

Noverton Lane, Prestbury, Cheltenham

Agricultural Land Classification

February 1999

Resource Planning Team
Bristol
FRCA Western Region

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NOVERTON LANE, PRESTBURY, CHELTENHAM
AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 5.5 ha of land at Noverton Lane, Prestbury, Cheltenham. Field survey was based on 8 auger borings and 1 soil profile pit, and was completed in February 1999. During the survey one 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 the Tewkesbury Local Plan.
3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant section. The published regional ALC map (MAFF 1977) shows the site at a reconnaissance scale as being all Grade 4. The site had not been previously surveyed. 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.
5. At the time of the current survey land cover was permanent pasture. Other land includes the remains of a farm building and a residential area.

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 Table 1.

Table 1: Distribution of ALC grades: Noverton Lane, Prestbury, Cheltenham.

Grade	Area (ha)	% Surveyed Area (5.3 ha)
3a	4.4	83
3b	0.9	17
Other land	0.2	
Total site area	5.5	

7. The majority of the site has been mapped as Subgrade 3a good quality agricultural land, with some Subgrade 3b land on the northern edge. Subgrade 3a land is characterised by heavy clay loam topsoils at Wetness Class II with a slowly permeable layer starting in the lower subsoil, the Subgrade 3b land has heavy clay loam topsoils at Wetness Class III with the slowly permeable layer starting higher up in the profile than the 3a land.

13. There does appear to be some correlation between the geology and the soils found on the site. The majority of the site was found to have clayey subsoils, typically derived from Lias Clay geology, however there was also an area of sandy soils not expected.

14. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW 1983) as Urban but the surrounding area was mapped as Evesham 2.

15. The Evesham 2 soils are described as slowly permeable calcareous clayey soils and slowly permeable seasonally waterlogged non-calcareous clayey and fine loamy or fine silty over clayey soils.

16. The soils found on the site are similar to the above soil associations in that the majority of the soils are fine loamy soils over clayey subsoils with a slowly permeable layer in the lower subsoil.

AGRICULTURAL LAND CLASSIFICATION

17. 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

18. Subgrade 3a, good quality land is mapped across the majority of the site. Nonetheless there were three Grade 2 borings in the west of this mapping unit. The Subgrade 3a land is characterised by heavy clay loam topsoils which are Wetness Class II. Although the upper clay subsoil was not gleyed or slowly permeable the lower clay subsoil was gleyed and slowly permeable. This soil profile is represented by Pit 1, although it should be noted that the thin stony gleyed horizon was not always picked up in the auger borings.

19. The western side of the site was found to have heavy clay loam topsoils in well drained Wetness Class I profiles (borings 1, 2 and 2E). Although borings 2 and 2E did have clay upper subsoils the lower subsoils were sandy clay loam and medium sandy loam, and boring 1 had a sandy clay loam upper subsoil and a loamy medium sand lower subsoil. None of these subsoils were gleyed or slowly permeable, resulting in Wetness Class I, Grade 2 soil profiles. Boring 1 proved to be slightly droughty although this did not affect the overall grade. It was not considered appropriate to map a separate area of Grade 2 considering the small area of the site and these better borings have been included in the overall Subgrade 3a unit.

20. Boring 7 was impenetrable at 60cm and although unable to determine the Wetness Class it is included in the 3a mapping unit. Nevertheless the boring does show signs of wetness which might indicate a possible slowly permeable layer below the stony layer as in Pit 1.

Subgrade 3b

21. The remaining area to the north east of the site has been mapped as moderate quality 3b land. Although similar to the Grade 3a soils with heavy clay loam topsoils over a clay subsoil the gleyed and slowly permeable lower clay subsoil appeared higher up in the profile thus resulting in Wetness Class III Subgrade 3b soils.

22. At 156 FCDays the critical boundary for the Wetness Class proved to be 54cm. If the slowly permeable layer occurred above 54 cm then it was classed Wetness Class III, and if the slowly permeable layer occurred below 54 cm then it was a Wetness Class II soil. Therefore the variability of the depth to the slowly permeable layer is critical. The Wetness Class III, 3b borings had the slowly permeable layer just above 54 cm so it should be noted that these soils only just fall into a 3b soil.

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1 March 1999

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	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

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>	WA: Weakly developed Adherent	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%		

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.

SITE NAME		PROFILE NO.	SLOPE AND ASPECT	LAND USE	Av Rainfall: 689mm	PARENT MATERIAL
Noverton Lane Prestbury, Cheltenham		Pit 1 (ASP 4)	0°	Permanent Grassland	ATO: 1415 day °C	
JOB NO.		DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 156	PSD SAMPLES TAKEN
8/99		18/2/99	SO9780 2381	GN	Climatic Grade: 1	
					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	Porosity	Roots: Abundance and Size	Calcareous	Horizon Boundary: Distinctness and form
1	20	HCL	10YR42/43	1% SLST (vis)	None	None	-	-	-	-	MF	-	Clear Smooth
2	55	C	2.5Y5/4	5% SLST (vis)	FFFO 10YR66	F	MDCSAB	FM	M	G	CF	-	Abrupt Smooth
3	60	C	2.5Y5/3	15% SLST (vis)	MDMO 10YR56	C	Too stony	FM/FR	(Assumed moderate)	G	FF	-	Abrupt Smooth
4	70	C	2.5Y6/3 2.5Y6/2	0% (vis)	MDMO 10YR56 7.5YR56	C	MDCAB	FM	P	P	F,F	-	Clear Smooth
5	80+	C	2.5Y5/2 2.5Y4/1	0% (vis)	MDMO 10YR56 7.5YR56	M	MDCAB	FM	P	P	None seen	-	

Profile Gleyed From: 55

Slowly Permeable Horizon From: 60

Wetness Class: II

Wetness Grade: 3a

Available Water Wheat: 133 mm

Potatoes: 112 mm

Moisture Deficit Wheat: 102 mm

Potatoes: 92 mm

Moisture Balance Wheat: +31mm

Potatoes: +20 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Wetness

Remarks: