subsoil horizons and are assessed as wetness class II.

Soil Type 2 (described in more detail in Appendix 1)

- 2.5.2 Soil type 2 comprises deep better bodied soils, occupying a central belt of land running north to south, and a small area of land in the extreme southwest. Topsoils comprise typically fine loams which are usually very slightly stony, although locally, slightly stony profiles occur. Upper subsoils are generally very slightly stony medium or heavy clay loams with some silty clay loams and silt loams found locally. Gleyed slowly permeable clay is encountered at depths between 35 and 55 cms. In some profiles, slowly permeable clay is encountered directly below the topsoil, or very occasionally, heavy or medium silty clay loams continue to depth. The wetness class is assessed as typically III although better and poorer drained variants sporadically occur.

3.0 AGRICULTURAL LAND CLASSIFICATION

- 3.1 The definitions of ALC grades are given in Appendix 2.
- 3.2 The site has been graded as similar proportions of subgrades 3a and 3b, with a smaller area of grade 2 land in the centre. The table overleaf shows a breakdown of ALC grades in hectares and percentage terms.

AGRICULTURAL LAND CLASSIFICATION

Grade	ha	%
2	3.0	7.8
3a	16.7	43.2
3b	18.2	47.0
Non-Agricultural (Woodlands)	<u>0.8</u>	<u>2.0</u>
TOTAL	38.7	100

Grade 2

- 3.3 Land graded 2 occurs in a small area in the central part of the site and corresponds with the better drained variants of the soils described in paragraph 2.5.2. The land has been assessed as wetness class II because slowly permeable clay is encountered at or below depths of 55 cms. Consequently the land is excluded from a higher grade by minor wetness and workability limitations.

Subgrade 3a

- 3.4 Subgrade 3a land occurs in the central, western and northern parts of the site and occurs in two main situations.
- 3.4.1 Firstly, in the western section and parts of the east of the site land is associated with the less stony variants of the soils described in paragraph 2.5.1. These overlie sand and gravel deposits at depths below 40 cms (occasionally gravel is absent from the profile) and are assessed as wetness class I. The land is limited to subgrade 3a predominantly by moderate droughtiness restrictions and in some cases by a combination of moderate droughtiness limitations and topsoil stone content (typically in the range 10 to 15% by volume >2 cms in size).
- 3.4.2 Secondly, land graded 3a occurs in the central strip of land and the extreme south west of the site and is associated with the soils which are described in paragraph 2.5.2. The land has been assessed as wetness class III and is restricted to subgrade 3a by moderate wetness and workability limitations.

Subgrade 3b

3.5 The 3b land is located in the west, east and northern peripheries of the site and occurs in three situations. The majority of the 3b land is described in paragraph 3.5.1.

3.5.1 Land graded 3b is associated with the stonier and droughtier variants of the soils which are described in paragraph 2.5.1. The presence of high numbers of flints in the profile significantly reduces the available water for crop growth and increases the wear and tear on farm machinery. Consequently the land is excluded from a higher grade by droughtiness and topsoil stone limitations.

3.5.2 Land in the central part of the site associated with the localised areas of poorly draining variants of the soils which are described in paragraph 2.5.2. Profile pit observations indicate that the wetness class is IV because of the presence of a slowly permeable horizon at shallow depths in the profile. Land is limited to subgrade 3b due to significant wetness and workability imperfections.

3.5.3 Localised areas in the north and south of the site, which are associated with both soil types, were found to have slopes in excess of 7°. The land is therefore restricted to 3b by the imposition of a significant gradient limitation.

Non Agricultural

3.6 Two small areas of woodland, one in the southwest and one in the north, have been identified as non-agricultural.

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REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES, 1948. Sheet 255, Drift edition 1:63,360 scale.

MAFF, 1970. Agricultural Land Classification Map Sheet 160 Provisional 1:63,360 scale.

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

METEOROLOGICAL OFFICE, 1989. Published agroclimatic dataset.

SOIL SURVEY OF ENGLAND AND WALES, 1983. Sheet 6 "South East England" 1:250,000 scale.

SOIL SURVEY OF ENGLAND AND WALES, 1984. "Soils and their use in South East England" M G Jarvis *et al*, Harpenden.

Appendix 1

SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE 1

Topsoil	Texture	: sandy loam, medium clay loam or sandy clay loam (occasionally loamy sand, sandy silt loam or silt loam).
	Colour	: 10YR4/2, some 10YR4/3
	Stone	: variable, typically in the range 14-25% total flints.
	Depth	: 30/35 cms
Upper Subsoil	Texture	: sandy loam, loamy sand, silt loam (or occasionally medium and heavy clay loam).
	Matrix colour	: 10YR5/4 and 10YR5/6
	Stone	: variable, typically in the range 15-35% small flints.
	Structure	: weakly developed fine subangular blocky, where deep profiles - weakly developed medium and coarse subangular blocky.
	Consistence	: friable
	Porosity	: >0.5% biopores
	Depth	: typically 45/55 cms
Lower subsoil	Texture	: loamy sand, sand or sandy clay loam matrix
	Matrix colour	: 10YR5/4
	* Stone	: typically 75% + flint gravel
	Structure	: structureless
	Consistence	: very friable
	Depth	: 120 cms

- * Very occasionally gravel is not encountered until 80 cms or deeper within the profile, in which cases, the upper subsoil continues.

Additional information	: assessed as typically wetness class I, occasionally II.
	: non calcareous throughout
	: mottling occasionally present in upper and lower subsoils of the deep profiles.

SOIL TYPE 2

Topsoil	Texture	: medium silty clay loam,(or occasionally silt loam, sandy silt loam, sandy clay loam and medium clay loam.)
	Colour	: 10YR4/2, some 10YR4/3 and 10YR5/4
	Stone	: typically 3% total flints, occasionally 15%
	Depth	: 30/35 cms
Upper Subsoil	Texture	: heavy clay loam (occasionally medium clay loam, medium or heavy silty clay loam or clay).
	Matrix colour	: 10YR5/4 and 10YR5/3
	Stone	: variable, typically 3-5% total flints, occasionally 10-20%.
	Structure	: weakly developed coarse subangular blocky
	Consistence	: firm
	Porosity	: >0.5% biopores
	Depth	: typically 45/50 cms
Lower subsoil	* Texture	: clay
	Matrix colour	: 10YR6/3 and 10YR6/2
	Stone	: variable, up to 10% flints
	Structure	: weakly developed medium subangular blocky
	Consistence	: firm
	Porosity	: <0.5% biopores
	Depth	: 100 cms

- * Occasionally, clay is not encountered in the profile and heavy clay loams and medium silty clay loams continue to depth.

Additional information : assessed as typically wetness class III, some as II and IV, and where profiles do not encounter clay as I.
: non calcareous throughout
: common ochreous and grey mottles noted in the lower subsoil (occasionally from 30/35 cms)

Appendix 2

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 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 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.