Cambs 02/91 H/2/91

AGRICULTURAL LAND CLASSIFICATION INCORPORATING SOIL PHYSICAL CHARACTERISTICS
WILLINGTON PIT EXTENSION, BEDS.

1. BACKGROUND

1.1 The site, an area of 130.2 hectares, is the subject of an application, by Redlands Aggregates Ltd, for the extraction of sand and gravel at Willington in Bedfordshire.

1.2 The site was surveyed by MAFF in February 1991 at an auger boring density of 1 per hectare. This survey broadly confirms the soil resource information recorded in the Redlands report.

2. SITE PHYSICAL CHARACTERISTICS

2.1 Climate

Climate data for the site was obtained from the published agricultural climatic dataset (Met Office, 1989). This indicates that for the site's modal altitude of 25m AOD the annual average rainfall is 571 mm (22.5"). This data also indicates that the field capacity days are 97 and moisture deficits are 119 mm for wheat and 115 mm for potatoes. The climatic characteristics do not impose any climatic limitation on the ALC grading of the survey site.

2.2 Altitude and Relief

The survey area gently slopes from south to north (26m AOD to 22m AOD) with a shallow valley feature, associated with the Elstow Brook, running approximately west to east through the site. Gradient and altitude do not constitute limitations to the ALC grading of the site.

3. AGRICULTURAL LAND CLASSIFICATION

3.1 The definitions of the Agricultural Land Classification (ALC) grades are included in Appendix 2.

3.2 The table below shows the breakdown of the ALC grades for the survey area.

AGRICULTURAL LAND CLASSIFICATION

Grade	ha	%
1	6.6	5.1
2	44.9	34.5
3a	38.2	29.3
3b	19.7	15.1
Urban	19.4	14.9
Non Agricultural	1.4	1.1
TOTAL	130.2	100.0

3.3 Irrigation

The western half of the site is regularly irrigated; this irrigation significantly enhances the potential of the soils on this part of the site. The ALC grade assigned to this area takes into account the reduction in drought risk afforded by irrigation.

3.4 Grade 1

A small area of land has been graded 1. This land is associated with the deep loamy soils of Soil Type 2 described in paragraph 4.2.2). This area is irrigated and well drained with neither droughtiness nor wetness being limitations to the ALC grade. This land is extremely versatile and can grow a very wide range of crops.

3.5 Grade 2

The grade 2 land is associated with Soil Type 1 (described in paragraph 4.2.1) on the western, irrigated, side of the site and, Soil Type 2 on the eastern, unirrigated, side of the site. In both these areas the soils are slightly droughty due to the combination of profile stone and soil textures.* As a result minor droughtiness and locally topsoil stone are the overriding limitations to the ALC grade.

* Locally topsoil stone content (>2 cm) ranges from 5-10% which prevents the land from being a higher grade.

3.6 Subgrade 3a

Subgrade 3a land is mapped in the north-eastern quarter of the site and in a small area in the south eastern corner of the site. Both these areas are associated with the soils of Soil Type 1 (described in paragraph 4.2.1). The common subsoils stone combine with soil textures to have a moderate limiting effect on the water holding capacity of these soils. Consequently moderate droughtiness is the major limitation to the ALC grade.

3.7 Subgrade 3b

An area of land adjacent to the Elstow Brook has been mapped as subgrade 3b. Personal communication with the Ouse Drainage Board indicates that this land is subject to frequent flooding. Flooding will result in significant crop damage; thus the land has been graded 3b. In addition some of the land is also associated with Soil Type 3 (described in paragraph 4.2.3). These soils have slowly permeable subsoils (ie. Wetness Class III) and non calcareous heavy clay loam topsoils. These factors combine to impose significant wetness and workability limitations on the land. Consequently wetness and/or flooding are the overriding limitations to the ALC grade.

3.8 Urban

Adjacent mineral workings have been mapped as urban.

4. SOIL PHYSICAL CHARACTERISTICS

4.1 Geology

The published 1:250,000 scale solid geology sheet no. 52°N02° shows the area to comprise Upper Jurassic Clay.

4.2 Soils

The Soil Survey of England and Wales have mapped the area on two occasions firstly, in 1969 at a scale of one inch to one mile and secondly, in 1983, at a reconnaissance scale of 1:250,000. These maps broadly correspond showing the site to comprise mainly Efford 1 Association (*1) with Thames Association (*2) occurring adjacent to the Elstow Brook.

