KETTLEBY QUARRY EXTENSION

Agricultural Land Classification (ALC) Map and Report and Statement of Physical Characteristics

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AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF PHYSICAL CHARACTERISTICS REPORT

KETTLEBY QUARRY EXTENSION

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) and Statement of Physical Characteristics survey of 27.4 ha of land at Kettleby, North Lincolnshire. The survey was carried out during November 1998.

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 a proposal to extend Kettleby Quarry into existing agricultural land.

3. The work was conducted by members of the Resource Planning Team in the Northern 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 on the site was in arable use, either recently cultivated or sown with winter cereals.

SUMMARY

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:5,000. 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
1			
2	7.1	25.9	25.9
3a	19.2	70.1	70.1
3b	1.1	4.0	4.0
4			
5			
Agricultural land not surveyed		N/A	
Other land		N/A	
Total surveyed area	27.4	100	-
Total site area	27.4	-	100

7. The fieldwork was conducted at an average density of one boring per hectare. A total of 29 borings and two soil pits were described.

8. Two areas of Grade 2 land were identified on the site. Topsoils were medium sandy loam as were upper subsoils. These horizons were slightly stony, stones were a mixture of chalk and flint stones. Lower subsoils were generally a stoneless sand. Droughtiness limits the ALC grade of this land. Most of the site was Subgrade 3a. Topsoils were a slightly stony medium sandy loam. Subsoils were variable but often contained thick horizons of a very stony medium sandy loam. Stones were a mixture of chalk and flint. Subsoils of different textures were also described, including sand, loamy sand, sandy loam or sandy clay loam. Although some land contains profiles that meet the criteria for Grade 2, they were not found together in uniform mappable units. Generally droughtiness limits this land to Subgrade 3a. Subgrade 3b was found in the north east of the site. Topsoils were sandy clay loam over a clay subsoil. Soil wetness and workability limits this land to Subgrade 3b.

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	TA 050 090
Altitude	m, AOD	12
Accumulated Temperature	day°C (Jan-June)	1398
Average Annual Rainfall	mm	635
Field Capacity Days	days	138
Moisture Deficit, Wheat	mm	108
Moisture Deficit, Potatoes	mm	101
Overall climatic grade	N/A	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 (ATO, January to June), as a measure of the relative warmth of a locality.

13. The combination of rainfall and temperature at this site means there is no overall climatic limitation on ALC grade. However, moisture deficits suggest light textural soils may be droughty.

Site

14. The site is mostly level to gently sloping with a north westerly aspect. Small hummocks are found towards the centre and south of the site.

Geology and soils

15. Solid deposits of the Ancholme Clay Group are covered with Vale of York glacial lake sand and gravel deposits. Soils are derived from the sand and gravel. Topsoils are generally uniform in texture, typically a medium sandy loam. Stone content is more variable and is generally higher on the hummocky land found in the centre and south of the site. Stones comprise a mixture of flints and chalk, both of which are typically small (less than 2cm in size). Total volume of stones in these areas is usually less than 15%. Elsewhere stone content is lower, again with few stones larger than 2cm in size.

16. Subsoils are more variable. They are generally relatively light textured, either a sand, loamy sand or sandy loam. Gravel comprising flints and chalk is often encountered within 120cm depth, especially in the hummocky areas where it is found closest to the surface. These soils are all freely drained and assessed as Wetness Class I.

17. A small corner in the north east of the site contains different soils. Topsoils are sandy clay loam over a clayey, slowly permeable subsoil. Profiles are Wetness Class IV.

AGRICULTURAL LAND CLASSIFICATION

Grade 2

18. Two areas containing similar soils were mapped as Grade 2. In both cases topsoils were a slightly stony medium sandy loam. Stones were a mix of chalk and flint. Upper subsoils were similar in texture and stoniness. Lower subsoils tended to be lighter textured and often a stoneless sand. Profiles were assessed as Wetness Class I. Droughtiness limits the ALC grade of this land.

