

SKELBROOKE QUARRY EXTENSION

**Agricultural Land Classification
and Statement of Physical
Characteristics Report
July 1996**

**Resource Planning Team
Leeds Statutory Group
ADAS Leeds**

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**SKELBROOKE QUARRY EXTENSION
AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF PHYSICAL
CHARACTERISTICS REPORT**

Introduction

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) and Statement of Physical Characteristics (SPC) survey on 7 ha of land at Skelbrooke, near Doncaster. The survey was carried out during July 1996.
2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) Land Use Planning Unit, Northallerton in connection with the proposal to quarry limestone at this site. This survey supersedes any ALC previous surveys on this land.
3. The work was conducted by members of the Resource Planning Team in the Leeds 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 all of the agricultural land on the site was under oilseed rape. Other land on the site consisted of an access road and part of the existing quarry in the west.

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)	% Total site area	% Surveyed Area
Subgrade 3a	1.4	20.0	25.9
Subgrade 3b	4.0	57.1	74.1
Other land	1.6	22.9	-
Total surveyed area	5.4	-	100
Total site area	7.0	100	-

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

8. Subgrade 3a, good quality agricultural land, occurs in the north of the site. The soils here are well or moderately well drained and consist of medium clay loam topsoils and upper subsoils overlying either weathering limestone or clay or silty clay lower subsoils. The ALC grade of this land is limited by soil droughtiness and by a pattern limitation, as the deeper soils (which meet the requirements for Grade 2) are too inextensive to map as a separate unit.

Subgrade 3b, moderate quality agricultural land, covers the remainder of the agricultural land on the site. Two distinct soil types occur within this area. The first consists of imperfectly drained soils in the centre of the site where non-calcareous heavy clay loam topsoils overlie gleyed and slowly permeable heavy clay loam, clay or silty clay subsoils at between 30 cm and 40 cm depth in most cases. Soil wetness and topsoil workability restrictions limit this land to Subgrade 3b. The second soil type consists of medium clay loam topsoils overlying, in most places, thin medium clay loam subsoils and, at between 20 cm and 40 cm depth, weathering limestone bedrock. In this case soil droughtiness is the grade-limiting factor.

Other land on this site occurs in the west and consists of part of the existing quarry and an access road.

9. In term of soils resources, there are two main soil types on the site. The first consists of heavy clay loam topsoils (median depth 30 cm) overlying heavy clay loam, clay or silty clay upper subsoils (mean depth 21 cm) and clay or silty clay lower subsoils (mean depth 68 cm). The second main soil type consists of medium clay loam topsoils (median depth 30 cm) overlying medium clay loam or heavy clay loam subsoils (mean depth 27 cm). Weathering Magnesian Limestone underlies this soil type at variable depth.

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. 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	SE 509 117
Altitude	m, AOD	31
Accumulated Temperature	day°C (Jan-June)	1388
Average Annual Rainfall	mm	605
Field Capacity Days	days	126
Moisture Deficit, Wheat	mm	107
Moisture Deficit, Potatoes	mm	98

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 there is no climate limitation to the ALC grade.

Site

15. The land on this site is level to gently sloping (0-3°) and as such gradient does not limit ALC grade at any point on this site. Neither micro-relief nor flood risk provide any limitation to ALC grade on the site.

Geology and soils

16. Most of the site is underlain by Upper Magnesian Limestone, with the far north underlain by Lower Magnesian Limestone. There is a band of Upper Permian Marl lying between the outcrops of Upper and Lower Magnesian Limestone. Although the geology map for the area (Sheet 87, Barnsley) shows no drift cover, the field survey found a cover of reddish till over parts of the centre of the site.

17. The Soils of Northern England shows the soils on the site as belonging to the Aberford association.

Agricultural Land Classification

18. 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.

19. The location of two representative soil pits is shown on the attached soil resource maps and the full profile descriptions are given in Appendix III.

