

AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS

TRINITY OPENCAST COAL SITE, SOUTHERN EXTENSION, LANGLEY MILL, DERBYSHIRE.

1. BACKGROUND

- 1.1 The site, covering an area of approximately 8.1 ha, is the subject of an application to extend the present Trinity opencast coal site (OCCS) near Langley Mill, Derbyshire towards the south of the present site. A previous extension to the Trinity OCCS to the north of the main site was the subject of a detailed survey by ADAS Statutory Unit in July 1992.
- 1.2 The current detailed survey was undertaken by ADAS Statutory Resource Planning Team in July 1995 to provide information on the agricultural land quality and soil physical characteristics of land within the survey area. Soil inspections using a hand held dutch auger were made on a 100m grid basis with two soil pits dug to assess subsoil conditions.
- 1.3 On the published provisional 1:63 360 scale ALC map, sheet 112 (MAFF, 1970), the whole site is shown as grade 4.
- 1.4 At the time of the survey the whole site was under permanent grassland with the exception of a small area of mature trees in the north of the site.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

- 2.1 Climatic criteria are considered when classifying land as these may have an overriding limitation in terms of the agricultural use of the land. The main parameters used in the assessment of the overall climatic limitation are average annual rainfall, as a measure of overall wetness, and accumulated temperature (day °C Jan-June), as a measure of the relative warmth of an area.
- 2.2 A detailed assessment of the prevailing climate for the site has been made by interpolation from the 5km grid dataset produced by the Meteorological Office (Met. Office, 1989). The details are given in Table 1 and these show that there is no overall climatic limitation affecting the site.
- 2.3 Climatic factors, however, do interact with soil properties to influence soil wetness and droughtiness.

Table 1: Climatic Interpolation

Grid Reference	SK 445 486
Altitude (m)	68
Accumulated Temperature (day °C, Jan-June)	1375
Average Annual Rainfall (mm)	732
Moisture deficit, Wheat (mm)	98
Moisture deficit, Potatoes (mm)	87
Field Capacity days	175
Overall Climatic grade	1

Altitude and Relief

- 2.4 The highest part of the site lies at an altitude of 75m in the north west but falls to approximately 65m in the south east. Slopes are gentle with the ground gently undulating. Altitude and relief therefore do not impose any limitations on the agricultural quality of the site.

Geology and soils

- 2.5 The published 1:50 000 scale geological map (Geol. Survey 1972) shows the majority of the site as Carboniferous Coal measures. A small area of Alluvium is shown adjacent to the stream in the south of the site.
- 2.6 The reconnaissance scale soil survey map for the area (Soil Survey, 1983) shows the site to comprise soils of the Dale Association.*
- 2.7 The detailed survey carried out on the site shows the presence of two distinct soil types.

Soil Type 1 (refer to Soils Type map and Appendix 1).

- 2.8 Soil Type 1 comprises very slightly stony medium clay loam textured topsoil overlying a similar upper subsoil. A lower subsoil of moderately stony clay (with fine sand) textured material extended to below sample depth. The stones within the profile were predominately sandstone fragments, generally small to medium in size but becoming increasingly large in the lower subsoil. Wetness class of this soil type was assessed as III.

* Dale Association : slowly permeable, seasonally waterlogged, clayey, fine loamy over clayey and fine silty soils on soft rock. Often stoneless.

Soil Type 2 (refer to Soils Type map and Appendix 1).

- 2.9 Soil Type 2 comprises the poorly drained clayey soils which are mapped on the slightly lower lying land on the site. These soils have a stoneless or very slightly stony heavy clay loam topsoil which usually overlies a thin very slightly stony heavy clay loam or clay textured upper subsoil. This upper subsoil overlies a stoneless or very slightly stony prominently mottled clay textured lower subsoil. Occasionally the upper subsoil was absent and the topsoil directly overlay the clay subsoil. This clay textured lower subsoil extended to varying depths, sometimes as shallow as 48cm or extending beyond sample depth to below 120cm, although was typically found to extend to 75cm. Below this subsoils were unweathered grey clay textured materials. The soil profiles within this soil type were assessed as wetness class IV.

Soil Type 2a (refer to Soils Type map and Appendix 1).

- 2.10 This soil type was similar to that of soil Type 2 but was within an area covered with mature trees. The surface of this area was strewn with bricks from a previously demolished small building.

3. AGRICULTURAL LAND CLASSIFICATION

- 3.1 The land within the site has been classified using the guidelines contained in the Agricultural Land Classification of England and Wales (MAFF, 1988). A breakdown of the individual grades found on the site is given in Table 2.

