North East of Cam

Agricultural Land Classification

October 1997

Resource Planning Team
Bristol
FRCA Western Region

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NORTH EAST CAM

AGRICULTURAL LAND CLASSIFICATION SURVEY

CONTENTS

CASTLE STREAM FARM DURSLEY

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 59 4 ha of land on the north eastern edge of Cam Dursley Field survey was based on 57 auger borings and three soil profile pits 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 sections The published regional ALC map (MAFF 1977) shows the site at a reconnaissance scale as being mainly Grade 3 with a small area of Grade 2 on the northern edge of the site Apart from this 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 therefore 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 some fields under cereal Other land that was not surveyed includes the residential area at Draycott Farm and a farm tack

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 North east Cam

Grade	Area (ha)	% Surveyed Area (58 6 ha)
2	6 0	10
3a	22 9	40
3b	29 7	50
Other land	0 8	
Total site area	59 4	100

6 Half of the site was graded as best and most versatile The Grade 2 (very good quality) land has a minor drought limitation where the soils are developed over a localised gravel deposit The Subgrade 3a (good quality) land and the Subgrade 3b (moderate quality) land both have a moderate wetness limitation where the soils are developed over Lower Lias clay

CLIMATE

7 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

8 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

9 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

Table 2 Climatic Interpolations North east Cam

Grid Reference		SO 751 014	SO 752 012	SO 756 008
Altitude (m)		30	40	60
Accumulated Temperature (day C)		1499	1488	1465
Average Annual Rainfall (mm)		810	816	825
Overall Climatic Grade		1	1	1
Field Capacity Days		179	180	181
Moisture deficit (mm)	Wheat	99	98	98
	Potatoes	91	89	85

RELIEF

10 Altitude ranges from 30 metres near Draycott Farm to 60 metres below Upper Upthorne Farm The site is gently and moderately sloping with no limitation to its agricultural usage

GEOLOGY AND SOILS

11 The underlying geology of the site is shown on the published geology maps (IGS 1970 1972) as being predominantly Lower Lias clay There is also an area of estuarine alluvium adjacent to the stream in the northern part of the site and a small area of Dyrham Silts at the most easterly part of the site The soils found during the recent survey indicate that the parent material is probably Lias clay across most of the site There was no evidence of Dyrham silts being present but evidence of the alluvium was found An area of gravel deposits was also found This is to the North west of Draycott Farm

12 Soil across the 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 and Martock Associations

13 The Curtisden soils are described as being silty soils over siltstone with slowly permeable subsoils and slight seasonal waterlogging There may be some similar soils which are well drained Others may also be well drained but are coarse loamy soils where they have developed over sandstone The Martock soils are also developed over siltstone or possibly shale They are described as being slowly permeable seasonally waterlogged stoneless clayey soils Some similar soils are only slowly permeable in the subsoil and have slight seasonal waterlogging

14 The soils found during the recent survey were generally similar to those described in Paragraph 13 In the northern part of the site there is also an area of well drained clay loams over heavy clay loam and gravel

AGRICULTURAL LAND CLASSIFICATION

15 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

16 The land mapped as Grade 2 has a minor workability and droughtiness limitations The profiles have medium clay loam topsoils over heavy clay loam and gravel subsoils They were assessed as Wetness Class I (see Appendix II) with a minor workability limitation Due to the gravel in the lower subsoil 62% hard rock by volume the amount of available moisture in the profile is reduced The soils are therefore not able to meet the potential crop moisture requirements throughout the year

Subgrade 3a

16 The Subgrade 3a mapping units are slightly variable The profiles tend to be medium clay loam topsoils over heavy clay loam and 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 with a moderate wetness limitation Soil profile pit 2 is representative of this mapping unit The occassional well drained profile is found in this mapping unit but thay can not be shown at this level of survey

Subgrade 3b

17 The land that was mapped as Subgrade 3b also has a moderate wetness limitation These profiles are gleyed from below the topsoil and have slowly permeable layers that start higher up the profile than the Subgrade 3a land They were assessed as Wetness Classes IV With a medium clay loam topsoil this is a moderate wetness limitation Soil profile pit 3 is representative of this mapping unit A few isolated profiles have heavy clay loam topsoils and

are Grade 4 with a serious wetness limitation It was not possible to map these areas at this level of survey The poor drainage means that the soil water regime will adversely affect plant growth and impose restrictions on cultivations and grazing by livestock

