BARRINGTON CEMENT WORKS, HASLINGFIELD ROAD, BARRINGTON, CAMBS.

Agricultural Land Classification ALC Map and Soil Physical Characteristics Report

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Resource Planning Team
Eastern Region
FRCA Cambridge

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AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS REPORT

Barrington Cement Works, Haslingfield Road, Barrington, Cambs.

INTRODUCTION

1. This report presents the findings of a detailed, Agricultural Land Classification (ALC) survey of 52.9ha of land at Barrington Cement Works, Haslingfield Road, Barrington in Cambridgeshire. The survey was carried out during September 1997.

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 the proposed extension of the existing quarry. This survey supersedes previous ALC information for this land.

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). 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 arable, comprising cultivated stubble following cereals, peas and oilseed rape. The areas mapped as 'Other' include the western and eastern extremes of the existing quarry, the site of Barrington Hill Fruit Farm, presently comprised of areas of concrete hard standing and derelict land, and Balk Plantation, to the immediate west of the quarry.

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
2	24.0	54.2	45.4
3a	20.3	45.8	38.4
Other land	8.6	-	16.2
Total surveyed area	44.3	100	-
Total site area	52.9	-	100

7. The fieldwork was conducted at an average density of 1 auger boring per hectare. A total of 51 auger borings and 5 soil pits was described.

8. Just over half the site has been assigned to grade 2 (very good quality agricultural land) and the remainder to subgrade 3a (good quality agricultural land) land. Grade 2 land occurs in two situations. In the eastern block a slight wetness and workability constraint is the limiting factor and in the western block slight droughtiness and/or slight wetness and workability constraints preclude the land from grade 1.

9. Land of subgrade 3a also occurs in two situations. In the eastern block land is restricted to this subgrade by a moderate wetness and workability constraint and in the western block by a moderate droughtiness imperfection.

FACTORS INFLUENCING ALC GRADE

Climate

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

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

Table 2: Climatic and altitude data

Factor	Units	Values	
Grid reference	N/A	TL 385 509	TL 399 515
Altitude	m, AOD	45	70
Accumulated Temperature	day°C (Jan-June)	1422	1394
Average Annual Rainfall	mm	577	577
Field Capacity Days	days	101	101
Moisture Deficit, Wheat	mm	119	116
Moisture Deficit, Potatoes	mm	114	111
Overall climatic grade	N/A	Grade 1	Grade 1

12. 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.

13. 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.

14. The combination of rainfall and temperature at this site mean that it is relatively warm and dry and consequently has no climatic limitation. It is therefore of climatic grade 1.

Site

15. The site is comprised of two blocks, located to the east and west of the existing quarry. The eastern block occupies a hilltop location at the site of the former Barrington Hill Fruit Farm. Its western and eastern sides abut the quarry and Chapel Hill (road) respectively whilst the northern and southern boundaries adjoin arable fields. The land slopes gently from a maximum altitude of 70m AOD in the west to a minimum of 60m AOD in the south. The western block is situated north of Wilsmere Farm. It adjoins the quarry to the east and arable land to the west, north and south. The land slopes in a southerly direction via a series of dry valleys. The highest point at 65m AOD occurs in the north, with the lowest point, at about 30m AOD, occurring in the south west. Over the majority of the area, gradients do not exceed 7° and therefore do not impose a limitation. On two very localised slopes gradients are greater than 7°, however, being located near the top of slopes, their impact on the agricultural land quality is not considered to be significant.

Geology and soils

16. At a scale of 1:50 000 geology sheet 204, Biggleswade (Geological Survey of Great Britain [England and Wales], 1976) maps the eastern block and the northern part of the western block as boulder clay over Cretaceous Lower Chalk (Grey Chalk). The remainder of the western block is mapped as Cretaceous Lower Chalk which is subdivided with Grey Chalk occurring on the upper slopes and Chalk Marl on the lower slopes..

17. The Soil Survey of England and Wales have mapped the site on two occasions. At a reconnaissance scale of 1:250 000 (Sheet 4, Soils of Eastern England, 1983) the eastern block and the extreme north of the western block is mapped as the Hanslope Association. This broadly corresponds to the boulder clay deposits. The Hanslope Association is briefly described as: Slowly permeable calcareous clayey soils. Some slowly permeable non-calcareous clayey soils. Slight risk of water erosion. The remainder of the site is mapped as the Wantage 2 Association, which is briefly described as: Shallow well drained calcareous silty soils over argillacious chalk associated with similar soils affected by ground water.. Deeper well drained coarse loamy soils in places. Complex soil patterns locally.

18. At a scale of 1:63 360, sheet 148, Saffron Walden, 1968 delineates similar areas, mapping the former as the Hanslope Series (with Stretham and Takeley named as related Series) and the latter as the Swaffham Prior Series, (with Wantage, Icknield and Wallop as related Series).

