



**HAWKS NEST OCCS EXTENSION  
WEST YORKSHIRE**

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

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

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## HAWKS NEST OCCS 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 survey of 9.4 ha of land at Garforth, near Leeds. The survey was carried out during December 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 coal from the site by open cast methods. This ALC survey supersedes any previous ALC surveys including that carried out in April 1992 in the north of the site (Ref.20/92) which found land in this area to be Subgrade 3a and Subgrade 3b.
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 agriculturally derelict for the most part. An area in the north forms part of the existing Hawks Nest OCCS and an area in the south-west was not surveyed because permission for access could not be obtained.

#### Summary

5. The findings of the survey are shown on the enclosed ALC, Topsoil Resources and Subsoil Resources maps. The maps have been drawn at a scale of 1:5,000. They are 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	1.9	20.2	33.3
Subgrade 3b	3.8	40.4	66.7
Other land	0.9	9.6	-
Land not surveyed	2.8	29.8	-
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Total surveyed area	5.7	-	100
Total site area	9.4	100	-

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

8. Subgrade 3a, good quality agricultural land, occurs in the north-east of the site. The soils vary between well drained and imperfectly drained, and consist of medium clay loam topsoils and medium clay loam or sandy clay loam upper subsoils overlying either gleyed and slowly permeable clay or permeable medium clay loam or sandy clay loam lower subsoils. Soil wetness and a pattern restriction are the factors which limit this land to Subgrade 3a.

9. The remaining agricultural land on the site is Subgrade 3b, moderate quality agricultural land. The soils are poorly drained and consist of medium clay loam or heavy clay loam topsoils overlying gleyed and slowly permeable heavy clay loam, heavy silty clay loam, clay or silty clay subsoils at between 25cm and 40cm depth. Soil wetness and topsoil workability restrictions limit the ALC grade of this land.

10. Other land on the site consists of tracks, spoil heaps and an area of scrub. It covers 0.9 ha.

11. Land not surveyed occurs in the south-west. This is because permission for the survey work to be carried out could not be obtained from the landowners.

12. In terms of soil resources there are three main soil types on the site. The first consists of medium clay loam or heavy clay loam topsoils (median thickness 25cm) overlying heavy clay loam, heavy silty clay loam, clay or silty clay subsoils (mean thickness 94cm).

13. The second main soil type occurs in the north and consists of soils which have been significantly affected by the spreading of colliery waste. Medium clay loam topsoils (median thickness 40cm) and medium clay loam or heavy silty clay loam upper subsoils (mean thickness 40cm) overlie gleyed and slowly permeable clay lower subsoils (mean thickness 30cm).

14. The third main soil type occurs in the north-eastern corner of the site, and is a medium textured soil derived from limestone. Medium clay loam topsoils (median thickness 20cm) overlie medium clay loam or sandy clay loam subsoils (mean thickness 100cm) in this case.

### Factors Influencing ALC Grade

#### Climate

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

16. 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 415 340
Altitude	m, AOD	75
Accumulated Temperature	day°C (Jan-June)	1330
Average Annual Rainfall	mm	688
Field Capacity Days	days	157
Moisture Deficit, Wheat	mm	96
Moisture Deficit, Potatoes	mm	85

17. 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.

18. 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.

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

## Site

20. The land on the site is level to gently sloping (0-2°) in the west, but gently to moderately sloping in the east (2-4°). However these slopes are not sufficient to restrict the ALC grade of the land and neither flood risk nor microrelief are of significance on this site.

## Geology and soils

21. The site is underlain by Carboniferous Middle Coal Measures or, in the far east, by Middle Permian Marl and, in the north eastern corner, by Lower Magnesian Limestone. Although no drift cover is shown on the geology maps (BGS Sheet 70, Leeds) the field survey found till in much of the centre of the site. Most of the soils have been disturbed to a greater or lesser degree and tipping of colliery waste has occurred in much of the centre of the site.

22. The Soils of the Leeds District (Soil Survey of England and Wales, 1970) shows Dunkeswick, Huddleston and Oglethorpe series soils in the north while the south and centre of the site has been included in the Garforth urban area.

## Agricultural Land Classification

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.

