

*Cambs 7/93*

**AGRICULTURAL LAND CLASSIFICATION  
AND  
SOIL PHYSICAL CHARACTERISTICS  
LAND AT HOODCROFT, DERBYSHIRE**

# **AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS**

## **LAND AT HOODCROFT, DERBYSHIRE**

### **1.0 BACKGROUND**

1.1 The site, an area of 146.7 hectares, is the subject of an application for extraction by British Coal Opencast. ADAS Resource Planning Team undertook a detailed Agricultural Land Classification (ALC) and soil physical characteristics survey in late 1991 and early 1992. Soil inspections were made using a hand held Dutch auger on a 100 metre grid basis, and four inspection pits were dug to assess subsoil conditions. The recreation ground was not surveyed because access was denied.

1.2 On the published 1:63360 scale provisional ALC Map Sheets 103 and 104 (MAFF 1961 and 1960), the site is mapped as grade 4 land, with a small proportion of grade 3 along the western boundary.

### **2.0 SITE PHYSICAL CHARACTERISTICS**

#### Climate

2.1 Climatic data for the site was interpolated from data contained in the published agricultural climatic dataset (Met Office 1989). This indicates that for an altitude of 100 m AOD the annual average rainfall is 737 mm (29.5"). The field capacity days are 168, and the moisture deficits for wheat and potatoes are 96 mm and 84 mm respectively. These climatic characteristics do not impose any limitation on the ALC grade of the site. However, at altitudes above 110 m AOD, covering roughly 30% of the site and occurring north of the railway, the lower accumulated temperature (January to June °C) of 1314, (compared to 1326 at 100 m AOD) imposes a slight limitation and restricts the higher areas of the site to grade 2.

#### Altitude and Relief

2.2 The land lies east of the M1 motorway, which forms the western boundary of the site. It is bounded by Romeley House Farm and Barlborough Common to the north, Clowne Common to the east and Oxcroft Colliery to the south. The land

lies between an altitude of about 130 m AOD in the north and 70 m in the south of the site. Slopes of 1-4° are typical over most of the site and thus do not constitute a limitation. However, some slopes west of Hoodcroft Farm are 8°, limiting the land to subgrade 3b. The main area of limitation due to slope is east of the motorway where parts of the slopes leading down to the ditch in the valley bottom are 8° and more, limiting the land to subgrade 3b, and to grade 4 where slopes are more than 11° at the southern tip of Romeley Wood. The eastern site of this valley has steeper slopes than the western side. A small area close to the spoil heap in the southern part of the site has a slope of 12°, thus limiting the land to grade 4.

### 3.0 AGRICULTURAL LAND CLASSIFICATION

3.1 Definitions of the ALC grades are given in Appendix 2.

3.2 The land has been mapped as mainly subgrade 3b with areas of grade 2, subgrade 3a and grade 4. Areas of woodland, agricultural buildings, and the Oxcroft Colliery spoil heap are included in the Non-Agricultural totals. The table below shows the breakdown of the grades in hectares and percentage terms for the survey area.

#### AGRICULTURAL LAND CLASSIFICATION

Grades	Hectares	Percent
2	21.8	14.9
3a	15.9	10.8
3b	91.4	62.3
4	1.0	0.7
Non-Agricultural	<u>16.6</u>	<u>11.3</u>
TOTAL	146.7	100.0

#### Grade 2

3.3 Land graded 2, which occurs sporadically over 14.9% of the site, comprises the soil types described in paragraph 4.5 (Unit 4) together with the better drained variants of those described in paragraph 4.4 (Unit 3).

- 3.3.1 The soils corresponding to the better drained variants of Unit 3 have a slowly permeable layer at depth, which imposes a slight wetness limitation (wetness class II) and excludes the land from a higher grade.
- 3.3.2 Those soils corresponding to Unit 4 are lighter textured than those in Unit 3. As a result they have smaller plant available water reserves, and thus minor droughtiness limitations restrict the land to grade 2 (very good quality agricultural land).
- 3.3.3 On higher land in the north of the site, the lower accumulated temperature imposes an additional climatic limitation, on land graded 2.

#### Subgrade 3a

- 3.4 The land graded 3a, covering 10.8% of the site, occurs mainly in the central and southern portions of the site, often adjacent to grade 2 land, and corresponds mainly to the soils described in paragraph 4.4 (Unit 3), and partly those described as the lighter textured variants of those in paragraph 4.2 (Unit 1).
- 3.4.1 The soils described in paragraph 4.4 (Soil Unit 3) have slowly permeable layers at depths varying from 44-72 cm and topsoil varying in texture from medium clay loam and sandy clay loams to medium silty clay loams. These profiles have been assigned wetness classes II and III, and the associated land is graded 3a.
- 3.4.2 Soils in Unit 1 have been assigned wetness class IV due to the relatively shallow depth to a slowly permeable layer (directly below the topsoil). However, where lighter textured medium silty clay loam topsoils predominate the land is eligible for subgrade 3a (good quality agricultural land).

