

**HENSALL QUARRY
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Agricultural Land Classification and
Statement of Physical Characteristics
Report
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**HENSALL QUARRY, HENSALL
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 survey of 12.8 ha of land at Hensall near Eggborough. The survey was carried out during September 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 the land. This survey supersedes any previous ALC 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 under cereal stubble although land to the south of West Common Lane was in sugar beet.

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 3a4.3	4.3	33.6	33.6
Subgrade 3b	8.5	66.4	66.4
Total surveyed area	12.8	-	100
Total site area	12.8	100	-

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

8. Subgrade 3a, good quality agricultural land, covers the north of the site. Generally the soils here are well drained, with sandy loam topsoils overlying loamy sand upper subsoils and sandy clay loam or sandy loam lower subsoils. Soil droughtiness limits this land to Subgrade 3a. In a small low-lying area in the north organic medium clay loam topsoils overlie gleyed and slowly permeable silty clay subsoils. Although this area meets the requirements for Grade 2, it is too small to map as a separate unit and it has therefore been included in the Subgrade 3a mapping unit.

9. Subgrade 3b, moderate quality agricultural land, covers the centre and south. The soils are well drained, and generally consist of loamy sand topsoils and upper subsoils overlying either sand or sandy loam, sandy clay loam, clay or sandy clay lower subsoils. The ALC grade of this land is limited by soil droughtiness.

10. There are three main soil types on the site. The first consists of very light-textured topsoils (median depth 35 cm) overlying similar subsoils (mean depth 87 cm). This occurs in the south of the site. The second soil type consists of light to very light-textured topsoils (median depth 30 cm) and upper subsoils (mean depth 67 cm) overlying medium to heavy-textured lower subsoils (mean depth 23 cm). This soil type covers most of the centre and north of the site. The third soil type consists of organic medium-textured topsoils (median depth 35 cm) overlying heavy-textured subsoils (mean depth 85 cm). This soil type is found in a small area in the north.

Factors Influencing ALC Grade

Climate

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

12. 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 583 232
Altitude	m, AOD	9
Accumulated Temperature	day°C (Jan-June)	1406
Average Annual Rainfall	mm	606
Field Capacity Days	days	126
Moisture Deficit, Wheat	mm	110
Moisture Deficit, Potatoes	mm	102

13. 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.

14. 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.

15. The combination of rainfall and temperature at this site means that there is no climatic limitation to the ALC grade of land in this area.

Site

16. The land on this site is level to gently sloping (0 - 2°) with variable aspect. As such gradient does not limit ALC grade at any point. Equally, neither microrelief nor flood risk are significant factors on this site.

Geology and soils

17. The site is underlain by Bunter Sandstone over which lie deep deposits of glacial sand and gravel (south of West Common Lane) and fluvioglacial sand (over the remainder of the site). North of West Common Lane glaciolacustrine clay occurs at depth in many places and at the soil surface in the lowest-lying area in the north (BGS, Sheet 79, Goole).

18. The soils on the site have been mapped as Newport 1 association by the Soil Survey of England and Wales (Soils of England and Wales, Sheet 1, Northern England). The field survey found Newport series soils south of West Common Lane and Blackwood and Ollerton series soils covering most of the land north of West Common Lane.

Agricultural Land Classification

19. 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.

Subgrade 3a

20. The north of the site has been mapped as Subgrade 3a, good quality agricultural land. Typically the soils in this area are well drained, falling in Wetness Class I (see Appendix II), and consist of medium sandy loam topsoils overlying gleyed loamy medium sand upper subsoils and medium sandy loam or sandy clay loam lower subsoils. The topsoils and upper subsoils are generally very slightly stony, containing around 2% hard stones, whilst the subsoils are generally stoneless. This land is limited to Subgrade 3a by soil droughtiness. A small area in the north consists of organic medium clay loam topsoils overlying gleyed and slowly permeable silty clay at around 35 cm depth. This small area has imperfectly drained soils (Wetness Class III) and meets the requirements for Grade 2, but it is too small to map as a separate unit.

Subgrade 3b

21. Subgrade 3b, moderate quality agricultural land, covers the centre and south of the site. The soils are well drained, falling in Wetness Class I, and typically consist of loamy medium sand topsoils and upper subsoils overlying either medium sand (south of West Common Lane) or medium sandy loam, sandy clay loam or sandy clay (north of West Common Lane). The topsoils and subsoils are very slightly stony to the north of West Common Lane (typically 2% total hard stones) but very slightly or slightly stony south of the lane (typically with between 4% and 6% hard stones in the topsoil and 4% to 12% hard stones in the subsoil). The ALC grade of this land is limited by soil droughtiness.

Statement of Physical Characteristics

22. Three main soil types occur on this site, descriptions of which are given below. Topsoil and subsoil resources are shown on the accompanying maps along with soil thickness and volume informations. Profile pit descriptions are given in Appendix III.

- (a) Soil Type 1 (T1/U1) - Light to very light-textured soil, slightly stony. This soil type occurs in the south of the site and is derived from glacial sand and gravel. It is characterised by it's very light-textured ungleyed subsoil.
- (b) Soil Type 2 (T2/U2/LIB) - Light to very light-textured soil overlying lacustrine clay. This soil type occurs in the centre and north of the site and is derived from fluvio-glacial sand. It is characterised by it's gleyed subsoil and the presence of lacustrine clay at depth.
- (c) Soil Type 3 (T3/L1A) - Organic topsoil overlying lacustrine clay. This soil type occurs in a small area of the north of the site. It is characterised by it's organic topsoil and clayey subsoil.

