Gloucestershire Minerals Plan Lady Lamb Farm South Fairford

Agricultural Land Classification

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LADY LAMB FARM SOUTH FAIRFORD

AGRICULTURAL LAND CLASSIFICATION SURVEY

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LADY LAMB FARM SOUTH FAIRFORD

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

- This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 29 4 ha of land at Lady Lamb Farm South Fairford Field survey was based on 30 auger borings and 3 soil profile pits and was completed in September 1997 During the survey 3 samples were analysed for particle size distribution (PSD)
- 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 Gloucesterhsire Minerals Plan
- 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 2 in the east and south the rest grade 3 the site was previously surveyed in 1979 at a scale of 1 25 000 (ADAS 1979). 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.
- The site was surveyed as part of the much larger survey of the Costwold Water Park in 1979. Seven borings were made within the current survey area. The findings of the 1979 survey are confirmed in the current survey which is more detailed and places the grade boundaries more accurately. Land to the north was surveyed in 1993 (ADAS 1993). This survey found Subgrade. 3a over stony soils and some areas of more poorly drained soils mapped as Subgrade 3b.
- 5 At the time of survey land cover was arable cropping

SUMMARY

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 Lady Lamb Farm South Fairford

Grade	Area (ha)	% Surveyed Area (29 4 ha)
2	3 7	13
3a	19 2	65
3a 3b	6 5	22
Total site area	29 4	

This shows that the majority of the site was found to be best and most versatile Small areas of Grade 2 are shown in the east where well drained slightly stony soils have a minor workability limitation. The main area of Subgrade 3a land has a moderate droughtness limitation imposed by stony subsoils. The other land shown as Subgrade 3b is limited mainly by wetness.

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
- 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.
- 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 Lady Lamb Farm South Fairford

Grid Reference	SU 142 987	SU 143 999
Altitude (m)	84	86
Accumulated Temperature (day C)	1429	1426
Average Annual Rainfall (mm)	714	720
Overall Climatic Grade	1	1
Field Capacity Days	160	161
Moisture deficit (mm) Wheat	103	102
Potatoes	94	93

RELIEF

Altitude ranges from 87 metres at the northern tip to 84 metres at the south end of the site. The topography is gently undulating with a slight dip along the stream in the middle of the site.

GEOLOGY AND SOILS

- The underlying geology of the site is shown on the published geology map (IGS 1974) as upper Jurassic Kellaways Clays at the western fringe of the site. The main part of the site is shown as recent drift deposits of Second Terrace River deposits which are mainly gravel. This was largely borne out by the recent survey although the boundaries were more variable than indicated by the geology map.
- Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as Evesham 2 in the western part of the site and Badsey Association in the east reflecting the mapped geology
- Evesham 2 Association is described as a slowly permeable calcareous clayey soil with some slowly permeable seasonally waterlogged non calcareous clayey and fine loamy or fine silty over clayey soils. Badsey 2 Association is described as well drained calcareous fine loamy soil over limestone gravel.
- Soils typical of Evesham 2 were found in the west of the site. The soils related to Badsey 2 Association were more variable with the stony layers occurring at variable depths and in places not within the augured profile. As indicated for the geology the pattern of soils was found to be more variable than indicated on the published map

AGRICULTURAL LAND CLASSIFICATION

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

Small areas of Grade 2 very good quality land have been mapped along the eastern edge of the site. These soils have a minor workability limitation imposed by a heavy clay loam topsoil. Profiles are well drained and were assessed as Wetness Class I. The soils are slightly stony and also have a minor droughtness limitation. Pit 3 was dug in the northern block of Grade 2 to describe the subsoil structural conditions of these soils.

Subgrade 3a

The majority of the site has been mapped as Subgrade 3a good quality land. These soils are stony and have a moderate droughtness limitation. The auger borings were often impenetrable to the auger before the full 120 cm was reached. Pit 1 was dug in an area of the shallowest borings. This showed that the subsoil stone content increased from 58% in the upper subsoil to gravel in the lower subsoil. The available water in this profile was borderline Subgrade 3a/3b and represents the worst droughtiness on the site. Other borings were generally found to be less stony and therefore less droughty having lower topsoil stone contents and were deeper to impenetrable very stony layers. Included on this unit are occasional wet profiles.

