

## **AGRICULTURAL LAND CLASSIFICATION**

### **NORTH WEST LEICESTERSHIRE LOCAL PLAN**

#### **SITE H4(y)**

##### **1.0 INTRODUCTION**

- 1.1 An Agricultural Land Classification (ALC) survey was undertaken on behalf of MAFF in September 1995 of a site included within the North West Leicestershire Local Plan.
- 1.2 The site, H4(y), occupies an area of 158.0 ha and is located to the south-west of Junction 24 on the M1 motorway to the south of the villages of Lockington and Hemington and to the north of East Midlands Airport. The site is bounded to the east by the A453T dual carriageway which runs adjacent to the M1 motorway and to the west by a small lane running due south from Hemington to the edge of the airport. To the west of this lane is a small strip of open farmland before the eastern edge of Castle Donnington is encountered. The southern boundary of the site does not follow any geographical boundary, leaving a narrow strip of farmland between it and the perimeter fence of the airport. The northern boundary is somewhat irregular in shape leaving a small area of open farmland between it and the settlements of Lockington and Hemington.
- 1.3 A total of 153 auger borings was made over the entire site using a dutch auger to a depth of 1.2 m unless prevented by impenetrable material. In addition, 8 soil pits representative of all the main soil variants found on the site were dug to help assess subsoil conditions in greater detail.
- 1.4 At the time of survey the majority of the site was under arable cropping with the fields either under stubble from the previous crops or cultivated and reseeded. The principle cropping is winter cereals, with some oilseed rape and some grass leys in the vicinity of Field Farm and an area of permanent grass on the western edge of the site. The site also contains one significant area of woodland, King Street Plantation, and some smaller areas of non agricultural land.
- 1.5 On the published 1:63,360 scale provisional ALC map (MAFF, 1971) the site has been mapped as predominantly grade 3 with a small area of grade 2 in the north-east corner adjacent to Junction 24 of the motorway. The provisional ALC of most of the site

(south-west corner excepted) was further reviewed in a desk study (ADAS, 1994) which concluded that, based on published reconnaissance soils data (see para 2.6, below), the land is likely to be predominantly grade 2 and subgrade 3a, with small areas of subgrade 3b and perhaps grade 1. However, both the provisional ALC and the subsequent desk study are of a reconnaissance nature and the current survey was undertaken to provide more detailed site specific information on soils and land quality.

## 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. 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 show that there is no overall climatic limitation affecting this site.

**Table 1: Climatic Interpolation**

Grid Reference (SK)	472275	465273	457274
Altitude (m)	45	60	70
Accumulated Temperature (Day °C, Jan-June)	1409	1393	1381
Average Annual Rainfall (mm)	627	637	643
Moisture Deficit, Wheat (mm)	108	106	105
Moisture Deficit, Potatoes (mm)	100	98	96
Field Capacity (Days)	135	137	139
Overall Climatic Grade	1	1	1

- 2.3 Climatic factors do, however, interact with soil properties to influence soil wetness and droughtiness.

## Altitude and Relief

- 2.4 The site is moderately undulating with a general northerly aspect. A small valley runs due north across the middle of the site and the western boundary forms the side slope of a second north-south valley. Slopes are generally in the order of 3-5°, although steeper slopes occur on the west facing sides at the northern ends of the two valley features. At the north-western corner of the site is a small area where previous quarrying operations have left a series of small pits and mounds which have subsequently become grassed over. In addition, the remainder of this field shows pronounced ridge and furrow microtopography. The altitude of the site ranges from a high point of 80 m AOD along the south-western edge of the site falling to approximately 40 m AOD in the vicinity of Junction 24. The only areas where relief is limiting are on the west facing slopes at the northern end of the two valley features and in the vicinity of the old mining operations.

## Geology and Soils

- 2.5 The published 1:50,000 scale geology map (Geol. Survey, 1976) shows the majority of the site to be underlain by Keuper Red Marl with beds of sandstone and bands of gypsum. The north-western quadrant of the site, however, is shown to be underlain by Keuper Sandstone with bands of Marl and a small area of Boulder Clay. The lower lying land at the north-east corner of the site, in the vicinity of Junction 24, has been mapped as River Terrace Drift.
- 2.6 The reconnaissance soil survey map for the area (Soil Survey, 1983) shows the site predominantly to comprise soils of the Hodnet Association\* with an area of Bromsgrove Association\*\* in the north-west corner of the site. The low lying land at the north east of the site is included in the Wick 1 Association\*\*\*.

