

AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

MINORCA OPEN CAST COAL SITE, BOSWORTH ROAD, NEAR MEASHAM, LEICESTERSHIRE

1.0 BACKGROUND

- 1.1 A detailed survey was carried out over the agricultural land contained within the boundary of the proposed Minorca open cast coal site.
- 1.2 The site is situated to the south east of Measham in Leicestershire, centred on grid reference SK 350 115, and covers a total area of 81.7 ha. The site is bounded to the north by the Swebstone Road, to the south by Bosworth Road and to the west by Gallows Lane. To the east of the site lies further agricultural land.
- 1.3 At the time of the survey the agricultural land was a mix of winter cereals and stubble following a cereal crop. Additionally within the site boundary are non-agricultural areas consisting of old tip washing lagoons and spoil tips from previous mining activity.
- 1.4 On the published 1:63 360 scale Agricultural Land Classification (ALC) map (MAFF, 1971) the area is mapped as grade 3 with areas of non-agricultural land shown in the south east of the site and the farm building in the north. This map is only of a reconnaissance nature and hence the current detailed survey was carried out to provide site specific ALC and soils information.
- 1.5 The agricultural areas within the site were surveyed on a 100 m grid basis using a dutch auger to a depth of 1.2 m wherever possible. In addition eight soil pits were dug to assess subsoil structure in more detail.

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 the Table 1 and these show that there is no overall climatic limitation affecting the site.

Grid Reference	SK 350 115
Altitude (m, AOD)	95
Accumulated Temperature Day °C, Jan-June	1363
Average Annual Rainfall (mm)	638
Moisture Deficit, Wheat (mm)	101
Moisture Deficit, Potatoes (mm)	90
Field Capacity Days	147
Overall Climatic Grade	1

Altitude and Relief

- 2.3 The agricultural land within the site falls gently from a maximum altitude of approximately 100 m AOD in the north west corner of the site towards the south east. Slopes are relatively gentle over much of the site and generally do not exceed approximately 5°. However, in the south east block of agricultural land occasionally slopes of approximately 10° were measured. Such strongly sloping areas are limited by subgrade 3b on gradient restrictions.

Geology and Soils

- 2.4 The published 1:50 000 geological map (Geol. Survey, 1982) shows the majority of the site to be underlain by Triassic Moira Breccia. However, in the north of the site an area of Carboniferous Shale is shown. Additionally in the south east of the site Bromsgrove Mudstone with alluvium occurs in the small valley and in a number of areas of limited extent the Bromsgrove Mudstone is overlain by glacial sand and gravel. A small area in the north west of the site is also shown as being overlain by glacial boulder clay.
- 2.5 The reconnaissance scale (1:250 000) soil survey map for the area (Soil Survey, 1983) shows the site to comprise soils predominantly from the Hodnet Association(*1). Additionally a small area running through the site along the line of the stream is shown to comprise soils of the Compton Association (*2).
- 2.6 The present detailed survey of the agricultural areas of the site shows the presence of seven distinct soil types over the site and these are described briefly in the following paragraphs.

Soil Type 1 (Refer to Soil Types Map and Appendix 1)

- 2.7 This soil type is found principally in the north west with smaller areas in the north and south east of the site. The soils in these areas consist of a very slightly to moderately stony medium sandy clay loam or medium clay loam textured topsoil which overlies a very slightly to slightly stony sandy clay loam or medium sandy loam upper subsoil. This upper subsoil in turn overlies a stoneless or very slightly stony clay or sandy clay textured

(*1) Hodnet Association: Reddish fine and coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Some similar well drained reddish fine loamy soils.

(*2) Compton Association: Stoneless mostly reddish clayey soils affected by groundwater. Flat land. Risk of flooding.

material. Occasionally the upper subsoil was found to contain ochreous mottles however, all subsoil horizons were found to be permeable. Hence profiles of this soil type were assessed as wetness class I or II.

Soil Type 2 (Refer to Soil Types Map and Appendix 1)

- 2.8 Soil Type 2 covers most of the centre of the site and an area in the west together with a small area in the south east of the site. This soil type consists of a reddish brown or dark brown very slightly to slightly stony medium clay loam or sandy clay loam topsoil. This topsoil overlies a reddish brown or dusky red very slightly to slightly stony heavy or medium clay loam upper subsoil which occasionally contained a few ochreous mottles. This in turn overlies a lower subsoil of dusky red slightly to moderately stony heavy clay loam or clay textured material. Very occasionally ochreous mottles were found within the lower subsoil, however examination of subsoil structures indicate that no horizon in this soil type was slowly permeable. Profiles of this soil type were therefore assessed as wetness class I or II.

