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**Agricultural Land Classification &  
Statement of Soil Physical Characteristics  
March 1997**

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# AGRICULTURAL LAND CLASSIFICATION REPORT AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

## WARREN VILLAS QUARRY, NEAR SANDY, BEDFORDSHIRE

### Introduction

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 9 ha of land at Warren Villas Quarry, near Sandy, Bedfordshire. The survey was carried out during March 1997.
2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) Land Use Planning Unit, Cambridge in connection with an application to extend the existing quarry for extraction of sand and gravel. This survey supersedes previous ALC surveys on this land.
3. The work was conducted by members of the Resource Planning Team in the Eastern Statutory Centre in ADAS. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). A description of the ALC grades and subgrades is given in Appendix I.
4. At the time of survey the land use on the site was permanent pasture.

### Summary

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:10 000 it is accurate at this scale but any enlargement would be misleading.
6. The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1.

Table 1: Areas of grades and other land

Grade/Other land	Area (hectares)	% surveyed
3b	9.0	100
Total survey area	9.0	100

7. The fieldwork was conducted at an average density of 1 boring per hectare. A total of 9 borings and 2 soil pits were described.
8. The land at the site has been graded entirely 3b (moderate quality agricultural land) due to wetness and workability limitations as a result of high groundwater levels at the site.

## Factors Influencing ALC Grade

### Climate

9. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

10. The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5 km grid datasets using the standard interpolation procedures (Met. Office, 1989).

Table 2: Climatic and altitude data

Parameter	Value
Grid reference	TL 181 477
Altitude (m, AOD)	25
Accumulated Temperature (day °C, Jan.–June)	1451
Average Annual Rainfall (mm)	545
Field Capacity Days	93
Moisture Deficit, Wheat (mm)	122
Moisture Deficit, Potatoes (mm)	118

11. The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

12. The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR), as a measure of overall wetness, and accumulated temperature (AT0, January to June), as a measure of the relative warmth of a locality.

13. The combination of rainfall and temperature at this site mean it is relatively warm and dry. These climatic characteristics are such that in themselves they impose no limitation to land quality and therefore the climatic grade for the site is 1.

### Site

14. The land at the site is virtually flat, being part of a floodplain feature adjacent to the River Ivel, and lies at an altitude of just below 25 m AOD. The land slopes very slightly upwards towards the embankments (levees) bordering the river. Therefore neither gradient nor altitude impose limitations to land quality. However the position of the site within the floodplain means it experiences high groundwater levels. Although this could be alleviated by pump drainage of the site it is unlikely that this will occur on this relatively small, isolated area of agricultural land. Therefore the land at the site has been graded with the limitations that the high groundwater levels impose.

## **Geology and soils**

15. The published 1:50 000 scale geology map, sheet 204, Biggleswade (Geological Survey of Great Britain, 1976) shows the site as comprising entirely alluvium.

16. On the detailed (1:25 000 scale) published soils map, sheet TL14, Biggleswade (Soil Survey of England and Wales, 1987) the eastern half of the site is mapped as Adventurers' 1 series which is briefly described as black humified peat with few recognisable plant remains over wet gravelly loam or clayey material at variable depths below 40 cm. The western half of the site is mapped as the Windrush series which is briefly described as deep greyish mottled stoneless calcareous clays over black humified peat at 40 to 80 cm depth.

17. The present survey of the site also identified two main soil types which closely correspond with those outlined above. These have been mapped on the accompanying soil resources map. This map is not necessarily a soil stripping map but illustrative of the soil resources available for restoration. A detailed description of their physical characteristics is given in Appendix III. It should be noted that the depths and volumes quoted for these soil types should be treated with caution due to soil variability.

### *Soil Type I (5.1 hectares)*

18. Soil type I occurs in the east of the site and corresponds with those of the mapped Adventures' 1 series, being deep peaty textured soils. Typically organic medium clay loam or occasionally loamy peat topsoils often overlie a thin horizon of organic heavy clay loam or organic clay, with humose peat subsoils which become fibrous peat with depth. These soils are stoneless throughout. Although these profiles have no slowly permeable layer within them, they are affected by the high groundwater levels at the site (see paragraph 14) and are therefore assessed as wetness class IV (for the definition of wetness classes see Appendix II).

### *Soil Type II (3.9 hectares)*

19. Soil type II occurs in the northwest of the site and corresponds with those of the mapped Windrush series. Profiles typically comprise calcareous clay loam topsoils over calcareous clay upper subsoils, with peat lower subsoils generally occurring below 50 cm depth. These soils are stoneless throughout and are also affected by the high groundwater levels at the site (see paragraph 14) and are therefore also assessed as wetness class IV

## **Agricultural Land Classification**

20. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1, page 1.

21. The location of the auger borings and pits is shown on the attached sample location map.

### *Subgrade 3b*

22. The land at the site has been graded entirely subgrade 3b and is associated with soil types I and II (paragraphs 20 and 21). These soils are poorly drained due to the high

groundwater levels at the site and this factor combines with the topsoil textures to limit land quality to subgrade 3b due to wetness and workability constraints. Where loamy peat topsoils occur the workability and therefore land quality is improved, however these profiles do not form a distinct area which could be mapped separately.

