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AGRICULTURAL LAND CLASSIFICATION
AND
STATEMENT OF SOIL PHYSICAL CHARACTERISTICS
FOXHOLE FARM, ILKESTON,
DERBYSHIRE
PROPOSED OPEN CAST COAL SITE

AGRICULTURAL LAND CLASSIFICATION AND STATEMENT OF PHYSICAL CHARACTERISTICS
LAND AT FOXHOLE FARM, ILKESTON, DERBYSHIRE

1.0 INTRODUCTION

1.1 The Agricultural Land Classification provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can operate in one or more of four principal ways: they may affect the range of crops which can be grown, the level of yield, the consistency of yield and the cost of obtaining it. The classification systems gives considerable weight to flexibility of cropping, whether actual or potential, but the ability of some land to produce consistently high yields of a somewhat narrower range of crops is also taken into account.

1.2 The principal physical factors influencing agricultural production are climate, site and soil. The main climatic factors which are taken into account are temperature and rainfall, although account is also taken of exposure, aspect and frost risk. The site factors used in the classification system are gradient, micro relief and flood risk. Soil characteristics of particular importance are texture, structure, depth and stoniness. In some situations chemical properties may also influence the long term potential of land and are taken into account.

1.3 These factors result in varying degrees of constraint on agricultural production. They can act either separately or in combination, the most important interactive limitations being soil wetness and droughtiness. The grade or subgrade of land is determined by the most limiting factor present. Five grades of land are recognised ranging from Grade 1 land of excellent quality to Grade 5 land of very poor quality. Grade 3, which constitutes about half of the agricultural land in England and Wales is divided into two subgrades designated 3a and 3b.

1.4 Details of the Agricultural Land Classification (ALC) System are contained in MAFF's Revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988). Descriptions of the ALC grades and subgrades are provided in Appendix I.

2. BACKGROUND TO THE SITE

2.1 An initial indication of land quality at Foxholes Farm is available from the Ministry's 1:63,360 scale reconnaissance ALC map No. 112 (MAFF 1970). This shows the majority of the site to be Grade 4 with approximately one third of the site at the western edge falling within Grade 3.

2.2 A detailed ALC survey was undertaken in August 1993 during which time a full inventory of soil resources was also compiled for restoration planning purposes.

2.3 At the time of survey the land was mostly under permanent pasture with approximately one third of the site under cereals. A total of 38 soil inspections were made over the site on a 100m grid basis giving an intensity of inspection of approximately 1 per hectare. Soils were sampled to a depth of 120cms using a hand held Dutch soil auger and data collected was supplemented by observations from 4 soil profile pits.

3.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

3.1 Site specific climate data has been obtained by interpolating information contained in the 5km grid data set produced by the Meteorological Office (Met Office, 1989).

3.2 This shows that Foxhole Farm has an annual average rainfall of approximately 676mm, and that soils are at field capacity for an estimated 154 days a year.

3.3 The accumulated temperature for this area is approximately 1376 day degrees celsius. This parameter gives an indication of the cumulative build up of warmth available for crop growth, and influences the development of soil moisture deficits (SMD)* and hence susceptibility to drought. The soil moisture deficits for wheat and potatoes at Foxhole Farm are 100mm and 90mm respectively, which are near the average for lowland England.

3.4 The site is neither particularly exposed nor frost prone.

Altitude and Relief

3.6 The site occupies gently to moderately sloping land between altitudes of 55m and 90m above OD.

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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.

Soil Drainage

3.7 Most profiles are imperfectly to poorly drained (Wetness Classes III and IV) with some small areas of well and moderately well drained soil (Wetness Classes I and II).

Geology and Soils

3.8 The 1:50000 scale solid and drift geology map sheet 125 (Geol. Surv. 1972) shows the majority of the site to be underlain by shale containing coal seams. There is also some alluvium alongside Stanley Brook.

3.9 The generalised 1:250,000 scale soil map "Midland and Western England" (SSEW, 1983) identifies soils of the Dale Association* to the west of Foxhole Farm with disturbed soils being mapped to the north east and south of the farm. Field survey observations broadly support this general description except that disturbed land although present is less widespread than indicated. The following soil types were identified.

