

Gunhouse Lane, Stroud
Agricultural Land Classification
April 1998

Resource Planning Team
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FRCA Western Region

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GUNHOUSE LANE STROUD
AGRICULTURAL LAND CLASSIFICATION SURVEY

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GUNHOUSE LANE STROUD

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 4.2 ha of land on Gunhouse Lane Stroud. Field survey was based on 6 auger borings and 1 soil profile pit and was completed in March 1998.

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 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 being Grade 5, 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 grassland for grazing. Land which was not surveyed includes an area of residential buildings and associated gardens.

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 Gunhouse Lane**

Grade	Area (ha)	% Surveyed Area (3.7 ha)
3a	3.7	100
Other land	0.5	
Total site area	4.2	

6 The whole of the site has been mapped as best and most versatile at Subgrade 3a. Within this mapping unit, there are profiles with moderate limitations due to wetness and drought in a varied pattern which is caused by the variable geology of the site.

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 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 Gunhouse Lane

Grid Reference	SO 859 042	SO 861 041	SO 862 041
Altitude (m)	55	70	85
Accumulated Temperature (day °C)	1466	1449	1432
Average Annual Rainfall (mm)	840	850	860
Overall Climatic Grade	1	1	1
Field Capacity Days	176	178	180
Moisture deficit (mm) Wheat	94	92	90
Potatoes	83	80	77

RELIEF

10 Altitude ranges from 55 metres near London Road to 90 metres near Thrupp Farm The site is mainly gently sloping with some areas of level ground giving no agricultural limitation

GEOLOGY AND SOILS

11 The underlying geology of the site is shown on the published geology map (IGS 1975) as being landslip and foundered strata This variable geology was borne out by the variable soil types found during the current survey

12 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) This shows soils from the Curtisdens Association which are described as being silty soils over siltstone with slowly permeable subsoils and slight seasonal waterlogging and some similar well drained soils and some well drained coarse loamy soils developed over sandstone

13 The general distribution of soils found was as expected with areas of slowly permeable subsoils among better drained stonier soils

AGRICULTURAL LAND CLASSIFICATION

14 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

15 The whole site has been mapped as Subgrade 3a with a moderate wetness limitation or in places a moderate drought limitation. Where the profiles are deeper they have medium or heavy clay loam topsoils over heavy clay loam upper subsoils and clay lower subsoils. The lower subsoils have evidence of wetness and are gleyed. They are also slowly permeable layers with restricted porosity. These profiles were assessed as Wetness Class II (see Appendix II) and are illustrated by Pit 1.

16 Two of the borings were impenetrable to a soil auger at 40 or 50 cm due to stone in the upper subsoil. It was assumed that they are no worse than Wetness Class III which with medium clay loam topsoils would still be Subgrade 3a. Available water calculations showed that at worst with bedrock from the depth at which they were impenetrable they would still be Subgrade 3a.

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April 1998

REFERENCES

HODGSON J M (Ed) (1974) Soil Survey Field Handbook Soil Survey Technical Monograph No 5 SSLRC Cranfield University

INSTITUTE OF GEOLOGICAL SCIENCES (1975) Sheet 234 Gloucester 1 50 000 series Solid and Drift edition IGS London

MAFF (1977) 1 250 000 series Agricultural Land Classification South West Region MAFF Publications Alnwick

MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for grading the quality of agricultural land MAFF Publications Alnwick

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

SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 5 Soils of South West England 1 250 000 scale SSEW Harpenden

SOIL SURVEY OF ENGLAND AND WALES (1984) Soils and Their Use in South West 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 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 (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 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 (In preparation) Soil Survey Field Handbook Revised Edition

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 1974)

1 Terms used on computer database in order of occurrence

GRID REF National 100 km grid square and 8 figure grid reference

USE 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		

ASPECT The aspect of the land

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

M REL	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

GLEYS If the soil horizon is gleyed a **Y** will appear in this column. If slightly gleyed and **S** will appear

STONE LITH Stone Lithology One of the following is used

HR	All hard rocks and stones	SLST	Soft oolitic or dolomitic 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	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 in 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%			

STRUCTURE Ped Development *

WA	Weakly adherent	M	Moderately developed
W	Weakly developed	S	Strongly developed

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 1974) for details

SITE NAME		PROFILE NO	SLOPE AND ASPECT	LAND USE	Av Rainfall	850 mm	PARENT MATERIAL					
Gunhouse Lane Stroud		Pit 1(Asp 2)	6 West	Permanent Grass	ATO	1449 day C	Landslip and foundered strata					
JOB NO		DATE	GRID REFERENCE	DESCRIBED BY	FC Days	178	SOIL SAMPLE REFERENCES					
35/98		23/3/98	SO 8613 0420	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	23	HCL	10YR43	2 / HR (Vis)	None	None					MF & VF		Clear Wavy
2	68	HCL	10YR54 56	5 / HR (Vis)	None	Few	MDCSAB	Friable	Moderate	Good	CF & VF		Clear Smoth
3	90 +	C	10YR64	0 / (Vis)	CDFO (75YR56) CDFG (25Y52)	Common	WKCPR	Firm	Poor	Poor	FVF		

Profile Gleyed From 68 cm
Depth to Slowly Permeable Horizon 68 cm
Wetness Class II
Wetness Grade 3a

Available Water Wheat 135 mm
Potatoes 112 mm
Moisture Deficit Wheat 92 mm
Potatoes 80 mm
Moisture Balance Wheat 43 mm
Potatoes 32 mm
Droughtiness Grade 1 (Calculated to 120 cm)

Final ALC Grade 3a
Main Limiting Factor(s) Wetness
Remarks Water coming above H3
A few sandy patches in H3 rotten sandstone ?