Soil Type 3 (Refer to Soil Types Map and Appendix 1)

- 2.9 Soil Type 3 is limited to a single block in the north west of the site and consists of a reddish brown or dark reddish brown very slightly stony medium or heavy clay loam textured topsoil overlying clay textured subsoil horizons. Both upper and lower subsoil horizons consist of dusky red clay textured material with the upper subsoil being very slightly stony and the lower subsoil generally slightly stony. No mottles were apparent in any of the soil horizons and examination of the subsoil structure confirmed no slowly permeable layers to be present within profiles of this soil type. Soil Type 3 was therefore assessed as wetness class I.

Soil Type 4 (Refer to Soil Types Map and Appendix 1)

- 2.10 Soil Type 4 is limited to a single block in the north of the site and consists of a brown very slightly to slightly stony medium or heavy clay loam textured topsoil overlying a clay textured subsoil. The subsoil consisted of a single light yellowish brown or brownish yellow stoneless or very slightly stony clay textured material. Many prominent ochreous mottles were present within the subsoil and examination of its structure confirmed the subsoil to be slowly permeable. Soil Type 4 was therefore assessed as wetness class IV.

Soil Type 5 (Refer to Soil Types Map and Appendix 1)

- 2.11 Soil Type 5 was found to occur in two small blocks in the south east of the site and consisted of the lighter textured soils within the site. A slightly stony medium sandy loam textured topsoil overlies a very slightly stony medium sandy loam or loamy medium sand upper subsoil which generally becomes increasingly sandy with depth. No mottles were apparent in any horizons of this soil type and hence profiles were assessed as wetness class I.

Soil Type 6 (Refer to Soil Types Map and Appendix 1)

- 2.12 Soil Type 6 was restricted to a small valley feature in the south east of the site. A moderately stony medium clay loam textured topsoil overlies an ochreous mottled slightly stony heavy clay loam upper subsoil. This upper subsoil in turn overlies a moderately stony mottled medium sandy clay loam textured lower subsoil. Examination of subsoil structures confirmed that no horizon was slowly permeable hence profiles of this soil type were assessed as wetness class I.

Soil Type 7 (Refer to Soil Types Map and Appendix 1)

- 2.13 Soil Type 7 was an area in which the topsoil and upper subsoil were removed , a hollow filled with colliery waste and then the soils re-instated. This disturbed soil type therefore consists of a slightly stony heavy clay loam topsoil which overlies a very slightly stony clay textured upper subsoil which in turn overlies dark bluish grey shale. The shale material was hard and compacted and hence profiles of this soil type were assessed as wetness class III.

3.0 AGRICULTURAL LAND CLASSIFICATION

- 3.1 The breakdown of the various Agricultural Land Classification (ALC) grades within the site are shown in Table 2. The definition of the ALC grades is given in Appendix 2.

Table 2. Distribution of grades and subgrades

Grade	Area (ha)	% of site
2	36.0	44.1
3a	8.2	10.0
3b	8.2	10.0
(Disturbed agricultural land	2.3)	
Other land	29.3	35.9
Total agricultural land	52.4	
Total site	81.7	100.0

Grade 2

- 3.2 Land of grade 2 quality is found within areas of Soil Types 1, 2, 3, 5 and 6 (paragraphs 2.7, 2.8, 2.9, 2.11 and 2.12). Within these areas quality is limited by combinations of topsoil stone content, slight droughtiness and slight wetness and workability restrictions. Occasionally within the areas mapped as

grade 2 profiles of grade 1 quality are found but these were generally in areas too small to be delineated separately.

Subgrade 3a

- 3.3 Land of subgrade 3a quality is found principally within areas of Soil Types 1, 2 and 5 (paragraphs 2.7, 2.8 and 2.11). Within Soil Types 1 and 2 the principal limitation is topsoil stoniness with small areas being restricted due to wetness and workability constraints. Limitations for Soil Type 5 are a combination of topsoil stoniness and droughtiness of the soil profiles.

Subgrade 3b

- 3.4 The area of subgrade 3b quality land in the west of the site is associated with Soil Type 7 (paragraph 2.13) which is disturbed land and suffers from a moderate wetness and workability limitation. A similar limitation is found for land associated with Soil Type 4 (paragraph 2.10) in the north of the site. In the south east of the site two small areas are mapped as subgrade 3b due to gradients in excess of 7°, thus restricting land quality on slope limitation. A third small area of subgrade 3b land in the extreme south east corner of the site is restricted by the topsoil stone content of the area associated with Soil Type 5 (paragraph 2.11).