19. The current survey identified 3 main soil types, one of which has been subdivided.

Soil type Ia

20. This soil type occurs over the majority of the eastern block. Profiles are typically clayey throughout and very calcareous. Upper subsoils are moderately well structured and are typically not mottled above 40 cm. Profiles typically become slowly permeable at 45/55cm or occasionally deeper. Topsoils are very slightly stony typically with 2-3% flints and 1% chalk. Stone content in the upper subsoils increases slightly with the lower subsoils containing a combination of chalk and flint which typically totals 10-15%.

Soil type Ib

21. This soil type occurs around the site of Barrington Hill Fruit Farm and on the highest land in the north-east of the western block. Profiles are similar in texture and stone content to those mentioned above but upper subsoils are mottled and poorly structured immediately below the topsoil. Profiles are typically slowly permeable from 35cm.

Soil type II

22. Soil type II occurs on the lower slopes and in the dry valleys on the western block. Typically these soils are derived from chalk but downwash from upper slopes increases the depth of material over the chalk especially in the valleys. These profiles typically comprise 30cm of very slightly stony silty clay[1] (occasionally heavy silty clay loam or heavy clay loam) topsoil over an upper subsoil of similar texture and stone content which extends to 45/60cm or in the valleys up to 90/95cm. Lower subsoils comprise soft rootable chalk to depth. These profiles are typically free draining.

Soil type III

23. The third soil type is a shallower variant of soil type II and occurs on the upper slopes and spurs of the western block. These soils comprise very slightly to slightly stony silty clay (occasionally heavy silty clay loam or heavy clay loam) topsoils to a depth of 25/30cm depth. This may directly overlay chalk or a shallow upper subsoil of silty clay may be present to a depth of 40cm. The chalk is rootable typically to about 100cm. The chalk tends to be more rubbly and slightly harder at depth than the chalk found on the lower slopes. Auger borings often became impenetrable at 60/90cm. Again these profiles are free draining.

AGRICULTURAL LAND CLASSIFICATION

24. 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.

25. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II.

Grade 2.

26. Land graded 2 (very good quality agricultural land) corresponds to two soil types, namely soil types Ia and II.

27. Firstly soil type Ia described in paragraph 20, suffers from a minor wetness and workability constraint. Profiles typically comprise clay throughout with a slowly permeable layer encountered below 40 cm. These profiles have been assessed as Wetness Class II and combine with the calcareous clay (<50% clay) topsoils to exclude the land from grade 1.

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[1] Whilst this texture is based on a laboratory PSD, the text on the Swaffham Prior Association in the Soils of Saffron Walden District, (Harpenden, 1969) points out that mechanical analyses of soils with high $CaCO_3$ content may be misleading.

28. Soil type II as described in paragraph 22, is limited to grade 2 by a slight droughtiness limitation. The soft rootable chalk typically encountered below 45cm reduces the amount of available water for plant growth, thus restricting the land to this grade. Also, the clayey topsoils impose slight restrictions on the workability of the land and this acts as an equally limiting factor.

Subgrade 3a.

29. Land graded 3a (good quality agricultural land) also corresponds to two soil types. Firstly soil type Ib which is described in paragraph 21. These profiles have been assessed as Wetness Class III with a slowly permeable layer typically encountered directly below the topsoil. This assessment in combination with the calcareous clay topsoils will impose some restrictions on when the soils are in a suitable condition for cultivation, thus limiting this land to this grade due to moderate wetness and workability imperfections.

30. Soil type III described in paragraph 23, is limited to this subgrade due to moderate droughtiness. Rootable chalk is typically encountered within 40 cm of the surface which means the available water reserves for crop growth are reduced sufficiently to limit this land to subgrade 3a.

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SOURCES OF REFERENCE

British Geological Survey (1976) *Sheet No.* 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 (1983) *Sheet 4, Soils of Eastern England.*
SSEW: Harpenden.

Soil Survey of England and Wales (1968) *Sheet 148, Saffron Walden,* 1:63 360 scale
SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in Eastern 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 Ia

