AGRICULTURAL LAND CLASSIFICATION

LAND AT FIR'S FARM, MANSFIELD, NOTTS.

1.0 BACKGROUND

1.1 A detailed survey was carried out over 55.3 ha lying 0.3 km south of Mansfield's urban limit. The site is one of several being surveyed in connection with the Mansfield District Local Plan. The site spans two ownerships, Fir's Farm in the eastern half and Rushley Farm in the west.

1.2 The site is bounded on the west by the A60 trunk road, on the east by a track known as Black Scotch Lane, in the south-east by Harlow Wood and in the north and south-west by agricultural land. Fir's Farm buildings are at the north-east corner of the site, outside the area of survey.

1.3 On the published 1:63 360 scale Agricultural Land Classification (ALC) map (MAFF, 1970) the whole area is mapped as 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. Adjacent land to the west of the site, at Rushley Farm, has a mix of Grades 2 and 3a land (ADAS, 1995).

1.4 A total of 57 auger borings was made using a dutch auger to a depth of 1.2 m unless stopped by impenetrable stony layers. In addition, 2 pits representative of the main soil types were dug to assess subsoil conditions in more detail. The topsoil stone content at 24 auger borings and the upper subsoil stone content at 13 auger borings were established by sieving. The fieldwork was carried out during January 1996.

1.5 At the time of the survey most of the land was in arable production. A small field in the north of the site is set-aside, perhaps on account of its stony soils and moderate slopes (see below). 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 554 583
Altitude (m)	150
Accumulated Temperature (day ºC, Jan-June)	1274
Average Annual Rainfall (mm)	709
Moisture Deficit, Wheat (mm)	90
Moisture Deficit, Potatoes (mm)	76
Field Capacity (days)	160
Overall Climatic Grade	2

Altitude and Relief

2.3 The site is part of an undulating plateau. In general terms a dry valley runs eastwards along the southern edge of the site and the land slopes southwards and south-eastwards towards this valley. However, slopes are not uniform; the land falls in a series of steps, with the longer slopes mostly 2° - 4° and and the short breaks-of-slope ranging from 5° - 8°. In addition, two small dry valley systems, in the centre and west of the site, run southwards and some sideslopes to these valleys are up to 15°. The highest land, 163 m AOD, is in the north of the site and the lowest point, at 124 m AOD, is in the south-east corner.

2.4 The relief does, locally, impose some limitations on the agricultural quality of the site. Land having slopes greater than 7° cannot be better than Grade 3b and where slopes exceed 11° the land cannot be better than Grade 4. These limits reflect an increasing risk to the safe and efficient operation of certain farm machinery.

Geology and Soils

2.5 The published 1:63 360 scale geological map (Geol. Survey, 1966) shows the site to be underlain by Permo-Triassic Bunter Pebble Beds.

2.6 There is no published detailed soil map of the site. The reconnaissance soil survey map for the area (Soil Survey, 1983) shows all of the site to comprise soils from the Cuckney 1 association, essentially well-drained sandy and coarse loamy soils with a risk of wind erosion.

2.7 The detailed survey carried out on the site shows the presence of 2 soil types. The most extensively occurring soil type is a deep, non-calcareous well-drained loamy sand over sand with a variable stone content. On the highest land in the north of the site occurs a small area of an imperfectly drained, non-calcareous loamy over clayey soil with a slowly permeable subsoil.

2.8 Characteristically, the first soil type has a dark brown or very dark greyish brown loamy medium sand topsoil of 30 - 35 cm over a brown, strong brown or reddish brown medium sand subsoil extending to more than 120 cm. The upper part of the subsoil may sometimes be loamy medium sand texture. Topsoil stone content is commonly in the range of 3 -12%, most of the stones being small and medium rounded pebbles. The subsoil stone content can vary considerably between and within profiles, with bands and pockets containing up to 30% stones. The soil is well-drained and is classified as Wetness Class I.

2.9 A stony variant of the above soil type is found over a small area in the north of the site, mainly within the field that is set-aside. This variant is essentially similar to the soil described above except for having a significantly greater stone content. Here, total topsoil stoniness is typically in the range of 15 - 20% (10 - 16% are greater than 2 cm) and subsoil horizons commonly contain between 20 - 30% stones.

2.10 There is some evidence of erosion of the sandy soils described above, in that wheelings close to the downslope field margins frequently contain sand and lower slope topsoils are sometimes deeper than those upslope. However, there is no evidence of the rills or micro-dunes that are often associated with sandy soils.

2.11 On the highest part of the site, in the north, occurs the second soil type, a small area of loamy over clayey soils with a slowly permeable subsoil beginning at 50 / 70 cm, more usually closer to the lower depth. The topsoil is a medium sandy loam. There is some variation in the upper subsoil, where textures range through loamy medium sand, medium sandy loam and sandy clay loam. The slowly permeable lower subsoil is either clay or sandy clay. The soil is only very slightly stony throughout.

2.12 The representative description of this soil shows a dark brown medium sandy loam topsoil of almost 35 cm overlying a thin, brown, medium sandy loam. Below this, at about 45 cm, occurs a brown and pale brown, mottled, loamy medium sand with clay inclusions. At the time of survey water was seeping from this horizon, above the slowly permeable lower subsoil beneath. The slowly permeable horizon extends from 70 cm to beyond 100 cm. It is a reddish brown sandy clay. The profile is classified as Wetness Class II. [In the very few profiles where the slowly permeable lower subsoil begins above 57 cm the soil is Wetness Class III.]

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), topsoil stoniness, the soil Wetness Class (a function of climate and soil permeability) and gradients. An ancillary consideration, although not definitive, is the susceptibility of certain soils to wind erosion. Overall, none of the land can be classified higher than Grade 2 on account of a slight climatic limitation.

Grade 2

3.2 Land having the loamy over slowly permeable clayey soils (para. 2.11) is mapped as Grade 2, principally on account of the overriding climatic limitation. Additionally, these soils are Wetness Class II (predominantly) or III, indicating that the land may lie wet for short periods and thus imposing some restrictions on its workability and demanding particular care with certain cultivations.

Table 2: Distribution of Grades and Subgrades

Grade	Area (ha)	%
2	5.5	10
3a	44.6	81
3b	4.8	9
4	0.4	<1
Total	55.3	100

Subgrade 3a

3.3 The land having the loamy sand over sand soils (para. 2.8) is mapped as Subgrade 3a. The land has a moderate droughtiness limitation. Moisture balance calculations show that the available water capacity within the soil profiles is limiting for the requirements of certain crops.

Subgrade 3b

3.4 Subgrade 3b land is associated with the stony variant of the loamy sand over sand soils (para. 2.9) or with slopes of 8° - 11°. In the first instance the moisture balance calculations indicate a moderately severe droughtiness limitation for certain crops. Additionally, in some places the content of medium and large stones in the topsoil restricts the land to Subgrade 3b. As regards gradient, where slopes exceed 7° they impose a significant limitation on the safe and efficient use of certain agricultural machinery and carry a potentially increased risk of erosion.

Grade 4

3.5 A small area of Grade 4 land is mapped where a valley sideslope attains 15°. This gradient presents a severe limitation for cultivations and carries a high risk of erosion.

February 1996

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REFERENCES

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GEOLOGICAL SURVEY OF GREAT BRITAIN, 1966. Sheet 113, Ollerton. 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.