Other Land

- 3.5 Areas mapped as other land within the site consists predominantly of old tips and settling lagoons from former coal workings. Also included in areas mapped as other land are tracks, a small wooded area in the south east of the site and the now derelict buildings of the former Minorca Farm.

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REFERENCES

- GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND AND WALES),
1982. Sheet 155, Coalville, 1:50 000 scale.
- MAFF, 1971. Agricultural Land Classification Map. Provisional. Scale 1:63 360
Sheet 121.
- 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. Bracknell.
- SOIL SURVEY OF ENGLAND AND WALES, 1983. Sheet 3, "Soils of Midland
and Western England". 1:250 000 scale.

Appendix 1

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STATEMENT OF SOIL PHYSICAL CHARACTERISTICS SOIL TYPE 1

Topsoil	Texture	:	medium sandy clay loam/medium clay loam, occasionally heavy clay loam.
	Colour	:	dark brown (7.5YR3/2), brown (7.5YR4/2) .
	Stone	:	very slightly - moderately stony (10%), small and medium rounded quartzite.
	Boundary	:	sharp, smooth
	Roots	:	many fine and very fine
	Depth	:	32 cm
	Upper Subsoil	Texture	:
Matrix colour		:	reddish brown (5YR4/4), brown (7.5YR5/4).
Mottles		:	none - common distinct ochreous
Stone		:	very slightly - slightly stony (5%), small - large rounded quartzite.
Structure		:	weakly developed coarse subangular blocky.
Consistence		:	very friable
Porosity		:	0.5% biopores
Boundary		:	abrupt, smooth
Roots		:	common fine and very fine
Depth		:	76 cm
Lower Subsoil	Texture	:	clay/sandy clay
	Matrix colour	:	dusky red (2.5YR3/4, 4/4), dark red (2.5YR4/6).
	Mottles	:	none
	Stone	:	stoneless - slightly stony, small - large rounded quartzite.
	Structure	:	weakly developed coarse and medium subangular blocky.
	Consistence	:	friable
	Porosity	:	<0.5% biopores
	Roots	:	few, fine
Depth	:	120 cm	

Comments: Wetness class I/II.

SOIL TYPE 2

Topsoil	Texture	:	medium clay loam/medium sandy clay loam.
	Colour	:	reddish brown (5YR4/3), dark brown (7.5YR3/2).
	Stone	:	very slightly - slightly stony (6%), small - medium rounded quartzite.
	Boundary	:	clear, smooth
	Roots	:	common fine and very fine and few medium.
	Depth	:	33 cm
Upper Subsoil	Texture	:	heavy clay loam/medium clay loam
	Matrix colour	:	reddish brown (5YR4/4), dusky red (2.5YR3/3, 4/4).
	Mottles	:	none - few ochreous
	Manganese	:	few manganese concretions
	Stone	:	very slightly - slightly stony (5%), small - medium rounded quartzite.
	Structure	:	weakly developed medium and coarse subangular blocky.
	Consistence	:	friable
	Porosity	:	>0.5% biopores
	Boundary	:	clear, smooth
	Roots	:	few, fine and very fine
Depth	:	59 cm	
Lower Subsoil	Texture	:	heavy clay loam/clay
	Matrix colour	:	dusky red (2.5YR 3/4, 4/4)
	Mottles	:	none - (very occasionally) common ochreous.
	Manganese	:	occasionally few manganese concretions
	Stone	:	slightly - moderately stony (10%), small - medium rounded and subangular.
	Structure	:	weakly developed coarse subangular blocky.
	Consistence	:	friable
	Porosity	:	>0.5% biopores
	Roots	:	few fine and very fine
Depth	:	120 cm+	

Comments: Wetness class I/II

SOIL TYPE 3

Topsoil	Texture	:	medium/heavy clay loam
	Colour	:	reddish brown (5YR4/3), dark reddish brown (5YR3/3).
	Stone	:	very slightly stony (4%), small - medium rounded and subangular, predominantly quartzite.
	Boundary	:	smooth, abrupt
	Roots	:	many fine and very fine
	Depth	:	30 cm
	Upper Subsoil	Texture	:
Matrix colour		:	dusky red (2.5YR4/4)
Mottles		:	none
Stone		:	very slightly stony, small - medium rounded and subangular quartzite.
Structure		:	weakly - moderately developed coarse (occ. med) subangular blocky.
Consistence		:	friable
Porosity		:	>0.5% biopores
Boundary		:	clear, wavy
Roots		:	common - many fine and very fine
Depth		:	71 cm
Lower Subsoil	Texture	:	clay
	Matrix colour	:	dusky red (2.5YR4/4)
	Mottles	:	none
	Stone	:	slightly stony (6%) - occasionally moderately stony. Small - medium quartzite.
	Structure	:	weakly developed coarse and medium - subangular blocky.
	Consistence	:	friable
	Porosity	:	0.5% biopores
	Roots	:	few - common fine and very fine
Depth	:	120 cm+	

