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Drakes Broughton

Agricultural Land Classification

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Resource Planning Team
Bristol
FRCA Western Region

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DRAKES BROUGHTON

AGRICULTURAL LAND CLASSIFICATION SURVEY

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INTRODUCTION

1 This report presents the findings of a semi detailed Agricultural Land Classification (ALC) survey of 113 2 ha of land at Drakes Broughton Field survey was based on 52 auger borings and 3 soil profile pits and was completed in November 1998 During the survey 2 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 the Worcestershire Structure Plan

3 Information on climate geology and soils and from previous ALC surveys was considered and is presented in the relevant section Apart from the published regional ALC map (MAFF 1977) which shows the site at a reconnaissance scale as Grade 3 the site had not been surveyed previously However 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 At the time of survey land cover was permanent pasture cereal ploughed land maize and ley pasture An area of 17 4 ha of agricultural land within the survey area was not surveyed because access was not possible

SUMMARY

5 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 Drakes Broughton

Grade	Area (ha)	% Surveyed Area (104 0 ha)
2	11 5	11 1
3a	44 7	43 0
3b	30 4	29 2
Agricultural land not surveyed	17 4	16 7
Other land	9 2	
Total site area	113 2	

6 The agricultural land on this site has been mapped in the current survey as Grade 2 (very good quality) Subgrade 3a (good quality) and Subgrade 3b (moderate quality) Just over half of the site have been mapped as best and most versatile

7 The Grade 2 land running along the railway line to the north of the site has a minor wetness limitation The topsoils are either Sandy Clay Loams or Medium Sandy Loams these overlie gleyed and slowly permeable subsoils

8 The soils mapped through the centre of the site have calcareous clay heavy clay loam and heavy silty clay loam topsoils with gleyed slowly permeable subsoils The land is graded as Subgrade 3a and has a moderate wetness limitation to its agricultural use

9 The Subgrade 3b land has a moderate wetness limitation with non calcareous clay heavy clay loam and heavy silty clay loam topsoils over gleyed slowly permeable subsoils

CLIMATE

10 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

11 *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

12 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 Drakes Broughton

Grid Reference		SO 932 483	SO 938 483
Altitude (m)		40	35
Accumulated Temperature (day C)		1462	1468
Average Annual Rainfall (mm)		617	613
Overall Climatic Grade		1	1
Field Capacity Days		131	130
Moisture deficit (mm)	Wheat	111	112
	Potatoes	105	106

RELIEF

13 Altitude ranges from 25 metres South of Broughton Farm to 40 metres North of Upper Broughton Farm with no slopes of significance to ALC

GEOLOGY AND SOILS

14 The underlying geology of the site is shown on the published geology map (BGS 1993) The majority of the area is mapped as Lower Lias Clay formation solid geology with thin limestones with the drift geology of River Severn deposits and alluvium found in small areas to the North of the site along the railway line to the far South East and to the West at the playing field There does appear to be some correlation between the Geology and the soils found on the site The majority of the site was found to have clayey subsoils There is also a possible association between the sandy soils found to the North of the site and the terrace deposits of the River Severn

15 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as Bishampton 2 and Evesham 2 associations The site is mainly covered by the Bishampton 2 association with a small area of Evesham 2 soils either side of Brickyard lane to the South of the site

16 Bishampton 2 soils are described as deep fine loamy and fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging associated with similar slowly permeable seasonally waterlogged soils Evesham 2 soils are described as slowly permeable calcareous clayey soils with some non calcareous clayey and fine loamy or fine silty over clayey soils landslips and irregular terrain

17 More detailed soils information is also available in the 1 50 000 scale survey of the Worcester area (SSEW 1986) Pinder series soils are mapped across the majority of the site sandwiched between this the Wickham association is found in substantial areas North of Brickyard Lane and Walcot Lane with a smaller area of the Evesham association South of Wheatlands Farm

18 The Pinder association suffers from seasonal waterlogging due to slowly permeable subsoils and limited drought problems because of limited available water for plant growth Wickham soils are described as seasonally waterlogged with slowly permeable subsoils and slightly to moderately droughty The Evesham association is described above

19 The soils found on the site are similar to the above soil associations in that they have slowly permeable subsoils

AGRICULTURAL LAND CLASSIFICATION

20 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

21 Two areas of Grade 2 very good quality land have been mapped to the North and North East of the site The topsoils are either Sandy Clay Loams or Medium Sandy Loams These overlie slowly permeable and gleyed subsoils These soils are assessed as Wetness Class III (See Appendix II) The light topsoil texture of the Medium Sandy Loam results in Grade 2 land and the better structure of the calcareous Sandy Clay Loam also results in Grade 2 land These soils are represented by Pit 1

