Bredon Road Tewkesbury

Agricultural Land Classification

February 1999

Resource Planning Team
Bristol
FRCA Western Region

Job Number 5/99

MAFF Ref EL14/271

BREDON ROAD TEWKESBURY

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 36 ha of land at Bredon Road Tewkesbury Field survey was based on 31 auger borings and 2 soil profile pits and was completed in February 1999

2 The survey was conducted by the Resource Planning Team of FRCA Western Region on behalf of MAFF in its statutory role in the preparation of the Tewkesbury Local Plan

3 Information on climate geology and soils and from previous ALC surveys was considered and is presented in the relevant section The published regional ALC map (MAFF 1977) shows the site at a reconnaissance scale as being all Grade 3 The site was previously surveyed in 1979 (ADAS 1979) showing Grade 3a on the western side and Grades 2 3a and 3b on the eastern side of the site The current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF 1988) and supersedes any previous ALC survey Grade descriptions are summarised in Appendix I

5 At the time of the current survey land cover was permanent pasture and allotment gardens

SUMMARY

6 The distribution of ALC grades is shown on the accompanying 1 10 000 scale ALC map The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas Areas are summarised in the Table 1

Table 1 Distribution of ALC grades Bredon Road Tewkesbury

Grade	Area (ha)	% Surveyed Area (36 ha)
2	11	31
3a	12	34
3b	13	35
Other land	<1	
Total site area	36	

7 Sixty five percent of the site proved to be best and most versatile agricultural land The Grade 2 land was freely drained Wetness Class I The main limitation was a drought limitation with a slightly lowered moisture balance for wheat and potatoes The Subgrade 3a land was characterised by two different types of soils The first soil type was heavy clay loam topsoil assessed as Wetness Class II with a slowly permeable layer starting in the lower subsoil The second soil type had sandier soils (similar to the Grade 2 land) also Wetness Class I with a stony subsoil resulting in a droughtiness limitation The 3b land was similar to the 3a land

except that the gleying and slowly permeable layer occurred higher up in the soil profile resulting in Wetness Class III and Wetness Class IV soils There were also some Wetness Class II soils with clay topsoils which are Subgrade 3b

CLIMATE

8 Estimates of climatic variables for this site were derived from the published agricultural climate dataset Climatological Data for Agricultural Land Classification (Meteorological Office 1989) using standard interpolation procedures Data for the key points around the site are given in Table 2 below

9 Since the ALC grade of land is determined by the most limiting factor present overall climate is considered first because it can have an overriding influence by restricting land to a lower grade despite more favourable site and soil conditions Parameters used for assessing overall climate are accumulated temperature a measure of relative warmth and average annual rainfall a measure of overall wetness The results shown in Table 2 indicate that there is no overall climatic limitation

10 Climatic variables also affect ALC grade through interactions with soil conditions The most important interactive variables are Field Capacity Days (FCD) which are used in assessing soil wetness and potential Moisture Deficits calculated for wheat and potatoes which are compared with the moisture available in each profile in assessing soil droughtiness limitations These are described in later sections

Table 2 Climatic Interpolations Bredon Road Tewkesbury

Grid Reference		SO 906 341	SO 900 339
Altitude (m)		31	15
Accumulated Temperature (day C)		1479	1498
Average Annual Rainfall (mm)		637	631
Overall Climatic Grade		1	1
Field Capacity Days		138	137
Moisture deficit (mm)	Wheat	112	114
	Potatoes	105	108

RELIEF

11 Altitude ranges from 31 metres east of Mitton Farm to below 15 metres on the western edge of the west site with no slopes of significance to ALC

GEOLOGY AND SOILS

12 The underlying geology of the site is shown on the published geology map (BGS 1988) There is underlying Lower Lias Clay (Jurassic) in the south and west and Blue Lias (Jurassic) in the north with Second Terrace gravel deposits covering much of the western site and the north eastern part of the eastern site

13 There does appear to be some correlation between the geology and the soils found on the site Generally the soils overlying the Terrace gravels were freely drained whereas the soils overlying the Lias geology tended to be slowly permeable and gleyed