#### Subgrade 3b

- 3.5 The land graded 3b comprises 62.3% of the site and corresponds with the slightly heavier variant soils described in paragraphs 4.2 (Soil Unit 1) and 4.3 (Soil Unit 2).
- 3.5.1 Those soils corresponding to paragraph 4.2 (Soil Unit 1) comprise occasionally gleyed medium and heavy textured topsoils immediately overlying a gleyed slowly permeable clayey subsoil, thus falling into wetness class IV. Where heavy clay loam topsoils predominate, the land is graded 3b.

- 3.5.2 The disturbed soils described in paragraph 4.3 (Soil Unit 2) correspond to areas of previous opencast working and associated peripheral areas of disturbance. They include areas of slightly heavier topsoils than those in Soil Unit 1, which directly overlie slowly permeable clayey subsoils, resulting in a wetness class of IV and thus subgrade 3b (moderate quality agricultural land). Some areas are also limited by gradient (see paragraph 2.2).

#### Grade 4

- 3.6 The land graded 4 corresponds to 0.7% of the site. It comprises those areas of land with gradients more than 12°, such as the southern end of Romeley Wood and just north of Oxcroft Colliery. It also includes the waterlogged land located at the base of the spoil heap slope which is assessed as wetness class IV and is limited by wetness and workability limitations. Thus it has been assigned grade 4 (poor quality agricultural land).

#### Non Agricultural

- 3.7 This category covers 11.3% of the site and includes Oxcroft Colliery spoil heap, the recreation ground, farm buildings and two small areas of woodland. No soil resource information is available for Romeley Wood.

### **4.0 SOIL PHYSICAL CHARACTERISTICS**

- 4.1 The published 1:50,000 scale solid and drift edition geology sheet 100 (Sheffield, Geological Survey of Great Britain, 1974) shows the site to comprise predominantly Silesian Upper Coal Measures. Approximately 20% of the site area comprises Silesian Sandstone, occurring on either side of the railway. The current detailed inspection of the site shows four main soil types (Units 1-4) derived from the above deposits. Unit 5 was not surveyed and Unit 6 comprises Oxcroft Colliery spoil heap.

Soil Unit 1 (Refer to Appendix 1 and Soil Resources Map)

- 4.2 This unit corresponds largely with land graded 3b. Profiles comprise very slightly stony medium and heavy clay loam or silty clay loam topsoils over heavier subsoils formed from Coal Measure deposits. The subsoils are non-calcareous and slowly permeable. Wetness class is assessed at IV.

Soil Unit 2 (Refer to Appendix 2 and Soil Resources Map)

- 4.3 Unit 2 corresponds with land graded 3b and is associated with historic opencast mining operations and peripheral areas of disturbance. This unit includes areas of heavier textured topsoils than those described in Unit 1, and has slowly permeable heavy clay loam, clay or silty clay subsoils. Coal fragments and waste are found sporadically within these profiles with occasional sandstone and shale. Overall profiles are very slightly stony. Wetness class is assessed as IV.

Soil Unit 3 (Refer to Appendix 2 and Soil Resources Map)

- 4.4 This unit comprises very slightly stony medium textured sandy clay loam and silty clay loam topsoils and similar upper subsoils, overlying slowly permeable heavy silty clay loams at depth. It has been assessed as wetness classes II and III and is associated with land graded 2 and 3a.

Soil Unit 4 (Refer to Appendix 2 and Soil Resources Map)

- 4.5 This Unit is the lightest textured on the site and lies in association with land graded 2. Profiles are generally stoneless and comprise light and medium textured topsoils, (sandy loams, sandy silt loams and sandy clay loams) over similar subsoils, which may become sandier with depth. Sandstone sometimes lies within 30 cm of the surface. The area north of Oxcroft Colliery has 1-2% soft, medium grained sandstone in the topsoil, and occasionally up to 30% in the subsoils. In some cases the lower subsoil may have 20% hard sandstone. These better drained soils have been assigned wetness classes I and II.

Soil Unit 5 (Refer to Appendix 2 and Soil Resources Map)

- 4.6 This Unit includes the farm buildings and the recreation ground where no survey work was permitted.

Soil Unit 6 (Refer to Appendix 2 and Soil Resource Map)

- 4.7 This Unit corresponds to Oxcroft Colliery spoil heap which has no soil except for that forming on small mound (see map) adjacent to Mill Lane. Topsoil here is beginning to form over medium clay loam and medium silty clay loam subsoils.

## Appendix 1

### **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 include 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 and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable crops. The level of yields is generally high but may be lower or more variable than Grade 1.

