

Castle Stream Farm, Dursley
Agricultural Land Classification
October 1997

Resource Planning Team
Bristol
FRCA Western Region

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CASTLE STREAM FARM DURSLEY
AGRICULTURAL LAND CLASSIFICATION SURVEY

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CASTLE STREAM FARM DURSLEY

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 20.8 ha of land at Castle Stream Farm Dursley. Field survey was based on 12 auger borings and one soil profile pit and was completed in September 1997.

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 Stroud District Local 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 mainly Grade 3 with a small area of Grade 4 on the northern edge of the site, the site had not previously been surveyed. 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 mostly permanent pasture with one field under cereal and another under forage maize. Other land that was not surveyed included the residential buildings at Castle Stream Farm and Spring Farm, land that has been planted up with trees and the areas around the disused and the current pumping stations.

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 Castle Stream Farm Dursley

Grade	Area (ha)	% Surveyed Area (20.8 ha)
3a	9.7	58
3b	6.9	42
Other land	4.2	
Total site area	20.8	100

6 Over half of the site was graded as best and most versatile. The Subgrade 3a (good quality) land is variable with some isolated areas having only minor limitations but most of the land has a moderate wetness limitation. The Subgrade 3b land (moderate quality) has two

distinct areas one with a moderate wetness limitation and the other with moderate droughtiness and soil depth limitations

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 ALC grade through interactions with soil conditions The most important interactive variables are Field Capacity (FC) Days that 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 A critical boundary of 200 FC Days was found running through the site

Table 2 Climatic Interpolations Castle Stream Farm Dursley

Grid Reference	ST 765 074	ST 767 075	ST 768 077
Altitude (m)	80	85	96
Accumulated Temperature (day C)	1483	1477	1465
Average Annual Rainfall (mm)	985	986	989
Overall Climatic Grade	1	1	1
Field Capacity Days	200	201	201
Moisture deficit (mm) Wheat	94	93	92
Potatoes	83	83	81

RELIEF

11 Altitude ranges from 71 metres near Spring Farm to 96 metres in the middle of the site The site is gently and moderately sloping with no limitation to its agricultural usage

GEOLOGY AND SOILS

12 The underlying geology of the site is shown on the published geology map (IGS 1970) as being mainly Lower Lias Cottswold Sands from the Lower Jurassic Era There are also bands of Lower Lias clay and Marlstone Rock running across the northern part of the site

from East to West. The soils found during the recent survey would indicate that the parent material is variable across the site. The hard Marlstone Rock is found on the higher ground with soils developed on the Cotteswold Sands on the lower ground.

13 Soil across the whole site was mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW 1983) as belonging to the Curtisden Association.

14 These are described as being silty soils over siltstone with slowly permeable subsoils and slight seasonal waterlogging. Some similar soils may be well drained. Others may be well drained coarse loamy soils where they have developed over sandstone.

15 The soils found during the recent survey were clay loams over sandy clay loams and sandy clayey soils. They have imperfect drainage and slowly permeable subsoils. There are also shallow well drained soils over fractured bedrock on the higher ground.

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.

Subgrade 3a

17 The Subgrade 3a mapping units are variable. They tended to be medium clay loam topsoils over sandy clay loam and sandy clay subsoils. Most of the profiles have gleying in the upper subsoils and a slowly permeable layer in the lower subsoil. These were assessed as Wetness Class III (see Appendix II) with a moderate wetness limitation. The land on the southern edge of the site is changeable and there are isolated Grade 2 profiles that could not be mapped at this level of survey.

Subgrade 3b

18 The land that was graded as Subgrade 3b has moderate droughtiness, depth and wetness limitations. The profiles on the higher ground near the disused pumping station and to the West of the current pumping station consist of well drained clay loams that are shallow over fractured bedrock. These were assessed as Wetness Class I. Due to the shallow and stony nature of the soils, 65% hard rock by volume in the upper subsoil, the amount of available moisture in the profile is reduced and the soils are not able to meet the potential crop moisture requirements throughout the year. The depth of soil will also limit the type of cultivation that can be undertaken as well as affecting the rooting of crops.

