

**EXTENSION OF LIMESTONE QUARRY  
Nr. WANSFORD, CAMBRIDGESHIRE  
Agricultural Land Classification  
Statement of Soil Physical Characteristics  
MARCH 1997**

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Huntingdon Statutory Group  
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**AGRICULTURAL LAND CLASSIFICATION REPORT**  
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**Introduction**

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 65.5 ha of land at the limestone quarry near Wansford, Cambridgeshire. 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 quarry workings.
3. The work was conducted by members of the Resource Planning Team in the Huntingdon 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 the land use on the site was mainly under set aside with a small area given to oil seed rape at the eastern part of the site and grass at the western end of the site. More than half of the survey area comprises quarry workings and spoil heaps. A dwelling house and associated outbuildings are situated on the restored land at the western end of the site.

**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**

<b>Grade/Other land</b>	<b>Area (hectares)</b>	<b>% surveyed</b>
3a	7.6	11.6
3b	14.4	22.0
4	6.8	10.4
Other land	36.7	56.0
<b>Total agricultural land</b>	<b>28.8</b>	<b>44.0</b>
<b>Total survey area</b>	<b>65.5</b>	<b>100.0</b>

7. The fieldwork was conducted at an average density of 1 boring per hectare. A total of 30 borings and 2 soil pits were described.

8. Land mapped as subgrade 3a (good agricultural quality) is confined to a small area in the eastern part of the site and is restricted to this grade due to a moderate droughtiness limitation. The remainder of the land in the eastern part of the site is mapped as subgrade 3b (moderate agricultural quality) due to a more severe droughtiness limitation. Also in parts topsoil stone content, and in the extreme north a small area having slopes in excess of 7°, equally limit the land to this subgrade. Land mapped as grade 4 (poor agricultural quality) is at the western end of the site and is restricted to this grade due to severe droughtiness with thin topsoils over quarry waste.

### 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

Parameter	Value
Grid reference	TL 055 994
Altitude (m, AOD)	50
Accumulated Temperature (day °C, Jan.–June)	1403
Average Annual Rainfall (mm)	589
Field Capacity Days	113
Moisture Deficit, Wheat (mm)	115
Moisture Deficit, Potatoes (mm)	109
Overall Climatic Grade	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, and therefore the climatic grade 1 is assigned.

### **Site**

14. The site is bounded by roads, woodland and open farmland. From a height of 55m AOD in the west the land slopes gently in an easterly direction to an approximate height of 35m AOD on the eastern boundary. A small area on the north western boundary dips sharply into the valley bottom and slopes are in excess of 7°.

### **Geology and soils**

15. The published 1:50 000 scale geology map (Geol. Survey 1978) shows the whole site to be developed from Lower Lincolnshire Limestone.

16. The 1:250 000 reconnaissance soil survey map for the area (SSEW, 1983) shows the site to comprise soils of the Elmtun 1 Association. These are briefly described as shallow well drained brashy calcareous fine loamy soils over limestone, with some similar deeper soils and some non-calcareous and calcareous clayey soils.

17. During the current survey three main soil types were encountered. Although the soils at the western end of the site will be described they are not considered to be a soil resource.

#### *Soil Type I*

18. Soil Type I occurs in a small area in the eastern part of the site. Profiles typically comprise slightly stony, calcareous medium clay loam or fine sandy loam topsoil. Upper subsoils comprise moderately stony, calcareous variably fine sandy loam/heavy clay loam/sandy clay loam upper subsoil. Lower subsoils comprise moderately stony medium sand/sandy clay loam with impenetrability at 60-90cms due to large limestone flags. Rooting was not observed beyond the depth of the limestone. The soils are free draining and assessed as Wetness Class I (q.v. Appendix I).

#### *Soil Type II*

19. Soil Type II occurs over the remainder of the eastern part of the site. Profiles typically comprise slightly/moderately stony, calcareous medium or heavy clay loam topsoil, over very stony, calcareous medium or heavy clay loam upper subsoil. Impenetrability occurred at 40-50cm due to large limestone flags. The soils are free draining and assessed as Wetness Class I.

### *Soil Type III*

20. Soil Type III occurs at the western end of the site and encompasses the restored area. Profiles typically comprise relatively thin, slightly stony, calcareous medium or heavy clay loam topsoil over very stony strongly calcareous, medium or heavy clay loam upper subsoil. Impenetrability occurred at 30-50cm due to quarry overburden and in some areas due to bricks and rubble.

### **Agricultural Land Classification**

21. 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.

