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AGRICULTURAL LAND CLASSIFICATION

BANBURY LOCAL PLAN

Land at Hanwell Fields

Land at Easington

Land at Bodicote

Ministry of Agriculture Fisheries and Food

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1 BACKGROUND

1 1 Three areas totalling approximately 167 ha on the outskirts of Banbury Oxfordshire were surveyed during October 1990 and April 1992 in connection with the Banbury Local Plan The sites were -

- Land at Hanwell Fields to the north-west of Banbury This 89 90 ha site is located immediately to the north of the outer residential areas of Banbury between the A41 (T) and the A423 (T) The majority of the site was surveyed during October 1990 whilst the northern most 29 ha was surveyed in April 1992
- Land at Easington to the south-west of Banbury This 49 27 ha site lies immediately south of the Saltway track and to the north of Wykham Farm between the A361 and the A41 (T)
- Land to the north east of Bodicote (south-east of Banbury) This 27 42 ha site is situated to the east of the A41 (T) Banbury to Adderbury Road

1 2 The sites were surveyed using 110 cm and 120 cm Dutch soil augers with samples being taken at 100 m intervals across the Hanwell Fields and Easington areas and at 200 m intervals across the Bodicote area Soil inspection pits were examined on all sites to enable more detailed soil description

1 3 All three sites have been surveyed previously by MAFF In 1976 a reconnaissance survey included all those areas currently under consideration whereas a subsequent more detailed survey in 1982 included only parts of the present areas The information from this later survey has been used where possible to assist in the current land classification of the sites

Land Use

1 4 At the time of survey the sites were principally given over to arable cropping (i e winter cereals field beans or oilseed rape) with small areas of permanent pasture being grazed by livestock

2 PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2 1 The Easington and Bodicote sites are both relatively flat lying between 110 and 135 m A O D with the land at Easington falling gently to the south-east and that at Bodicote falling gently north-east towards the Cherwell Valley At both of these localities gradient is not a significant factor in terms of land quality The site at Hanwell Fields lies between 95 and 150 m A O D and falls more steeply towards the east Across the middle of the site slopes of 5-6 were recorded these not being sufficient to limit the agricultural land quality However slopes of 7 5-12 were measured across a small valley along the southern boundary these acting as a limitation to the land quality

Climate

2 2 Estimates of climatic variables were obtained by interpolation from a 5 km gird database (Met Office 1989) for a representative location in the survey area

Climatic Interpolation

Variables

	Site		
	Hanwell Fields	Easington	Bodicote
Grid Ref	*SP 4442 2425*	*SP 4445 2388*	*SP 4465 2385*
Altitude (m A O D)	95-150	120-135	110-120
Accumulated Temperature (days Jan-June)	1328-1391	1346-1363	1363-1375
Av annual rainfall (mm)	690 703	695	690-692
Field capacity days	158-159	157	156
Moisture deficit wheat (mm)	98 104	100-101	101-102
Moisture deficit potatoes (mm)	86 94	90 91	91-92

2 3 The important parameters in assessing an overall climatic limitation are average annual rainfall (a measure of overall wetness) and accumulated temperature (a measure of the relative warmth of a locality) Although average annual rainfall and consequently moisture deficits are moderately low there is no overall climatic limitation affecting the land quality of these sites However climatic factors do affect interactive limitations between soil and climate namely soil wetness and droughtiness

Geology and Soils

2 4 British Geological Survey sheets 201 Banbury (1982) and 218 Chipping Norton (1968) show all three areas to be underlain by Jurassic Lias deposits These comprise Upper Middle and Lower Lias clays and Marlstone Rock Beds All of these deposits outcrop at the Hanwell Fields site whilst only Upper Lias and Marlstone Rock Beds occur at Easington and Middle and Lower Lias at Bodicote A small area of Alluvium has been mapped at the Hanwell Fields site adjacent to the stream towards the east of the site

2 5 Soil Survey of England and Wales Sheet 6 (1983) Soils of South-East England shows a range of soil associations across the three sites although the Banbury association is common to all areas These soils are described as stony well drained fine loamy ferritic brown earths resting on shattered ironstone at moderate depth (SSEW 1984) The Wickham 2 association has been mapped across the mid and lower slopes of the Hanwell Fields site (with soils of the Banbury association occurring across the upper slopes towards the west) Wickham 2 association soils are described as fine loamy over clay typical stagnogleys developed in loamy drift over Jurassic clays (SSEW 1984) Soils of the Denchworth association (pelo-stagnogleys (SSEW 1984)) are mapped over the western part of the Easington site with the eastern part being shown to comprise Banbury association The whole of the Bodicote area is mapped as the Banbury association