19 The profiles to the East of the current pumping station were assessed as Wetness Classes III and IV. They are gleyed from below the topsoil and have a slowly permeable layer in the subsoils. With a medium clay loam topsoil this is a moderate wetness limitation. The poor drainage that means that the soil water regime will adversely affect plant growth and impose restrictions on cultivations and grazing by livestock.

Other Land

20 Other land that was not surveyed includes the residential buildings at Castle Stream Farm and Spring Farm. Land that has been planted up with trees and the areas around the disused and the current pumping stations was also unsurveyed.

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FRCA Bristol
October 1997

REFERENCES

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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 that 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 that 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 that can be grazed or harvested over most of the year.

Grade 4 poor quality agricultural land

Land with severe limitations that significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. 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 that 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 SSLRC Cranfield University

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

GLEYSPL 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 subdivided 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

GLEYS 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

<u>Degree of development</u>	WA Weakly developed Adherent	WK Weakly developed
	MD Moderately developed	ST Strongly developed
<u>Ped size</u>	F Fine	M Medium
	C Coarse	VC Very coarse
<u>Ped Shape</u>	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	Av Rainfall	986 mm	PARENT MATERIAL	
Castle Stream Farm Dursley		Pit 1 (ASP 7)	2 North West	Permanent Grass	ATO	1477 day C	Marlstone Rock Beds	
JOB NO		DATE	GRID REFERENCE	DESCRIBED BY	FC Days	200	PSD SAMPLES TAKEN	
64/97		29/9/97	ST 765 074	HLJ	Climatic Grade	1	None	
					Exposure Grade	1		

Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Pcd 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 Abundanc and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form
1	22	MCL	10YR44	8% HR 2 m (S) 18% HR 2 m (S+D) 26% HR T + I	None	None				Good	MF + VF		Clear smooth
2	42	SCL	10YR54	35% HR 2 m (S) 30% HR 2 m (S+D) 65% HR T + I	None	None	MMSAB	Friable	Good	Good	CF + MVF		Clear smooth
3	70+	HCL	10YR64	80% HR T + I (VIS)	None	None	WMSAB	Friable	Good	Good	FF + MVF		

Profile Gleyed From Not gleyed

Depth to Slowly Permeable Horizon No SPL

Wetness Class I

Wetness Grade 2

Available Water Wheat 50 mm

Potatoes 48 mm

Moisture Deficit Wheat 93 mm

Potatoes 83 mm

Moisture Balance Wheat 43 mm

Potatoes 35mm

Droughtiness Grade 3b (Calculated to 120 cm)

Final ALC Grade 3b

Main Limiting Factor(s) Drought

Remarks Possibly 3b on soil depth

SITE NAME		PROFILE NO	SLOPE AND ASPECT		LAND USE		Av Rainfall		986 mm		PARENT MATERIAL		
Castle Stream Farm Dursley		Pit 2 (ASP 13)	2 North East		Permanent Grass		ATO		1477 day C		Lower Lias Cotteswold Sands		
JOB NO		DATE	GRID REFERENCE		DESCRIBED BY		FC Days		200		PSD SAMPLES TAKEN		
64/97		29/9/97	ST 766 077		HLJ		Climatic Grade		1		None		
							Exposure Grade		1				

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	21	MCL	10YR42	<1% HR (VIS)	None	None				Good	MF + VF		Clear smooth
2	58	SCL	10YR63	2% HR (VIS)	CDFO (10YR58)	None	MCSAB	Friable	Moderate	Good	CF + VF		Clear smooth
3	85	SC	10YR62	0% (VIS)	CDFO + G (10YR58) (10YR51)	None	WCSAB	Firm	Moderate	Poor * ¹	FF + VF		

Profile Gleyed From 21 cm

Depth to Slowly Permeable Horizon 58 cm

Wetness Class III

Wetness Grade 3a

Available Water Wheat 150 mm

Potatoes 110 mm

Moisture Deficit Wheat 93 mm

Potatoes 83 mm

Moisture Balance Wheat 57 mm

Potatoes 27 mm

Droughtiness Grade 1 (Calculated to 120 cm)

Final ALC Grade 3a

Main Limiting Factor(s) Wetness

Remarks *¹ few large pores