14 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as the Fladbury 1 association and the Evesham 2 association The western site was mapped as mainly Fladbury 1 with a small area of Evesham 2 in the east and the eastern site was mappped mainly as Evesham 2 with Fladbury 1 on the lower land

15 Evesham 2 soils are described as being slowly permeable calcareous clayey soils with some slowly permeable seasonally waterlogged non calcareous clayey and fine loamy or fine silty over clayey soils

16 The Fladbury 1 association are described as stoneless clayey soils which are in places calcareous and are variably affected by groundwater It should be noted that flat land can be associated with flooding

17 The soils found on the site are similar to the above soil associations in that some of the soil profiles are slowly permeable however there are some freely drained soils as well and the soils were not calcareous

AGRICULTURAL LAND CLASSIFICATION

18 The distribution of ALC grades found by the current survey is shown on the accompanying 1 10 000 scale map and areas are summarised in Table 1 The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas

Grade 2

19 The Grade 2 land proved to be well drained Wetness Class I soil with medium sandy loam sandy clay loam medium clay loam and heavy clay loam topsoils These freely drained soils did however have a drought limitation with the moisture balance of potatoes and wheat slightly lowered Although represented by Pit 2 it should be noted that the Grade 2 land had significantly less stones and is therefore less droughty allowing Grade 2 The topsoils showed some variability in sand content nonetheless this was not critical to the final grade

20 ASP 28 had no drought limitation with a medium clay loam topsoil and heavy clay loam upper subsoil resulting in a Grade 1 boring however due to the isolated nature of this borings it was included in the Grade 2 mapping unit

Subgrade 3a

21 Subgrade 3a land on the western site and on the lower ground of the eastern site had heavy clay loam topsoils which are Wetness Class II with a gleyed slowly permeable layer starting in the lower subsoil This is represented by Pit1 With a non calcareous heavy clay loam topsoil the final grade was Subgrade 3a limited by wetness ASP 32 was classed as

Grade 2 as the gleyed and slowly permeable clay subsoil did not appear until below 90 cm However due to the boring s isolated nature it was included in the Subgrade 3a mapping unit

22 The other area of Subgrade 3a land on the higher ground opposite Mitton Farm on eastern site was characterised by stony soils Although similar to the sandier Grade 2 soils the extra stone content throughout the soil profile significantly increased the droughtiness of the soil (as shown by the reduced moisture balance) In addition to this there was also some gleying in the lower subsoil however due to the depth of this occurrence the soil was still classed Wetness Class I This area of land is represented by Pit 2

Subgrade 3b

22 Subgrade 3b soils were similar to the 3a soils (illustrated by Pit 1) except that the topsoils were either heavy clay loam or clay and the slowly permeable layer occurred higher up in the soil profile resulting in Wetness Class III and IV soils Two borings were Wetness Class II but with the clay topsoil resulted in Subgrade 3b

23 All the topsoils tested proved to be non calcareous

Previous Survey

24 The areas of Grade 2 and Subgrades 3a and 3b had changed from the previous 1979 Tewkesbury Villages survey (ADAS 1979) No soil records were available for the western site however records were found for the eastern site

25 The land Subgraded as 3a on the present survey was Graded 2 on the 1979 survey (ADAS 1979) It seems probable that the previous survey underestimated the stone content which is considered more fully under the Revised Guidelines

26 The borders of the Subgrade 3a and 3b soils on the remaining part of the eastern site differed from the previous survey Boring data from the previous survey revealed that under the pre revision system many of the borings were borderline Subgrades 3a/3b It appears that the difference in Subgrade occurs between the present and previous survey due to the different emphasis placed on mottling in the pre revision guidelines

Other Land

28 Other land found by the current survey included a residential area and a hard core road

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1 March 1999

REFERENCES

ADAS RESOURCE PLANNING TEAM (1979) Agricultural Land Classification Survey of Tewkesbury Villages 1979 Scale 1 25 000 Reference 1979 ADAS Bristol