Topsoil	Texture	clay
	Colour	typically 2.5Y 4/2, occasionally 10YR 4/2
	Stone content	2-3% small flints and 1% chalk pieces
	Roots	common very fine and fine
	Calcium carbonate	calcareous or very calcareous
	Boundary form	clear, smooth
	Depth	30cm
Upper subsoil	Texture	clay
	Colour	typically 2.5Y (occ. 10YR) 5/4, 5/3 or 4/4
	Stone content	variable; 1-5% small flints and 1-5% chalk pieces
	Structure	moderately developed coarse subangular blocky
	Consistence	firm
	Porosity	>0.5% >0.5mm
	Roots	common very fine and fine
	Calcium carbonate	very calcareous
	Concretions	few manganese
	Boundary form	abrupt, smooth
	Depth	typically 45/55cm (occasionally deeper)
Lower subsoil	Texture	clay
	Colour	typically 2.5Y (occ. 10YR) 5/3 and 5/4
	Stoniness	10-15% chalk pieces (occ. also 2-5% small flints)
	Structure	weakly developed coarse prismatic, breaking to coarse subangular blocky
	Consistence	firm
	Porosity	<0.5% >0.5mm
	Roots	common very fine and fine
	Calcium carbonate	very calcareous
	Concretions	few manganese
	Depth	120cm

Notes: Profiles have been assessed as Wetness Class II

Soil type Ib.

Topsoil	Texture	clay
	Colour	typically 2.5Y 4/2, (occasionally 10YR 4/2)
	Stone content	2-3% small flints and 1% chalk pieces
	Roots	common very fine and fine
	Calcium carbonate	calcareous or very calcareous
	Boundary form	abrupt, smooth
	Depth	typically 30cm (range 25-35cm)
Subsoil	Texture	clay
	Colour	typically 2.5Y (occ. 10YR) 5/3 and 5/4. 2.5Y 5/2 on ped faces
	Stone content	variable; 1-5% small flints and 1-5% chalk pieces
	Structure	moderately developed coarse angular blocky
	Consistence	firm
	Porosity	<0.5% >0.5mm
	Roots	common very fine and fine
	Calcium carbonate	very calcareous
	Concretions	common manganese
	Boundary form	-
	Depth	120cm

Notes: Profiles have been assessed as Wetness Class III

Soil type II

Topsoil	Texture	typically silty clay (occasionally heavy silty clay loam or heavy clay loam)
	Colour	typically 2.5Y 5/2 (occ. 4/2 or 4/3)
	Stone content	typically 1-2% small flints and 1-2% chalk pieces
	Roots	many very fine and fine
	Calcium carbonate	very calcareous
	Boundary form	abrupt, wavy
	Depth	30cm
Upper subsoil	Texture	typically silty clay (occ. heavy silty clay loam or heavy clay loam)
	Colour	2.5Y 6/3 (occ. 6/4 or 5/4)
	Stone content	1-2% small (occ. medium or large) flints
	Structure	moderately developed medium and fine subangular blocky
	Consistence	firm
	Porosity	>0.5% >0.5mm
	Roots	many very fine and fine
	Calcium carbonate	very calcareous
	Concretions	none
	Boundary form	clear/gradual, wavy
	Depth	typically 45/60cm, upto 90/95cm in valley bottoms
Lower subsoil	Texture	soft weathered chalk
	Colour	2.5Y 7/2 (occ. 8/1 or 8/2)
	Stoniness	stoneless
	Structure	moderately developed medium and fine subangular blocky
	Consistence	friable
	Porosity	>0.5% >0.5mm
	Roots	common very fine and fine
	Calcium carbonate	very calcareous
	Concretions	none
	Depth	120cm

Notes: Profiles have been assessed as Wetness Class I

Soil type III

Topsoil	Texture	typically silty clay (occasionally heavy silty clay loam or heavy clay loam)
	Colour	typically 2.5Y 5/2 (occ. 4/2 or 4/3)
	Stone content	typically 1-2% small flints and variable amounts of chalk pieces (1-10%)
	Roots	many very fine and fine
	Calcium carbonate	very calcareous
	Boundary form	abrupt, wavy
	Depth	25/30cm
*Upper subsoil	Texture	typically silty clay (occ. heavy silty clay loam or heavy clay loam)
	Colour	2.5Y 6/3 (occ. 5/2 or 5/3)
	Stone content	typically stone free
	Structure	upper subsoil was
	Consistence	absent in the pit; see notes.
	Porosity	>0.5% >0.5mm
	Roots	common very fine and fine
	Calcium carbonate	very calcareous
	Concretions	none
	Boundary form	gradual, wavy
	Depth	typically 35/40cm
Lower subsoil	Texture	soft weathered chalk with 5-10% mineral soil, decreasing with depth
	Colour	2.5Y 7/2 (occ. 8/1 or 8/2)
	Stoniness	stoneless
	Structure	chalk rubble comprised of large angular chalk blocks
	Consistence	-
	Porosity	>0.5% >0.5mm
	Roots	few very fine and fine, no roots below 100cm
	Calcium carbonate	very calcareous
	Concretions	none
	Depth	120cm

Notes: *On the upper slopes and spurs the upper-subsoil is frequently absent, the topsoil directly overlying chalk rubble
Profiles have been assessed as Wetness Class I