Other Land

19 Other land that was not surveyed includes the residential buildings at Draycott Farm and a farm track

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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 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

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
North East Cam	Pit 1 (ASP 2)	2 South East	Permanent Grass	Av Rainfall 816 mm ATO 1488 day C	Lower Lias and Lower Jurassic Clay
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 180 Climatic Grade 1 Exposure Grade 1	PSD SAMPLES TAKEN
66/97	4/9/97	SO 753 004	SH/HLJ		None

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	18	MCL	10YR42	1% HR TOTAL (VIS)	None	None					MF + VF		Abrupt smooth
2	45	HCL	25Y54	2% 2 m (S d) [1] 29% < 2 m (S d) 31% T tal HR	None	None	MDMSAB	Friable	Good	Good	CF + VF		Gradual smooth
3	100	HCL	25Y54 25Y52	4% > 2 m (S) 58% < 2cm (S+D) 62% HR T tal	None	None	WCSAB breaking to MSAB	Friable	Good	Good	FVF		Abrupt smooth
4	120	MZCL	25Y51 52	< 1% HR (V)	None	None			Moderate *[2]	Good			

Profile Gleyed From Not gleyed

Depth to Slowly Permeable Horizon No SPL

Wetness Class I

Wetness Grade 2

Available Water	Wheat	125 mm
	Potatoes	94 mm
Moisture Deficit	Wheat	98 mm
	Potatoes	89 mm
Moisture Balance	Wheat	27 mm
	Potatoes	5 mm

Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 2

Main Limiting Factor(s) Workability and Drought

Remarks Gravel increases with soil depth to 100 cm then onto alluvium *[2] assumed
*[1] average of 2 measurements (22% and 36% < 2cm)

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE			PARENT MATERIAL
North East Cam	Pit 2 (ASP 53)	2 West	Stubble	Av Rainfall	816 mm	Lower Lias and Lower Jurassic Clay
				ATO	1488 day C	
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days	180	PSD SAMPLES TAKEN
66/97	5/9/97	SO 751 016	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	28	MCL	10YR42	<1% HR (VIS)	None	None					MF + VF		Clear smooth
2	45	HCL	10YR53 52	<1% HR (VIS)	FDFO (10YR56)	None	MCSAB	Friable	Moderate	Good	CF + VF		Clear smooth
3	63	C	25Y51 52	0% (VIS)	CDFO (10YR56)	Common	MCAB (Some CPr)	Firm	Poor	Poor	FF + VF		Gradual smooth
4	90+	C	10Y61 25Y51	0% (VIS)	MDFO (75YR58)	Few	WCPr (Some CAB)	Firm	Poor	Poor	FVF		

Profile Gleyed From 45 cm

Depth to Slowly Permeable Horizon 45 cm

Wetness Class III

Wetness Grade 3a

Available Water	Wheat	133 mm
	Potatoes	110 mm
Moisture Deficit	Wheat	98 mm
	Potatoes	89 mm
Moisture Balance	Wheat	35 mm
	Potatoes	21 mm
Droughtiness Grade	1	(Calculated to 120 cm)

Final ALC Grade 3a

Main Limiting Factor(s) Wetness

Remarks Variable structure in SPLs

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE			PARENT MATERIAL
North East Cam	Pit 3 (ASP 30)	2 North West	Stubble/Fallow	Av Rainfall	816 mm	Lower Lias and Lower Jurassic Clay
				ATO	1488 day C	
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days	180	PSD SAMPLES TAKEN
66/97	5/9/97	SO 752 009	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	22	MCL	10YR42	<1% HR (VIS)	None	None					CF + VF		Clear smooth
2	35	HCL	10YR52 53	0% (VIS)	FDFO (10YR56)	None	MCSAB	Friable	Moderate	Good	CF + VF		Clear smooth
3	70	C	10Y61	0% (VIS)	CDMO (75YR58)	Few	MCPr	Firm	Poor	Poor	FVF		

Profile Gleyed From	35 cm	Available Water	Wheat	129 mm	Final ALC Grade 3b
Depth to Slowly Permeable Horizon	35 cm		Potatoes	106 mm	Main Limiting Factor(s) Wetness
Wetness Class	IV	Moisture Deficit	Wheat	98 mm	
Wetness Grade	3b		Potatoes	89mm	
		Moisture Balance	Wheat	31 mm	Remarks
			Potatoes	17 mm	
		Droughtiness Grade 1		(Calculated to 120 cm)	

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