camlbs 13/92

AGRICULTURAL LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS

ROBBINETTS PROPOSED OPENCAST COAL SITE, NOTTINGHAMSHIRE

1.0 BACKGROUND

1.1 The site, an area of 168.1 hectares, is the subject of an application by British Coal Corporation (Opencast) for the extraction of coal from land near Trowell, Nottinghamshire. ADAS surveyed the site in March 1992 to assess the agricultural land quality and soil physical characteristics.

1.2 On the published Agricultural Land Classification (ALC) Map sheet number 121 (Provisional, scale 1:63360, MAFF 1971), the site is shown as grade 4. The current survey was undertaken to provide a more detailed ALC of the site.

1.3 Auger boring observations were supplemented by observations from 5 soil pits. At the time of the survey much of the area was under grass, cereals and oilseed rape.

2.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

2.1 Climate data for the site was obtained from the published climatic dataset (Met Office, 1989). This indicates that the annual average rainfall for the site is 672 mm. This data also shows that field capacity days are 149.

2.2 The accumulated temperature for this area is approximately 1363 Day degrees Celsius. This parameter indicates the cumulative build-up of warmth available for crop growth and in conjunction with rainfall has an influence on the development of soil moisture deficits (SMD)* and susceptibility to drought; soil moisture deficits of 100 mm and 90 mm are recorded for wheat and potatoes respectively.

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* SMD represents the balance between rainfall and potential evapotranspiration occurring during the growing season. For ALC purposes the soil moisture deficits developing under a winter wheat and maincrop potato cover are considered. These reference crops have been selected because they are widely grown, and in terms of their susceptibility to drought, are representative of a wide range of crops.

Altitude and Relief

2.3 The site lies between Trowell to the south, Cossall to the north west and the M1 motorway to the east. From a central plateau of 90 m AOD, land falls to 70 m AOD at the northern and southern boundaries, and to 60 m AOD at the western boundary.

2.4 Neither gradient nor altitude are limitations to ALC grade.

Geology and Soils

2.5 The published 1:63360 scale drift edition geology sheet 125 (Geological Survey of England and Wales 1967) shows the site to comprise Lower Coal Measures.

2.6 During the current survey, two main soil types were identified, with smaller scattered areas of a third.

Soil Type I (refer to Appendix 1 and Soil Resource Map)

2.6.1 Approximately half of the site (82.2 hectares) comprises land which has been worked for coal, consequently the soils are disturbed. The topsoils typically comprise heavy clay loams to a depth of 25/30 cm. These overlie clay subsoils which often contain coal fragments. In places the grey overburden, silty clay, is present below 50 cms depth.

Soil Type II (refer to Appendix 1 and Soil Resource Map)

2.6.2 These soils occupy undisturbed land over nearly half of the site area (81.6 hectares). The topsoils typically comprise heavy clay loams or medium clay loams over similar or heavier upper subsoils which overlie clays or silty clays below 35/50 cms. Sporadically heavier or siltier textured topsoils may occur.

Soil Type III (refer to Appendix 1 and Soil Resource Map)

2.6.3 These soils are fine loamy in texture and lie sporadically in association with the sandstone deposits, mainly in the southern half of the site. Topsoils typically comprise medium clay loams, which overlie heavy clay loam or clay upper subsoils.

Below 80 cms depth sand is often present in a narrow band over the sandstone rock.

3.0 AGRICULTURAL LAND CLASSIFICATION

3.1 The definitions of the Agricultural Land Classification grades are included in Appendix 2.

3.2 The survey area has been graded mainly 3b, with smaller areas of 3a. The table below shows the breakdown of ALC grades in hectares and percentage terms.

AGRICULTURAL LAND CLASSIFICATION

Grade	ha	%
3a	5.8	3.5
3b	161.5	96.0
NonAgricultural/ Agricultural Buildings	0.8	0.5
TOTAL	168.1	100.0

Subgrade 3a

3.3 Land graded 3a occupies three small areas which lie chiefly in association with the undisturbed land (i.e. soil types II and III). The presence of gleying and a slowly permeable layer at depth result in a wetness class assessment of III. These factors combined with the loamy, non calcareous topsoils results in an ALC grade of 3a (good quality agricultural land). Land has also been graded 3a at the margins of the disturbed/undisturbed land where better drained disturbed profiles occur.

Subgrade 3b

3.4 The majority of the site has been graded 3b and coincides with the disturbed land (soil type I) and poorer drained soil variants of the undisturbed land (soil types II and III). Profile pit observations indicate that profiles are slowly permeable directly below the topsoil consequently the wetness class has been assessed as IV. The high wetness class combined with the relatively heavy topsoil textures restrict the land to subgrade 3b (poor quality agricultural land).

Non Agricultural/Agricultural Buildings

3.5 Two small areas of woodland appear as Non Agricultural and Shortwood Farm has been mapped as Agricultural Buildings.

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Resource Planning Team
ADAS

REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES 1967. Drift edition geology map 125 (Derby) 1:63,360 scale.

MAFF 1971. Agricultural Land Classification Map 121, 1:63,360 scale.

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 data set.

Appendix 1

SOIL PHYSICAL CHARACTERISTICS

ROBBINETTS OPENCAST COAL SITE

SOIL TYPE I (82.2 ha) DISTURBED LAND

Topsoil	Texture	:	mainly heavy clay loams, occasionally medium clay loams.
	Structure	:	moderately developed coarse subangular and angular blocky.
	Depth	:	typically 25/30 cm (range 15-40 cm)
Subsoil	Texture	:	clay or silty clay
	Structure	:	weakly developed coarse angular blocky and strongly developed coarse prismatic.
	Gleying	:	typically present from 30 cm depth
	Consistence	:	very firm
	Depth	:	120 cm

General Comments

Often a pan was found at the base of the topsoil and coal fragments were present throughout the topsoil and subsoil along with the remains of woody roots. In addition, subsoil contamination of the topsoil was noted.

SOIL TYPE II (81.6 ha) UNDISTURBED LAND

Topsoil	Texture	:	heavy clay loam or medium clay loam, occasionally silty clay loam or clay.
	Depth	:	20/30 cm
Upper Subsoil	Texture	:	clay loam or clay
	Structure	:	moderately or strongly developed medium subangular and angular blocky.
	Consistence	:	firm
	Gleying	:	none present
	Depth	:	35/50 cm
Lower Subsoil	Texture	:	clay or silty clay
	Structure	:	coarse prismatic weakly to moderately developed.
	Gleying	:	present from 35/50 cm
	Consistence	:	firm
	Depth	:	120 cm

General Comments

Occasionally below 70 cms depth, textures may be lighter and structures blocky. Roots were noted throughout the soil profile between and within peds. Profile stone content typically equates to 5% small sandstone fragments and occasional coal fragments.

SOIL TYPE III (4.3 ha)

Topsoil	Texture	:	medium clay loam or occasionally heavy clay loam.
	Structure	:	weakly developed, fine subangular blocky
	Depth	:	25/30 cm
Subsoil	Texture	:	heavy clay loams or clays (occasionally fine sandy loams).
	Structure	:	weakly and moderately developed coarse subangular blocky.
	Stones	:	15-20% sandstone fragments up to 4 cm in size.
	Gleying	:	present from 35/50 cm
	Depth	:	80 cm

General Comments

Subsoils typically overlie sandstone rock below 80 cm.

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 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.