3.10 To the north west of Foxhole Farm the topsoil has been stripped and stored in a mound adjacent to the farm. The remaining soil consists of silty clay or heavy silty clay loam subsoil to depth. (Soil type I on the accompanying map).

3.11 The second soil (type II) is widespread across the site. In places it contains other soil types covering areas too small or variable to separate. It also includes areas of disturbed land. Soils generally consist of very slightly stony medium silty clay loam or medium clay loam topsoils over slowly permeable heavy silty clay loam or silty clay subsoils. Profiles are typically slowly permeable from 30cm depth and are thus poorly drained (Wetness Class IV). More localised areas contain permeable upper subsoils (see also soil type III) which usually pass into slowly permeable lower subsoils below about 50cm depth. Profiles of this type are imperfectly drained and fall within Wetness Class III. Disturbed areas are usually recognised by the presence of compacted subsoil horizons and the occurrence of grey overburden at about 50cm depth. Other variations within the map unit include profiles which pass into thinly bedded sandstone at depth.

Mean topsoil thickness is 30cm below which in most places there is 90cm of medium or heavy textured subsoil.

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* Dale Association: Surface water gley soils with a medium to heavy clay loam texture, generally formed over Carboniferous mudstones and shales.

3.12 The third soil (type III) occurs in a strip across the centre of the site east and west of Foxhole Farm. Topsoils consist of medium silty clay loam or medium clay loam to a depth of about 30cm. These pass into upper subsoils formed of silty clay loam, sandy clay loam or medium clay loam. Lower subsoils, below about 50cm depth vary from similar textured material to slowly permeable heavy silty clay loam or silty clay.

3.13 The fourth soil type occurs as a strip along Stanley Brook. Profiles consist of stoneless medium silty clay loam topsoils 30cm in thickness over stoneless heavy silty clay loam or silty clay subsoils to 120cm.

4.0 AGRICULTURAL LAND CLASSIFICATION

Agricultural land on this site falls within Subgrades 3a and 3b and Grade 4. A breakdown of land quality in hectares and percentage terms is given below.

ALC	Ha	%
3a	13.4	34.2
3b	21.3	54.3
4	3.0	7.7
Urban	0.7	1.8
Farm Buildings	0.8	2.0
Total	39.2	100

4.1 Subgrade 3a

This subgrade occurs to the west, north east and north of Foxhole Farm. Soils generally consist of medium clay loam or medium silty clay loam topsoils over similar upper subsoils. Lower subsoils vary from slowly permeable heavy clay loam, heavy silty clay loam or silty clay to permeable, sometimes stony, sandy clay loam or medium clay loam. Profiles with slowly permeable loam subsoils are imperfectly drained (Wetness Class III) and limited to Subgrade 3a by wetness. Those with permeable lower subsoils are well drained (Wetness Class I) and limited by droughtiness.

4.2 Subgrade 3b

This subgrade covers most of the agricultural land on the site. Profiles typically consist of stoneless medium clay loam or medium silty clay loam topsoils over stoneless, slowly permeable heavy silty clay loam to silty clay subsoils. They are poorly drained (Wetness Class IV) and limited to Subgrade 3b by wetness.

4.3 Grade 4

This grade occurs to the north west of Foxhole Farm. At the time of survey the topsoil had been stripped and stored in a mound adjacent to the farm. The remaining soil resources consist of silty clay subsoil to depth. Lack of topsoil is the main factor restricting this land to Grade 4.

APPENDIX I

DESCRIPTION OF THE GRADES AND SUBGRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. In practice, the grades are defined by reference to physical characteristics and the grading guidance and cut-offs for limitation factors in Section 3 enable land to be ranked in accordance with these general descriptions. The most productive and flexible land falls into Grades 1 and 2, and Subgrade 3a land collectively comprises about one-third of the agricultural land in England and Wales. About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4. Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in Grade 5, which mostly occurs in the uplands.

Descriptions are also given of other land categories which may be used on ALC maps.

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 includes 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 root 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 level of yields. It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yields of which are variable. In moist 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.

