CRIMPLESHAM QUARRY,
Downham Market, Norfolk.

Agricultural Land Classification and
Statement of Soil Physical Characteristics.
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AGRICULTURAL LAND CLASSIFICATION REPORT AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

CRIMPLESHAM QUARRY, Downham Market, Norfolk.

INTRODUCTION

1. This report presents the findings of a detailed Mineral Site Survey of 10.8ha of land at Crimplesham in Norfolk, the survey was carried out during January 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 sand and gravel quarry located to the immediate west of the application area. 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 Group 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 approximately half the surveyed area was sown to a winter cereal which was just emerging, the remainder was bare soil, having been ploughed and pressed.

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)	% Total site area
3b	10.8	100
Total site area	10.8	100

7. The fieldwork was conducted at an average density of 1 auger boring per hectare. A total of 12 auger borings and 2 soil pits were described.

8. The whole site has been graded 3b (moderate quality agricultural land). It is restricted to this grade due to a droughtiness limitation.

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 5km grid datasets using the standard interpolation procedures (Met. Office, 1989).

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	TF 666 035
Altitude	m, AOD	35
Accumulated Temperature	day°C (Jan-June)	1404
Average Annual Rainfall	mm	606
Field Capacity Days	days	114
Moisture Deficit, Wheat	mm	113
Moisture Deficit, Potatoes	mm	107

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 (ATO, 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 is situated approximately 1km east of Crimplesham village. It is bounded to the south by the A134, to the east by a green lane and the A134, to the west by the existing quarry and to the north by a track leading to Mill House. The site is virtually level, with only a very gentle fall from north to south. Relief and slope therefore impose no limitation on the agricultural quality of this land.

Geology and soils

15. There are no detailed published geology maps of the area. At a scale of 1:253,440, Sheet 12, Geological Survey of Great Britain (England and Wales), 1971, Drift edition, shows the site to be mapped as predominantly glacial sands and gravels, with a possibility of some glacial boulder clay in the north east corner.

16. On the 1:250,000 scale published soils map (Soil survey of England and Wales, Sheet 4, Soils of Eastern England, 1983) Wick 3 association soils are shown to coincide with most of the site. In the north east extremity of the site, an area of Burlingham 1 association is mapped. The Wick 3 association is briefly described as a deep, well drained coarse loamy, often stoneless soil, with some similar sandy soils. The Burlingham 1 association is described as a deep coarse or fine loamy soil, with a slowly permeable subsoil affected by slight seasonal waterlogging. This association also includes some deep well drained coarse loamy or sandy soils.

17. During the current more detailed survey, the majority of the site was found to be of one soil type, which closely corresponds to the geology and soils mapped.

Soil description.

18. The whole site has been assigned to one soil type. The soil profiles are non calcareous, free draining (wetness class I) and typically comprise very slightly stony to slightly stony loamy medium sand to an average depth of 35cm, overlying a similar (sometimes coarser textured) upper subsoil of varying thickness (differentiated primarily by colour) extending to 45/70cm. This overlies similarly stony, predominantly loamy medium sand or medium sand subsoils which extend to at least 120cm depth. Very occasionally lower subsoil textures become heavier below 70cm depth.

Agricultural Land Classification

19. 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.

20. 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 III.

Subgrade 3b

21. The main limitation associated with this land is drought risk. A combination of the poor water holding capacity of the coarse textured very slightly to slightly stony topsoil and subsoil, and the relatively low average annual rainfall of the locality, mean that many crops grown on the land are likely to be adversely affected by drought stress during the summer months. This restriction limits the entire site to sub-grade 3b (moderate quality agricultural land).

22. **Soil Resources**

One soil unit, divided into two horizons, has been identified to represent the site. Whilst the depths quoted (modal) are representative of the findings of this survey, due to the inherent spatial variability of soils, they may not be wholly accurate.

Table 3. Soil resources.

	Area (ha)	Thickness (cm)	Volume (m^3)
Topsoil	10.8	35	37,800
Subsoil	10.8	85	91,800

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SOURCES OF REFERENCE

Geological Survey of Great Britain (England and Wales), 1971, *Sheet No.12,* 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.

Hodgson, J M [Ed] (1976) *Soil Survey Field Handbook.* Soil Survey Technical Monograph No. 5. Harpenden.

Soil Survey of England and Wales (1983) *Sheet 4, Soils of Eastern England.* SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in Eastern England* SSEW: Harpenden

APPENDIX 1

DESCRIPTION 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 that 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 that restricts 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.

Wetness Class	Duration of waterlogging[1]
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years.[2]
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.

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).

[1] The number of days is not necessarily a continuous period.
[2] 'In most years' is defined as more than 10 out of 20 years.

APPENDIX III

Statement of Soil physical characteristics.

Topsoil	Texture	loamy medium sand
	Colour	predominantly brown (10YR4/3) but occasionally dark greyish brown (10YR4/2)
	Depth	0 to 35cm (range 0 to 30/38)
	Stoniness	very slightly stony to slightly stony (3-8%), predominantly small and medium flints, occasional large flints.
	Roots	many, very fine.
	Calcium carbonate	non calcareous
	Boundary form	smooth, abrupt.
Upper subsoil	Texture	loamy medium sand / medium sand
	Colour	predominantly dark yellowish brown (10YR4/5 & 5/6) or yellowish brown (10YR5/5 & 5/6), occasionally, brown (7.5YR4/4 & 5/4) or strong brown (7.5YR4/6 & 5/6).
	Depth	35cm to 45/70cm.
	Stoniness	very slightly stony to slightly stony (3-8%), predominantly small and medium flints, occasional large flints
	Structure	weakly developed very coarse angular blocky
	Consistence	very friable
	Porosity	<0.5% pores >0.5mm
	Roots	many, very fine
	Calcium carbonate	non calcareous
	Concretions	none
	Boundary form	irregular, abrupt
Lower subsoil	Texture	predominantly loamy medium sand / medium sand*
	Colour	predominantly yellowish brown (10YR5/6), occasionally, dark yellowish brown (10YR4/6) or brownish yellow (10YR6/8)
	Depth	45/70cm to 120cm
	Stoniness	slightly stony (1-5%), small and medium flints
	Structure	weakly developed very coarse angular blocky.
	Consistence	very friable
	Porosity	<0.5% pores >0.5mm
	Roots	common, very fine
	Calcium carbonate	non calcareous
	Concretions	none
	Boundary form	-

Comments: Assessed as wetness class I.
* Occasionally, sandy clay loam, sandy clay or clay below 70cm depth.