



**Routh Quarry - Extension
Agricultural Land Classification and
Statement of Physical Characteristics
Humberside
October 1996**

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

**ADAS Reference: 95/96
MAFF Reference: EL 11096
LUPU Commission: N2920**

RPT 20, 090

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

Introduction

1. This report presents the findings of a detailed Statement of Physical Characteristics and Agricultural Land Classification (ALC) survey of 41.6 ha of land at Routh, near Beverley. The survey was carried out during October 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 extract sand and gravel from this land. This ALC survey supersedes any previous surveys.
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 the land on the site was mainly in arable use, with winter cereals in the north-west and east, and linseed stubble in the south. There is also an area of coniferous woodland/scrub/bracken in the centre of the site and a belt of recently planted mixed woodland in the north-west.

Summary

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:7,500. 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
Grade 2	10.8	26.0	37.2
Subgrade 3a	8.3	20.0	28.6
Subgrade 3b	9.9	23.8	34.2
Other land	12.6	30.2	-
Total surveyed area	29.0	-	100
Total site area	41.6	100	-

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

8. Grade 2, very good quality agricultural land, occurs in the south and east of the site. The soils are well drained, with sandy loam topsoils and upper subsoils overlying sandy loam or loamy sand lower subsoils, although in the east some moderately well or imperfectly drained profiles occur where sandy loam topsoils and upper subsoils overlie sandy clay loam, heavy clay loam or clay lower subsoils. This land is limited to Grade 2 by soil droughtiness (in the south) and either soil droughtiness or soil wetness (in the east).

9. Subgrade 3a, good quality agricultural land, occurs in the south, north-west and far east. In the south and east the soils are well drained, with sandy loam topsoils, sandy loam or loamy sand upper subsoils and loamy sand lower subsoils. In these areas the topsoils are very slightly to slightly stony while the subsoils are slightly stony. Soil droughtiness limits the ALC grade of these areas. In the north-west the soils are more variable, with light to heavy-textured topsoils overlying medium to heavy-textured subsoils which become slowly permeable at between 30 cm and 60 cm depth. Soil wetness limits this land to Subgrade 3a.

10. Subgrade 3b, moderate quality agricultural land, occurs mainly in the north-west but also in two small areas in the east. The soils are generally poorly drained, with silty clay or organic silty clay topsoils overlying gleyed and slowly permeable silty clay upper subsoils which grade into fibrous peat at depth. Soil wetness and topsoil workability restrictions limit this land to Subgrade 3b. The small area of Subgrade 3b land north-west of High Farm consists of sandy clay loam topsoils overlying gleyed and slowly permeable sandy clay loam subsoils. Again, soil wetness is the grade-limiting factor in this case.

11. Other, non-agricultural, land consisting of mixed woodland in the north-west and coniferous woodland/scrub/bracken in the centre of the site covers 12.6 ha.

12. Three main soil types occur on the site. The first occurs in the south and east and consists of sandy loam topsoils (median thickness 30 cm) overlying sandy loam or loamy sand subsoils (mean thickness 87 cm) in most places. The second soil type occurs mainly in the north-west and consists of silty clay or organic silty clay topsoils (median thickness 30 cm) overlying silty clay upper subsoils (mean thickness 65 cm) and organic silty clay, peaty loam, loamy peat or peat lower subsoils (mean thickness 26 cm). The third main soil type occurs in the centre of the site and consists of organic or peaty topsoils (median thickness of deep phase 45 cm, median thickness of shallow phase 20 cm) overlying sandy loam or loamy sand subsoils in most cases, although horizons of medium silty clay loam or sandy clay loam occur at depth in places. In this case the subsoil extends from below the topsoil to 120 cm depth.

Factors Influencing ALC Grade

Climate

13. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

14. 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	TA 085 438
Altitude	m, AOD	1
Accumulated Temperature	day°C (Jan-June)	1394
Average Annual Rainfall	mm	640
Field Capacity Days	days	147
Moisture Deficit, Wheat	mm	106
Moisture Deficit, Potatoes	mm	98

15. 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.

16. 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.

17. The combination of rainfall and temperature at this site means that there is no climatic limitation on ALC grade.

Site

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

Geology and soils

19. This area is underlain by Cretaceous Chalk over which lie deep deposits of glacial sand and gravel in the south and east, and heavy-textured marine alluvium in the north-west (BGS, Sheet 72, Beverley). In the centre of the site is an area of scrub land where peaty or organic topsoils overlie generally very light-textured glacial deposits.

20. The soils on this site have been mapped as Holderness association in the south and east and Downholland 3 association in the north-west (Soil Survey of England and Wales, Soils of Northern England).

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.

