



**AGRICULTURAL LAND CLASSIFICATION
AND SOIL PHYSICAL CHARACTERISTICS**

BLOCK FEN EXTENSION

MEPAL, CAMBS

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1. INTRODUCTION

1.1 The site is the subject of an application by Redland Aggregates Ltd, for the extraction of sand and gravel at Block Fen, Cambridgeshire. This report provides detailed information on land quality and soil physical characteristics of this 50.3 hectare site. The site survey was carried out in March 1989 and the northern area in February 1992. A total of 54 soil inspections were made using a hand held Dutch soil auger, and 3 soil pits dug to assess subsoil conditions. Pit details from recently surveyed, adjacent sites were used to supplement this information.

2. SITE PHYSICAL CHARACTERISTICS

2.1 Climate data for the site was obtained from the published agricultural climatic dataset (Met Office, 1989). This indicates that the site has an annual average rainfall of 537 mm (21.1"). This also indicates that the soils are at field capacity for a period of 88 days and moisture deficits are 118 mm for wheat and 114 mm for potatoes. Median accumulated temperature above 0°C January to June (ATO) is 1458 Day °C. These climatic characteristics do not impose any climatic limitation on the ALC grade of the site.

Altitude and Relief

2.2 The site comprises a fairly level area ranging in altitude from 0 to 2 m AOD. Land falls very gently to the south eastern edge where the land becomes peaty. Gradient and altitude do not constitute limitations to the ALC grade.

Irrigation

2.3 Irrigation is used by the landowner to irrigate certain crops in the arable rotation. However the quantity of water available appears to be insufficient to adequately irrigate the whole of the holding (approx. 170 hectares). Thus irrigation has not been taken into account when grading

this land.

3. AGRICULTURAL LAND CLASSIFICATION

3.1 On the Ministry's published 1:63,360 scale (provisional) ALC map No 135 (MAFF, 1971) the site is mapped as grade 2. 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.

3.2 The survey area has been graded as relatively equal proportions of grades 1 and 3a with a slightly smaller area of grade 2. The definition of the ALC grades are included in Appendix 1.

AGRICULTURAL LAND CLASSIFICATION

Grade	ha	%
1	17.3	34
2	14.5	29
3a	17.7	35
Non Agricultural	<u>0.8</u>	<u>2</u>
TOTAL	<u>50.3</u>	<u>100</u>

Grade 1

3.3 Approximately a third of the site (towards the east) has been graded 1 and is associated with the soils (Type 2) described in detail in paragraph 4.4.

3.4 The soils typically comprise organic loam topsoils over fine and coarse loamy mineral subsoils. At depth profiles tend to become stonier before merging into gravel deposits below 80/90 cms⁺. The water storage capacity of land in this area is high. This derives in part from the enhanced organic matter content of the topsoils, and also from the water retentive nature of the subsoils and the great depth to the gravel deposit. Drought risk is consequently minimised and the land is capable of producing consistently high yields of a wide range of crops.

Grade 2

- 3.5 A number of smaller blocks of land, particularly to the east, have been graded 2. These areas lie in association with the three remaining soil types, 1, 3 and 4 which are described in paragraphs 4.3, 4.5 and 4.6 respectively.
- 3.6 The majority of the grade 2 land is associated with the slightly droughty organic soils (Type 1) which outcrop to the north. Profiles are organic (8-18% organic matter) in the topsoil and have mineral upper subsoils which overlies gravels at moderate depths (typically 50/55 cms). The presence of gravel horizons reduce the water reserves available for crop growth. As a result slight droughtiness imperfections restrict the land to grade 2 (very good quality agricultural land).
- 3.7 Most of the remaining grade 2 land is associated with the peaty soils of soil type 3. Rooting within the subsoil is restricted by the acidity of these soils*. This acidity occurs below 40 cms depth so it cannot be easily removed by normal management operations. Consequently the land is limited by slight droughtiness imperfections which are only partly offset by the high organic matter content of the topsoil and upper subsoil.
- 3.8 The small areas of grade 2 to the west are associated with the non organic soils of soil type 4. The presence of fine loamy textures and stones at depth slightly reduce the water holding capacity of these soils. As a result land is excluded from a higher grade.

* These acid horizons are formed by the oxidation of pyrite (ferrous disulphide) which is a stable constituent of some *anaerobic* marine sediments (MAFF, 1983). When drained, air is allowed to penetrate the soil mass and the pyrite oxidises to form sulphuric acid, which often impairs the development of plant roots through the soil profile.

Subgrade 3a

- 3.9 The land graded 3a is associated with the mineral terrace gravel soils of Soil Type 4. The presence of slight profile stone, particularly in the lower horizons, a greater depth of sandy textures and gravel deposits at depths of 85/105 cms⁺ impose a moderate restriction on the available water for crop growth. Consequently land grade is restricted to subgrade 3a (good quality agricultural land).

4. SOIL PHYSICAL CHARACTERISTICS

Geology

- 4.1 The published 1:50,000 scale solid and drift edition geology map No 173 (Ely) (Geological Survey of Great Britain, 1980) shows the site to comprise mainly first and second terrace river gravels with a narrow deposit of Nodelph peat at the eastern edge.
- 4.2 The current detailed inspection of the soils shows the presence of four main soil types. These are described below.

