# AGRICULTURAL LAND CLASSIFICATION

## LAND AT ROTHLEY, LEICESTERSHIRE

## 1.0 INTRODUCTION

1.1 The site, an area of approximately 33 hectares is the subject of a development proposal. The majority of the site was surveyed in June 1993 as this was within an area of search specified within the draft Charnwood District Local Plan. A small additional area was surveyed around Rothley Lodge in March 1995 to cover the full extent of the new proposed development. The work was undertaken by ADAS Statutory Resource Planning Team with a total of 35 auger borings carried out. In addition 3 soil inspection pits were dug to provide more detailed information on subsoil conditions.

1.2 At the time of the surveys the higher land was under cereal production. Land in the Soar valley was under permanent grassland.

1.3 On the published 1:63 360 scale ALC map, sheet 121 (MAFF, 1971) the higher land is mapped as grade 2. The lowest land in the Soar valley is mapped as grade 4. A small area of grade 3 is shown in the valley to the east of Marsh Farm. This map is of a reconnaissance nature designed primarily for strategic planning purposes. The recent surveys were undertaken to provide more detailed information on land quality for the site.

## 2.0 PHYSICAL FACTORS AFFECTING LAND QUALITY

Climate

2.1 Climate data for the site was interpolated from data contained in the published agricultural climatic dataset (Met Office, 1989). This indicates that for the average altitude of 55 m AOD, the average annual rainfall is 644 mm (25.4").

Accumulated temperature is given at 1401 days °C. It also indicates that field capacity days are 148 and that moisture deficits for wheat and potatoes are 108 mm and and 99 mm respectively. These climatic characteristics do not impose any overall climatic limitation to land quality.

Altitude and Relief

2.3 The site lies between the newly constructed A6, Mountsorrel By-Pass and the River Soar. The site occupies part of the flat valley bottom of the River Soar and the north east valley side. The land rises from 45 m AOD on the valley floor to 62 m near Rothley Lodge, with slopes not exceeding 5°. Thus neither gradient or altitude constitute limitations to the ALC grade.

Geology and Soils

2.4 The published 1:50 000 scale solid and drift edition geology map, sheet 156 (Geological Survey of Great Britain, 1975) show that the site exhibits a geological sequence that is typical of valley sides in the region. The flat valley floor is covered by alluvium. On the slightly raised land to the east of Marsh Farm terrace river gravels are mapped. As the land rises the underlying solid geology of Triassic Keuper Marl is exposed on the mid slopes. This is capped on the higher land by glacial sand and gravel deposits.

2.5 No detailed soil map of the region exists but the published reconnaissance scale "Soils of Midland and Western England" map (1:250 000 scale SSEW, 1983) shows the occurrence of three soil associations on the site.

2.6 Fladbury 2 Association (*1) is found in conjunction with alluvium deposits and covers the flat valley bottom. The Wick 1 Association (*2) is mapped over most of the remainder of the land and is formed from glaciofluvial or river terrace drift Dunnington Heath Association (*3) soils are mapped along the extreme south eastern boundary.

2.7 During the more detailed survey work two main soil types have been identified.

2.8 The first soil type is found on the land above the flat valley floor of the River Soar. These soils typically comprise slightly to moderately stony medium sandy loam or occasionally sandy clay loam topsoils overlying slightly to moderately stony sandy clay loam (occasionally medium sandy loam or loamy medium sand) upper subsoils. Lower subsoils typically comprise very slightly stony clay or sandy clay which commonly has a thin horizon of medium sandy loam above. The depth to clay is variable ranging from 40-85 cms. Topsoil stone content is highest just to the north of Rothley Lodge and was measured at 15-25% soil volume with between 11-20% of stones exceeding 2 cm. Generally on lower slopes topsoil stone content is around 5% soil volume. These soils are generally assessed as wetness class II or III.

2.9 The second soil type is found on the valley floor of the River Soar. Soils typically comprise stoneless heavy silty clay loam topsoils. Upper subsoils are typically stoneless clay, occasionally heavy silty clay loam or sandy clay loam.

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(*1) Fladbury 2 Association: Stoneless clayey soils variably affected by groundwater, some with sandy subsoils. Some similar fine loamy soils. Flat land. Risk of flooding.

(*2) Wick 1 Association: Deep well drained coarse loamy and sandy soils, locally over gravel. Some similar soils affected by groundwater. Slight risk of water erosion.

(*3) Dunnington Heath Association: Reddish coarse and fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

Lower subsoils comprise stoneless clay. Soils are poorly drained with the slowly permeable layer encountered between 30-40 cms (assessed as wetness class IV, occasionally III).

Flooding

2.10 The valley bottom of the River Soar is regularly flooded. Information has been sought from the National River Authority, and landowner and from site observations taken during the survey work. Figures have been obtained from the National Rivers Authority regarding the 100 year flood level and more frequent flood levels down to 5 years. These figures were derived from a new computer model and when plotted onto a map appear to conflict with the topographical information available, bearing little correlation to contour lines (see ALC map).

2.11 Because no accurate information is available from the National Rivers Authority and due to the time involved in carrying out a detailed topographic survey along the edge of the floodplain, the grading of the land, in accordance with the revised ALC guidelines (MAFF, 1988) given below is based largely on field observations such as break of slope and the condition of crops at the time of the survey.