### Subgrade 3a.

24. A small area of Subgrade 3a land occurs in the north-east of the site. Two main soil types occur within this subgrade. The first consists of well drained profiles (Wetness Class I) where medium clay loam topsoils overlie medium clay loam or sandy clay loam subsoils containing horizons of loamy sand in places. The topsoils are slightly stony, containing around 10% limestones (4-8% > 2cm in size), while the subsoils are very slightly to slightly stony, with 3-15% limestones. Although these soils meet the requirements for Grade 2 they cover too small an area to allow them to be mapped as a separate unit. The second main soil type consists of moderately well or imperfectly drained profiles (Wetness Classes II and III) where deep medium clay loam topsoils, or medium clay loam topsoils and upper subsoils overlie gleyed and slowly permeable clay below 55cm depth in most cases. Although colliery waste has been spread on this land to variable depth plant growth appears to be unaffected, and it is a pattern and soil wetness limitation which restricts the land to Subgrade 3a.

### Subgrade 3b.

25. Most of the land on the site falls in Subgrade 3b. The soils are poorly drained (Wetness Class IV) and consist of medium clay loam or heavy clay loam topsoils, some of which have been contaminated by colliery waste, overlying gleyed and slowly permeable heavy clay loam, heavy silty clay loam, clay or silty clay at between 25cm and 40cm depth. Soil wetness and topsoil workability limitations are the grade-limiting factors in this case.

Other land.

26. Land in this category includes tracks, spoil heaps and an area of scrub.

Land not surveyed.

27. This is found in the south-west and was not surveyed because permission for survey work was not forthcoming.

### **Statement of Physical Characteristics.**

28. 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/S1). Medium to heavy-textured soil.

This is the most common soil type on the site. It is characterised by medium to heavy-textured topsoils, many of which are contaminated to varying degrees by colliery shale, and gleyed and slowly permeable heavy-textured subsoils.

b) Soil Type 2 (T2/U1/L1). Disturbed soil.

This soil type occurs in the north of the site and is characterised by deep medium-textured topsoils or medium-textured topsoils and upper subsoils which have been affected by the spreading of colliery waste, overlying gleyed and slowly permeable heavy-textured lower subsoils.

c) Soil Type 3 (T3/S2). Deep medium-textured soil derived from limestone.

This soil type is found in the north-east of the site. It is characterised by a medium-textured topsoil and a deep ungleyed medium-textured subsoil.

### **Soil Resources.**

Topsoils.

29. Topsoil T1 is the most widespread topsoil on the site. It is medium to heavy-textured (medium clay loam or heavy clay loam) and has been subject to the spreading of colliery waste in places. Topsoil T1 has a stone content of 10-20% very small and small fragments of coal and shale and very small to medium limestones. It has a weakly developed coarse subangular blocky structure and a median thickness of 25cm.

30. Topsoil T2 occurs in the north of the site and is generally medium-textured (medium clay loam). This topsoil has been subject to a greater degree of contamination by colliery waste and has up to 20% very small and small fragments of coal and shale. This topsoil has a moderately developed medium subangular or medium angular blocky structure and a median thickness of 40cm.

31. Topsoil T3 occurs in the north-eastern corner. It is medium-textured (medium clay loam) and slightly stony, with 7-12% very small to large limestones. It has a moderately developed medium subangular blocky structure and a median thickness of 20cm.

#### Upper/Whole Subsoils.

32. Whole subsoil S1 underlies Topsoil T1. It is heavy-textured, consisting of heavy clay loam, heavy silty clay loam, clay or silty clay, and is stoneless to very slightly stony, containing up to 3% limestones and fragments of coal and shale. Unit S1 has a weakly developed medium prismatic structure and a mean thickness of 94cm.

33. Whole subsoil S2 underlies Topsoil T3 in the north-eastern corner of the site. It is medium-textured (consisting of medium clay loam or sandy clay loam) and has a weakly to moderately developed coarse subangular blocky structure. Unit S2 is very slightly to slightly stony, containing up to 15% very small to large limestones, and has a mean thickness of 100cm.

34. Upper subsoil U1 underlies Topsoil T2 in the north of the site. It too has been subject to a considerable degree of contamination by the spreading of colliery waste and it is slightly to moderately stony, containing up to 25% very small and small fragments of shale and coal. Unit U1 is medium to heavy-textured (generally medium clay loam or heavy silty clay loam) and has a mean thickness of 40cm.

#### Lower Subsoils.

35. Lower Subsoil L1 underlies Topsoil T2 and upper subsoil U1 in the north of the site. Apart from its mean thickness (30cm) it is in all respects similar to whole subsoil S1 in that it is heavy textured and stoneless to very slightly stony, with a weakly developed medium to coarse prismatic structure.

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## SOURCES OF REFERENCE

British Geological Survey (1974) *Sheet No. 70, Leeds (Solid)*, 1:50,000 scale  
BGS: London.

