AGRICULTURAL LAND CLASSIFICATION

LAND AT RUSHLEY FARM, MANSFIELD, NOTTS.

1.0 BACKGROUND

1.1 A detailed survey was carried out over 35.5 ha lying 0.5 km south of Mansfield's urban limit. The land is the subject of a planning application for the proposed construction of a telecommunications centre (Millenium Information Technology Centre).

1.2 The site is bounded on the west by the A611 trunk road, on the east by the A60 trunk road, in the south-west by Thieves' Wood and in the south and north by open farmland.

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.

1.4 A total of 35 auger borings was made using a dutch auger to a depth of 1.2 m unless stopped by impenetrable stony layers. In addition, 4 soil pits representative of the main soil types were dug to assess subsoil conditions in more detail. The topsoil stone content at most auger borings and the upper subsoil stone content at selected auger borings were established by sieving. The fieldwork was carried out during December 1995.

1.5 At the time of the survey all the land was in arable production, mainly barley, sugar beet and rape. It is reported by the land owner that, especially in spring, topsoils are affected by blowing, leading to complaints from nearby residential areas. 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 °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 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 542 580
Altitude (m)	155
Accumulated Temperature (day °C, Jan-June)	1286
Average Annual Rainfall (mm)	718
Moisture Deficit, Wheat (mm)	89
Moisture Deficit, Potatoes (mm)	75
Field Capacity (days)	164
Overall Climatic Grade	2

Altitude and Relief

2.3 The site is part of an undulating plateau. In general terms the north-western part of the site is an almost flat surface at 167 m AOD and slopes of 2°-5° fall eastwards and south-eastwards to a dry valley running in a southerly direction along the eastern boundary of the site, following the line of the A60 road. The south-eastern corner of the site is the lowest point, at 140 m AOD. In the south of the site (to the north-east of Thieves' Wood) occurs the head of a tributary dry valley and slopes to this are up to 5° south and westwards. 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, 1963) shows the site to be underlain by Permo-Triassic Bunter Pebble Beds with an overlay of Head deposits in the extreme north-east of the site.

2.5 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.

2.6 The detailed survey carried out on the site shows the presence of 3 soil types and these are described in the following paragraphs. Briefly, there occur well-drained coarse loamy over sandy profiles, moderately well-drained coarse loamy over clayey soils and imperfectly drained loamy over clayey soils. The first-named type is the most extensive, covering the east, south and north-west of the site. The other two soils have in common a slowly permeable subsoil and occur as a complex in a band running from the west to the north-east and north of the site.

Soil Type 1

2.7 Characteristically, Soil Type 1 is a deep, non-calcareous, dark brown loamy medium sand over strong brown loamy medium sand and sand. Topsoil stone content commonly ranges from 5-15%, most of the stones being medium rounded pebbles. Infrequently, topsoil texture may be medium sandy loam. Typically, the upper subsoil, down to 55-70 cm, is loamy medium sand although occasionally it is medium sand. The upper part of this horizon is slightly to moderately stony, with 10-20% small and medium rounded pebbles. The upper subsoil may occasionally be slightly mottled. Below 55-70 cm the lower subsoil is nearly always medium sand with few stones. All the subsoil horizons are very friable, porous and have weakly developed blocky structures.

2.8 Soil Type 1 is well-drained and is classified as Wetness Class I.

Soil Type 2

2.9 Soil Type 2 differs from Type 1 by having a slowly permeable and mottled sandy clay and/or clay lower subsoil starting between 45 and 65 cm. Above this, the topsoil and upper subsoil are very slightly to moderately stony loamy medium sand with weakly

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(*) Cuckney association: Well-drained sandy and coarse loamy soils, often over soft sandstone and with a risk of wind erosion.

developed blocky structures.

2.10 Where it occurs, the sandy clay lower subsoil horizon is light yellowish brown with abundant ochreous mottles. It is firm, with few pores and a weakly developed blocky structure, and is assessed as being slowly permeable.

2.11 Most commonly, the upper subsoil loamy sand overlies a brown, strong brown or reddish brown clay. This clay has common ochreous mottles and occasionally also few grey mottles. It is firm, with few pores and a moderately developed coarse and very coarse prismatic structure, and is assessed as being slowly permeable.

2.12 Soil Type 2 is classified mainly as Wetness Class III. [In the very few profiles where the slowly permeable lower subsoil is below 57 cm the soil is Wetness Class II.]

Soil Type 3

2.13 Soil Type 3 has a similar slowly permeable clay and/or sandy clay lower subsoil to that described for Soil Type 2 but differs by having a finer-textured topsoil and upper subsoil. The topsoil is typically a dark or very dark greyish brown medium sandy loam. The upper subsoil is usually a brown or yellowish brown sandy clay loam which may be unmottled or have many ochreous mottles. It is porous, friable and has weakly developed medium and coarse blocky structures. Both the topsoil and the upper subsoil are very slightly or slightly stony.

2.14 In a very few profiles the slowly permeable clay or sandy clay occurs immediately below the topsoil. In a very few other profiles it is encountered below its normal depth of 45-55 cm. This affects the wetness classification; normally the soil is Wetness Class III but atypical profiles may be Class IV or II respectively.

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). An ancillary consideration is the susceptibility of certain soils to wind

erosion. 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	10.4	29
3a	24.3	69
Other land	0.8	2
Total	35.5	100

Grade 2

3.2 Land having Soil Types 2 and 3 is mapped as Grade 2. These soils are predominantly Wetness Class III and under the prevailing climate cannot be classified higher than Grade 2. The land may lie wet for short periods and some care is required with certain cultivations. Additionally, Soil Type 2, on account of its loamy sand topsoil and upper subsoil, is susceptible to wind erosion and is slightly drought-prone. Analysis of soil available water relative to moisture deficits in the area indicates that this soil type is Grade 2 on droughtiness criteria.

Subgrade 3a

3.3 The land having Soil Type 1 is mapped as Subgrade 3a. Coarse loamy and sandy soils that are slightly or moderately stony ensure that the land, without the benefits of irrigation, has a moderate droughtiness limitation. Moisture balance calculations show available water capacity within the profile to be limiting for the requirements of certain crops. In addition, Soil Type 1 is particularly prone to wind erosion which can reduce topsoil fertility and can affect the choice of cropping and rotations.

Other land

3.4 Land other than agricultural comprises the Rushley Farm buildings and gardens.

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REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES, 1963. 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.