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\* Hodnet Association: Reddish fine and coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging developed on Permo-Triassic and Carboniferous reddish mudstone, siltstone and sandstone.

\*\* Bromsgrove Association: Well drained reddish coarse loamy soils mainly over soft Permo-Triassic and Carboniferous sandstone and siltstone with some associated fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

\*\*\* Wick 1 Association: Deep well drained coarse loamy and sandy soils locally over gravel, developed on glaciofluvial or river terrace drift. Some similar soils affected by groundwater.

- 2.7 The detailed survey carried out on the site has identified four distinct soil types correlating with the underlying geology of the area. The most extensive soil type, occurring widely over the eastern, central, northern and south-western parts of the site comprises reddish fine loamy over clayey soils overlying red Keuper Marl. These soils typically have a dark reddish brown medium clay loam topsoil with few small and medium rounded stones, overlying a red or reddish brown heavy clay loam or clay upper subsoil which invariably becomes a redder clay within 60 cm depth. The subsoil structure is generally coarse prismatic, especially where the texture is clay, and some small manganiferrous concretions or stains may occur locally. In addition, small, pale greenish soft and highly weathered mudstone fragments may be common throughout the subsoil. Mottling is generally not evident but the ped faces are typically slightly paler and greyer than the matrix colour. These soils have therefore been assessed as wetness class III. The underlying mudstone or marl is encountered at varying depths across the site but where it occurs at shallow depths, especially in the south-west corner of the site, roots tend to penetrate the rock to considerable depth.
- 2.8 Over the central part of the site to the south of The Dumps, a heavier textured variant of the above soil type has been mapped. These soils are similar in most respects but have a heavy clay loam topsoil texture.
- 2.9 The second soil type is generally associated with the lower lying land and valley features and comprises deep fine loamy soils over red clay and/or mudstone at depth. The soils typically contain a high percentage of fine sands and silts. A typical profile has a dark reddish brown medium clay loam or fine sandy silt loam topsoil with few hard rounded stones, overlying a reddish brown, medium or heavy clay loam, or fine sandy clay loam upper subsoil with coarse subangular blocky structure and occasional manganiferrous staining. Below 60-70 cm depth, poorly structured red clay and/or reddish mudstone is encountered with some manganiferrous staining. Both subsoil horizons may contain varying amounts of pale greenish, highly weathered mudstone/siltstone fragments. These soils are typically assessed as wetness class II.
- 2.10 The third soil type occurs in the north-west corner of the site and comprises fine loamy soils over relatively hard, fine grained Keuper sandstone. These soils have a dark reddish brown medium clay loam topsoil with few small and medium hard pebbles, overlying a reddish brown medium or heavy clay loam subsoil with a coarse subangular blocky structure and common pale greenish or grey weathered fine grained sandstone/siltstone fragments. These soils are free-draining where the underlying sandstone is at a shallow depth (adjacent to the old workings) or moderately well

drained in the case of the deeper variants and they have been assessed as wetness class I/II.

- 2.11 On the lower lying land at the extreme north-east of the site, loamy soils overlying river terrace sands and gravels have been identified. These soils have a medium sandy loam or occasionally sandy clay loam topsoil with common small and medium rounded hard pebbles overlying a medium sandy loam or sandy clay loam upper subsoil with common stones. Below 50/70 cm depth the soils are very stony (25-35%) loamy medium sand or medium sand and are generally impenetrable by auger. Further to the south as the land rises, the soils are underlain by Keuper Marls at depth and display ochreous mottling in the subsoil horizons; the sands and gravels disappear. These soils are assessed as wetness class I-III depending on the character of the underlying material.

### 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 individual grades found on the site is given in Table 2 and the definition of each grade is given in Appendix 1.