2 6 Detailed field examination of the soils broadly confirms this distribution with three soil types being identified

2 7 Soils associated with Marlstone Rock deposits comprise silt loam silty clay loam or clay loam tending to become heavier with depth Impenetrable marlstone occurs at variable depths in the profile tending to be shallow (i e at 25-40 cm) on the Bodicote site and in places on the Hanwell Fields site but deeper (i e an average of 70-100 cm) at Easington and Hanwell Fields Profiles may be slightly to moderately stony and are well drained (wetness class I)

2 8 Soils associated with Middle and Lower Lias deposits comprise medium or heavy clay loam or silty clay loam topsoils overlying similar textures in the upper subsoil and passing to clay in the lower subsoil Evidence of imperfect drainage in the lower subsoil combined with the slowly permeable nature of the clay horizons in the subsoil causes these soils to be assigned to wetness class II or III Soils of this type are found across much of the Hanwell Fields site and also to a lesser extent at Bodicote

2 9 Soils associated with Upper Lias deposits are similar to those described in section 2 8 above but are generally of poorer drainage status Medium or heavy clay loam topsoils overlie gleyed and slowly permeable clay in the subsoil which becomes pure bluish grey Lias clay at depth Wetness classes III and IV are assigned to these profiles

3 AGRICULTURAL LAND CLASSIFICATION

3 1 Appendix 1 gives a general description of the grades and sub-grades identified in the survey

3 2 LAND AT HANWELL FIELDS

3 2 1 The ALC grades of the survey area is primarily determined by the interaction between climate and soil factors namely *wetness and droughtiness* In addition *gradient* affects the land quality across a limited area of the site ALC grades 2 3a 3b and 4 have been mapped and a breakdown of these grades in terms of area and extent is given below

Grade	Area (ha)	% of total agricultural land
2	31 59	37
3a	24 86	29
3b	27 76	33
4	0 75	1
Total agricultural area	84 96	100
Non agricultural	3 32	
Woodland	1 12	
Urban	0 15	
Farm Buildings	0 35	
Total area surveyed	89 90 ha	

3 2 2 Grade 2

Land of this quality occurs across the central part of the site and is associated with two different situations

- To the west of Hanwell Fields land of this quality occurs in association with Marlstone Rock deposits Profiles typically comprise heavy clay loam or heavy silty clay loam topsoils resting over similar textures to depth The

soils are well drained (wetness class I) but have a slight workability limitation due to the heavy nature of the topsoils In addition occasional profiles become impenetrable (to soil auger) due to brashy marlstone at depths of about 58-80 cm Such profiles are slightly droughty and their agricultural potential is thereby limited

- To the east of Hanwell Fields across the mid-slopes of the site and to the east of the stream soils are derived from Middle and Lower Lias deposits Profiles typically comprise silt loam medium silty clay loam or medium clay loam topsoils which overlie heavier textures in the subsoil passing from heavy silty clay loam and heavy clay loam in the upper subsoil to medium clay or silty clay in the lower subsoil Evidence of impeded drainage in the form of gleying (typically from 32-55 cm) is common and profiles are thus assigned to wetness class II Wetness and workability limitations affect this land and cause it to be assigned to a maximum of grade 2

3 2 3 Grade 3a

Land of this quality is found in two situations

- The large unit of grade 3a land towards the east of the site on the lower slopes and that in the far west adjacent to The Elms is found in association with Upper and Lower Lias deposits and the main limitation to agricultural use is wetness and workability Profiles typically comprise medium clay loam or occasionally medium silty clay loam topsoils passing to slightly heavier clay loams in the upper subsoil and resting over slowly permeable clay or silty clay at variable depths greater than 45 cm This causes restricted subsoil drainage as evidenced by gleying observed at about 30-45 cm from the surface Profiles are assigned to wetness class III accordingly and are limited in their agricultural potential by wetness and workability problems