Subgrade 3a

19. Much of the site was categorised as Subgrade 3a. Again, topsoils were generally a medium sandy loam, generally slightly stony, but with a higher stone content in the hummocky areas in the centre and south of the site. Subsoils were more variable and often contained thick horizons of stony (gravelly) medium sandy loam, stones were chalk and flint. Different textured subsoils were also observed including sand, loamy sand, sandy loam and sandy clay loam. The stony or gravelly horizons tended to occur closest to the surface on the hummocky land. The 3a land is generally more droughty than the Grade 2 land due to a higher stone content. Although some land meets the criteria for Grade 2, it was not found in uniform mappable units. Land was generally subject to a Subgrade 3a droughtiness limitation.

Subgrade 3b

20. This land was found in the north east of the site. Topsoils are a sandy clay loam over a clayey, slowly permeable subsoil. Soil wetness and workability problems limit the ALC grade of this land.

STATEMENT OF PHYSICAL CHARACTERISTICS

21. One main soil type was found on the site, a description of which is given below. Topsoil and subsoil resources are shown on the accompanying maps along with soil thickness and volume information. Representative pit descriptions are given in Appendix III.

a. Soil Type 1 (T1/S1) Light textured soil.

This soil type covers the whole site. A small area in the north east of the site contain heavier textured soils. However, it is too small to be described as a separate soil unit in this report.

Soil Resources

Topsoils (T1)

22. One topsoil was identified on the site. It is light textured, typically a medium sandy loam and is very slightly or slightly stony (5 to 15% volume stones). Stones are a mixture of flints and chalk and are mostly less than 2cm in size. Stoniness tends to be highest in the centre and south of the site where relief is slightly hummocky. The topsoil has a strongly developed structure. The topsoil is 30cm thick on average. However, some profiles were identified with a topsoil upto 40cm thick.

Subsoil S1a and S1b

23. S1a and S1b are very similar in terms of typical texture and structure. They both are mostly light textured, either a sandy loam, loamy sand, sand or occasionally sandy clay loam. The structure is typically moderate to weakly developed medium angular blocky. Stone content is variable. Unit S1a is generally stonier and frequently contains horizons of very stony (or gravelly) material. The stones are a mixture of flints and chalk. Unit S1b is distinguished by being generally less stony. Both S1a and S1b are 90cm thick.

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SOURCES OF REFERENCE

British Geological Survey (1981) *Sheet No. 89, Solid Geology, Brigg, 1:50,000 scale* BGS: London.

British Geological Survey (1982) *Sheet No. 89, Drift Geology, Brigg, 1:50,000 scale* 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.

[ALC Map]

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.

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

SOIL PROFILE DESCRIPTION

Soil Type:	T1/S1b
Location:	TA 05100890
Land Use:	Winter Cereals
Slope and Aspect:	1°W

Depth (cm)	Horizon Description
0-36	Dark brown (10YR3/3); unmottled; medium sandy loam; 2% stones >2cm, 0% >6cm, 6% >2mm; stones mixture of flint and chalk; moist; strongly developed medium subangular blocky; friable; common fine fibrous roots; gradual wavy boundary.
36-80	Light yellowish brown (10YR6/4), unmottled; coarse sandy loam; 10% volume stones (flint and chalk); moist; moderate to weakly developed medium angular blocky; friable; common fine fibrous roots; abrupt wavy boundary.
80-120	Light yellowish brown (10YR6/4), unmottled; coarse sand; 10% volume stones (flint and chalk); moist; weakly developed coarse angular blocky; very friable; few fine fibrous roots.

Soil Type:	T1/S1a
Location:	TA 05100910
Land Use:	Recently cultivated
Slope and Aspect:	0°

Depth (cm)	Horizon Description
0-31	Dark brown (10YR3/3); unmottled; medium sandy loam; 4% stones >2cm, 0% >6cm, 10% total (flint and chalk); moist; strongly developed medium subangular blocky; friable; common fine fibrous roots; smooth wavy boundary.
31-61	Yellowish brown (10YR5/6), unmottled; medium sandy loam; 46% volume stones (flint and chalk); moist; loose granular; few fine fibrous roots; smooth wavy boundary.
61-120	Dark yellowish brown (10YR4/6), with few brownish yellow (10YR6/6) mottles; medium sandy loam; stoneless; moist; weakly developed coarse angular blocky; very friable; few fine fibrous roots.