Comments: Wetness class I

SOIL TYPE 4

Topsoil	Texture	:	medium/heavy clay loam
	Colour	:	brown (10YR4/3, 7.5YR3/2)
	Stone	:	very slightly - slightly stony (5%), small - medium rounded quartzite.
	Boundary	:	smooth, abrupt
	Roots	:	many fine and very fine
	Depth	:	33 cm
Subsoil	Texture	:	clay
	Matrix colour	:	light yellowish brown (10YR6/4), brownish yellow (10YR6/6) - dark red inclusions (2.5YR4/6).
	Mottles	:	many prominent ochreous mottles
	Stone	:	stoneless - very slightly stony
	Structure	:	moderately developed coarse prismatic
	Consistence	:	firm
	Porosity	:	<0.5% biopores
	Roots	:	many fine and very fine
	Depth	:	120 cm+

Comments: Wetness class IV

SOIL TYPE 5

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Topsoil	Texture	:	medium sandy loam
	Colour	:	dark brown (7.5YR3/2), brown (7.5YR4/3).
	Stone	:	slightly stony (10%), small - medium rounded quartzite.
	Boundary	:	clear, smooth
	Roots	:	many fine and medium
	Depth	:	32 cm
	Upper Subsoil	Texture	:
Matrix colour		:	brown (7.5YR4/4, 5/4), strong brown (7.5YR4/6).
Mottles		:	none
Stone		:	very slightly stony (3%)
Structure		:	weakly developed coarse angular blocky
Consistence		:	very friable
Porosity		:	>0.5% biopores
Boundary		:	clear, smooth
Roots		:	few fine and very fine
Depth		:	65 cm
Lower Subsoil		Texture	:
	Matrix colour.	:	strong brown (7.5YR6/6, 5/8), dark brown (7.5YR4/3, 4/4).
	Mottles	:	none
	Stone	:	very slightly - slightly stony (5%)
	Structure	:	single grain
	Consistence	:	loose
	Roots	:	few fine and very fine
	Depth	:	120 cm+

Comments: Wetness class I

SOIL TYPE 6

Topsoil	Texture	:	medium clay loam
	Colour	:	dark brown (7.5YR3/2)
	Stone	:	moderately stony (18%), small - large rounded and angular, quartzite and flints.
	Boundary	:	smooth, abrupt
	Roots	:	many fine and very fine
	Depth	:	26 cm
Upper Subsoil	Texture	:	heavy clay loam (sandy)
	Matrix colour	:	yellowish brown (10YR5/4)
	Mottles	:	many distinct ochreous mottles
	Stone	:	slightly stony (10%)
	Structure	:	weakly developed coarse angular blocky
	Consistence	:	friable
	Porosity	:	0.5% biopores
	Boundary	:	clear, smooth
	Roots	:	common fine and very fine
	Depth	:	45 cm
Lower Subsoil	Texture	:	medium sandy clay loam
	Matrix colour	:	yellowish brown (10YR5/6) light yellowish brown (10YR6/4).
	Mottles	:	many distinct ochreous mottles
	Stone	:	moderately stony (20%)
	Structure	:	weakly developed coarse subangular blocky.
	Consistence	:	friable
	Porosity	:	>0.5% biopores
	Roots	:	few fine and very fine
	Depth	:	120 cm+

Comments: Wetness class I

SOIL TYPE 7

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Topsoil	Texture	:	heavy clay loam
	Colour	:	reddish brown (5YR4/3)
	Stone	:	slightly stony (7%), rounded, subangular and angular quartzite and flint.
	Boundary	:	clear smooth
	Roots	:	many fine and very fine
	Depth	:	28 cm
	Upper Subsoil	Texture	:
Matrix colour		:	dusky red (2.5YR4/4)
Stone		:	very slightly stony (1%) reinstated subsoil overlying shale.
Depth		:	49 cm
Lower Subsoil	Texture	:	shale
	Matrix colour	:	dark bluish grey (5B4/1)
	Stone	:	moderately stony (18%)

Comments: Disturbed soil profile. Wetness Class III

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

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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.