

AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

PROPOSED OPEN COAL SITE, RENISHAW, DERBYSHIRE

1.0 Background

- 1.1 A detailed survey was carried out over 79.1 ha of land within the proposed Renishaw Open Cast Coal site in Derbyshire. The proposed site lies approximately 2.5 km north of Stavelay and 1.5 km west of Renishaw in Derbyshire and is centred on grid reference SK 432 770.
- 1.2 The site consists of the rubble and hardstanding of the Old Renishaw Park Colliery and its associated spoil tip in the east of the site and agricultural land for the remainder of the site. At the time of the survey the majority of the agricultural land was under permanent grass with winter cereals found in the centre of the site.
- 1.3 On the published 1:63 360 scale Agricultural Land Classification (ALC) map (MAFF, 1961) the agricultural land within the site is shown as predominantly Grade 3 with a small area of Grade 4 in the south close to the River Rother. Small areas in the west and east of the site are shown as non-agricultural and the area of the old mine is shown as urban. However, this map is of a reconnaissance nature and the current survey was undertaken to provide site specific details.
- 1.4 ADAS Statutory Resource Planning Team undertook a detailed ALC and soil physical characteristics survey of the site during November 1995. Information was collected from auger borings, spaced at 100 m intervals, to a depth of 120 cm wherever possible. Subsoil conditions were assessed from four soil pits.

1.5 Within the site are two methane gas vents, one within the area of the old colliery and one in the north west of the site close to Old Furnace Wood. However, at the time of the survey no plant growth problems were evident and no anaerobic soil horizons were encountered. It is stressed therefore that the grading of the land within the site is based on conditions at the time of the survey and no assessment can be made for possible future problems which may occur due to gas leakage.

2.0 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 5 km 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.

Table 1: Climatic Interpolation

Grid Reference	SK 430 770
Altitude (m)	65
Accumulated Temperature (day °C, Jan-June)	1366
Average Annual Rainfall (mm)	738
Moisture Deficit, Wheat (mm)	98
Moisture Deficit, Potatoes (mm)	87
Field Capacity Days	172
Overall Climatic Grade	1

Altitude and Relief

- 2.3 The agricultural land within the site is generally level but rises gently in the west from approximately 45 m AOD to 75 m AOD. Similarly the land rises gently to the north of the site to approximately 65 m AOD. Gradients rarely exceed 3°.
- 2.4 Small areas in the west of the site had been the subject of subsidence from previous deep mining operations. These areas of differential settlement did not significantly effect the agricultural use of the land. However, it must be stressed that the grading of the land within this report is based on site conditions at the time for the survey and no assessment can be made as to the extent or degree of further settlement. Therefore at the time of the survey altitude and relief 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, 1974) shows the majority of the site to consist predominantly of Middle Coal Measures. A small area of First Terrace Gravels is shown around Slittingmill Farm and Head deposits are found in the centre of the site. Along the course of the River Rother deposits of Alluvium are mapped.
- 2.6 The reconnaissance (1:250 000 scale) soil survey map for the area (Soil Survey, 1983) shows the whole site as comprising the Bardsey association* with the exception of a small area in the west of the site mapped as disturbed soils.

* Bardsey association: slowly permeable seasonally waterlogged loamy over clayey and fine silty soils over soft rock. Some well drained coarse loamy soils over harder rock. Formed on Carboniferous mudstone with interbedded sandstone.

- 2.7 The detailed survey carried out on the site shows the presence of three distinct soil types over the site and these are described briefly below.

Soil Type 1 (refer to Soil Types map and Appendix 1)

- 2.8 Soil Type 1 is found in the east of the agricultural land with a small area in the centre of the site and a further small area in the north west. This soil type consists of a stoneless or very slightly stony medium or heavy clay loam topsoil overlying a stoneless or very slightly stony, mottled, heavy clay loam or heavy silty clay loam upper subsoils. Ferrimanganiferous concretions were commonly found in the upper subsoil. This horizon in turn overlay a stoneless or slightly stony clay or clay with silt textured lower subsoil. This lower subsoil was slowly permeable and these soils are assessed as predominantly Wetness Class III but occasionally Wetness Class II or IV.

Soil Type 2 (refer to Soil Types map and Appendix 1)

- 2.9 This soil type was found in the centre and west of the site and consisted of a very slightly stony, occasionally stoneless, medium or heavy clay loam textured topsoil. Upper and lower subsoil horizons were similar for this soil type consisting of stoneless to slightly stony, mottled, clay or clay with silt textured material. The upper subsoil was found to be slowly permeable and hence profiles of this soil type were assessed as Wetness Class IV.

Soil Type 3 (refer to Soil Types map and Appendix 1)

- 2.10 This soil type is found in the west of the site and consists of an area in which spoil has been tipped and spread. A layer of very slightly stony well weathered shale of a heavy silty clay loam or silty clay texture overlies a less well weathered slightly stony shale horizon of similar texture. This material usually then overlies a true subsoil of stoneless to slightly stony clay or silty clay texture. Occasionally the shale material extended to beyond sampling depth. Profiles of this soil type were assessed as Wetness Class IV.

3.0 AGRICULTURAL LAND CLASSIFICATION

3.1 The land 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 site is given in Table 2 and a description of each grade is given in Appendix 2.

Table 2: Distribution of grades and subgrades

Grade	Area (ha)	% of site
3a	4.5	5.7
3b	37.5	47.4
4	8.4	10.6
Urban	27.2	34.3
Non-Agricultural	<u>1.6</u>	<u>2.0</u>
TOTAL	79.2	100.0

Subgrade 3a

3.2 Land assessed as Subgrade 3a occurs in the centre and north west of the site. Land of this quality is associated with Soil Type 1 (paragraph 2.8) in which the profile is assessed as Wetness Class II or III and is overlain by a medium clay loam textured topsoil. Hence these profiles are moderately well drained but will have workability restrictions limiting the land to Subgrade 3a.

