

**SCROOBY QUARRY,
NOTTINGHAMSHIRE.**

**Agricultural Land Classification and Soil
Physical Characteristics Report.
April 1999**

**Resource Planning Team
Eastern Region
FRCA Cambridge**

**RPT Job Number: 30/99
MAFF Reference: EL32/01620
LURET Job Number: MLEG01620A**

AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS REPORT

SCROOBY QUARRY, NOTTINGHAMSHIRE.

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 16.9 ha of land at Scrooby in Nottinghamshire. The survey was carried out in April 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 a review of conditions relating to Scrooby Quarry (North) owned by Rotherham Sand and Gravel Co. Ltd.
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, and grassland. The 'Other land' comprises young tree plantations, scrub and a derelict building.

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	2.2	14	13
3b	13.5	84	80
4	0.3	2	2
Other land	0.9	N/A	5
Total surveyed area	16.0	100	95
Total site area	16.9	-	100

7. The fieldwork was conducted at an average density of one auger boring per hectare. A total of 16 auger borings and four soil pits was described.
8. Most of the site has been graded 3b (moderate quality agricultural land) and is restricted to this subgrade by significant droughtiness. In the south a small area of grade 2

land has been mapped, a slight droughtiness constraint precluding this land from a higher grade. At the northern end of the former quarry workings a small area of very droughty land has been identified and mapped as grade 4 (poor quality agricultural land).

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	SK 656 896
Altitude	m, AOD	10
Accumulated Temperature	day°C (Jan-June)	1418
Average Annual Rainfall	mm	577
Field Capacity Days	days	112
Moisture Deficit, Wheat	mm	111
Moisture Deficit, Potatoes	mm	105
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 between Scrooby and Ranskill and comprises three parts. The northern most part lies between Scrooby village and a previously worked quarry. It adjoins open fields to the north and west and the old quarry to the south and east. In the extreme north-east it abuts the railway. The middle and largest part of the site adjoins the A638 to the west and a railway to the east. To the north it abuts open fields and to the south further open fields and part of a water filled quarry. The southern most part of the site lies adjacent to the railway. It adjoins open fields to the south and west and the water filled quarry to the north. The site is virtually level occupying an altitude of approximately 10 m AOD. Altitude and gradient do not therefore impose any limitation to the agricultural land quality.

Geology and soils

15. At a scale of 1:63 360 the geology map, sheet 101 (Geological Survey of Great Britain [England and Wales], 1967) maps the three parts of the site as follows:

- North: Bunter Pebble Beds in the west and alluvium in the east.
- Middle: 1st terrace deposits in the east, Bunter Pebble Beds in the north-west and glacial deposits of sandy boulder clay or glacial sand and gravel in the south-west.
- South: Sandy boulder clay in the west and 1st terrace deposits in the east.

16. At a reconnaissance scale of 1:250 000 the Soil Survey of England and Wales, (Sheet 3, Soils of Midland and Western England, 1983) maps the site as the Newport 1 Association which is briefly described as a deep well drained sandy or coarse loamy soil which may be affected by groundwater.

17. The current survey identified four main soil types, the fourth of which comprises disturbed profiles and includes two variants.

Soil Type I (9.3 ha)

18. Soil Type I coincides with the majority of the middle part of the site. Topsoils comprise non-calcareous slightly to moderately stony medium sandy loams or loamy medium sands. The upper subsoil, encountered at 30/35 cm depth and typically extending to 50/65 cm depth, comprises non-calcareous medium sandy loam or loamy medium sand and is typically moderately to very stony. The lower subsoil is typically moderately stony (occasionally very stony) has medium sand texture (occasionally loamy medium sand or medium sandy loam), is non-calcareous and extends to depth. Profiles often become impenetrable to auger at 75/95 cm.

Soil Type II (2.9 ha)

19. Soil Type II occurs in the northern part of the site. Topsoils are slightly stony, non-calcareous and of medium sandy loam or loamy medium sand texture. The topsoil extends to 30/35 cm, the upper 10/20 cm of which is rich in organic matter. The upper subsoil is variable, typically comprising slightly stony loamy medium sand or medium sand extending to 45/80 cm, over very slightly stony or stoneless medium sandy loam or sandy clay loam to depth. Where it occurs the sandy clay loam is poorly structured and slowly permeable.