- The small unit of grade 3a land around Hanwell Fields is limited on the basis of soil droughtiness as caused by shallow profiles resting over marlstone at about 50 cm Medium clay loam or medium silty clay loam topsoils may be slightly stony (i e c 2-9% v/v hard marlstone fragments) and typically overlie similar textures or heavy clay loam in the subsoil Profiles become impenetrable (to soil auger) over brashy marlstone at 50 cm this having the effect of reducing the water available to plants from the soil and causing a droughtiness limitation

3 2 4 Grade 3b

Land is assigned to this grade on the basis of a number of limitations

- A small area of grade 3b land in the unit at the west of the site and the area to the north of Hanwell Fields Farm which has been mapped as Grade 3b is limited by droughtiness due to the presence of impenetrable (to soil auger) brashy marlstone at 30-45 cm depth and moderate soil stoniness Profiles comprise medium clay loam or silty clay loam with between 3 and 20% v/v marlstone fragments throughout and brashy marlstone at shallow depth
- East of Hanwell Fields the presence of a small valley feature causes some land to be downgraded on the basis of gradient The maximum gradient recorded was 12 but small areas fall within the range 7 -11 In view of the difficulty this may cause to cultivation practices and the increased erosion risk a land classification of grade 3b is appropriate
- The majority of grade 3b land is associated with poorly drained soils which have wetness and workability limitations Profiles comprise medium or heavy clay loam or silty clay loam topsoils overlying similar textures and

passing to slowly permeable clay or silty clay usually within 40 cm Gleying is associated with this clay horizon typically occurring from about 25-40 cm Soils are assigned to wetness class III or more usually IV Soil wetness problems restrict the workability cultivation and versatility of this land

3 2 5 Grade 4

A small unit of grade 4 land occurs in association with a small steep-sided valley along the southern boundary of the site Although the soils found here were moderately well drained and deep gradients of 11 12 were recorded and the land was assigned to grade 4 accordingly It is to be expected that cultivation of this land would be difficult and that the erosion risk would be considerable

3 3 LAND AT EASINGTON

3 3 1 The ALC grading of the survey area is primarily determined by interactions between climate and soil factors namely wetness and droughtiness ALC grades 2 3a and 3b have been mapped and a breakdown in terms of area and extent is given below

Grade	Area (ha)	% of total agricultural land
2	16 66	35
3a	13 55	28
3b	17 72	37
Total agricultural area	47 92	100
Non-agricultural)		
Woodland)	1 35	
Total area surveyed	49 27 ha	

3 3 2 Grade 2

Land of this quality occurs as three distinct mapping units across the site and is limited to a minor extent by soil wetness although occasional profiles suffer a slight droughtiness restriction Profiles typically comprise medium or heavy clay loam topsoils overlying heavy clay loam in the upper subsoil and passing to slowly permeable bluish grey Lias clay in the lower subsoil from about 60 cm Evidence of poor drainage in the lower subsoil i e gleying from 60-80 cm causes these soils to be assigned to wetness class I or II

Occasional profiles suffer from a slight droughtiness limitation as a result of resting over marlstone at depths greater than 55 cm

3 3 3 Grade 3a

Land of this quality occurs as two mapping units which represent two different situations

- The unit towards the west comprises soils with medium or heavy clay loam topsoils which overlie heavy clay loam upper subsoils and pass to clay in the lower subsoil from about 30-60 cm depth Profiles are typically gleyed and slowly permeable from 40-60 cm thereby giving rise to a wetness class of II or III These soils are limited by wetness and workability as a result of textural and drain age characteristics
  Grade 3a land across the eastern part of the site is associated with soils developed over Marlstone Rock deposits Profiles tend to be shallow typically resting over brashy marlstone at depths from about 50 cm Soils are well drained medium clay loams which are slightly stony (c 2-5% v/v marlstone fragments) throughout This land is limited by a droughtiness restriction due to relatively low available water for plant growth

3 3 4 Grade 3b

Land of this quality occurs across much of the western part of the site in association with Upper Lias deposits Profiles typically comprise heavy clay loam topsoils which overlie similar textures or medium clay in the upper subsoil and pass to progressively heavier clay with depth commonly within about 30-40 cm Gleying in association with slowly permeable clay is found at variable depths between 25 and 50 cm These soils are poorly drained (wetness class III or IV) which combined with heavy textures in the topsoil cause the cultivation and workability of this land to be restricted