Subgrade 3b

3.3 Land of Subgrade 3b quality occurs over the majority of the agricultural land within the site and is associated with Soil Type 1 and 2. Within areas of Soil Type 1 (paragraph 2.8) land assessed as Subgrade 3b is found where the profiles are Wetness Class III with a heavy textured topsoil or where the profile is assessed as Wetness Class IV. All areas of Soil Type 2 (paragraph 2.9)

within the site are of Subgrade 3b quality. Profiles of this soil type have relatively poor drainage (Wetness Class IV) and hence will have moderately severe workability limitations during wetter periods of the year limiting the land to Subgrade 3b.

Grade 4

- 3.4 Land of Grade 4 quality is found in the west of the site and consists of the disturbed, overtipped land of Soil Type 3 (paragraph 2.10). Profiles of this soil type are poorly drained (Wetness Class IV) and have a lack of true topsoil hence this disturbed area is assessed as being of Grade 4 quality.

Urban

- 3.5 The area of the Old Renishaw Park Colliery and associated tip, the B6053 and other metalled roads and tracks within the site are all mapped as urban.

Non-Agricultural

- 3.6 Small areas of scrub and woodland, predominantly in the north west of the site are mapped as non-agricultural.

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REFERENCES

GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND AND WALES),
1974. Sheet 100. Sheffield, Solid and Drift. 1:50 000 scale.

MAFF, 1961. Agricultural Land Classification Map. Provisional. Scale 1:63 360
Sheet 103.

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. Met. Office, Bracknell.

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

Appendix 1

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS SOIL TYPE 1

Topsoil	Texture	:	medium/heavy clay loam	
	Colour	:	dark greyish brown (10YR4/2, 2.5Y4/2)	
	Stone	:	stoneless - very slightly stony (0-5%)	
	Boundary	:	smooth, abrupt	
	Roots	:	many fine and very fine	
	Depth	:	25 cm	
	Upper Subsoil	Texture	:	heavy clay loam/heavy silty clay loam
Matrix colour		:	light olive brown (2.5Y5/3), light yellowish brown (2.5Y6/4), brown (10YR5/3).	
Mottles		:	common - many distinct ochreous	
Manganese		:	few concretions	
Stone		:	stoneless - very slightly stony (0-5%)	
Structure		:	moderately developed coarse and very coarse subangular blocky	
Consistence		:	friable	
Porosity		:	1% biopores	
Boundary		:	smooth, abrupt	
Roots		:	many fine and very fine	
Depth		:	50 cm	
Lower Subsoil		Texture	:	clay (clay with silt)
		Matrix colour	:	brown (10YR5/3), light brownish grey (10YR6/2), grey (10YR6/1), light yellowish brown (2.5Y6/3).
	Mottles	:	many - very many prominent ochreous	
	Stone	:	stoneless - slightly stony (0-15%)	
	Structure	:	moderately - weakly developed coarse and very coarse prismatic.	
	Consistence	:	firm	
	Porosity	:	<0.5% biopores	
	Roots	:	common fine and very fine	
	Depth	:	100/120 cm	

Wetness Class : predominantly III occasionally II or IV

Appendix 1

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS SOIL TYPE 2

Topsoil	Texture	:	medium/heavy clay loam
	Colour	:	dark greyish brown (10YR4/2, 2.5Y4/2), olive brown (2.5Y4/3).
	Stone	:	stoneless - very slightly stony (0-5%)
	Boundary	:	smooth, abrupt
	Roots	:	many fine and very fine
	Depth	:	26 cm
	Upper Subsoil	Texture	:
Matrix colour		:	light olive brown (2.5Y5/3), light yellowish brown (2.5Y6/3).
Mottles		:	many prominent ochreous
Structure		:	moderately developed coarse and very coarse prismatic.
Consistence		:	firm
Porosity		:	<0.5% biopores
Boundary		:	sharp, abrupt
Roots		:	common fine and very fine
Depth	:	65 cm	
Lower Subsoil	Texture	:	clay/silty clay
	Matrix colour	:	light yellowish brown (2.5Y6/3)
	Stone	:	stoneless - slightly stony (0-15%)
	Structure	:	moderately - weakly developed coarse and very coarse prismatic.
	Consistence	:	firm
	Porosity	:	<0.5% biopores
	Roots	:	common fine and very fine
	Depth	:	90/120 cm

Wetness Class : IV.

Appendix 1

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS SOIL TYPE 3

Topsoil	Texture	:	well weathered shale (heavy silty clay loam/silty clay).
	Colour	:	very dark/dark grey (2.5Y3/1, 2.5Y4/1)
	Stone	:	very slightly stony (5%)
	Boundary	:	abrupt, smooth
	Roots	:	many fine and very fine
	Depth	:	30 cm
	Upper Subsoil	Texture	:
Matrix colour		:	grey (2.5Y5/1), very dark grey (5Y3/1)
Stone		:	slightly - moderately stony (5-35%)
Structure		:	generally massive but some fine and very fine platy.
Consistence		:	friable
Porosity		:	<0.5% biopores
Boundary		:	abrupt, smooth
Roots		:	common fine and very fine
Depth		:	68 cm
Lower Subsoil	Texture	:	clay/silty clay
	Matrix colour	:	light yellowish brown (2.5Y6/3)
	Stone	:	stoneless - slightly stony (0-15%)
	Structure	:	moderate - weakly developed coarse and very coarse prismatic.
	Consistence	:	firm
	Porosity	:	<0.5% biopores
	Roots	:	common fine and very fine
	Depth	:	115 cm

Wetness Class : IV.

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.