## 3.0 AGRICULTURAL LAND CLASSIFICATION

3.1 The definitions of the ALC grades is provided in Appendix 1 with wetness class definitions given in Appendix 2.

3.2 Approximately one third of the site is mapped as grade 2 which occurs along the mid slopes. Two areas of subgrade 3a land are mapped on the upper and lower slopes of the site. A small area of subgrade 3b land is mapped to the north of Rothley Lodge whilst the valley bottom of the River Soar is mapped as grade 4. The table below shows the breakdown of the grades in hectares and % terms for the survey area.

AGRICULTURAL LAND CLASSIFICATION

| Grade | ha | % |
|---|---|---|
| 2 | 11.2 | 33.9 |
| 3a | 8.6 | 26.0 |
| 3b | 1.6 | 4.8 |
| 4 | 8.9 | 26.9 |
| Urban | 0.3 | 0.9 |
| Non Agricultural | 1.9 | 5.7 |
| Open Water | 0.6 | 1.8 |
| TOTAL | 33.1 | 100.0 |

Grade 2

3.3 Land graded 2 is mapped over 11.2 hectares of land on the midslopes of the site corresponding with the moderately well drained variant of fine loamy over clayey soils as described in paragraph 2.8. Wetness class is assessed as II or III and land is limited by minor wetness and workability imperfections. Where soils are slightly lighter in texture or contain significant topsoil stone the land is also excluded from grade 1 by minor topsoil stoniness and slight droughtiness imperfections.

Subgrade 3a

3.4 This occurs in two areas covering a total of 8.6 hectares.

Firstly, on the upper slopes of the site, grade 3a is associated with the stonier variant of soils described in 3.3 above. Topsoil stoniness ≥2 cm was measured at 11-13% of soil volume within this area. The presence of stone affects crop drilling and establishment, the availability of soil water and nutrients, and wear and tear on farm machinery, thus limiting the land to subgrade 3a.

3.5 Secondly, 3a is mapped on the lower slopes corresponding with the slightly heavier less stony variant of soils described in paragraph 2.8. The soils are typically slowly permeable from 45-55 cms and the land is consequently limited to 3a by moderate wetness and workability limitations.

Subgrade 3b

3.6 Land graded 3b is associated with the stoniest variant of land described in paragraph 2.8. This land is mapped in a small area (1.6 ha) in the south west corner of the site. Topsoils stone volumes in excess of 2 cm in size were measured at typically 20% excluding land from subgrade 3a.

Grade 4

3.7 Land graded 4 occurs in the floodplain of the River Soar covering an area of 8.9 hectares. These soils are associated with the poorly drained heavy textured clayey soils described in paragraph 2.9. The overriding limitation on this land is flooding. Flooding in winter occurs on a frequent basis and typically lasts for more than 4 days. Under the revised ALC guidelines (MAFF, 1988) this limits the land to grade 4, as it restricts the types of crops that can be grown (grass) and causes problems of soil management.

Non Agricultural

3.8 Areas of cricket bat willow plantation, woodland and scrubland are mapped as non agricultural.

3.9 The house and farm buildings at Rothley Lodge are mapped as urban.

Open Water

3.10 Part of the River Soar which dissects the northern part of the site is mapped as open water.

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Resource Planning Team
ADAS Cambridge

## REFERENCES

GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND AND WALES). Sheet 156. 1975. Leicester, Solid and Drift. 1:50 000.

MAFF, 1971 Agricultural Land Classification Map (Provisional) Sheet 121. Scale 1:63 360.

MAFF, 1988. Agricultural Land Classification of England and Wales, Revised Guidelines and criteria for grading the quality of agricultural land. Alnwick.

METEOROLOGICAL OFFICE, 1989. Data extracted from the published agroclimatic dataset.

SOIL SURVEY OF ENGLAND AND WALES, 1980. Soils of Midland and Western England. Sheet 3. Scale 1:250 000.

SOIL SURVEY OF ENGLAND AND WALES, 1984. Soils and their use in Midland and Western England, by J M Ragg *et al.* Harpenden.

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.

Appendix 2

## Field Assessment of Soil Wetness Class

### Soil Wetness Classification

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and defined in the table below.

**Definition of Soil Wetness Classes**

| Wetness Class | Duration of Waterlogging[1] |
|---|---|
| I | The soil profile is not wet within 70 cm depth for more than 30 days in most years[2]. |
| II | The soil profile is wet within 70 cm depth for 31-90 days in most years **or**, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but only wet within 40 cm depth for 30 days in most years. |
| III | The soil profile is wet within 70 cm depth for 91-180 days in most years **or**, if there is no slowly permeable layer present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years. . |
| IV | The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years **or**, if there is no slowly permeable layer present within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years. |
| V | The soil profile is wet within 40 cm depth for 211-335 days in most years. |
| VI | The soil profile is wet within 40 cm depth for more than 335 days in most years. |

Soils can be allocated to a wetness class on the basis of quantitative data recorded over a period of many years or by the interpretation of soil profile characteristics, site and climatic factors. Adequate quantitative data will rarely be available for ALC surveys and therefore the interpretative method of field assessment is used to identify soil wetness class in the field. The method adopted here is common to ADAS and the SSLRC.

[1] The number of days specified is not necessarily a continuous period.

[2] 'In most years' is defined as more than 10 out of 20 years.