**Table 2: Distribution of Grades and Subgrades**

Grade	Area (ha)	% of Site
2	51.8	33
3a	86.7	55
3b	9.7	6
5	3.2	2
Non-Agricultural	2.8	2
Woodland	2.6	2
Urban	1.2	<1
<b>TOTAL</b>	<b>158.0</b>	<b>100</b>

#### Grade 2

- 3.2 The deep moderately well drained soils generally associated with the lower lying land of the valley features have been mapped as grade 2. These soils which are described in

detail in paragraph 2.9 have been restricted to this grade due to a minor wetness limitation. The soils are assessed as wetness class II, and under the prevailing climatic conditions and due to the medium clay loam topsoil texture will have a minor workability limitation during the wetter periods of the year. In addition, some of the shallower variants will have a slight droughtiness limitation which may result in slightly depressed crop yields during the drier years.

#### Subgrade 3a.

3.3 A large proportion of the site has been mapped as subgrade 3a due principally to a wetness and workability restriction, although some areas will also have droughtiness limitations. The fine loamy soils overlying the red clay which predominate over much of the site and are described in paragraph 2.7 have a moderate wetness limitation. These red soils have been assessed as wetness class III, which under the prevailing climatic conditions and with medium clay loam topsoil textures will result in a moderate workability limitation. Cultivations and harvesting need to be carefully controlled to avoid structural damage to the soils during the wetter periods of the year. The major limitation on the shallow variants which occur in the south-west corner of the site, however, is droughtiness. Nonetheless, despite the presence of mudstone at relatively shallow depths (40 cm) roots penetrate deeply into the rock and consequently the soils are less droughty than may be anticipated. Moisture balance calculations indicate the area to be subgrade 3a.

3.4 Droughtiness, resulting in a subgrade 3a classification is also a limitation for the deeper soils which are developed over the fine-grained Keuper sandstone and described in paragraph 2.10. Rooting depth is somewhat restricted and moisture balance calculations indicate that in this relatively low rainfall area and despite some rooting into the underlying sandstones, these soils will tend to be droughty for the deeper rooting crops restricting the land to subgrade 3a. In addition, the soils developed on the river terrace deposits at the north-east of the site (paragraph 2.11) will have a similar droughtiness limitation which will be reflected in reduced crop yields during the drier years.

#### Subgrade 3b

3.5 Three areas of subgrade 3b land have been mapped. To the south east of The Dumps the land has been restricted to this subgrade due to a gradient limitation. In this area

slopes of 7-9° have been measured which may cause difficulties in operating some machinery safely and efficiently.

- 3.6 The largest area to have been mapped as subgrade 3b, south of The Dumps, comprises the heavier variant of the fine loamy soils overlying the red clays which are described in paragraph 2.8. These soils have been assessed as wetness class III and have a heavy clay loam topsoil texture. Consequently, there is a moderately severe workability restriction which limits the land to subgrade 3b.
- 3.7 The remaining area mapped as subgrade 3b occurs in the north-west corner of the site where the land is under permanent grass and has pronounced ridge and furrow topography. This area has shallow (c. 40 cm deep) fine loamy soils overlying relatively hard, fine grained sandstone. Such soils will have a moderately low available water capacity and under the relatively low rainfall that occurs in the area, will be moderately droughty, restricting the land quality to subgrade 3b.

#### Grade 5

- 3.8 Two small areas have been mapped as grade 5, poor quality land only suitable for grazing. Both areas have very uneven topography rendering the land unsuitable for any form of mechanised cultivation. The area close to the western end of the site comprises pits and mounds, probably the result of former quarrying activities, which have been grassed over and used for livestock grazing. The valley floor south of The Dumps is also uneven and broken and is likewise restricted to rough grazing.

#### Urban

- 3.9 The areas mapped as Urban comprise the concrete farm roads.

#### Non-Agricultural

- 3.10 Five areas of Non-Agricultural land have been mapped. The largest, King Street Plantation, comprises a mature broadleaf woodland. The remaining areas comprise smaller areas of scrub and woodland.

## REFERENCES

ADAS CAMBRIDGE, 1994. North West Leicestershire Local Plan (Resource Planning Team Internal Reports, 31/94)

GEOLOGICAL SURVEY OF GREAT BRITAIN, 1976. Sheet 141, Loughborough, Solid and Drift edition, 1:50,000 scale.

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. Climatological Data for Agricultural Land Classification.

SOIL SURVEY OF ENGLAND AND WALES, 1983. Sheet 3, "Soils of Midland and Western England". 1:250,000 scale.

## 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.