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Gloucestershire Minerals Plan
Shorncote Somerford Keynes

Agricultural Land Classification

September 1997

Resource Planning Team
Bristol
FRCA Western Region

Job Number 58/97

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SHORNCOTE SOMERFORD KEYNES

AGRICULTURAL LAND CLASSIFICATION SURVEY

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SHORNCOTE SOMERFORD KEYNES
AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 15 6 ha of land at Shorncote Somerford Keynes Field survey was based on 16 auger borings and 2 soil profile pits and was completed in September 1997 During the survey 1 sample was 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 Gloucestershire Minerals 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 2 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

4 The site was surveyed in 1979 as part of a much larger area in the Cotswold Water Park The northern part of the site was mapped as Grade 2 with Subgrade 3a in the south where the stony layers were shallower During the 1979 survey only two auger borings were made on this site approximately at the positions of the pits dug in the current survey The current survey shows more Grade 2 but has greater boring detail and the boundary between grades has been more accurately placed Land to the east was surveyed in 1993 at the Cotswold Community (ADAS 1993) and in 1995 at Shorncote Quarry (ADAS 1995) These surveys showed similar stony soils

5 At the time of survey land cover was grass Other land which was not surveyed included a newly planted small wood

SUMMARY

6 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 Shorncote Somerford Keynes

Grade	Area (ha)	% Surveyed Area (14 9 ha)
2	9 4	63
3a	5 5	37
Other land	0 7	
Total site area	15 6	

7 The soils are similar across the site and all the agricultural land is mapped as best and most versatile In the north the profiles are stony at a greater depth than in the south and experience a minor droughtness limitation Grade 2 whereas in the south the moderate droughtness limitation restrict the soils to Subgrade 3a

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 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 Shorncote Somerford Keynes

Grid Reference		SU 025962	SU 024 965
Altitude (m)		90	92
Accumulated Temperature (day C)		1426	1424
Average Annual Rainfall (mm)		758	763
Overall Climatic Grade		1	1
Field Capacity Days		174	175
Moisture deficit (mm)	Wheat	97	97
	Potatoes	87	86

RELIEF

11 Altitude ranges from 90 metres in the south to 92 metres in the north with a virtually flat site

GEOLOGY AND SOILS

12 The underlying geology of the site is shown on the published geology map (IGS 1974) as the First Terrace River Deposits Upper Jurassic Clays are mapped to the north of the site but the recent survey found only soils developed on the Terrace deposits

13 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as Badsey 2 Association which is described as comprising well drained calcareous loamy soils on limestone gravel The recent survey found soils typical of the Badsey 2 description with varying depth to the stony horizons

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

Grade 2

15 The northern part of the site is mapped as Grade 2 very good quality land These soils have a minor droughtness limitation becoming increasingly stony with depth but the soil texture is generally clay loam until deep in the profile where it becomes sandier The profile is generally well drained Wetness Class I (see Appendix II) This is illustracted by Pit 2

Subgrade 3a

16 The southern part of the site is mapped as Subgrade 3a good quality land These soils are similar to those described above but are stonier higher in the profile This is illustrated by Pit 1 with stone contents assessed by sieving and displacement The greater stone content reduces the amount of water available in the profile and a moderate droughtness limitation is imposed These soils are also Wetness Class I

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September 1997

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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

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE			PARENT MATERIAL
Shorncote Somerford Keynes	1 (ASP14)	Flat	Permanent Grass	Av Rainfall ATO	758 mm 1426 day C	1st Terrace River Deposits
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days Climatic Grade Exposure Grade	174 1 1	PSD SAMPLES TAKEN Topsoil 0 25 cm HZCL/HCL/ZC/C (S 20% Z 45% C 35%)
58/97	16/9/97	SU02489650	HLJ/PRW			

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	14	HZCL	10YR43	1% HR ( )	None	None	MFSAB*[1]	Friable	Good	Good	MF + VF		Abrupt Smooth
2	38	HCL	10YR44	1% 2 m ( ) 27% < 2 m (+d) 27% HR t t l	None	None	MMSAB	Friable	Good	Good	CF + VF		Abrupt Smooth
3	100+	MS	10YR64	4% > 2 cm ( ) 58% < 2 m (+d) 62% HR t t l	None	None	Single Grain	Loose	Moderate	Good	FF + VF		

Profile Gleyed From	Not gleyed	Available Water	Wheat	77 mm	Final ALC Grade 3a
Slowly Permeable Horizon From	No spl		Potatoes	70 mm	Main Limiting Factor(s) Droughtiness
Wetness Class	I	Moisture Deficit	Wheat	97 mm	
Wetness Grade	2		Potatoes	87 mm	
		Moisture Balance	Wheat	20 mm	Remarks *[1] almost granular
			Potatoes	17 mm	
		Droughtiness Grade 3a		(Calculated to 120 cm)	

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE			PARENT MATERIAL
Shorncote Somerford Keynes	Pit 2 (ASP 3)	Flat	Permanent Grass	Av Rainfall ATO FC Days Climatic Grade Exposure Grade	758 mm 1426 day C 174 1 1	1st Terrace River Deposits
JOB NO 58/97	DATE 18/9/97	GRID REFERENCE SU02549602	DESCRIBED BY HLJ			PSD SAMPLES TAKEN

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	HCL	10YR42	<5%> 2 cm (s) 5%<2 m (s + d) 5% HR	None	None	MMSAB	Friable	Good	Good	MF + VF		Clear Smooth
2	56	HCL	10YR53	1% 2 cm (s) 9% < 2 m (+d) 10% HR total	None	None	MCSAB	Friable	Moderate	Good	CF + VF		Abrupt Wavy
3	65	HCL	10YR53	1% > 2 cm ( ) 27% 2 m (+d) 28% HR t t l	None	None	MCSAB	Friable	Moderate	Good	CF + VF		Abrupt Wavy
4	115+	MSL	2 5Y64 63	5% > 2 m ( ) 55% < 2 cm (s + d) 60% HR T t l	None	None	MFGR	Friable	Good	Good	FF + VF		

Not gleyed

Profile Gleyed From No spl

Slowly Permeable Horizon From I

Wetness Class 2

Wetness Grade

Available Water	Wheat	121 mm
	Potatoes	102 mm
Moisture Deficit	Wheat	97 mm
	Potatoes	87 mm
Moisture Balance	Wheat	24 mm
	Potatoes	15 mm
Droughtiness Grade	2	(Calculated to 120 cm)

Final ALC Grade 2

Main Limiting Factor(s) Droughtiness workability

Remarks

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