Soil Type III (2.2 ha)

20. Soil type III occurs only in the southern part of the site. Topsoils comprise very slightly to slightly stony, non-calcareous medium sandy loams and extend to 35 cm depth. The upper subsoil is non-calcareous and typically slightly stony. Textures include medium sandy loams or medium sandy silt loams merging into sandy clay loams. The upper subsoil either continues to depth (where it comprises medium sandy loam) or, beneath the better bodied upper subsoils, merges into a slightly stony, non-calcareous loamy medium sand lower subsoil at 80/85 cm.

Soil Type IV (1.2 ha)

21. Soil Type IV corresponds with the restored land along the eastern side of the middle part of the site. Topsoils comprise slightly stony, non-calcareous medium sandy loams to 30/35 cm depth. The subsoil comprises a poorly structured, compact mixture of slightly to moderately stony medium sandy loam, sandy clay loam and clay. In places the subsoil is likely to be slowly permeable and imperfectly drained.

Soil Type IVa (0.3 ha)

22. Soil type IVa occurs in a small area in the north of the site. This soil type also corresponding with disturbed land. In this area the upper horizon comprises medium sand, is not a true topsoil and is impenetrable to auger at 20 cm.

23. 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.

24. 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

Grade 2

25. Land mapped as grade 2 corresponds with Soil Type III described in paragraph 20. The combination of profile stone contents and coarse loamy topsoils over predominantly coarse loamy subsoils mean these soils have a slightly limited ability to retain water for crop growth. This land therefore suffers from a minor droughtiness constraint which precludes it from a higher grade.

Subgrade 3b

26. Land mapped as subgrade 3b corresponds with three soil types.

27. Firstly it corresponds with Soil Type I, described in paragraph 18. The coarse loamy or sandy profile textures in combination with the high percentages of stones in the profile mean that these soils only retain small reserves of water for crop growth. This land is therefore significantly droughty and hence restricted to subgrade 3b.

28. Although less stony, land corresponding to Soil Type II (described in paragraph 19) is also restricted to subgrade 3b by significant droughtiness. Profile stone contents combined with the coarse loamy, sandy or poorly structured fine loamy horizons mean that these soils also retain significantly limited reserves of soil water for crop growth.

29. Lastly, 3b land corresponds with Soil Type IV, described in paragraph 21. This restored land has a compact subsoil in which effective rooting depth extends to only 50 cm. The depth of soil resource within which roots can explore for water is therefore significantly restricted. This factor combined with the textures and stone contents present within the

rootable zone mean that this land suffers from a significant droughtiness constraint and is thus precluded from a higher grade.

Grade 4

30. Grade 4 land corresponds to Soil Type IVa, described in paragraph 22. In this small area of disturbed land there is no true topsoil. Profiles comprise medium sand from the surface, which due to its stone content is impenetrable to auger below 20 cm. This land has therefore been assessed as severely droughty and has been mapped as grade 4.

Adrian Rochford
Resource Planning Team
Eastern Region
FRCA Cambridge

SOURCES OF REFERENCE

Geological Survey of Great Britain (England and Wales), 1967, *sheet 101, East Retford*
1:63 360 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 3, Soils of Midland and Western England*,
1:250 000 scale, SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their use in Midland and Western 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	medium sandy loam or loamy medium sand
	Colour	10YR 4/2 (occasionally 4/3)
	Stone content	5–20% small, medium and occasional large pebbles
	Roots	many very fine and fine
	Calcium carbonate	non-calcareous
	Boundary form	abrupt, smooth/wavy
	Depth	30/35 cm
Upper subsoil	Texture	medium sandy loam or loamy medium sand
	Colour	typically 10YR 4/5, 5/5, 5/4 or 7.5YR 5/4, 5/5.
	Stone content	typically 30–60% (occasionally <10%) small, medium and large pebbles
	Structure	typically too stony to assess
	Consistence	friable
	Porosity	<0.5%
	Roots	common/many very fine and fine
	Calcium carbonate	non-calcareous
	Concretions	none
	Boundary form	clear/gradual, wavy
	Depth	typically 50/65 cm
Lower subsoil	Texture	typically medium sand (occasionally loamy medium sand or medium sandy loam)
	Colour	variable, typical range 10YR 5/4, 5/6 to 5YR 5/4, 5/6.
	Stoniness	typically 30–40% (occasionally <10%) small, medium and large pebbles.
	Structure	typically too stony to assess
	Consistence	very friable/loose
	Porosity	variable, from <0.5% to >0.5%.
	Roots	very few roots.
	Calcium carbonate	non-calcareous.
	Concretions	none
	Depth	120 cm

Notes: Profiles are free draining and therefore Wetness Class I.

