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CAMBRIDGESHIRE.**

**VALIDATION SURVEY  
Agricultural Land Classification and Soil  
Physical Characteristics Report.  
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**Resource Planning Team  
Eastern Region  
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AGRICULTURAL LAND CLASSIFICATION AND  
SOIL PHYSICAL CHARACTERISTICS REPORT**

**MAXEY QUARRY, PETERBOROUGH, CAMBRIDGESHIRE**

**INTRODUCTION**

1. This report presents the findings of a detailed, Agricultural Land Classification (ALC) validation survey of 58.7 ha of land at Maxey in Cambridgeshire. The survey was carried out during January 1999.
2. The survey was carried out by the Farming and Rural Conservation Agency (FRCA) for the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with an application by Tarmac Limited to extract sand and gravel from the site before restoration to agricultural use. The site was surveyed to validate the ALC grades and mapped soil resources produced by Reading Agricultural Consultants on behalf of the applicant.
3. The work was conducted by members of the Resource Planning Team in the Eastern Region of FRCA. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). This survey supersedes previous ALC information for this site. A description of the ALC grades and subgrades is given in Appendix I.
4. At the time of survey, the agricultural land on site comprised cereal crops, sugar beet (part harvested), cereal stubble and ploughed land. The 'Other land' comprises a green lane which links the unclassified road north of Etton to Woodgate Lane via a bridge over Maxey Cut.

**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: Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
3a	36.1	63	62
3b	21.4	37	36
Other land	1.2	N/A	2
Total surveyed area	57.5	100	98
Total site area	58.7	-	100

7. The fieldwork was conducted at an average density of one auger boring per hectare. A total of fifty nine auger borings and four soil pits was described.

8. Most of the site has been graded 3a (good quality agricultural land) and is restricted to this subgrade by moderate droughtiness and/or wetness and workability constraints. The remainder of the site has been graded 3b (moderate quality agricultural land). This land suffers from significant wetness and workability constraints which preclude it from a higher grade.

## 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

Factor	Units	Values
Grid reference	N/A	TF 131 070
Altitude	m, AOD	10
Accumulated Temperature	day°C (Jan-June)	1444
Average Annual Rainfall	mm	572
Field Capacity Days	days	104
Moisture Deficit, Wheat	mm	120
Moisture Deficit, Potatoes	mm	115
Overall climatic grade	N/A	1

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 there are no overriding climatic limitations to the land. It is therefore of climatic grade 1.

### Site

14. The site lies to the south of Maxey, Cambridgeshire, which is located in the broad valley of the River Welland. To the north and south it is bounded by Maxey Cut and South Drain respectively. The western end of the site adjoins open fields and the eastern end abuts an unclassified road north of Etton. The site is virtually level, occupying an altitude of approximately 10 m AOD. Gradient and altitude do not impose any limitation to the agricultural quality of the land.

## Geology and soils

15. At a scale of 1:50 000 the geology sheet 158 (British Geological Survey [England and Wales], 1984) maps the entire site as alluvium. 1st river terrace deposits are mapped in close proximity to the southern boundary of the site.

16. At a reconnaissance scale of 1:250 000 the Soil Survey of England and Wales, (Sheet 4, Soils of Eastern England, 1983) maps the site as the Badsey 2 Association, described briefly as: Well drained calcareous fine loamy soils over limestone gravel. Some similar soils affected by groundwater.

17. The current survey identified two main soil types each of which has a variant differentiated by the depth to the underlying gravelly material.

### *Soil Type I (27.6 ha)*

18. Soil Type I predominates the southern half of the site. Topsoils mostly comprise clays (occasionally heavy clay loams). They are very slightly stony, typically non-calcareous (occasionally very slightly calcareous) and 30/35 cm deep. Upper subsoils comprise very slightly to slightly stony, non-calcareous clay. The depth to which the upper subsoil extends varies, typically ranging from 60 to 75 cm. Occasionally this horizon becomes increasingly sandy with depth. The lower subsoil continues to depth and comprises calcareous to very calcareous, very stony (occasionally moderately stony), sandy clay loam, medium sandy loam or loamy medium sand (the texture becoming lighter with depth). The stone content comprises a mixture of very small, small and medium sized flint and limestone fragments. These profiles have been assessed as well drained.

### *Soil Type Ia (6.5 ha)*

19. In the north west of the site Soil Type Ia is mapped. This soil unit comprises a deeper variant of Soil Type I. Within this variant the composition of the topsoils and upper subsoils are essentially the same as Soil Type I. However, the upper subsoil typically extends to at least 80 cm depth before the stony lower subsoil is encountered.

### *Soil Type II (20.7 ha)*

20. Soil Type II occurs in the northern half of the site. Topsoils typically comprise very slightly stony, non-calcareous clay extending to 30 cm depth. Directly beneath the topsoil slowly permeable dense clay occurs. This clay is non-calcareous, very slightly stony or stoneless and typically extends to at least 80 cm depth before the lower subsoil is encountered. The lower subsoil typically comprises moderately to very stony, calcareous sandy clay loam or medium sandy loam which continues to depth. Due to the slowly permeable nature of the upper subsoil these profiles have been assessed as imperfectly drained.

### *Soil Type Ia (2.7 ha)*

21. Soil Type Ia is a shallower variant of Soil Type II, in which the stony lower subsoil is encountered at between 55 and 75 cm depth. The topsoil and upper subsoil textures and the drainage status of the profiles are the same as described in paragraph 20.

