Cambs 14/92

AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS

WILLOWHILL FARM, MOGERHANGER, BEDFORDSHIRE

1. INTRODUCTION

1.1 The site, an area of 32.6 hectares, is the subject of an application for the extraction of sand and gravel by Redland Aggregates Ltd. MAFF carried out a detailed soil survey of the site in February 1992. 33 soil inspections were made on a 100 metre grid basis using a Dutch soil auger. Three soil inspection pits were dug to assess subsoil conditions and supplement soil auger boring information.

1.2 On the published small scale Agricultural Land Classification (ALC) Map, sheet 147 (Provisional, 1:63,360 scale, MAFF 1971) the survey area is shown as grade 3 north of the disused railway line and grade 1 south of this. The current survey was undertaken to provide more detailed information on the land quality of the site.

2. SITE PHYSICAL CHARACTERISTICS

Altitude and Relief

2.1 The site area occupies part of the floodplain of the River Great Ouse. The majority of the site is level and lies at an altitude of 20 metres AOD rising gently to the south to 25 metres AOD at the boundary with the Barford Road. Subdividing the area is a disused railway line on an embankment which lies approximately 1 to 2 metres above the ground surface. Gradient and altitude do not constitute limitations to the quality of the agricultural land.

Climate

2.2 Climate data for the site was obtained from the published agricultural climatic dataset produced by the Meteorological Office (Met Office, 1989). This indicates a site average annual rainfall of 557 mm (21.9 inches), field capacity days are 95. This also indicates that the accumulated temperature (ATO) for this area is approximately 1457 day

degrees Celsius. Soil moisture deficits for wheat and potatoes are 121 mm and 117 mm respectively. These climatic characteristics do not impose any climatic limitation on the ALC grading of the survey site.

Flooding

2.3 The majority of the site is situated on low lying level land next to the River Great Ouse. The degree of flood risk is strongly influenced by the topography and the vicinity of the river. However, it was ascertained that the land was not at risk from frequent flooding because the presence of locks and the dredging of the river keeping the flow of water within the river banks, in most instances.

Irrigation

2.4 It is understood that some irrigation was previously available on this land, however, at present the supply and quantity of water is no longer guaranteed. Consequently irrigation has not been taken into account when grading this site.

3. AGRICULTURAL LAND CLASSIFICATION

3.1 The definitions of the Agricultural Land Classification (ALC) subgrades are included in Appendix 1.

3.2 The majority of the site is mapped as subgrade 3b with two smaller areas of subgrade 3a north and south of the disused railway line. The table below shows the breakdown of the grades in hectares and % terms for the survey area.

AGRICULTURAL LAND CLASSIFICATION

Grade	ha	%
3a	13.7	42.0
3b	18.9	58.0
TOTAL	32.6	100

Subgrade 3a

3.3 Land at the southern edge of the site and a smaller area to the north of the disused railway line has been graded 3a. Primarily due to droughtiness constraints and to a lesser extent wetness limitations. The soils (described in paragraph 4.4) form two distinct areas.

3.4 Soils on the southern edge of the site show little or no evidence of drainage impedance, consequently profiles have a wetness class of I or II. However, over-riding this is the inherent droughtiness associated with this land. The presence of fine loamy and coarse loamy textures combined with stones (which generally increase in volume down the profile) impose a moderate limitation on the available water for crop growth. As a result crops experience moderate drought stress in dry periods which limits the land to subgrade 3a.

3.5 Soils in a smaller area north of the disused railway line are limited by wetness/workability or droughtiness imperfections depending upon the topsoil texture (sandy clay loams and occasionally heavy clay loams). Wetness class has been assessed as I and II. Wetness and workability constraints restrict the land to 3a in areas with heavier textured topsoils while areas with sandy clay loam topsoils are restricted to subgrade 3a by moderate droughtiness constraints.

Subgrade 3b

3.6 The majority of the site has been graded 3b due to the inherent wetness/ workability limitation. The soils (described in paragraph 4.3) are slowly permeable and clayey in the subsoil. Wetness class has been assessed as III. The heavy textures combine with profile wetness to impose significant restrictions to the agricultural potential of this land. Consequently the land is limited to subgrade 3b.

4. SOIL PHYSICAL CHARACTERISTICS

Geology

4.1 The published 1:50,000 scale drift edition Geology Map sheet 204 Biggleswade (Geological Survey of England and Wales, 1976), shows the majority of the site to be Pleistocene and recent alluvium. The southwest corner of the site is shown as recent and pleistocene 1st and 2nd terrace river gravels.

Soils

4.2 The published 1:63,360 scale soil map sheet 147 (Soil Survey of England and Wales, 1968) shows the occurrence of the Mead association in the northern half of the site. This is a calcareous gley soil derived from alluvium. The Biggleswade Association is mapped as the southern half of the site. These soils are gleyed brown earths derived from the river gravel. The current more detailed inspection of the soils confirms the presence of these two soil types. The extent of the soils is shown on the soil types map.