Topsoils

23. Topsoil T1 occurs south of West Common Lane. It is light or very light-textured, consisting of medium sandy loam or, more often, loamy medium sand, and very slightly to slightly stony, with between 3% and 6% very small to medium hard stones. This topsoil has a weakly developed medium and coarse angular blocky structure and a median depth of 35 cm.

24. Topsoil T2 covers most of the centre and north of the site. It is light or very light-textured, consisting of medium sandy loam or loamy medium sand, and it is very slightly stony, with only 1 - 2% total very small to medium hard stones. Unit T2 typically has a moderately developed medium subangular blocky structure and a median unit depth of 30 cm.

25. Topsoil T3 occurs in a small area in the north of the site. It is organic (typically organic medium clay loam) and stoneless, and has a moderately developed coarse angular blocky structure. It's median depth is 35 cm.

Upper Subsoils

26. Upper subsoil Unit U1 underlies topsoil Unit T1 in the south of the site. It is very light-textured or sandy (loamy medium sand or medium sand) and is very slightly to slightly stony, with up to 12% very small to very large hard stones. It has a weakly developed coarse angular blocky or single grain structure. In reality Unit U1 forms both the upper and lower subsoil as it extends from directly beneath the topsoil to 120 cm depth.

27. Upper subsoil Unit U2 underlies topsoil Unit T2 in the centre and north. It is light or very light-textured, consisting of medium sandy loam or, more often, loamy medium sand. Unit U2 is very slightly stony and contains 1 - 2% very small to medium hard stones. It has a weakly developed coarse angular and subangular blocky structure and a mean thickness of 67 cm.

Lower Subsoils

28. Unit L1A is found in a small low-lying area in the north of the site. It is heavy-textured (silty clay) and stoneless, with a weakly to moderately developed medium and coarse prismatic structure. Unit L1A forms both the upper and lower subsoil in reality and extends from below topsoil T3 to 120 cm depth. The mean thickness of Unit L1A is, therefore, 85 cm.

29. Unit L1B underlies topsoil T2 and upper subsoil U2 in the centre and north of the site. It is, in fact, a transitional horizon between the light or very light-textured Unit U2 and the underlying lacustrine clay which forms Unit L1A. It's texture varies between medium sandy loam and clay, with sandy clay loam or sandy clay being the most common textures. Although absent from some profiles (i.e. not occurring within 120 cm depth), it begins at about 70 cm depth in others. The mean thickness of Unit L1B is 23 cm.

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SOURCES OF REFERENCE

British Geological Survey ([1971] *Sheet No. 79, Goole. 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, 1:250,000 scale.* 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 to very light-textured soil, slightly stony.
Location: Grid Ref. SE 582 231
Land Use: Sugar Beet
Slope: 2° N
Recent weather: Overcast and mild after recent heavy rain.

<u>Depth (cm)</u>	<u>Horizon Description</u>
0 - 28	Dark brown (10YR3/3) medium sandy loam; no mottles; slightly stony, with approximately 6% very small to medium subrounded and subangular hard stones (2% > 2 cm); moist; weakly developed medium and coarse angular blocky structure; firm; very porous; common very fine fibrous roots to 20 cm, few below 20 cm; slightly sticky; non-plastic; non-calcareous; abrupt smooth boundary.
28 - 84	Strong brown (7.5YR4/6) loamy medium sand; no mottles; slightly stony, with approximately 12% very small to very large subrounded and subangular hard stones; slightly moist; weakly developed coarse angular blocky structure; friable; extremely porous; few very fine fibrous roots; slightly sticky; non-plastic; non-calcareous; abrupt, wavy boundary.
84 - 120	Pink (7.5YR7/3) medium sand, becoming reddish yellow (5YR6/6) below 100 cm; no mottles; slightly stony with approximately 6% very small to medium subrounded and subangular hard stones; slightly moist; single grain structure; extremely porous; no roots; non-sticky; non-plastic; non-calcareous.

Soil Type 2: Light to very light-textured soil overlying lacustrine clay.

Location: Grid Ref. SE 585 232

Land Use: Cereal stubble

Slope: 0°

Recent Weather: Overcast and mild after recent heavy rain.

Depth (cm)

Horizon Description

0 - 32	Brown (10YR3/3) loamy medium sand; no mottles; very slightly stony, with 1% very small to medium sub-rounded hard stones; moist; moderately developed medium subangular blocky structure; friable; extremely porous; common very fine fibrous and medium fleshy roots, slightly sticky; non-plastic; non-calcareous; sharp smooth boundary.
32-120	Light yellowish brown (10YR6/4) loamy medium sand; many brownish yellow (10YR6/8) mottles; very slightly stony, with 1% very small to medium subrounded hard stones; moist; weakly developed coarse angular blocky and subangular blocky structure; firm; extremely porous; few very fine fibrous roots; non-sticky; non-plastic; non-calcareous.
120 +	Grades into gleyed glaciolacustrine clay.

Soil Type 3: Organic topsoil overlying lacustrine clay

Location: Grid Ref. SE 582 233

Land Use: Cereal Stubble

Slope: 0°

<u>Depth (cm)</u>	<u>Horizon Description</u>
0 - 34	Black (10YR2/1) organic medium clay loam; no mottles; stoneless; slightly moist; moderately developed coarse angular blocky structure; firm; moderately porous; common very fine fibrous and medium fleshy roots; slightly sticky; moderately plastic; non-calcareous; clear smooth boundary.
34 - 120	Dark grey (10YR4/1) silty clay; common distinct brownish yellow (10YR6/8) mottles; slightly moist; weakly developed coarse angular blocky and medium prismatic structure; extremely firm; slightly porous (<0.5% pores > 0.5 mm); few very fine fibrous roots; moderately sticky; very plastic; non-calcareous.