Table 2 : Distribution of grades and subgrades

AGRICULTURAL LAND CLASSIFICATION		
Grade	Area (ha)	%
3a	1.62	19.9
3b	6.32	77.8
Non-Agricultural	0.19	2.3
TOTAL	<hr/> 8.13	<hr/> 100.0

Subgrade 3a

- 3.2 Land of subgrade 3a was associated with Soil Type 1 described in paragraph 2.8. Wetness is the major limitation of this soil type which has been assessed as wetness class III. This assessment together with the medium clay loam textures of the upper 25cm of the soil profile results in a workability restriction limiting the land to subgrade 3a.

Subgrade 3b

- 3.3 The majority of the survey area has been restricted to this subgrade and correlates with Soil Type 2 (paragraph 2.9). Wetness is the main limitation with Soil Type 2 being assessed as wetness class IV. The heavy clay loam texture of the upper 25cm of the soil profile together with a wetness class of IV results in a moderately severe workability limitation limiting the land to subgrade 3b. The site has been assessed as being at field capacity for 175 days, this is just 1 day below the point at which the ALC guidelines (MAFF, 1988) changes for the estimation of final ALC grade for certain wetness classes and upper 25cm soil textures. Therefore if the number of field capacity days had been 176 days with heavy clay loam textured upper 25cm and a wetness class of IV, then final ALC grade would have been grade 4 for this area.

Non-Agricultural

- 3.4 A small area in the north of the site is covered by mature trees and was therefore classed as non-agricultural land.

REFERENCES

BRITISH GEOLOGICAL SURVEY, 1972. Sheet 125, Derby, 1:50 000 scale.

MAFF, 1970. Agricultural Land Classification Map. Provisional. Scale 1:63 360.
Sheet 112.

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

METEOROLOGICAL OFFICE, 1989. Climatological Data for Agricultural Land
Classification.

SOIL SURVEY OF ENGLAND AND WALES, 1983. Sheet 3, "Soils of Midland and
Western England". 1:250 000 scale.

Appendix 1

DESCRIPTION OF SOIL PHYSICAL CHARACTERISTICS SOIL TYPE 1

Topsoil	Texture	:	medium clay loam
	Colour	:	dark greyish brown, 10YR4/2
	Stone	:	very slightly stony (2%), small and medium sandstone fragments.
	Boundary	:	clear, smooth
	Roots	:	many, fine and very fine
	Depth	:	16 cm
	Upper Subsoil	Texture	:
Matrix colour		:	brown and pale brown 10YR5/3 and 6/3 leading to light grey and pale yellow 10YR7/2 and 2.5Y7/4.
Mottles		:	common distinct ochreous
Stone		:	very slightly (4%), small and medium sandstone fragments.
Structure		:	moderately developed medium to coarse prismatic.
Consistence		:	firm - friable
Porosity		:	>0.5% biopores, including some large worm channels.
Boundary		:	abrupt, smooth
Roots		:	many, fine and very fine
Depth	:	70 cm	
Lower Subsoil	Texture	:	clay (fine sand)
	Matrix colour	:	light yellowish brown, 2.5Y6/3
	Stone	:	moderately (15%), small - large sandstone fragments.
	Structure	:	weakly developed coarse and very coarse prismatic.
	Consistence	:	firm
	Porosity	:	<0.5% biopores
	Roots	:	few fine
Depth	:	120 cm+	

Comments : wetness class III

**DESCRIPTION OF SOIL PHYSICAL CHARACTERISTICS
SOIL TYPE 2**

Topsoil	Texture	:	heavy clay loam
	Colour	:	dark greyish brown, 10YR4/2 or greyish brown, 10YR5/2.
	Stone	:	stoneless - very slightly stony (2%) small and medium sandstone and flints.
	Boundary	:	abrupt, smooth
	Roots	:	many, fine and very fine
	Depth	:	20 cm
	Upper Subsoil (where present)	Texture	:
Matrix colour		:	brown, 10YR5/3
Mottles		:	common faint/distinct ochreous mottles
Stone		:	very slightly (4%) small and medium
Structure		:	moderately developed coarse prismatic breaking to medium and fine subangular blocky.
Consistence		:	firm
Porosity		:	>0.5% biopores
Boundary		:	abrupt, smooth
Roots		:	many, fine and very fine
Depth		:	35 cm
Lower Subsoil	Texture	:	clay
	Matrix colour	:	predominantly light olive brown, 2.5Y5/3
	Mottles	:	many prominent ochreous mottles
	Stone	:	stoneless - very slightly stony (1-4%) small-medium.
	Structure	:	weakly developed coarse prismatic.
	Consistence	:	firm
	Porosity	:	<0.5% biopores
	Roots	:	common fine and very fine
	Depth	:	75 cm

Comments : wetness class IV
soil type 2a similar to type 2 but under woodland

Appendix 2

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 yield 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 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 levels of yields. It is mainly suited to grass with occasional arable crops (e.g. 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.