22. 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.

23. The location of the auger borings and pits is shown on the attached sample location map and the soil physical characteristics data are presented in Appendix II

## **AGRICULTURAL LAND CLASSIFICATION**

### *Subgrade 3a*

24. Land mapped as subgrade 3a corresponds with the soils described in paragraphs 18 and 19. The combination of profile textures and stone contents mean that this land has a moderately limited ability to retain water for crop growth. Most of these profiles are therefore moderately droughty. Where the topsoil texture is clayey, a moderate wetness and workability limitation also exists. The above limitations, either alone or as equally limiting constraints, restrict the land to subgrade 3a. Within this area, better (grade 2) and poorer (subgrade 3b) profiles have been identified in isolation. However, due to their sporadic occurrence, they can not be delineated separately.

### *Subgrade 3b*

25. All the land mapped as subgrade 3b corresponds with the soils described in paragraph 20 and 21. This land is subject to a significant wetness and workability limitation. Profiles have been assessed as Wetness Class III due to the presence of gleying and slowly permeable clay at shallow depth. This factor in combination with the non-calcareous, fine loamy or clayey topsoils imposes a significant wetness and workability constraint to the land, thus precluding it from a higher grade.

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## SOURCES OF REFERENCE

British Geological Survey (England and Wales), 1984, *sheet 158, Peterborough*  
1:50 000 scale.

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 (1983), *Sheet 4, Soils of Eastern England*, 1:250 000 scale,  
SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in South East England*  
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

### STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

#### Soil Type I

Topsoil	Texture	clay (occasionally heavy clay loam)
	Colour	10YR 4/3, occasionally 10YR 4/2
	Stone content	1–4%, very small, small and medium flints.
	Roots	common/many very fine and fine
	Calcium carbonate	typically non-calcareous (occasionally very slightly calcareous)
	Boundary form	abrupt, wavy
	Depth	typically 30 cm, (occasionally up to 35 cm)
Upper subsoil	Texture	clay (occasionally becoming sandy at depth)
	Colour	typically 10YR 4/4, 5/4 or 5/5, occasionally 10YR 4/3, 4/5 or 5/3
	Stone content	typically in the range 2 to 10% (full range 1–15%) small and medium flints
	Structure	moderately developed coarse and medium sub-angular blocky
	Consistence	friable
	Porosity	<0.5%
	Roots	typically common very fine and fine (occasionally many)
	Calcium carbonate	typically non calcareous (very occasionally very slightly to slightly calcareous)
	Concretions	none
	Boundary form	clear, wavy
	Depth	typically 60/75 cm (range 40–80 cm)
Lower subsoil	Texture	sandy clay loam, medium sandy loam, occasionally loamy medium sand. (texture becoming lighter with depth)
	Colour	typically 10YR 5/5, 6/5 or 5/4, occasionally 10YR 5/6 or 5/4
	Stoniness	typically 40/50% (range 20–55%) mix of flints and limestone fragments
	Structure	too stony to assess
	Consistence	loose
	Porosity	>0.5%
	Roots	variable, typically few to common very fine and fine.
	Calcium carbonate	very calcareous
	Concretions	none
	Depth	120 cm

Notes: Profiles are typically assessed as Wetness Class I.

#### Soil Type Ia

This soil type variant comprises the same three horizons as Soil Type I. It has been delineated separately due to its deeper upper subsoil, which typically extends to 80/90 cm before the stony lower subsoil is encountered.



## Soil Type II

Topsoil	Texture	clay
	Colour	10YR (occ. 2.5Y) 4/3 or occasionally 4/2
	Stone content	1–3%, very small, small and medium flints.
	Roots	common very fine and fine
	Calcium carbonate	non-calcareous
	Boundary form	abrupt, wavy
	Depth	typically 30 cm (range 25–30 cm)
Upper subsoil *	Texture	clay
	Colour	typically 2.5Y or 10YR 5/3 and 5/4, occasionally 2.5Y 5/1 and 5/2
	Mottles	common distinct ochreous mottles, typically 7.5 YR 5/6 and 4/6, occasionally common distinct grey mottles, 2.5Y 5/1
	Stone content	1–4%, very small, small and medium flints.
	Structure	moderately developed coarse angular blocky
	Consistence	firm
	Porosity	<0.5%
	Roots	common very fine
	Calcium carbonate	non-calcareous
	Concretions	none
	Boundary form	abrupt, wavy
	Depth	typically 80/100+ cm
Lower subsoil	Texture	sandy clay loam or medium sandy loam
	Colour	typically 10YR 5/6, 5/5 and 6/5
	Stoniness	typical range 25–50%, mix of flints and limestone fragments
	Structure	*
	Consistence	*
	Porosity	*
	Roots	*
	Calcium carbonate	very calcareous
	Concretions	typically none
	Depth	120 cm

Notes: Profiles are typically assessed as Wetness Class III.

- \* The pit was not dug onto the stony lower subsoil, however, where it was augered it was found to be very similar to the Soil Type I lower subsoil.

## Soil Type IIa

This soil type variant comprises the same three horizons as Soil Type II. It has been delineated separately due to its shallower upper subsoil, which extends to 55/75 cm before the stony lower subsoil is encountered.