British Geological Survey (1951) *Sheet No. 70. Leeds (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*, 1:250,000 scale  
SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in Northern England*  
SSEW: Harpenden

Soil Survey of England and Wales (1970) *Soils of the Leeds District*. 1:63,360 Scale  
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 <sup>1</sup>
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years. <sup>2</sup>
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).

<sup>1</sup> The number of days is not necessarily a continuous period

<sup>2</sup> "In most years" is defined as more than 10 out of 20 years.

## APPENDIX III

### REPRESENTATIVE PIT DESCRIPTIONS

#### Soil Type 1

**Location:** Grid reference SE 4162 3398  
**Land use:** Cereal stubble  
**Slope:** 3° W  
**Recent weather:** Cool and foggy

Depth (cm)	Horizon description
0-27	Dark greyish brown (10YR4/2) heavy clay loam; no mottles; slightly stony, with around 10% very small and small angular fragments of coal and shale; moist; weakly developed coarse subangular blocky structure; very firm; slightly porous; many very fine fibrous roots; moderately sticky; moderately plastic; non-calcareous; abrupt smooth boundary.
27-40	Brown (10YR5/3) heavy clay loam; few brownish yellow (10YR6/6) mottles; stoneless; moist; weakly developed medium prismatic structure; very firm; slightly porous (< 0.5% pores > 0.5m); common very fine fibrous roots; moderately sticky; moderately plastic; non-calcareous; clear smooth boundary.
40-69	Greyish brown (2.5Y5/2) heavy clay loam; common brownish yellow (10YR6/6) mottles becoming many below 50cm; stoneless; moist; weakly developed medium prismatic structure; very firm; slightly porous (< 0.5% pores > 0.5mm); few very fine fibrous roots; moderately sticky; moderately plastic; non-calcareous; gradual smooth boundary
69-120	Light grey (N7/) clay; common brownish yellow (10YR6/8) and yellowish red (5YR5/6) mottles; many yellowish red mottles below 100cm depth; stoneless; moist; weakly developed medium prismatic structure; very firm; slightly porous (< 0.5% pores > 0.5mm); few very fine fibrous roots; moderately sticky; moderately plastic; non-calcareous; gradual smooth boundary.

**Soil Type 2**                      **Disturbed Soil**

**Location:**                      **Grid reference SE 4157 3408**

**Land use:**                      **Ley grass**

**Slope:**                              **2°W**

**Recent weather:**              **Cool and foggy**

**Depth (cm)**                      **Horizon description**

0-29                              Black (10YR2/1) medium clay loam; no mottles; slightly stony, with approximately 15% very small and small angular fragments of coal and shale; moist; moderately developed medium angular and subangular blocky structure; firm; moderately porous; many very fine fibrous roots; slightly sticky; moderately plastic; non-calcareous; clear smooth boundary.

29-58                              Very dark grey (10YR3/1) medium clay loam; no mottles; moderately stony with around 25% very small and small angular fragments of coal and shale; moist; moderately developed coarse subangular blocky structure; firm; moderately porous; common very fine fibrous roots; slightly sticky; moderately plastic; non-calcareous; clear smooth boundary.

58-120                              Brown (2.5YR5/3) gradually turning to white (N8/) clay; common strong brown (7.5YR5/8) mottles becoming many reddish yellow (7.5YR6/8) at depth; stoneless; moist; weakly developed medium prismatic structure becoming coarse prismatic below 90cm; very firm becoming extremely firm below 90cm; slightly porous; (< 0.5% pores > 0.5mm); few very fine fibrous roots; moderately sticky; very plastic; non-calcareous.

**Soil Type 3                      Deep medium-textured soil derived from limestone**

**Location:                      Grid reference SE 4174 3407**

**Land use:                      Standing wheat**

**Slope:                          0°**

**Recent weather:              Cool and foggy**

**Depth (cm)                      Horizon description**

0-21                      Dark brown (10YR3/3) medium clay loam; no mottles; slightly stony, containing around 12% very small to medium limestones (approximately 8% > 2cm in size); moist; moderately developed medium subangular blocky structure; firm; moderately porous; many very fine fibrous roots; moderately sticky; moderately plastic; non-calcareous; clear smooth boundary.

21-120                      Brown/dark brown (10YR4/3) medium clay loam; no mottles; slightly stony, with approximately 15% very small to large limestones; slightly moist; weakly to moderately developed coarse subangular blocky structure; firm; moderately porous; common very fine fibrous roots; slightly sticky; moderately plastic; non-calcareous.