ADAS RESOURCE PLANNING TEAM (1988) Agricultural Land Classification Survey of Mitton Lodge Tewkesbury Scale 1 25 000 Reference 69 ADAS Bristol

BRITISH GEOLOGICAL SURVEY (1988) Sheet No 216 Tewkesbury 1 50 000 series Solid and Drift edition BGS London

HODGSON J M (Ed) (1997) Soil Survey Field Handbook Soil Survey Technical Monograph No 5 Silsoe

MAFF (1977) 1 250 000 series Agricultural Land Classification South West Region MAFF Publications Alnwick

MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for grading the quality of agricultural land MAFF Publications Alnwick

METEOROLOGICAL OFFICE (1989) Climatological Data for Agricultural Land Classification Meteorological Office Bracknell

SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 5 Soils of South West England 1 250 000 scale SSEW Harpenden

SOIL SURVEY OF ENGLAND AND WALES (1984) Soils and Their Use in South West England Bulletin No 14 SSEW Harpenden

APPENDIX I

DESCRIPTION OF GRADES AND SUBGRADES

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 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 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

Source MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land MAFF Publications Alnwick

APPENDIX II

DEFINITION OF SOIL WETNESS CLASSES

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile

Wetness Class I

The soil profile is not wet within 70 cm depth for more than 30 days in most years

Wetness Class 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

Wetness Class 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

Wetness Class 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

Wetness Class V

The soil profile is wet within 40 cm depth for 211 335 days in most years

Wetness Class VI

The soil profile is wet within 40 cm depth for more than 335 days in most years

Notes The number of days specified is not necessarily a continuous period

In most years is defined as more than 10 out of 20 years

Source Hodgson J M (Ed) (1997) Soil Survey Field Handbook Soil Survey Technical Monograph No 5 Silsoe

APPENDIX III

ABBREVIATIONS AND TERMS USED IN SURVEY DATA

Soil pit and auger boring information collected during ALC survey is held on a computer database and is reproduced in this report Terms used and abbreviations are set out below These conform to definitions contained in the Soil Survey Field Handbook (Hodgson 1997)

1 Terms used on computer database in order of occurrence

GRID REF National 100 km grid square and 8 figure grid reference

LAND USE At the time of survey

WHT	Wheat	**SBT**	Sugar Beet	**HTH**	Heathland
BAR	Barley	**BRA**	Brassicas	**BOG**	Bog or Marsh
OAT	Oats	**FCD**	Fodder Crops	**DCW**	Deciduous Wood
CER	Cereals	**FRT**	Soft and Top Fruit	**CFW**	Coniferous Woodland
MZE	Maize	**HRT**	Horticultural Crops	**PLO**	Ploughed
OSR	Oilseed Rape	**LEY**	Ley Grass	**FLW**	Fallow (inc Set aside)
POT	Potatoes	**PGR**	Permanent Pasture	**SAS**	Set Aside (where known)
LIN	Linseed	**RGR**	Rough Grazing	**OTH**	Other
BEN	Field Beans	**SCR**	Scrub		

GRDNT Gradient as estimated or measured by hand held optical clinometer

GLEY SPL Depth in centimetres to gleying or slowly permeable layer

AP (WHEAT/POTS) Crop adjusted available water capacity

MB (WHEAT/POTS) Moisture Balance (Crop adjusted AP crop potential MD)

DRT Best grade according to soil droughtiness

If any of the following factors are considered significant Y will be entered in the relevant column

MREL	Microrelief limitation	**FLOOD**	Flood risk	**EROSN**	Soil erosion risk
EXP	Exposure limitation	**FROST**	Frost prone	**DIST**	Disturbed land
CHEM	Chemical limitation				

LIMIT The main limitation to land quality The following abbreviations are used

OC	Overall Climate	**AE**	Aspect	**EX**	Exposure
FR	Frost Risk	**GR**	Gradient	**MR**	Microrelief
FL	Flood Risk	**TX**	Topsoil Texture	**DP**	Soil Depth