Subgrade 3b

Two areas of Subgrade 3b moderate quality land have been mapped. These soils are poorly drained due to slowly permeable subsoils. Pit 2 was dug in this unit, and showed that the subsoil was slowly permeable from 28 cm, where gleying also started. This was assessed as Wetness Class IV, typical of many profiles in this mapping unit, and with clay topsoil this implies a moderate wetness limitation.

G M SHAW Resource Planning Team FRCA Bristol September 1997

REFERENCES

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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	ΑE	Aspect	$\mathbf{E}\mathbf{X}$	Exposure
FR	Frost Risk	GR	Gradient	MR	Microrelief

FL	Flood Risk	TX	Topsoil Texture	DP	Soil Depth
CH	Chemical	\mathbf{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	\mathbf{CL}	Clay Loam	ZCL	Sılty Clay Loam		
ZL	Silt Loam	SCL	Sandy Clay	\mathbf{C}	Clay		
			Loam				
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 Adhere			, ,				
	MD develo	Moderately ped	ST	Strongly developed				
Ped size	\mathbf{F}	Fine	M	Medium				
	С	Coarse	VC	Very coarse				
Ped Shape	S	Single grain	M	Massive				
	GR	Granular	AB	Angular blocky				
	SAB PL	Sub angular blocky Platy	PR	Prismatic				

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%</th>
 VM
 Very Many
 >40%

C Common 2 20%

POROSITY

Poor less than 0 5% biopores at least 0 5mm in diameter
 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
\mathbf{F}	Few	1 10	1 or 2
C	Common	10 25	2 5
M	Many	25 200	>5
\mathbf{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</th>
 Gradual
 6.13cm

 Abrupt
 0.5.25cm
 Diffuse
 >13cm

Clear 2.5 6cm

HORIZON BOUNDARY FORM Smooth wavy irregular or broken *

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

		PROFILE NO SLOPE Pit 1 (ASP 24)		SLOPE AND ASPECT			LAND USE Ploughed			laınfall	= 0.0		PARENT MATERIAL 2nd Terrace River Deposits			
South			,		1 South	i		J		АТО	•	1426 day	c			
JOB NO		DAT	TE	GRID I	REFERENC	É	DES	CRIBED B	Ÿ	FC D	ays	161		PSD SAMPLES TAKEN		
59 97		17 9	97	SU 141	0 9890		HLJ				atic Grade	1		Topsoil 0 25 cm clay (S 23% Z 37% C 40%)		
Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Ped Face) Colours	Field M	pe and lethod	Mottling Abundance Contrast Size and Colour		Mangan Concs	Structure I Developme Size and Shape	Ped ent	Consistence	Structural Condition	Pores (Fissures)	Roots Abundance and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form
1	28	С	25Y44	19 > 2 cr 169 2 17% HR	m (+ d)	None		None MCSAE		3	Friable	Moderate	Good	CF + VF		Clear Smooth
2	55	С	25Y54	49 > 2 cr 549 < 2 58% HR	m (+ d)	None None		Few	MFSAB		Friable	Good	Good	CF + VF		Clear Smooth
3	115	MSL	25Y64	109 > 2 64% < 2 74% GH	m (+ d)	None		None Single Gi		ain	Loose	Moderate	Good	FF + VF	_	
Profile G	leyed Fron	n Not G	lleyed		Available	Water W	Vheat 84 mm				Final ALC Grade 3a					
Slowly Po	From	No sp	ol		Potatoes 73 mm Moisture Deficit Wheat 102 mm						Main Limiting Factor(s) Workability Droughtiness					
Wetness Class 1 Potatoes 93 mm																
Wetness Grade 3a					Moisture E	Balance W	/heat	18 п	nm			Remarks	* Coi	nmon to 50 cm		<u> </u>
	Potatoes 20 mm						nm			Remarks Common to 30 cm						
Droughtiness Grade 3a (Calcula								ulated to 120	cm)							

