Bullinghope, Hereford

Agricultural Land Classification

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Resource Planning Team
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FRCA Western Region

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[Site Name]

AGRICULTURAL LAND CLASSIFICATION SURVEY

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BULLINGHOPE

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 213 5 ha of land at Bullinghope Hereford Field survey was based on 191 auger borings and 7 soil profile pits and was completed in January 1999 During the survey 8 samples were analysed for particle size distribution (PSD)

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 Herefordshire Local Plan

3 Information on climate geology and soils and from previous ALC surveys was considered and is presented in the relevant sections Apart from the published regional ALC map (MAFF 1977) which shows the site at a reconnaissance scale as Grade 2 in the west and north and Grade 3 in the east the site was previously surveyed in 1986 at a scale of 1 25 000 (ADAS 1986) This survey showed mainly Grade 2 and 3a with small areas of other grades 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

4 An area to the west was surveyed in 1997 (FRCA 1997) This showed Grade 1 running along part of the road Subgrades 3a and 3b with moderate wetness limitations along the brook and Grade 2 across the rest of the site with a minor wetness limitation The soils found on the adjacent land during the current survey were similar to the Grade 1 soils being well drained light textured soils The more poorly drained soils are restricted to the westward sloping land in the 1997 survey area

5 At the time of survey land cover was pasture and arable cropping An area of 10 3 ha of agricultural land within the survey area was not surveyed because ownership information could not be obtained Other land which was not surveyed included residential areas and an army firing range

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 Bullinghope

Grade	Area (ha)	% Surveyed Area (183 5 ha)
1	137 0	75
2	29 3	16
3b	17 2	9
Agricultural land not surveyed	10 3	
Other land	19 7	
Total site area	213 5	

7 Over 90% of the agricultural land surveyed has been mapped as best and most versatile Three quarters of the land is of excellent quality and 16% is of very good quality The Grade 1 soils which are well drained and easily worked can hold sufficient moisture for growing crops The Grade 2 soils are also well drained but because they are slightly stony they have a minor droughtiness limitation which affects their versatility Small areas of Subgrade 3b soils have been mapped The Subgrade 3b soils in the west and south are very stony which imposes a moderate droughtiness limitation There is a small area of Subgrade 3b soils with a moderate wetness limitation in the north by the railway where slowly permeable subsoils restrict the drainage of the soil A small area of land has a moderate gradient limitation in the centre of the site limiting the land to 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 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 the 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 Bullinghope

Grid Reference		SO 520 420	SO 512 421	SO 514 423
Altitude (m)		55	70	65
Accumulated Temperature (day C)		1457	1440	1446
Average Annual Rainfall (mm)		687	689	696
Overall Climatic Grade		1	1	1
Field Capacity Days		151	153	153
Moisture deficit (mm)	Wheat	107	104	105
	Potatoes	99	96	97

RELIEF

11 Altitude ranges from 53 metres at Watery Lane to 76 metres east of Grove Farm The land is gently undulating in the east In the west there is steeper land sloping down to small brooks either side of Bullinghope These only exceed 7 degrees to the west of the caravan park where the slopes limit the versatility of the land

GEOLOGY AND SOILS

12 The underlying geology of the site is shown on the published geology map (BGS 1990) as Raglan mudstone The absence of a more detailed published geology map precludes a detailed assessment of what extent the recent survey found similar parent materials but it showed red soils across the whole site These soils are similar to other areas where Raglan mudstone is found There were areas of shallow soils which may be linked to drift deposits

13 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as Bromyard Association in the south west corner Newnham Association in the north east with Escrick 1 Association between and a small area of Eardiston 1 in the east More detailed soils information is also available in the 1 25 000 scale survey of Hereford area (SSEW 1971) This shows a more complex distribution of soil series

14 Bromyard Association is described as a well drained reddish fine silty soil over shale and siltstone There may be similar soils with slowly permeable subsoils and slight seasonal waterlogging as well as well drained coarse loamy soils over sandstone included in this association The Escrick 1 Association is derived from reddish till and is described as deep well drained reddish coarse loamy soils with some similar soils with slowly permeable subsoils and slight seasonal waterlogging This association includes some slowly permeable seasonally waterlogged reddish fine silty soils The Eardiston 1 Association is a free draining reddish coarse loamy soil over sandstone which is shallow in places especially on brows Included are some reddish fine silty soils over shale and siltstone The Newnham Association is described as well drained reddish coarse and fine loamy soils over gravel being derived from river terrace gravel

15 The pattern of soils found during the recent survey broadly matches the less detailed published soils map The additional detail provided by the 1 25 000 scale soils map reveals more of the variations found such as the patches of stonier soils found in the east linked to the more precise mapping of the Newnham series Variation in textures around the site can be linked into the different soil series mapped such as the sandier soils found in the east and north west

AGRICULTURAL LAND CLASSIFICATION

16 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 1

17 The majority of the site has been mapped as Grade 1 excellent quality land Four soil profile pits were dug within this grade confirming that the soils are Wetness Class I (see Appendix II) In the south west PSD results showed that the topsoil texture are borderline medium clay loam/medium silty clay loam This does not affect the grade of the land as either texture can be Grade 1 with well drained profiles for the prevailing FCD value of 153 These soils are able to hold adequate moisture for growing crops PSD results for the sample points in the east and north showed sandier soils sandy silts loams with a high proportion of fine sand These soils hold even higher amounts of moisture

18 Most of these areas were mapped as Grade 2 in the 1986 survey This change in grading is mainly the result of the change in emphasis of the wetness assessment Under the Revised System the structural condition of the soil is taken into account in addition to evidence of wetness such as mottling The original guidelines did not permit any mottling in the top 60 cm for Grade 1 soils however under the Revised system only mottling accompanied by pale or grey colours that is gleying above 40 cm would lead to downgrading Gleying was not typically found in the upper part of profiles examined and the soils are assessed as Wetness Class I Grade 1

Grade 2

19 Small areas of Grade 2 very good quality land have been mapped The areas in the east are well drained Wetness Class I but are stony These soils have a minor droughtiness limitation Two soil pits were dug which showed over 50% stone in the lower subsoil Medium clay loam and medium sandy silt loam topsoils lie over clay loams and clays The area of Grade 2 mapped below Bullinghope is a mix of stony soils and in the southern fields heavier and wetter profiles The heavier profiles have heavy silty clay loam topsoils which imposes a slight workability limitation Some of these profiles also show some evidence of restricted drainage

Subgrade 3b

20 The area of Subgrade 3b moderate quality land in the west by the depots is mainly limited by a moderate droughtiness limitation The profile is stony throughout with typical stone contents measured at a soil profile pit Stone contents increased from 19% in the topsoil only 1% being over 2 cm to 68% below 50cm This high stone content restricts the amount of moisture that the soil can hold Similar stony soils were found in the centre of the site to the west of the caravan site In this same area a moderate gradient limitation also was found with slopes measured as 9 degrees

21 In the 1986 survey these stony areas were mapped as Subgrade 3a downgraded because of the soil depth However examination of the soil profile pit in this area shows that the high stone content of the subsoils imposes a greater limitation downgrading the soils to Subgrade 3b in the current survey using the Revised Guidelines

22 A small area of Subgrade 3b land is mapped in the north by the railway Here a mix of lower quality soils showing evidence of wetness and droughtiness have been mapped together

Other Land

23 Three areas were not surveyed because the ownership could not be established Other land includes residential areas roads industrial land and an army range

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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

V	Visual	**S**	Sieved	**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 might be noted as RRC

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