CH	Chemical	**WE**	Wetness	**WK**	Workability
DR	Drought	**ER**	Erosion Risk	**WD**	Soil Wetness/Droughtiness
ST	Topsoil Stoniness				

TEXTURE Soil texture classes are denoted by the following abbreviations

S	Sand	**LS**	Loamy Sand	**SL**	Sandy Loam
SZL	Sandy Silt Loam	**CL**	Clay Loam	**ZCL**	Silty Clay Loam
ZL	Silt Loam	**SCL**	Sandy Clay Loam	**C**	Clay
SC	Sandy clay	**ZC**	Silty clay	**OL**	Organic Loam
P	Peat	**SP**	Sandy Peat	**LP**	Loamy Peat
PL	Peaty Loam	**PS**	Peaty Sand	**MZ**	Marine Light Silts

For the sand loamy sand sandy loam and sandy silt loam classes the predominant size of sand fraction will be indicated by the use of the following prefixes

F Fine (more than 66% of the sand less than 0 2mm)
M Medium (less than 66% fine sand and less than 33% coarse sand)
C Coarse (more than 33% of the sand larger than 0 6mm)

The clay loam and silty clay loam classes will be sub divided according to the clay content **M** Medium (< 27% clay) **H** heavy (27 35% clay)

MOTTLE COL Mottle colour using Munsell notation

MOTTLE ABUN Mottle abundance expressed as a percentage of the matrix or surface described

F few <2% **C** common 2 20% **M** many 20 40% **VM** very many 40%+

MOTTLE CONT Mottle contrast

F faint indistinct mottles evident only on close inspection
D distinct mottles are readily seen
P Prominent mottling is conspicuous and one of the outstanding features of the horizon

PED COL Ped face colour using Munsell notation

GLEY If the soil horizon is gleyed a Y will appear in this column If slightly gleyed an S will appear

STONE LITH Stone Lithology One of the following is used

HR	All hard rocks and stones	**SLST**	Soft oolitic or dolimitic limestone
CH	Chalk	**FSST**	Soft fine grained sandstone
ZR	Soft argillaceous or silty rocks	**GH**	Gravel with non porous (hard) stones
MSST	Soft medium grained sandstone	**GS**	Gravel with porous (soft) stones

SI Soft weathered igneous or metamorphic rock

Stone contents are given in % by volume for sizes >2cm >6cm and total stone >2mm

STRUCT The degree of development size and shape of soil peds are described using the following notation

Degree of development	**WA**	Weakly developed Adherent	**WK**	Weakly developed
	MD	Moderately developed	**ST**	Strongly developed
Ped size	**F**	Fine	**M**	Medium
	C	Coarse	**VC**	Very coarse
Ped Shape	**S**	Single grain	**M**	Massive
	GR	Granular	**AB**	Angular blocky
	SAB	Sub angular blocky	**PR**	Prismatic
	PL	Platy		

CONSIST Soil consistence is described using the following notation

L	Loose	**VF**	Very Friable	**FR**	Friable	**FM**	Firm
VM	Very firm	**EM**	Extremely firm	**EH**	Extremely Hard		

SUBS STR Subsoil structural condition recorded for the purpose of calculating profile droughtiness **G** Good **M** Moderate **P** Poor

POR Soil porosity If a soil horizon has poor porosity with less than 0 5% biopores >0 5mm a Y will appear in this column

IMP If the profile is impenetrable to rooting a Y will appear in this column at the appropriate horizon

SPL Slowly permeable layer If the soil horizon is slowly permeable a Y will appear in this column

CALC If the soil horizon is calcareous with naturally occurring calcium carbonate exceeding 1% a Y will appear this column

2 Additional terms and abbreviations used mainly in soil pit descriptions

STONE ASSESSMENT

VIS	Visual	**S**	Sieve	**D**	Displacement

MOTTLE SIZE

EF	Extremely fine <1mm	**M**	Medium 5 15mm
VF	Very fine 1 2mm>	**C**	Coarse >15mm
F	Fine 2 5mm		

MOTTLE COLOUR May be described by Munsell notation or as ochreous (OM) or grey (GM)