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## SOURCES OF REFERENCE

Geological Survey of Great Britain (England and Wales)(1976) *Sheet 204, Biggleswade*.  
BGS: London.

Ministry of Agriculture, Fisheries and Food (1988) *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land*. MAFF: London.

Met. Office (1989) *Climatological Data for Agricultural Land Classification*.  
Met. Office: Bracknell.

Soil Survey of England and Wales (1987) *Sheet TL14, Biggleswade*. SSEW: Harpenden.

Soil Survey of England and Wales (1987) *Soils in Bedfordshire I*. SSEW: Harpenden

## APPENDIX I

### DESCRIPTIONS OF THE GRADES AND SUBGRADES

#### **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 or horticultural crops can usually be grown but on some land of this 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 land.

#### **Grade 3: Good to Moderate Quality Land**

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When 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 the level of yields. It is mainly suited to grass with occasional arable crops (e.g. 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 severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.



## APPENDIX II

### SOIL WETNESS CLASSIFICATION

#### Definitions of Soil Wetness Classes

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

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Wetness Class	Duration of waterlogging <sup>1</sup>
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years. <sup>2</sup>
II	The soil profile is wet within 70 cm depth for 31-90 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but only wet within 40 cm depth for 30 days in most years.
III	The soil profile is wet within 70 cm depth for 91-180 days in most years or, if there is no slowly permeable layer present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years.
IV	The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer present within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.
V	The soil profile is wet within 40 cm depth for 211-335 days in most years.
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years.

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#### Assessment of Wetness Class

Soils have been allocated to wetness classes by the interpretation of soil profile characteristics and climatic factors using the methodology described in *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988).

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<sup>1</sup> The number of days is not necessarily a continuous period.

<sup>2</sup> 'In most years' is defined as more than 10 out of 20 years.

## APPENDIX III

### SOIL DATA

#### Soil type I (5.1 hectares)

Topsoil	Texture	: Organic medium clay loam or loamy peat
	Colour	: Very dark greyish brown (10YR 3/2) or dark brown (7.5YR 3/2)
	Depth	: Typically 20 cm, range 20 to 30 cm
	Stoniness	: Stoneless
	Structure	: Not determined - plough layer
	Consistence	: Not determined - plough layer
	Porosity	: Not determined - plough layer
	Roots	: Many fine and very fine
	Calcium carbonate	: Non-calcareous, typically pH 6
	Boundary form	: Clear, wavy
	Upper subsoil	Texture
Colour		: Dark grey (10YR 4/1), very dark grey (10YR 3/1) or greyish brown (10YR 4/2)
Depth		: Typically 30 cm, range 30 to 40 cm
Stoniness		: Stoneless
Structure		: Not determined - to thin a layer to assess
Consistence		: Not determined - to thin a layer to assess
Porosity		: Not determined - to thin a layer to assess
Roots		: Common fine and very fine
Calcium carbonate		: Non-calcareous, typically pH 6
Boundary form		: Clear, smooth
Lower subsoil		Texture
	Colour	: Very dark grey (7.5YR 3/1)
	Depth	: 120 cm plus
	Stoniness	: Stoneless
	Structure	: Not determined as peaty texture
	Consistence	: Not determined as peaty texture
	Porosity	: Not determined as peaty texture
	Roots	: Few fine and very fine, no obvious root mat
	Calcium carbonate	: Non-calcareous, typically pH 6
	Boundary for	: Not seen

Wetness Class: IV, due to high groundwater levels at the site.  
Water seeping into pit from 40 cm and below.

## Soil type II (3.9 hectares)

Topsoil	Texture	: Medium or heavy clay loam
	Colour	: Dark greyish brown (10YR 4/2) or very dark greyish brown (10YR 3/2)
	Depth	: Typically 20 cm, range 20 to 30 cm
	Stoniness	: Stoneless
	Structure	: Not determined - plough layer
	Consistence	: Not determined - plough layer
	Porosity	: Not determined - plough layer
	Roots	: Many fine and very fine
	Calcium carbonate	: Typically very calcareous
	Boundary form	: Clear, wavy
Upper subsoil	Texture	: Clay
	Colour	: Brown (10YR 5/3), or greyish brown (10YR 5/2)
	Depth	: Typically 50 cm, range 40 to 70 cm
	Stoniness	: Stoneless
	Structure	: Weakly developed coarse subangular blocky
	Consistence	: Friable
	Porosity	: Less than 0.5% biopores
	Roots	: Common fine and very fine
	Calcium carbonate	: Typically very calcareous
	Boundary form	: Abrupt, smooth
Lower subsoil	Texture	: Peat
	Colour	: Black (7.5YR 2.5/1) or very dark grey (7.5YR 3/1)
	Depth	: 120 cm plus
	Stoniness	: Stoneless
	Structure	: Not determined as peaty texture
	Consistence	: Not determined as peaty texture
	Porosity	: Not determined as peaty texture
	Roots	: Few fine and very fine, no obvious root mat
	Calcium carbonate	: Non-calcareous, typically pH 6.5
	Boundary form	: Not seen

Wetness Class: IV, due to high groundwater levels at the site.

Water seeping into pit from 55 cm and below.