3 4 LAND AT BODICOTE

3 4 1 The ALC grading of the survey area is determined by interactions between climate and soil factors namely wetness and droughtiness In addition topsoil stoniness represents a limitation in terms of land quality ALC grades 3a and 3b have been mapped and a breakdown in terms of area and extent is given below

Grade	Area (ha)	% of total agricultural land
3a	18 65	68
3b	8 77	32
Total area surveyed	27 42 ha	

3 4 2 Grade 3a

Land of this quality occurs across much of the central part of the site Profiles typically comprise heavy clay loam topsoils overlying similar textures and passing to clay or silty clay from about 35-45 cm Gleying is evident from about 50 cm commonly found in association with slowly permeable clay horizons Wetness classes I-III are assigned to these soils Profiles become impenetrable (to soil auger) over brashy marlstone between 60 and 90 cm These soils are limited by wetness and/or droughtiness as a result of drainage imperfections and relatively shallow depth over marlstone

3 4 3 Grade 3b

Land of this quality occurs as two mapping units on the site which each represent a different situation

- Across the north-eastern part of the site profiles are shallow over marlstone between 25 and 40 cm Soils are

medium silty clay loams which contain between 5 and 27% v/v marlstone fragments and which rest directly over marlstone at shallow depth Droughtiness imposes the most limiting factor to agricultural use although topsoil stoniness is also a significant factor in this respect In addition to there being a much reduced available water for plant growth cultivations will be made difficult by the shallow stony nature of the soils

- At the far south western edge of the site wetness problems form the overriding limitation to agricultural use Profiles comprise heavy clay loams overlying medium clay in the subsoil Gleying at about 45-50 cm causes these soils to be assigned to wetness class III Such drainage imperfections combined with the heavy nature of topsoil textures results in there being wetness and workability restrictions to this land

SOURCES OF REFERENCE

- BRITISH GEOLOGICAL SURVEY (1968) Sheet 218 Chipping Norton

- BRITISH GEOLOGICAL SURVEY (1982) Sheet 201 Banbury

- GEOLOGICAL SURVEY OF GREAT BRITAIN (1965) Geology of the country around Banbury and Edge Hill

- MAFF (1988) Agricultural Land Classification of England and Wales Revised guidelines and criteria for grading the quality of agricultural land

- METEOROLOGICAL OFFICE (1989) Climatological datasets for agricultural land classification

- SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 6 - Soils of South-East England

- SOIL SURVEY OF ENGLAND AND WALES (1984) Bulletin 15 - Soils and Their Use in South-East England

APPENDIX 1
DESCRIPTION OF THE GRADES AND SUBGRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur typical cropping range and the expected level and consistency of yield In practice the grades are defined by reference to physical characteristics and the grading guidance and cut offs for limitation factors in Section 3 enable land to be ranked in accordance with these general descriptions The most productive and flexible land falls into Grades 1 and 2 and Subgrade 3a and collectively comprises about one third of the agricultural land in England and Wales About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4 Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates The remainder is very poor quality land in Grade 5 which mostly occurs in the uplands

Descriptions are also given of other land categories which may be used on ALC maps

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 includes 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 root 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 level of yields It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yields of which are variable In moist 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

Descriptions of other land categories used on ALC maps

Urban

Built up or hard uses with relatively little potential for a return to agriculture including housing industry commerce education transport religious buildings cemeteries Also hard surfaced sports facilities permanent caravan sites and vacant land all types of derelict land including mineral workings which are only likely to be reclaimed using derelict land grants

Non agricultural

Soft uses where most of the land could be returned relatively easily to agriculture including golf courses private parkland public open spaces sports fields allotments and soft surfaced areas on airports/airfields Also active mineral workings and refuse tips where restoration conditions to soft after uses may apply

Woodland

Includes commercial and non commercial woodland A distinction may be made as necessary between farm and non farm woodland

Agricultural buildings

Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses Temporary structures (eg polythene tunnels erected for lambing) may be ignored

Open water

Includes lakes ponds and rivers as map scale permits

Land not surveyed

Agricultural land which has not been surveyed

Where the land use includes more than one of the above land cover types eg buildings in large grounds and where map scale permits the cover types may be shown separately Otherwise the most extensive cover type will usually be shown

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 revised soil wetness classes (Hodgson in preparation) are identified and are defined in Table 11

Table 11 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 not wet within 40 cm depth for more than 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 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 and 90 days in most years
IV	The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years *or* if there is no slowly permeable layer 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

[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

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