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

- 4.3 These soils occur to the north and cover 11.1 hectares. They typically comprise organic loam topsoils over upper subsoils consisting of bands of sandy clay loams and sandy clays (or occasionally medium sandy loams). At moderate depths (typically 50/55 cms) profiles merge into gravel deposits which generally comprise 40% flints in a loamy sand or sand matrix.

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

- 4.4 Eastwards, deeper organic soils outcrop and extend to an area of 17.3 hectares. These soils generally consist of organic loam topsoils over interbedded sandy clay loam, sandy loam and sandy clay subsoils which overlie gravel below 80/90 cms⁺. Typically below 50/55 cms profiles become more stony with flint content ranging from 10 to 20%.

Soil Type 3 (refer to Appendix 2 and Soil Types Map)

- 4.5 A narrow strip of peaty soils have been mapped at the south eastern edge of the site. The area extends to 3.4 hectares and typically comprises peaty loams to depth over sandy loams or silty clays. Gravel is rarely encountered, although profiles tend to become slightly stony in the lower horizons.

Soil Type 4 (refer to Appendix 2 and Soil Types Map)

- 4.6 To the west 18.5 hectares of mineral terrace gravel derived soils have been mapped. They typically comprise medium sandy loam topsoils over interbedded sandy loam, sandy clay loam, loamy sand, sand and sandy clay subsoils which overlie gravel from 85/105 cms⁺. Profiles become stonier with depth but rarely exceed 10% above the gravel deposit.

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Appendix 2

SOIL PHYSICAL CHARACTERISTICS

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SOIL TYPE 1 (11.1 hectares)

Topsoil	Texture	:	organic loam
	Stone	:	1-2% flints
	Depth	:	35 cm
Upper Subsoil	Texture	:	sandy clay loam or sandy clay; occasional bands of sandy loam.
	Stone	:	1-2%, may become moderately stony in a thin layer above the gravel.
	Structure	:	moderately developed coarse subangular blocky.
	Depth	:	in the range 45 to 65 cm, typically 50/55 cms.
	Mineral Deposit	:	approximately 40% flints in a medium sand or loamy medium sand matrix.

SOIL TYPE 2 (17.3 hectares)

Topsoil	Texture	:	organic loam
	Stone	:	1-2% flints
	Depth	:	35 cm
Upper Subsoil	Texture	:	sandy clay loam or sandy loams with occasional bands of sandy clay.
	Stone	:	3 to 10% small flints
	Structure	:	weakly and moderately developed coarse subangular blocky.
	Depth	:	50/55 cm
Lower Subsoil	Texture	:	sandy clay or sandy clay loam, occasional bands of sandy loam.
	Stone	:	10 to 20% small flints
	Structure	:	weakly developed coarse subangular blocky
	Depth	:	80/90 cm
	Mineral Deposit	:	approximately 40% flints in a loamy medium sand and sand matrix.

SOIL TYPE 3 (3.4 hectares)

Topsoil	Texture	:	peaty loam
	Depth	:	35 cm
Upper Subsoil	Texture	:	peaty loam or occasionally organic loam
	Stone	:	negligible
	Structure	:	granular
	Roots	:	common very fine, but not fully exploiting the subsoil due to the low pH's at depth in this horizon.
	Depth	:	typically 65 cm
Lower Subsoil	Texture	:	silty clay or medium sandy loam with occasional sandy clay loam lenses.
	Stone	:	approx. 10% flints
	Structure	:	weakly developed coarse subangular blocky
	Roots	:	negligible
	Depth	:	typically 120 cm

SOIL TYPE 4 (18.5 hectares)

Topsoil	Texture	:	medium sandy loam
	Stone	:	negligible
	Depth	:	35 cm
Upper Subsoil	Texture	:	sandy clay loams or sandy loams with common lenses of loamy sand and sand.
	Stone	:	3 to 10% small flints
	Structure	:	moderately developed coarse subangular blocky.
	Depth	:	50/65 cm
Lower Subsoil	Texture	:	sandy clay loam or sandy clay, with common lenses of loamy medium sand and sand.
	Stone	:	typically 10% small flints
	Structure	:	as above or weakly developed
	Depth	:	85/105 cm ⁺ , occasionally 120 cm
Mineral Deposit	:	:	approximately 40% flints in a medium sand and loamy medium sand matrix.

REFERENCES

- GEOLOGICAL SURVEY OF GREAT BRITAIN 1980, Solid and drift edition geology sheet 173 (Ely) 1:50,000 scale.
- MAFF, 1971. Agricultural Land Classification Map Sheet 135 Provisional. 1:63,360 scale.
- MAFF, 1983. The Management of Acid Fen and Marsh Soils in East Anglia. Unpublished Report by Soil and Water Management Panel, Eastern Region.
- 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.

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MAP 1 : AGRICULTURAL LAND CLASSIFICATION

MAP 2 : SOIL TYPES