

Chipping Sodbury
Agricultural Land Classification

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Resource Planning Team
Bristol
FRCA Western Region

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CHIPPING SODBURY
AGRICULTURAL LAND CLASSIFICATION SURVEY

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CHIPPING SODBURY

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 144.4 ha of land at west of Chipping Sodbury. Field survey was based on 60 auger borings and 3 soil profile pits, and was completed in March 1997.
2. The survey was conducted by the Resource Planning Team of FRCA Western Region (formerly ADAS Taunton Statutory Group) on behalf of MAFF in its statutory role in the preparation of South Gloucestershire 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 along the southern edge, 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 mainly grazing with some arable on the higher land. Other land which was not surveyed included woodland and residential areas.

SUMMARY

5. The distribution of ALC grades is shown on the accompanying 1:20 000 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: Chipping Sodbury

Grade	Area (ha)	% Surveyed Area (130 ha)
4	130	100
Other land	15	
Total site area	145	

6. All the agricultural land surveyed is mapped as Grade 4. These soils are poorly drained and have a severe wetness limitation.

12. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW, 1983) as mainly Denchworth Association but with a large area of Evesham 1 Association mapped across the centre of the site.

13. Evesham 1 Association is described as slowly permeable calcareous clayey soils associated with shallow well drained brashy calcareous soils over limestone. Denchworth Association is also slowly permeable clayey soils seasonally waterlogged.

14. The recent survey found soils typical of the Denchworth Association. On the higher land some evidence of calcareous Evesham 1 soils was found particularly in the soil pits where limestone was encountered.

AGRICULTURAL LAND CLASSIFICATION

15. The distribution of ALC grades found by the current survey is shown on the accompanying 1:20 000 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 4

16. All of the agricultural land has been mapped as poor quality land with severe wetness limitations. The heavy clay loam and clay topsoils overlie slowly permeable clay subsoils. The soils are sometimes gleyed even from the surface. The subsoils are poorly structured with low porosity. These soils are assessed as Wetness Class IV (see Appendix II). The extent and duration of waterlogging means that these soils have limited versatility in terms of agricultural use.

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April 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 (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.

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.

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
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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>	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
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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 Chipping Sodbury		PROFILE NO. Pit 1	SLOPE AND ASPECT 0°	LAND USE OSR	Av Rainfall: 830 mm ATO: 1421 day °C FC Days: 185 Climatic Grade: 1 Exposure Grade: 1	PARENT MATERIAL Limestone
JOB NO. 5/97		DATE 19/3/97	GRID REFERENCE ST 7400 8230	DESCRIBED BY GMS		PSD SAMPLES TAKEN 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	27	HCL	10YR41	Neg	None	None	-	-	-	-	FVF	-	Abrupt smooth
2	40	C	2.5Y52	10% SLST (VIS)	CDFO 10YR58	Common	WCSAB	Firm	Poor	Poor	CVF	-	Gradual wavy
3	60+	C	2.5Y52	30% SLST (VIS)	CDFO 10YR58	None	Affected by stones	Affected by stones	-	-	-	-	-

Profile Gleyed From: 27 cm

Depth to Slowly Permeable Horizon: 27 cm

Wetness Class: IV

Wetness Grade: 4

Available Water Wheat: 92 mm

Potatoes: 95 mm

Moisture Deficit Wheat: 90 mm

Potatoes: 78 mm

Moisture Balance Wheat: 2 mm

Potatoes: 17 mm

Droughtiness Grade: 3a (Calculated to 80 cm)

Final ALC Grade: 4

Main Limiting Factor(s): Wetness

Remarks: Effect on drainage of SPL by stones is debatable. Between the large stones soil is very thick clay with good mottling. Since this extent of stones not found in any borings assume not typical

SITE NAME		PROFILE NO.	SLOPE AND ASPECT	LAND USE	Av Rainfall: 830 mm	PARENT MATERIAL	
Chipping Sodbury		Pit 2	0°	OSR	ATO: 1421 day °C	Limestone	
JOB NO.		DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 185	PSD SAMPLES TAKEN	
5/97		19/3/97	ST 7390 8220	GMS	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	24	C	10YR41	None	None	None	-	-	-	-	FVF	-	Abrupt smooth
2	45	C	2.5Y52	None	CDFO 10YR56	Common	WCSAB	Firm	Poor	Poor	CVF	-	Gradual wavy
3	60+	C	2.5Y52	10% SLST (VIS)	CDFO 10YR56	Common	As H2	-	-	-	-	-	-

Profile Gleyed From: 24 cm	Available Water	Wheat: 94 mm	Final ALC Grade: 4
Depth to Slowly Permeable Horizon: 24 cm		Potatoes: 98 mm	Main Limiting Factor(s): Wetness
Wetness Class: IV	Moisture Deficit	Wheat: 90 mm	
Wetness Grade: 4		Potatoes: 78 mm	
	Moisture Balance	Wheat: 4 mm	
		Potatoes: 20 mm	
	Droughtiness Grade: 3a	(Calculated to 80 cm)	Remarks:

SITE NAME Chipping Sodbury		PROFILE NO. Pit 3	SLOPE AND ASPECT 0°	LAND USE PGR	Av Rainfall: 830 mm ATO: 1421 day °C	PARENT MATERIAL Lower Lias Clay
JOB NO. 5/97		DATE 19/3/97	GRID REFERENCE ST 7490 8210	DESCRIBED BY GMS	FC Days: 185 Climatic Grade: 1 Exposure Grade: 1	PSD SAMPLES TAKEN 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	28	HCL	10YR41	None	CDFO 10YR56	None	-	-	-	-	MVF	-	Gradual smooth
2	60+	C	2.5Y52,53	None	CDFO 10YR58	None	WMCAB	Firm	Poor	Poor	CVF	-	-

Profile Gleyed From: Surface	Available Water	Wheat: 86 mm	Final ALC Grade: 4
Depth to Slowly Permeable Horizon: 28 cm		Potatoes: 92 mm	Main Limiting Factor(s): Wetness
Wetness Class: IV	Moisture Deficit	Wheat: 90 mm	
Wetness Grade: 4		Potatoes: 78 mm	
	Moisture Balance	Wheat: -4 mm	
		Potatoes: +14 mm	Remarks:
	Droughtiness Grade: 3a	(Calculated to 60 cm)	