Subgrade 3a

20. Subgrade 3a, good quality agricultural land, occurs in the north of the site. The soils are well or moderately well drained, falling in Wetness Classes I and II (see Appendix II). Typically medium clay loam topsoils and upper subsoils overlie either weathering limestone (at around 60 cm depth) or clay or silty clay lower subsoils (at around 50 cm depth), which are sometimes slowly permeable. The topsoils are generally slightly stony, containing around 6% total limestones (3% > 2 cm) but the ALC grade of the land is limited by soil droughtiness and by a pattern limitation, as the deeper soils (which meet the requirements for Grade 2) are too inextensive to map as a separate unit.

Subgrade 3b

21. Subgrade 3b, moderate quality agricultural land, covers the remainder of the agricultural land on the site. On the lower-lying land in the centre of the site the soils are imperfectly drained, falling in Wetness Class III (see Appendix II). In this area non-calcareous heavy clay loam topsoils overlie gleyed and slowly permeable heavy clay loam, clay or silty clay subsoils at between 30 cm and 40 cm depth in most cases. The ALC grade of this land is restricted by soil wetness and topsoil workability restrictions.

The second soil type occurs in the south of the site and consists of medium clay loam topsoils and, in most places, thin medium clay loam subsoils overlying weathering Magnesian Limestone at between 20 cm and 40 cm depth in most cases. These soils are well drained, falling in Wetness Class I, and topsoils and subsoils are generally slightly stony, containing around 8% total limestones. The ALC grade of this land is restricted by soil droughtiness and, although some deeper profiles do occur in places, their occurrence is too erratic to allow them to be mapped together as a separate unit.

Other land

22. This occurs in the west of the site and consists of part of the existing quarry and an access road.

Statement of Physical Characteristics

23. Two main soil types were identified on the site, descriptions of which are given below. Topsoil and subsoil resources are shown on the accompanying maps along with soil thickness and volume information, which has been drawn up using information collected during the ADAS survey and also soils information provided for the applicants by R C Palmer of the Soil Survey and Land Research Centre.

a. Soil Type 1 (T1/U1/L1), Heavy-textured soil derived from till.

This soil type occurs in the north-east of the site, and is characterised by a heavy clay loam topsoil overlying a heavy clay loam, clay or silty clay subsoil.

b. Soil Type 2 (T2/U2/Magnesian Limestone), Medium-textured soil derived from limestone.

This soil type occurs over the remainder of the agricultural land on the site and is derived from weathering limestone. Typically medium clay loam topsoils and medium or heavy clay loam subsoils overlie weathering limestone at between 30 cm and 100 cm depth.

Soil Resources

Topsoils

24. Unit T1 occurs in the north-east of the site. It consists of heavy clay loam and has a moderately developed coarse angular blocky structure. It is very slightly to slightly stony, typically containing 5-6% very small to medium limestones, and it has a median unit depth of 30 cm.
25. Unit T2 occurs in the centre and south of the site. It is medium-textured (usually consisting of medium clay loam) and has a moderately developed coarse subangular and angular blocky structure. It is very slightly to slightly stony in most cases, with between 5% and 8% very small to medium limestones, and it has a median unit depth of 30 cm.

Upper Subsoils

26. Unit U1 underlies topsoil T1 in the north-east of the site. It is heavy-textured, consisting of heavy clay loam, clay or silty clay, and has a moderately developed coarse angular blocky and medium prismatic structure. It is very slightly to slightly stony, containing between 5% and 8% very small to medium limestones in most cases, and it has a mean unit depth of 21 cm.
27. Unit U2 underlies topsoil T2. It is medium to heavy-textured and typically consists of medium or heavy clay loam with a weakly to moderately developed coarse subangular blocky and medium prismatic structure. Unit U2 is very slightly to slightly stony in most cases, containing between 5% and 12% very small to medium limestones, and it has a mean unit depth of 27 cm. It is underlain by weathering Magnesian Limestone.

Lower Subsoils

28. Lower Subsoil Unit L1 occurs in the north-east of the site. It consists of clay or silty clay and has a moderately developed coarse angular blocky and medium prismatic structure. It is slightly to moderately stony, containing up to 30% very small to medium limestones, and it has a mean depth of 68 cm.