Grade 2

22. Land in this grade, defined as very good quality agricultural land, occurs in the south and east of the site. In the south the soils are well drained, falling in Wetness Class I (see Appendix II) and generally consist of medium sandy loam topsoils and upper subsoils overlying medium sandy loam or loamy medium sand lower subsoils. In the east the soils vary between well drained and imperfectly drained (Wetness Classes I to III) and in most cases medium sandy loam topsoils and upper subsoils overlie sandy clay loam, heavy clay loam or clay lower subsoils. These lower subsoils, which occur below 60 cm depth, are often gleyed and slowly permeable. In both the south and the east the soils are very slightly to slightly stony, with between 5% and 15% very small to medium flints and hard stones (1% > 2 cm in the topsoils). The ALC grade of these areas is restricted by soil droughtiness in the south and either soil droughtiness or soil wetness in the east.

Subgrade 3a

23. Subgrade 3a, good quality agricultural land, occurs in the south, north-west and far east (along the line of the proposed access road). In the south and far east the soils are well drained (Wetness Class I) with medium sandy loam topsoils, medium sandy loam or loamy medium sand upper subsoils and loamy medium sand lower subsoils. In these areas the topsoils are very slightly to slightly stony, with 5 - 6% very small to medium flints and hard stones, whilst the subsoils are slightly stony, with 10 to 15% flints and hard stones. The ALC grade of these areas is limited by soil droughtiness. In the north-west of the site the soils are more variable, with medium sandy loam, medium clay loam or heavy clay loam topsoils overlying, in most cases, medium clay loam or heavy clay loam upper subsoils and clay lower subsoils. Slowly permeable layers begin at between 30 cm and 60 cm depth and soil wetness is the factor which limits this land to Subgrade 3a.

Subgrade 3b

24. Land in this subgrade, moderate quality agricultural land, occurs mainly in the north-west but also in two small areas in the east. In the north-west and in the east on the line of the proposed access road the soils consist of silty clay or organic silty clay topsoils overlying gleyed and slowly permeable silty clay subsoils. Horizons of organic clay or fibrous peat occur below 50 cm depth in many places and these soils are poorly drained falling in Wetness Class IV. Soil wetness and topsoil workability limitations restrict the ALC grade of these areas. A small area north-west of High Farm is also limited to Subgrade 3b by soil wetness but in this case sandy clay loam topsoils overlie gleyed and slowly permeable sandy clay loam subsoils at round 30 cm depth.

Other Land

25. Other, non-agricultural, land on this site consists of a belt of recently-planted mixed woodland in the north-east, and a larger block in the centre consisting of scrub, coniferous woodland and bracken.

Statement of Physical Characteristics

Three 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. Representative pit descriptions are given in Appendix III.

(a) Soil Type 1 (T1/S1B) Light to very light-textured soils

This soil type occurs mainly in the south and east, but also in two small areas in the north-west of the site. It is characterised by very slightly or slightly stony sandy loam topsoils overlying slightly stony sandy loam or loamy sand subsoils. A small area of land north-west of High Farm has topsoils and subsoils with a slightly higher clay content (typically sandy clay loams) but the texture is variable and even here horizons of loamy medium sand occur at variable depth. As such this area is not sufficiently distinct to warrant mapping out as a separate soil type.

(b) Soil Type 2 (T2/U1/L1) Heavy-textured alluvial soil

This soil type covers most of the north-west of the site and a small area in the north-east. It is characterised by stoneless silty clay topsoils (some of which are organic) and upper subsoils overlying organic silty clay or peaty lower subsoils.

(c) Soil Type 3 (T3A and T3B/S1A and S1B) Peaty /organic topsoils overlying very light to medium-textured subsoils.

This soil type occurs in the centre of the site. It is characterised by an organic or peaty topsoil. (Deep phase: T3A, Shallow phase: T3B) overlying a very light to medium textured subsoil (S1A) or a very light to light-textured subsoil (S1B).

Soil Resources

Topsoils

Unit T1 covers most of the south and east of the site and also occurs in two small areas in the north-west. It generally consists of medium sandy loam and it is very slightly to slightly stony, with between 5% and 10% very small to medium hard stones and flints. It has a moderately developed fine and medium subangular blocky structure and a median unit thickness of 30 cm.

Topsoil Unit T2 covers most of the north-west and a small part of the north-east. It is heavy-textured (silty clay) and often organic. Unit T2 is stoneless, has a strongly developed fine and medium subangular blocky structure, and a median unit thickness of 30 cm.

Unit T3 occurs on the non-agricultural land in the centre of the site. It can be subdivided into T3A, which is peaty and has a median thickness of 45 cm, and T3B, which is organic or peaty and has a median thickness of only 20 cm. Both Unit T3A and T3B are stoneless and have a weakly developed coarse angular blocky structure. Field tests suggest that this topsoil has a pH of around 4.0 and as such it would require heavy liming before it could be used in any agricultural restoration.

Whole Subsoils

Subsoil S1 underlies most of the south, centre and east of the site and also occurs in two small areas in the north-west. It can be subdivided into S1A which has a mean thickness of 65 cm and varies in texture between loamy medium sand and sandy clay loam, and S1B which has a mean thickness of 87 cm and generally consists of loamy medium sand or medium sandy loam, although horizons of sandy clay loam, heavy clay loam or clay occur at variable depth in the east of the site. Both Unit S1A and S1B have weakly developed coarse angular blocky structures. Unit S1A is typically stoneless whilst S1B is slightly stony, with 10% to 15% very small to medium hard stones and flints.