SITE NAME Lady Lamb Farm South			PROFILE NO SLOPE Pit 2 (ASP 14)		LOPE AND ASPECT Flat		rioughed		Av	Rainfall	720 mm 1426 day C		PARENT MATERIAL Kellaways Clays		
JOB NO		DAT	E	GRID I	REFERENC	E	DESCRIBED BY FC Days		161	ŀ	PSD SAMPLE	PSD SAMPLES TAKEN			
59 97		179	97	SU 141	0 9930		ны			Climatic Grade 1					
Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Ped Face) Colours	Stonine Size Ty Field M	pe and	Mottling Abundance Contrast Size and Colour	Mangan Concs	Structure Developm Size and Shape	Ped	Consistence	Structural Condition	Pores (Fissures)	Roots Abundance and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form
1	28	С	25Y53* ¹ 10YR56	57 HR ()	None	None	MCSAE	3* ²	Fırm	Moderate	Good	CF + VF		Clear Smooth
2	58	C	2 5Y63 5Y63	5% HR ()	CDFO 10YR56	None	WCSAB MCAE		Firm	Poor	Good	CVF		Abrupt Wavy
3	120	С	5Y62	5% HR ()	CDMO 10YR56	Few	MCSA tending prismat	to	Firm	Poor	Good	FVF	_	
Profile G	leyed Fron	n 28 cm			Available Water Wheat 119 mm						Final ALC Grade 3b				
Slowly Pe Horizon I		28 cm			Potatoes 97 mm						Main Limit	ing Factor(s) Wetness		
Wetness (Class	IV			Moisture Deficit Wheat 102 mm										
Wetness	Grade	3b			Moisture B			mm mm							
Moistu				Moisture 1						Remarks		me mixing with			
	Potatoes 4 mm Droughtiness Grade 2 (Calculated to 12)				0 cm))		Dug	to 95 cm augerentered stone enco	ed to 120 So					
											1				

SITE NAME Lady Lamb Farm South			PROFILE NO Pit 3 ASP 9		SLOPE AND ASPECT 0			LAND USE PLO		Av Raınfall ATO	720 mm 1426 day	720 mm 1426 day C		PARENT MATERIAL 2nd Terrace River Deposits		
JOB NO 59/97			DATE 17/9/97		GRID REFERENCE SU 1430 9960			DESCRIBED BY HLJ/GMJ		FC Days Climatic Grade Exposure Grade	161 1 1		PSD SAMPLES TAKEN Topsoil HZCL S 18% Z 52% L 30%			
Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness Size Type and Field Method		Mottling Abundanc Contrast Size and Colour		Mangan Concs	Structure I Developme Size and Shape	Ped	Structural	Pores (Fissures)	Roots Abundance and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form	
1	28	HZCL 10YR43		1% > 2 m() 5% 2 mm (+d) 6% HR		None		None	WCSAB	Friable	Moderate	Good	CF + VF		Abrupt Smooth	
2	68	C 75YR54		10% HR (s)		None		None	WCSAB	Friable	Moderate	Good	FF + VF		Clear Smooth	
3	95	С	10YR64	5% HR ()		CFFO 10YR56		Common	MCSAB	Friable	Moderate	Good	FF + VF		Clear Wavy	
4	115+	С	10YR56	40% HR max	()	Some coloui variation		None WCSA		Friable	Moderate	Good	FVF			
Profile Gleyed From 68 cm					Available Water Wheat 128 mm						Final ALC Grade 2					
Slowly Po Horizon I		No sp	1	Potatoes 111 mm Moisture Deficit Wheat 102 mm						Main Limit	Main Limiting Factor(s) Workability Droughtiness					
Wetness	Class	I			Potatoes 93 mm											
Wetness	Grade	3a	3a			Balance W	Theat 26 mm otatoes 18 mm				Remarks	Remarks * Colours in H3 are vague Stones sitting on top of H2 and H3				
					Droughtine	ess Grade 2	:	(Calcı	ulated to 120	cm)						