AGRICULTURAL LAND CLASSIFICATION

LAND AT ABBOTT ROAD, MANSFIELD, NOTTS.

1.0 BACKGROUND

1.1 A detailed survey was carried out over 29.3 ha lying immediately west of Mansfield's urban limit. The site is one of several being surveyed in connection with the Mansfield District Local Plan.

1.2 The site is bounded on the east by the A6075 trunk road and in the north by a minor road. Elsewhere the site is surrounded by agricultural land. A minor road known as Penniment Lane crosses the middle of the site from east to west. Two public footpaths cross the north-west corner and the southern tip of the site and the Penniment Farm house and buildings are situated in the centre of the site.

1.3 On the published 1:63 360 scale Agricultural Land Classification (ALC) map (MAFF, 1970) the northern part of the site is shown to be Grade 2 and the southern part Grade 3. However, this map is of a reconnaissance nature and since its publication the ALC system has been revised (MAFF, 1988). The current survey was undertaken, therefore, to provide site-specific land quality and soil information.

1.4 A total of 30 auger borings was made using a dutch auger to a depth of 1.2 m unless stopped by impenetrable stony layers. In addition, 5 pits representative of the main soil types were dug to assess subsoil conditions in more detail. The fieldwork was carried out during January 1996.

1.5 At the time of the survey most of the land was in arable production. There is no irrigation on the site.

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 ºC 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 a slight climatic limitation affecting the site. Also, climatic factors interact with soil properties to influence soil wetness and droughtiness.

Table 1: Climatic Interpolation

Grid reference	SK 515 618
Altitude (m)	145
Accumulated Temperature (day ºC, Jan-June)	1279
Average Annual Rainfall (mm)	716
Moisture Deficit, Wheat (mm)	90
Moisture Deficit, Potatoes (mm)	76
Field Capacity (days)	162
Overall Climatic Grade	2

Altitude and Relief

2.3 The site is part of an undulating plateau. In general terms the land slopes southwards with gradients of 1° - 4°. Steeper slopes, up to 7°, do occur, however, associated with knolls and valley sides. Subdued knolls and ridges are

found in the north and west of the site and a shallow dry valley occurs in the north-eastern corner of the site. The highest land, 156 m AOD, is at the southern edge of the site and the lowest point, at about 134 m AOD, is near the north-east corner. Neither altitude nor relief impose any limitation on the agricultural quality of the site.

Geology and Soils

2.4 The published 1:63 360 scale geological map (Geol. Survey, 1971) shows the northern part of the site (ie. to the north of Penniment Lane) to be underlain by Permo-Triassic Lower Magnesian Limestone. The southern part of the site is predominantly Pleistocene Boulder Clay with two small areas of Glacial Sand and Gravel.

2.5 There is no published detailed soil map of the site. The reconnaissance soil survey map for the area (Soil Survey, 1983) shows two soil associations, Aberford and Salop (*) The detailed survey carried out on the site shows the presence of 5 soil types and these are described briefly below.

2.6 The first soil type is shallow and overlies hard sandstone. The soil occurs in two places, a knoll in the north of the site and as a band running for about 300 m south-east from the knoll to the west of Penniment Farm. Apart from these two main localities there are a few small occurrences of this soil type scattered over the site. A typical profile shows a brown or dark brown sandy silt loam or medium clay loam topsoil overlying strong brown and reddish yellow loamy

(*) Aberford association: Shallow, locally brashy, well-drained calcareous fine loamy soils over Permian, Jurassic and Eocene limestone. Some deeper soils in colluvium.

Salop association: -Slowly permeable, seasonally waterlogged reddish fine loamy over / and clayey soils developed in reddish till.

medium sand, frequently containing large sandstone fragments. Hard sandstone is typically encountered between 40 and 50 cm. The upper part of the rock is slightly fissured and the cracks are infilled with sand.

2.7 The second soil type is characteristically a deep, loamy over sandy profile. It occurs in two places, at the southern end of the site and as a band running eastwards from Penniment Farm just to the south of Penniment Lane. In the south of the site a very dark greyish brown medium sandy loam topsoil overlies strong brown loamy medium sand. This passes into medium sand at about 60 / 80 cm. The soil is very slightly stony. In the second location, near Penniment Farm, the soil is more variable. The sand may be finer and the topsoil and upper subsoil may be sandy clay loam or, at the margins of the unit, medium clay loam texture.