Subgrade 3a

22 Subgrade 3a good quality land is mapped through the centre of the site These soils have clay or heavy clay loam and heavy silty clay loam topsoils The presence of slowly permeable subsoils which are gleyed was confirmed in soil profile Pit 2 in this area The depth to the slowly permeable layer varies such that most are assessed as Wetness Class III with some Wetness Class II The topsoils within this mapping unit are generally calcareous so the soils are more workable and are upgraded to Subgrade 3a ASP 22 was found not to be calcareous it was still included in this subgrade because as an isolated boring it would not be appropriate to include a separate map unit of 3b land

Subgrade 3b

23 The remaining areas are mapped as Subgrade 3b moderate quality land These soils are similar to the 3a soils except that the topsoils are not calcareous and therefore experience a moderate wetness limitation The soil profile is represented by Pit 3 ASP 49 was found to be calcareous however it was decided inappropriate to map it as a separate unit of 3a land

Other Land

24 Access was not available to an area of agricultural land in the South West of the site and was not therefore surveyed It is expected that this land will be Subgrades 3a or 3b depending on the calcareous nature of the topsoil Other land not surveyed included residential areas a playing field and farmyards

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8/12/98

REFERENCES

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

SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 3 Soils of Midland and Western England 1 250 000 scale SSEW Harpenden

SOIL SURVEY OF ENGLAND AND WALES (1984) Soils and Their Use in Midland and Western England Bulletin No 12 SSEW Harpenden

SOIL SURVEY OF ENGLAND AND WALES (1986) Sheet 150 Soils of Worcester and the Malverns district 1 50 000 scale 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	**WK**	Weakly developed Adherent
	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
Brakes Broughton	Pit 1	0	Ploughed + rolled	Av Rainfall 613 mm ATO 1468 day C	Lower Lias Clay
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 130 Climatic Grade 1 Exposure Grade 1	PSD SAMPLES TAKEN
82/98	5/11/98	SO 938 486	GMS/GMN		T/S MSL S70 Z16 c14

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	34	MSL	10YR41	2%HR( )	None	None					FVF	Yes	Clear Smooth
2	57	SCL	10YR53	5%HR (s)	CDFO 10YR68	Few	WKCSAB	Friable	Mod	Borderline Low	VFVF	Slightly	Clear Wavy
3	75+	C	2 5Y52	1%HR (s)	CDFO 10YR68	Few	WKCSAB	Firm	Poor	Low	None seen	Slightly	

Profile Gleyed From 34 cm

Slowly Permeable Horizon From 34 cm

Wetness Class III

Wetness Grade 2

Available Water	Wheat	130 mm
	Potatoes	106 mm
Moisture Deficit	Wheat	112 mm
	Potatoes	106 mm
Moisture Balance	Wheat	18 mm
	Potatoes	0 mm

Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 2

Main Limiting Factor(s) Wetness

Remarks

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Drakes Broughton	Pit 2	0	Ley	Av Rainfall 613 mm ATO 1468 day C FC Days 130 Climatic Grade 1 Exposure Grade 1	Lower Lias Clay
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
82 98	5/11/98	SO 934 486	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	30	C	10YR41	4%HR (s)	None	None					MF + VF	Yes	Abrupt Smooth
2	55+	C	25Y52	2%HR (v s)	MDMO 75YR56	Few	WKCSAB with some AB	Firm	Poor	Low	FVF	Slightly	

Profile Gleyed From 30 cm

Slowly Permeable Horizon From 30 cm

Wetness Class III

Wetness Grade 3a (calc)

Available Water	Wheat	123 mm
	Potatoes	100 mm
Moisture Deficit	Wheat	112 mm
	Potatoes	106 mm
Moisture Balance	Wheat	+11 mm
	Potatoes	6 mm

Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 3a

Main Limiting Factor(s) Wetness

Remarks

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE			PARENT MATERIAL
Drakes Broughton	Pit 3	0	PGR	Av Rainfall ATO	613 mm 1468 day C	Lower Lias Clay
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days Climatic Grade Exposure Grade	130 1 1	PSD SAMPLES TAKEN
82 98	5/11/98	SO 933 481	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	25	HZCL	10YR41	No e	CFFO 10YR44	None					MF+VF	not	Abrupt Smoth
2	42	C	10YR51	None	MDFO 75YR58	Few	WKCAB	Firm	Poor	Low	MVF	not	Clear Smooth
3	60+	C	25Y52	1%HR (s)	MDFO 75YR58	Few	MDCAB with some prismatic and adherence	Firm	Poor	Low	CVF	not	

Profile Gleyed From 25 cm

Slowly Permeable Horizon From 25 cm

Wetness Class III

Wetness Grade 3b

Available Water	Wheat	128 mm
	Potatoes	106 mm
Moisture Deficit	Wheat	112 mm
	Potatoes	106 mm
Moisture Balance	Wheat	16 mm
	Potatoes	0 mm

Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 3b

Main Limiting Factor(s) Wetness

Remarks