### **Grade 3 - good to moderate quality agricultural land**

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where 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 winter 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 levels of yields. It is mainly suited to grass with occasional arable crops (eg. cereals and forage crops) the yield of which are variable. In most 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 very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

## Appendix 2

### **SOIL PHYSICAL CHARACTERISTICS**

#### **LAND AT HOODCROFT, DERBYSHIRE**

##### SOIL UNIT 1

Topsoil	Texture	:	medium clay loams and silty clay loams, occasionally heavy clay loam or medium sandy clay loam.
	Colour	:	10YR3/3 - dark brown
	Stone	:	very slightly stony
	Depth	:	20-30 cms
	Structure	:	cultivation zone - not applicable
	Roots	:	common
	Upper Subsoil	Texture	:
Colour		:	10YR5/3 - brown 10YR6/1 - grey 10YR5/6 - yellowish brown
Stone		:	very slightly stony, typically 1% hard rock.
Depth		:	in the range 40-75 cms
Structure		:	weakly developed medium and coarse prismatic.
Porosity		:	typically less than 0.5% biopores
Roots		:	few
Lower Subsoil	Texture	:	clay, occasionally silty clay
	Colour	:	10YR5/2 - greyish brown 10YR7/1 - light grey 10YR5/6 - yellowish brown
	Stone	:	stoneless
	Depth	:	120 cms +
	Structure	:	As above
	Porosity	:	less than 0.5% biopores

## SOIL UNIT 2

Topsoil	Texture	:	medium clay loam
	Colour	:	10YR3/3 - dark brown
	Stone	:	very slightly stony, 1% coal fragments and 1% weathered sandstone.
	Depth	:	20-30 cms
	Structure	:	cultivation zone - not applicable.
	Roots	:	few
Upper Subsoil	Texture	:	heavy clay loam or clay
	Colour	:	10YR4/4 - dark yellowish brown 10YR5/3 - brown
	Stone	:	very slightly stony 2% coal fragments
	Depth	:	in the range 45/55 cms sometimes 70 cms.
	Structure	:	weakly developed coarse subangular blocky becoming massive with depth.
	Porosity	:	less than 0.5% biopores
	Roots	:	very few
Lower Subsoil	Texture	:	heavy clay loam and clay, occasionally silty clay.
	Colour	:	10YR5/3 - brown 10YR7/1 - light grey 10YR5/8 - yellowish brown
	Stone	:	2% coal fragments
	Depth	:	in the range 80-120 cms
	Structure	:	massive
	Porosity	:	less than 0.5% biopores
	Roots	:	very few

### SOIL UNIT 3

Topsoil	Texture	:	silty clay loams and sandy clay loams
	Colour	:	10YR3/3 - dark brown
	Stone	:	stoneless
	Depth	:	25-35 cms
	Structure	:	cultivation zone - not applicable
	Roots	:	many
	Upper Subsoil	Texture	:
Colour		:	10YR4/4 - dark yellowish brown 10YR6/2 - light brownish grey
Stone		:	very slightly stony - 2% weathered sandstone.
Depth		:	in the range 60-80 cms
Structure		:	moderately developed coarse subangular blocky.
Porosity		:	more than 0.5% biopores
Roots		:	many
Lower Subsoil		Texture	:
	Colour	:	10YR5/3 - brown 10YR7/1 - light grey 10YR5/8 - yellowish brown
	Stone	:	stoneless
	Depth	:	in the range 100-120 cms
	Structure	:	weakly developed coarse subangular blocky.
	Porosity	:	less than 0.5% biopores
	Roots	:	few

## SOIL UNIT 4

Topsoil	Texture	:	medium sandy silt loams and medium sandy clay loams.
	Colour	:	10YR3/3 - dark brown
	Stone	:	very slightly stony - 1% coal fragments and 2% fine weathered sandstone.
	Depth	:	25-30 cms
	Structure	:	cultivation zone - not applicable
	Roots	:	many
Upper Subsoil	Texture	:	medium sandy clay loam, medium sandy loam, medium sandy silt loam and silty clay loam.
	Colour	:	10YR6/4 - light yellowish brown 10YR5/4 - yellowish brown
	Stone	:	moderately stony - 25% medium weathered sandstone.
	Depth	:	in the range 40-55 cms
	Structure	:	weakly developed coarse granular
	Porosity	:	more than 0.5% biopores
	Roots	:	common
Lower Subsoil	Texture	:	loamy medium sand and medium sand
	Colour	:	10YR4/3 - brown 10YR5/6 - yellowish brown 10YR7/3 - pale yellow
	Stone	:	moderately stony - 25% medium weathered sandstone.
	Depth	:	in the range 50-100 cms
	Structure	:	weakly developed coarse granular
	Porosity	:	more than 0.5% biopores
	Roots	:	none

## **REFERENCES**

**GEOLOGICAL SURVEY OF GREAT BRITAIN 1974.** Solid and Drift edition sheet 100 (Sheffield) 1:50,000.

**MAFF, 1961.** Provisional Agricultural Land Classification map sheet 103 1:63,360.

**MAFF, 1988.** Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for grading the quality of Agricultural Land) Alnwick.

**METEOROLOGICAL OFFICE 1989.** Climate data extracted from the published agricultural climatic dataset.