Soil Type 1 (see Appendix 2 and Soil Types Map)

4.3 This soil covers the majority of the site and comprises clayey profiles. Profiles typically consist of clay or occasionally heavy clay loam topsoils over clay subsoils. Towards the base of the profiles lenses of sandy clay, sandy clay loam and occasionally loamy medium sand were encountered. These were typically calcareous, stony and often impenetrable to the auger.

Soil Type 2 (see Appendix 2 and Soil Types Map)

4.4 These soils cover two distinct areas north and south of the disused railway line. Topsoils typically comprise very slightly stony to slightly stony sandy clay loams (or occasionally heavy clay loams and medium sandy loams) over upper subsoils with similar textures and stone

contents. Lower subsoils are varied in texture but typically consist of sandy clay loam, sandy clay, medium sandy loam (or occasionally loamy medium sand) moderate to very stony. These lower horizons are often calcareous.

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APPENDIX 1

DESCRIPTION OF ALC SUBGRADES

Subgrade 3a - good quality agricultural land

Land capable of consistency 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.

APPENDIX 2

SOIL PHYSICAL CHARACTERISTICS

WILLOWHILL FARM, MOGERHANGER, BEDFORDSHIRE

SOIL TYPE 1 (18.9 ha)

Topsoil	Texture	:	clay, occasionally heavy clay loam
	$CaCO_3$	:	non calcareous except adjacent to the river
	Colour	:	brown (10YR 4.5/3) and dark greyish brown (2.5YR 4/2).
	Stone	:	1/3% small and medium rounded, sub-rounded, and subangular flints, 10/20% at waters edge.
	Structure	:	cultivation zone - not applicable
	Boundary	:	abrupt smooth
	Roots	:	common fine and very fine
	Depth	:	35/38 cm
Upper Subsoil	Texture	:	clay
	$CaCO_3$	:	occasionally calcareous
	Colour	:	brown (10YR 5/3) and yellowish brown (10YR 5/4).
	Stone	:	1/3% small and medium rounded, sub-rounded, and subangular flints, occasionally 20 to 40%.
	Structure	:	moderately developed coarse prismatic tending towards coarse subangular blocky.
	Boundary	:	abrupt smooth
	Roots	:	common fine and very fine chiefly on ped faces.
	Depth	:	typically 75/85 cm
Lower Subsoil	Texture	:	sandy clay, sandy clay loam, occasionally clay and loamy medium sand.
	$CaCO_3$	:	variable
	Colour	:	yellowish brown (10YR 5/4 and 5/6)
	Stone	:	typically 20 to 40% flints at 80/85 cm
	Structure	:	too stony to assess
	Boundary	:	base of pit
	Roots	:	few fine and very fine
	Depth	:	120 cm

SOIL TYPE 2 (13.7 ha)

Topsoil	Texture	:	sandy clay loam, occasionally heavy clay loam and medium sandy loam.
	$CaCO_3$	:	non calcareous
	Colour	:	dark greyish brown (10YR 4/2) and dark brown/brown (10YR 4/3).
	Stone	:	variable, in the range 1 to 20% typically 5 to 15% small and medium subrounded and angular flints.
	Structure	:	cultivation zone - not applicable
	Boundary	:	abrupt smooth
	Roots	:	common and many fine and very fine
	Depth	:	32/40 cm, typically 35/38 cm
Upper Subsoil	Texture	:	sandy clay loam, occasionally heavy clay loam and clay.
	$CaCO_3$	:	non calcareous
	Colour	:	brown/dark brown (10YR 4/3) and yellowish brown (10YR 3/4 and 4/4).
	Stone	:	variable, in the range 1 to 30%, typically 5 to 15% small and medium subrounded and angular flints.
	Structure	:	moderately developed coarse subangular blocky. When not to stony to assess.
	Boundary	:	abrupt smooth
	Roots	:	common fine and very fine
	Depth	:	55/85 cm, typically 55/75 cm
Lower Subsoil	Texture	:	variable, sandy clay loam, sandy clay, medium sandy loam and loamy medium sand.
	$CaCO_3$	:	typically calcareous
	Colour	:	dark yellowish brown (10YR 4/4 and 4/6) and yellowish brown (10YR 5/6).
	Stone	:	variable, in the range 10 to 45%, typically 20 to 40% at 60-85 cm.
	Structure	:	moderately developed coarse subangular blocky. When not too stony to assess.
	Boundary	:	base of pit
	Roots	:	few fine and very fine
	Depth	:	120 cm

REFERENCES

GEOLOGICAL SURVEY OF GREAT BRITAIN. (England and Wales), 1976. Drift edition Geology Sheet 204 (Biggleswade) 1:50,000 scale.

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