2.8 The third soil type is defined by having slowly permeable clay within 40 cm. The soil occurs in the south-west of the site. A dark brown or very dark greyish brown medium clay loam topsoil overlies a brown, pale brown or brownish yellow clay with ochreous mottles. This clay is slowly permeable. Below about 45 cm the subsoil is a dusky red, mottled, slowly permeable clay. The soil is classified as Wetness Class IV.

2.9 The fourth soil type is loamy above slowly permeable clay starting at 50 / 70 cm. The soil occurs mainly south of Penniment Lane in the east of the site, although scattered occurrences are found north of Penniment Lane. The topsoil is a brown to very dark greyish brown sandy silt loam (occasionally medium clay loam). This overlies a brown or light yellowish brown, mottled, sandy clay loam upper subsoil. A slowly permeable, brownish yellow, mottled sandy clay begins at 50 / 70 cm and this usually passes into the slowly permeable red clay that is characteristic of soil type 3, above. The soil is classified as Wetness Class II or III.

2.10 The fifth soil type occupies most of the northern part of the site. The soil is characterised as being deep, brown, uniformly loamy, very slightly stony and well-drained (Wetness Class I). A typical profile shows a brown medium clay loam topsoil overlying a brown medium (becoming heavy) clay loam subsoil. Included in soil type 5 are a few deep, brown fine sandy loam profiles. Also included is a small area in the east of the site where thin (about 30 / 45 cm) horizons of slowly permeable clay appear in the subsoil.

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 grades found on the site is given in Table 2 and a description of each grade is given in Appendix 1. At this site the factors which primarily determine grading are soil droughtiness (a function of soil texture, structure and stoniness relative to the crop adjusted moisture deficits in the area) and the soil Wetness Class (a function of climate and soil permeability). Overall, none of the land can be classified higher than Grade 2 on account of a slight climatic limitation.

Table 2: Distribution of Grades and Subgrades

Grade	Area (ha)	%
2	21.1	72
3b	7.0	24
Other land	1.2	4
Total	29.3	100

Grade 2

3.2 Most of the site is classified as Grade 2. Land having soil type 5 (para. 2.10) is classified on the basis of the climatic limitation alone; there are no soil limitations. Land having soil type 2 (para. 2.7), in addition to the climatic constraint, has a slight droughtiness limitation, in that moisture balance calculations show the available water capacity within the soil profiles to be limiting for the requirements of certain crops. Land having soil type 4 (para. 2.9), again in addition to the climatic constraint, is graded on the basis of a slight wetness limitation. The soils have predominantly sandy silt loam topsoils and are Wetness Class II or III. The land may lie wet for short periods, imposing some restrictions on its workability and demanding particular care with certain cultivations.

3.3 Within the land shown to be Grade 2, very small areas of Subgrades 3a and 3b may occur. However, these occurrences are scattered and cannot be delineated separately at the scale of survey.

Subgrade 3b

3.4 Subgrade 3b land is mapped in the north and in the west of the site. It is associated with soil types 1 (para. 2.6) and 3 (para. 2.8). In the first instance the shallow rooting depth and subsoil stoniness result in a moderately severe soil droughtiness limitation. The underlying hard sandstone is generally encountered within 40 / 50 cm and roots penetrate below or into this in only a few instances. Soil type 3, on account of its slowly permeable upper subsoil (Wetness Class IV) and its medium clay loam topsoil, has a moderately severe wetness limitation. Soil workability is adversely affected and considerable care and timeliness are needed with cultivations.

Other land

3.5 Non-agricultural land comprises Penniment Lane and the Penniment Farm buildings and gardens.

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REFERENCES

GEOLOGICAL SURVEY OF GREAT BRITAIN, 1971. Sheet 112, Chesterfield. Solid and Drift Edition, Scale 1:63 360.

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 4, "Soils of Eastern England". Scale 1:250 000 .

Appendix 1

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.