ROOT CHANNELS In topsoil the presence of rusty root channels should also be noted

MANGANESE CONCRETIONS Assessed by volume

N	None		**M**	Many	20 40%
F	Few	<2%	**VM**	Very Many	>40%
C	Common	2 20%			

POROSITY

P	Poor	less than 0 5% biopores at least 0 5mm in diameter
G	Good	more than 0 5% biopores at least 0 5mm in diameter

ROOT ABUNDANCE

The number of roots per 100cm^2		Very Fine and Fine	Medium and Coarse
F	Few	1 10	1 or 2
C	Common	10 25	2 5
M	Many	25 200	>5
A	Abundant	>200	

ROOT SIZE

VF	Very fine	<1mm	**M**	Medium	2 5mm
F	Fine	1 2mm	**C**	Coarse	>5mm

HORIZON BOUNDARY DISTINCTNESS

Sharp	<0 5cm	**Gradual**	6 13cm
Abrupt	0 5 2 5cm	**Diffuse**	>13cm
Clear	2 5 6cm		

HORIZON BOUNDARY FORM Smooth wavy irregular or broken *

* See Soil Survey Field Handbook (Hodgson 1997) for details

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Bredon Road Tewkesbury	Pit 1 (Between ASP 20-14)	0	PGR	Av Rainfall 637 mm ATO 1479 day C FC Days 138 Climatic Grade 1 Exposure Grade 1	Blue Lias (Jurassic)
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
5/9)	)/2/))	SO 8987 3309	GN + GMS		No

Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness Size Type and Field Method	Mottling Abundance Contrast Size and Colour	Mangan Concs	Structure Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots Abundance and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form
1	30	HCL	10YR3/2	2/HR( )	0	0					M VF	Not Calareous	Abrupt Smooth
2	55	C	10YR5/3+ 7 5YR5/4	20/ HR( )	From 50 cm 7 5YR5/6 CDFO	F	WKMSAB	FR	G	Good	C VF		Abrupt Smooth
3	70+	C	5Y5/3+ 2 5Y5/3	0 ( )	10YR5/6 CFFO	0	MDCAB +WKSAB	FM	P	Low	F VF		

Profile Gleyed From 50 cm

Slowly Permeable Horizon From 55 cm

Wetness Class II

Wetness Grade 3a

Available Water	Wheat	139 mm
	Potatoes	115 mm
Moisture Deficit	Wheat	113 mm
	Potatoes	106 mm
Moisture Balance	Wheat	+26 mm
	Potatoes	+9 mm

Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 3a

Main Limiting Factor(s) We

Remarks

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Bredon Road Tewkesbury	Pit 2	0	PGR	Av Rainfall 637 mm ATO 1479 day C FC Days 138 Climatic Grade 1 Exposure Grade 1	2nd terrace R Avon
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
5/99	9/2/99	SO 9047 3407	GMN/GMS		No

Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness Size Type and Field Method	Mottling Abundance Contrast Size and Colour	Mangan Concs	Structure Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots Abundance and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form
1	35	MSL	7 5YR4/2	1/HR>2 cm ( ) 7/ HR<2 cm (+d) 8 HR	None	None					MVF	None	Clear Smooth
2	70	MSL	7 5YR4/3	15 HR>2 cm ( ) 20 HR< 2 cm (+d) 35 HR	None	None	MDCSAB	VF	M	Good	CF+VF	None	Clear Smooth
3	90+	MSL	7 5YR5/3	50 HR ( )	CDMO 7 5YR5/6	F	WCSAB	VF	M	Good	CVF	None	

Profile Gleyed From 70 cm

Slowly Permeable Horizon From No SPL

Wetness Class I

Wetness Grade 1

Available Water Wheat 114 mm

Potatoes 90 mm

Moisture Deficit Wheat 113 mm

Potatoes 106 mm

Moisture Balance Wheat +1 mm

Potatoes 16 mm

Droughtiness Grade 3a (Calculated to 120 cm)

Final ALC Grade 3a

Main Limiting Factor(s) Droughtiness

Remarks H3 wet with water seeping into pit