During MAFF's more detailed inspection three main soil types were identified.

4.2.1 SOIL TYPE 1. (Refer to Appendix 1)

Profiles typically comprise very slightly or occasionally slightly stony** coarse and fine loamy topsoils. These overlie similar textured, moderately stony upper subsoils over gravelly material from 45/60 cm. This gravelly material commonly comprises 35%-40% flints (>2 mm) in a clay loam, clay or occasionally loamy medium sand matrix.

4.2.2 SOIL TYPE 2 (Refer to Appendix 1)

These soils are deeper and less stony than those described in Soil Type 1 and consequently they are less droughty. Profiles typically comprise

(*1) EFFORD 1 ASSOCIATION. Well drained fine loamy soils often over gravel, associated with similar permeable soils variably affected by ground water.

(*2) THAMES ASSOCIATION. Stoneless mainly calcareous clayey soils affected by ground water.

** Stone contents of 6-8 % occur in a few localised areas.

very slightly stony coarse and fine loamy topsoils over similar textured slightly stony subsoils. These subsoils may overlie gravelly material (described above in paragraph 4.2.1) from 80 cm. Profiles are commonly wetness class III and non calcareous in the upper subsoils and topsoils.

4.2.3 SOIL TYPE 3 (Refer to Appendix 1)

The heavier land in the vicinity of Elstow Brook, towards the south western corner of the site has been mapped as Soil Type 3. Profiles typically comprise clay loam topsoils over gleyed clay subsoils which may overlie gravelly material (described in paragraph 4.2.1 above) from 60 cm. Profiles are commonly wetness class III and non calcareous in the upper horizons.

RESOURCE PLANNING GROUP
CAMBRIDGE RO

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APPENDIX 1

DESCRIPTION OF SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE 1

Topsoil	Texture	:	medium sandy loam or sandy clay loam, occasionally sandy silt loam.
	Stone	:	typically 1-5% small and medium flints occasionally up to 10% in localised areas.
	Depth	:	28/35 cm
Upper Subsoil	Texture	:	sandy clay loam, occasionally medium sandy loam or clay loam.
	Stone	:	typically 20%-35% small and medium flints.
	Structure	:	moderately developed coarse and very coarse subangular blocky.
	Consistence	:	friable/firm
	Depth	:	45/60 cm.
Lower Subsoil	Gravelly material		45/60 cm+

SOIL TYPE 2

Topsoil	Texture	:	medium sandy loam or clay loam, occasionally sandy silt loam
	Stones	:	1-5% small and medium flints
	Depth	:	28/35 cm
Subsoil	Texture	:	medium sandy loam or clay loam, occasionally sandy silt loam
	Stones	:	typically 10% flints
	Structure	:	moderately developed coarse subangular blocky
	Consistence	:	friable
	Depth	:	80/120 cm

May overlie gravelly material from 80 cm+

SOIL TYPE 3

Topsoil	Texture	:	heavy clay loam or occasionally medium clay loam
	Stones	:	typically 1-5% small and medium flints
	Depth	:	30 cm
Subsoil	Texture	:	clay (gleyed)
	Stones	:	negligible
	Structure	:	weakly developed very coarse subangular blocky
	Depth	:	60/120 cm

May overlie gravelly material from 60 cm+

Additional information - All soil types

Gravelly material	:	35-40% small and medium flints in a clay loam or clay (or occasionally loamy medium sand) matrix.
Calcium carbonate	:	Topsoil and subsoil horizons are commonly non calcareous. Gravelly material is commonly calcareous.

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 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 with affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. When more demanding crops and 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 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.

References

AGRICULTURAL RESEARCH COUNCIL SOIL SURVEY, 1969 Special Survey No 1 Soils of the Luton and Bedford District. Scale 1:63,360

BRITISH GEOLOGICAL SURVEY 1985. 1:250,000 scale Solid Geology, sheet 52°N02° East Midlands.

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

METEOROLOGICAL OFFICE 1989 Climatic Data extracted from the published Agricultural Climatic Dataset.

SOIL SURVEY OF ENGLAND AND WALES, 1983 "The Soils of Eastern England" Sheet 4 Scale: 1:250,000.