Upper Subsoils

Upper subsoil U1 underlies topsoil T2. It is also stoneless and heavy-textured, consisting of silty clay, and has a weakly developed coarse angular blocky structure. The mean thickness of Unit U1 is 65 cm.

Lower Subsoils

Lower subsoil L1 underlies topsoil T2 and upper subsoil U1. It is stoneless and consists of organic silty clay, peaty loam, loamy peat or peat. It is stoneless and has a weakly developed very coarse platy structure. The mean thickness of Unit L1 is 26 cm. Field tests suggest that this lower subsoil has a pH of 4.0 or less and as such further tests on the pH should be carried out if it is to be used in any agricultural restoration.

File Ref: RPT 20,090
Resource Planning Team
Leeds Statutory Group
ADAS Leeds

SOURCES OF REFERENCE

British Geological Survey (1960) *Sheet No. 72, Beverley (Drift), 1:63,360 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.*
SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in 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: Light-textured to very light-textured soils (T1/S1B)
Location: Grid Reference TA 0840 4360.
Land Use: Linseed stubble.
Slope: 0°
Recent weather: Mild and overcast.

<u>Depth (cm)</u>	<u>Horizon Description</u>
0 - 30	Dark brown (10YR3/3) medium sandy loam; no mottles; very slightly stony, with approximately 5% very small to medium hard stones and flints; moist; moderately developed fine and medium subangular blocky structure; friable to firm; very porous; many very fine fibrous roots; slightly sticky; moderately plastic; non-calcareous; clear wavy boundary.
30 - 51	Light grey (10YR7/2) medium sandy loam becoming brown (10YR5/3) below 44 cm; common brownish yellow (10YR6/8) and strong brown (7.5YR5/8) mottles; very slightly stony, with approximately 5% very small to medium flints and hard stones; dry; weakly developed coarse angular blocky structure; moderately to very hard; very porous; common very fine fibrous roots; slightly sticky; moderately plastic; non-calcareous; clear, smooth boundary
61 - 120	Brown (10YR5/3) medium sandy loam; many brownish yellow (10YR6/8) mottles; slightly stony, with around 15% very small to medium flints and hard stones; slightly moist, becoming moist below 100 cm; weakly developed medium and coarse angular blocky structure; very firm; very porous; few very fine fibrous roots; slightly sticky; slightly plastic; non-calcareous.

Soil Type 2: Heavy-textured alluvial soil (T2/U1/L1)

Location: Grid Reference TA0800 4415

Land Use: Winter Cereals.

Slope: 0°

Recent weather: Cool and overcast after overnight rain.

<u>Depth (cm)</u>	<u>Horizon Description</u>
0 - 33	Very dark greyish brown (10YR3/2) organic silty clay; no mottles; stoneless; slightly moist; strongly developed fine and medium subangular blocky structure; very firm; slightly porous; common very fine fibrous roots; moderately sticky; very plastic; non-calcareous; clear, smooth boundary.
33 - 60	Grey (10YR5/1) silty clay; many strong brown (7.5YR4/6) mottles; stoneless; slightly moist; weakly developed coarse angular blocky structure; extremely firm; very slightly porous (< 0.5% pores >0.5 mm); common very fine fibrous roots; moderately sticky; very plastic; non-calcareous; clear gradual boundary.
60 - 76	Dark brown (7.5YR3/2) organic silty clay; no mottles; stoneless; wet; weakly developed very coarse platy structure; firm; extremely porous; no live roots but abundant plant remains; moderately sticky; very plastic; non-calcareous; clear gradual boundary.
76 - 120	Black (10YR2/1) fibrous peat; no mottles; stoneless; wet; weakly developed very coarse platy structure; firm; extremely porous; no live roots but abundant plant remains; moderately sticky; moderately plastic; non-calcareous; clear, smooth boundary.
120 +	Clay

Soil Type 3: Peaty/organic topsoils overlying very light to light textured subsoils (T3B/S1B)

Location: Grid Reference TA 0860 4380

Land use: Scrub.

Slope: 0°

Recent weather: Mild and overcast.

<u>Depth (cm)</u>	<u>Horizon Description</u>
0 - 13	Brown/dark brown mat of grass roots; clear, smooth boundary.
13 - 31	Black (10YR2/1) humified peat; no mottles; stoneless; slightly moist; weakly developed coarse angular blocky structure; firm; very porous; abundant fine and very fine fibrous roots; slightly sticky; moderately plastic; non-calcareous; clear, smooth boundary.
31 - 120	Light brown (7.5YR6/3) loamy medium sand; common strong brown (7.5YR5/8) mottles; very slightly stony, with around 2% very small to medium hard stones; slightly moist; weakly developed coarse angular blocky structure; firm; extremely porous; common fine and very fine fibrous roots; slightly sticky; slightly plastic; non-calcareous.