Restoration Proposals

29. For the restoration of the proposed extension it is proposed to use soils already stored in two mounds within the existing quarry. These soil mounds were inspected during the field survey carried out in July 1996. The first soil mound occurs along the north-western boundary of the existing quarry, adjoining Straight Lane. It consists primarily of topsoil, although lenses of marly subsoil were evident in places. It is approximately 270 m long with an average height of approximately 4 m and an average width of approximately 12 m. It appears to be only slightly stony and, despite the contamination with lenses of heavy-textured marly subsoil, it appears to be suitable for restoration as a topsoil.

30. The second soil mound lies to the south of the existing site, adjoining Duckhole Wood and Harry Wood. In general terms the soils stored here are accurately described in the document "Soil Quality Assessment in Soil Stores at Skelbrooke Quarry", written by R C Palmer and I P Holman of the Soil Survey and Land Research Centre. However, this soil mound has a length of approximately 270 m (not 100 m as described in the Palmer and Holman report), and the average stone content of 50% given in the final page of the document appears to be a conservative estimate. As many of the stones in this mound are large, hard limestones, it is not suitable as such for use in a restoration, and only once these have been removed will the true volume of material suitable for use in any restoration (ie the soil and smaller stones contained within the mound) be known.

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SOURCES OF REFERENCE

British Geological Survey (1976) *Sheet No. 87, Barnsley (Solid and Drift), 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.

Soil Survey of England and Wales (1983) *Sheet 1, Soils of Northern England, 1:250,000 scale.* SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use Northern 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

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 DESCRIPTIONS

Soil Type 1: Heavy-textured soil derived from till

Location: East of boring 5

Land Use: Oilseed rape

Slope: 0°

Recent Weather: Warm and showery

Depth (cm) Horizon Description

0-34 Brown/dark brown (10 YR 4/3) heavy clay loam; no mottles; slightly stony, with approximately 6% total very small to medium limestones (4% >2 cm); dry; moderately developed coarse angular blocky structure; very hard; slightly porous; few coarse fleshy and many fine and very fine fibrous roots; moderately sticky; moderately plastic; non-calcareous; clear smooth boundary.

34-57 Brown (7.5 YR 5/3) clay; common distinct reddish yellow (7.5 YR 6/6) mottles; slightly stony, with approximately 6% total very small to medium limestones; dry; moderately developed coarse angular blocky and medium prismatic structure; extremely hard; slightly porous (<0.5% pores >0.5 mm); few very fine fibrous roots; moderately sticky; very plastic; non-calcareous; clear wavy boundary.

57-110 Yellowish red (5 YR 4/6) clay; common distinct light grey (2.5 YR 7/2) mottles; slightly stony, with approximately 6% total very small to medium limestones; dry; moderately developed coarse angular blocky and medium prismatic structure; extremely hard; slightly porous (<0.5% pores >0.5 mm); few very fine fibrous roots; moderately sticky; very plastic; clear, smooth boundary.

110+ Weathering Magnesian Limestone

Soil Type 2: Medium-textured soil derived from limestone

Location: Boring 6

Land Use: Oilseed rape

Slope: 0°

Recent Weather: Warm and showery

Depth (cm) Horizon Description

0-33 Dark brown (10 YR 3/3) medium clay loam; no mottles; slightly stony, with approximately 7% total very small to medium limestones (4% >2 cm); dry; moderately developed coarse subangular blocky and angular blocky structure; very hard; moderately porous; abundant very fine fibrous roots to 10 cm depth, many below 10 cm and few coarse fleshy roots; moderately sticky; moderately plastic; non-calcareous; clear, smooth boundary.

33-59 Brown/dark brown (7.5 YR 4/2) heavy clay loam; common strong brown (7.5 YR 4/6) mottles; slightly stony, with approximately 12% very small to medium limestones; dry; weakly developed coarse subangular blocky and medium prismatic structure; very hard; moderately porous (>0.5% pores >0.5 mm); common very fine fibrous roots; moderately sticky; very plastic; non-calcareous; clear smooth boundary.

59+ Weathering white (10 YR 8/1) Magnesian Limestone.