22. 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 3a*

23. Land classified as subgrade 3a occurs in a small area in the eastern part of the site and corresponds to the soils described in paragraph 18. The combination of profile stone content, soil textures and the limited extent to which roots can exploit these soils gives rise to a moderate droughtiness limitation.

### *Subgrade 3b*

24. Land classified as subgrade 3b occurs in the remainder of the eastern part of the site and corresponds to the soils described in paragraph 19. With very stony subsoils both rooting and available water are restricted causing a moderately severe droughtiness limitation. In addition the land adjacent to the A47(T) road is restricted to this subgrade due to topsoil stone content and the area to the northwest has slopes in excess of 7°.

### *Grade 4*

25. Land classified as grade 4 occurs in the western part of the site and corresponds to the soils described in paragraph 20. With a thin topsoil over quarry overburden, rooting depth and available water are severely restricted causing a severe droughtiness limitation.

### *Soil Resources*

26. Three distinct soil types have been identified within the site and their distribution is shown on the accompanying soil resources map (NB. Soil Type III does not constitute a soil resource) which is illustrative of the soil resources within the site for restoration purposes but is not a soil stripping map for the site. A statement of the physical characteristics of Soil Types I and II is given in Appendix III. The thicknesses and the volumes given in Table 3 below should be treated with some caution due to the variability of the soils.

**Table 3 Soil Resources**

		Area (ha)	Thickness (cm)	Volume (m <sup>3</sup> )
Soil Type I	Topsoil	7.6	30	22800
	Upper Subsoil	7.6	30	22800
	Lower Subsoil	7.6	25	19000
Soil Type II	Topsoil	14.4	34	48960
	Upper Subsoil	14.4	26	37440

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## SOURCES OF REFERENCE

British Geological Survey (1978) *Sheet No. 157, Stamford, Solid and Drift. Scale: 1:50 000*  
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. Scale 1:250 000*  
SSEW: Harpenden.

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

### APPENDIX III

#### STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

##### SOIL TYPE I

Topsoil	Texture	:	fine sandy loam/medium clay loam
	Colour	:	10YR4/4
	Mottles	:	-----
	Concretions	:	-----
	Stone	:	5-7% mainly limestone pieces
	Roots	:	common, fine and very fine
	CaCO <sup>3</sup>	:	calcareous
	Depth	:	30cm
	Boundary	:	smooth/clear
Upper subsoil	Texture	:	fine sandy loam/sandy clay loam/heavy clay loam
	Colour	:	7.5YR5/6
	Mottles	:	----
	Concretions	:	----
	Stone	:	30% limestone pieces
	Structure	:	too stony
	Consistence	:	friable
	Structural condition	:	----
	Pores	:	>0.5%
	Roots	:	common fine and very fine
	CaCO <sup>3</sup>	:	calcareous
	Depth	:	60cm
	Boundary	:	smooth gradual
Lower subsoil	Texture	:	sandy clay loam/medium sand
	Colour	:	7.5YR5/6
	Mottles	:	----
	Concretions	:	----
	Stone	:	45% limestone flags
	Structure	:	too stony
	Consistence	:	friable
	Structural condition	:	----
	Pores	:	>0.5%
	Roots	:	few, fine and very fine. None seen >75/80cm
	CaCO <sup>3</sup>	:	calcareous
	Depth	:	Impenetrable 85cm, large limestone flags

Wetness Class: I



STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

SOIL TYPE II

Topsoil	Texture	:	medium or heavy clay loam
	Colour	:	10YR4/4
	Mottles	:	----
	Concretions	:	----
	Stone	:	8-18%, variable
	Roots	:	common, fine and very fine
	CaCO <sub>3</sub>	:	calcareous
	Depth	:	34cm
	Boundary	:	smooth/abrupt
Upper subsoil	Texture	:	medium or heavy clay loam
	Colour	:	10YR4/6+10YR5/6
	Mottles	:	----
	Concretions	:	----
	Stone	:	50-60% medium limestone flags
	Structure	:	too stony
	Consistence	:	friable
	Structural condition	:	----
	Pores	:	>0.5%
	Roots	:	few/common fine and very fine. none seen below 65cm
	CaCO <sub>3</sub>	:	calcareous
	Depth	:	Impenetrable 60cm, large limestone flags
	Boundary	:	
Lower subsoil	Texture	:	
	Colour	:	
	Mottles	:	
	Concretions	:	
	Stone	:	
	Structure	:	
	Consistence	:	
	Structural condition	:	
	Pores	:	
	Roots	:	
	CaCO <sub>3</sub>	:	
	Depth	:	

Wetness Class: I