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

FOXHOLE FARM, ILKESTON

SOIL TYPE I (3.0 ha)

TOPSOIL	Texture	:	No topsoil resources
	Colour	:	
	Stone	:	
	Depth	:	
	Structure	:	
	Boundary	:	
	Roots	:	
SUBSOIL	Texture	:	Silty clay
	Colour	:	Light brownish grey (10YR 6/2) with strong brown (75YR 5/8) mottles.
	Stone	:	Stoneless
	Depth	:	120 cm
	Structure	:	Strongly developed medium and coarse prismatic structures.
	Consistence	:	Very firm
	Porosity	:	Slightly porous
	Boundary	:	-
	Roots	:	Common very fine fibrous roots on ped faces

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

FOXHOLE FARM, ILKESTON

SOIL TYPE II (21.5 ha)

TOPSOIL	Texture	:	Medium silty clay loam to medium clay loam
	Colour	:	Dark greyish brown (10YR 4/2) with common, small, distinct yellowish red (10YR 5/8) mottles.
	Stone	:	Stoneless
	Depth	:	10 to 40 cm, mean 30 cm
	Structure	:	Well developed, medium sub angular blocky to coarse granular structure.
	Boundary	:	Clear, smooth
	Roots	:	Heavy silty clay loam to silty clay
SUBSOIL	Texture	:	Heavy silty clay loam to silty clay
	Colour	:	Dark greyish brown (10YR 5/2). Many medium distinct dark reddish brown (10YR 3/4) mottles.
	Stone	:	Stoneless
	Depth	:	120 cm
	Structure	:	Moderately developed, very coarse prismatic structure.
	Consistence	:	Very firm
	Porosity	:	Slightly porous
	Boundary	:	-
	Roots	:	Few fine fibrous roots

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

FOXHOLE FARM, ILKESTON

SOIL TYPE III (10.9 ha)

TOPSOIL	Texture	:	Medium clay loam
	Colour	:	Dark greyish brown (10YR 4/2)
	Stone	:	Stoneless
	Depth	:	25-40 cm mean 30 cm
	Structure	:	Moderately developed, coarse and medium sub angular blocky.
	Boundary	:	Smooth clear
	Roots	:	Many fine and medium fibrous roots
UPPER SUBSOIL	Texture	:	Medium silty clay loam
	Colour	:	Pale brown (10YR 6/3) with many distinct medium yellowish red (5YR 4/6) mottles.
	Stone	:	Very slightly stony, small to medium soft silt stones.
	Depth	:	40-50 cm
	Structure	:	Moderately developed coarse platy structure
	Consistence	:	Friable
	Porosity	:	Moderately porous
	Boundary	:	Smooth clear
	Roots	:	Common fine fibrous roots
LOWER SUBSOIL	Texture	:	Medium sandy clay loam
	Colour	:	Grey (N5) with common distinct yellowish brown (10YR 5/6).
	Stone	:	Extremely stony, small to coarse soft silt stones
	Depth	:	45 cm +
	Structure	:	Massive
	Consistence	:	Friable
	Porosity	:	Moderately porous
	Roots	:	No roots

STATEMENT OF SOIL PHYSICAL CHARACTERISTICS

FOXHOLE FARM, ILKESTON

SOIL TYPE IV (2.3 ha)

TOPSOIL	Texture	:	Medium silty clay loam
	Colour	:	Very dark greyish brown (10YR 3/2) with a few feint reddish brown (5YR 3/4) mottles.
	Stone	:	Stoneless
	Depth	:	30 cm
	Structure	:	Moderately developed coarse subangular blocky
	Boundary	:	Abrupt, smooth
	Roots	:	Many very fine fibrous
SUBSOIL	Texture	:	Silty clay
	Colour	:	Greyish brown (10YR 5/2) with many distinct dark yellowish brown (10YR 3/4) mottles
	Stone	:	Stoneless
	Depth	:	120 cm
	Structure	:	Moderately to strongly developed very coarse prismatic
	Consistence	:	Very firm
	Porosity	:	Slightly porous
	Boundary	:	-
	Roots	:	Few fine fibrous