Soil Type II

Topsoil	Texture	loamy medium sand or medium sandy loam
	Colour	10YR 3/1, 3/2 in OM rich layer to 10/20 cm, then typically 10YR 4/1
	Stone content	1-3% increasing to 5-15% below 10/20 cm, small and medium, mostly pebbles
	Roots	abundant very fine and fine
	Calcium carbonate	non calcareous
	Boundary form	-
	Depth	30/35 cm
Upper subsoil	Texture	loamy medium sand or medium sand
	Colour	10YR 6/3, 7/3 or 2.5Y6/1, 6/2.
	Mottles	common distinct/prominent ochreous mottles, 10YR 5/8
	Stone content	5-15% small and medium, mostly pebbles
	Structure	-
	Consistence	-
	Porosity	-
	Roots	-
	Calcium carbonate	non-calcareous
	Concretions	none
	Boundary form	-
	Depth	45/80
Lower subsoil	Texture	medium sandy loam or sandy clay loam
	Colour	variable: typically 5YR 5/3, 5/4
	Mottles	many prominent ochreous mottles 7.5YR 5/8, 6/8 and common distinct grey mottles 2.5Y 6/1.
	Stoniness	0-5% small and medium, mostly pebbles
	Structure	-
	Consistence	-
	Porosity	-
	Roots	-
	Calcium carbonate	non-calcareous
	Concretions	none
	Depth	120 cm

Notes: No pit was dug in this soil type

Profiles are likely to range from Wetness Class I to III depending on the nature of the lower subsoil

The poor structural condition for the sandy clay loam lower subsoil has been interpolated from a pit with a similar horizon in the south of the site

Soil Type III

Topsoil	Texture	medium sandy loam
	Colour	10YR 4/2
	Stone content	typically 5% small and medium pebbles
	Roots	abundant very fine and fine
	Calcium carbonate	non-calcareous
	Boundary form	abrupt, irregular
	Depth	35 cm
Upper subsoil	Texture	medium sandy loam, medium sandy silt loam, sandy clay loam
	Colour	2.5Y 6/2, 7/2 and 5Y 6/1
	Mottles	many prominent ochreous mottles 7.5YR 5/6 & 5/8
	Stone content	5–10% small and medium pebbles
	Structure	moderately developed coarse and very coarse prismatic
	Consistence	friable, becoming firm where heavier textured
	Porosity	typically <0.5%
	Roots	common very fine and fine
	Calcium carbonate	non-calcareous
	Concretions	few/common manganese
	Boundary form	clear, wavy
	Depth	either continues to depth (where MSL) or merges to lower subsoil at 80/85 cm.
Lower subsoil	Texture	loamy medium sand
	Colour	7.5 YR 5/4, 5/3
	Mottles	common distinct ochreous mottles, 7.5YR 5/8 many prominent grey mottles 5Y 6/1 and 7/1
	Stoniness	10–15% mainly small pebbles
	Structure	very dense: massive/weakly developed very coarse sub-angular blocky
	Consistence	friable
	Porosity	<0.5%
	Roots	very few very fine
	Calcium carbonate	non-calcareous
	Concretions	none
	Depth	120 cm

Notes: The gleying evident in the subsoil is thought to be a relic effect, profiles have therefore been assessed as Wetness Class I.

Soil Type IV

Topsoil	Texture	medium sandy loam
	Colour	10YR 3/2
	Stone content	10–15% small, medium and occasional large. Mostly rounded pebbles.
	Roots	common very fine
	Calcium carbonate	non-calcareous
	Boundary form	abrupt, wavy
	Depth	30/35 cm
Subsoil	Texture	variable: compact mix of medium sandy loam, sandy clay loam with large clay lenses.
	Colour	mixed: 7.5YR and 10YR 5/4 and 5/6; 5YR 5/3 and 6/3 (in clay).
	Mottles	within clay lenses, many prominent grey mottles, 2.5Y 7/1 and common distinct ochreous mottles 7.5YR 5/6 and 5/8.
	Stone content	10–20% medium rounded pebbles
	Structure	weakly developed very coarse sub-angular blocky
	Consistence	firm to very firm
	Porosity	<0.5%
	Roots	very few to 50 cm, none found below this depth
	Calcium carbonate	non-calcareous
	Concretions	generally few manganese, common in places.
	Boundary form	-
	Depth	120 cm.

Notes: This soil type is disturbed and has compacted subsoils.

Profiles are likely to be variably porous. In places, where the subsoil is slowly permeable, they are assessed as Wetness Class III.

No worms were observed in the subsoil, and in places there was a slight anaerobic smell. Some remedial action is needed to improve the structure and aeration of the subsoil.