Backwell

Agricultural Land Classification

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Resource Planning Team
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AGRICULTURAL LAND CLASSIFICATION SURVEY

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INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 426.3 ha of land at Backwell. Field survey was based on 101 auger borings and 6 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 the replacement Structure Plan for the county previously known as Avon.

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 largely Grade 1 and Grade 2 with Grade 3 west of Flax Bourton Quarry, and Grade 3 and 4 south of the railway line, north of Chelvey and Grove Farm. The site had not been surveyed previously. The current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF, 1988) and therefore supersedes any previous ALC survey. Grade descriptions are summarised in Appendix I.

4. Several areas that lie adjacent to the present site were surveyed in 1985 at a scale of 1: 10 000 (ADAS, 1985 a, b, c). In 1989 land south of Farleigh Road and land south of Moor Lane were surveyed at 1: 10 000 scale (ADAS, 1989 a and b), in 1990 as part of the Woodspring rural areas plan (ADAS, 1990) a small site off Station Road, Flax Bourton was surveyed and in 1994 an extension to Stancombe Quarry, Flax Bourton (ADAS, 1994) was surveyed.

5. The post revision survey of land south of Moor Lane shows Grade 2, Subgrade 3a and Subgrade 3b bordering the present site along Moor Lane with Subgrade 3b and Grade 4 land north of Grove Farm, the limitation to the area being workability and wetness.

6. Land south of Farleigh Road mapped in 1989 under the Revised Guidelines as comprising largely Grade 2 land (workability) with a small area of Subgrade 3a (droughtiness) and some Subgrade 3b land due to gradient.

7. At Flax Bourton, the land west of Station Road is identified as Subgrade 3a as is land mapped in the survey at Flax Bourton Quarry.

8. Attention was paid to the grading of these sites in the grading of the present survey.

9. At the time of survey land cover was permanent pasture, ley grassland, cereals, linseed and oilseed rape. An area of 68.7 ha of agricultural land within the survey area was not surveyed because access could not be obtained. Other land which was not surveyed included urban areas, playing fields, sports grounds and farm buildings.

SUMMARY

10. 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: Backwell

Grade	Area (ha)	% Surveyed Area (250.7 ha)
1	14.8	6
2	83.3	33
3a	115.6	46
3b	35.3	14
5	1.7	1
Agricultural land not surveyed	68.7	
Other land	106.9	
Total site area	426.3	

11. Best and most versatile land covers the majority of the site. Grade 1 land has no limitations. Grade 2 and Subgrade 3a land is limited by workability and wetness. Subgrade 3b land is limited in its agricultural use by topsoil stoniness and gradient. The small area of Grade 5 also has a gradient limitation.

CLIMATE

12. 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.

13.. 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.

14. 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: Backwell

Grid Reference		ST473 684	ST 501 694	ST 498 680
Altitude (m)		8	40	145
Accumulated Temperature (day °C)		1545	1507	1388
Average Annual Rainfall (mm)		843	874	900
Overall Climatic Grade		1	1	1
Field Capacity Days		190	195	199
Moisture deficit (mm):	Wheat	97	92	79
	Potatoes	87	81	64

RELIEF

15. Altitude ranges from 8 metres northwest of Grove Farm, in the west of the site, to 157 metres at Flax Bourton Quarry. The site is generally gently undulating but with some slopes of 9-11° in the areas around Cherry Wood and Court Farm, Chelvey Farm and just east of Park Farm above Farleigh Road. These areas are limited in their agricultural use to Subgrade 3b. Along the footpath south of Cherry Wood gradients of around 24° limit a strip of land to Grade 5.

GEOLOGY AND SOILS

16. The underlying geology of the site is shown on the published geology map (IGS, 1974) as largely Keuper Marl with Limestone in the south and Terrace Alluvium in the west. The recent survey identified red marl subsoils across the majority of the site, with limestone west of Flax Bourton Quarry and a grey alluvial clay in the west, around and north of Grove Farm.

17. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW, 1983) as comprising the Compton, Hodnet, Crwbin and Brockhurst Soil Associations.

18. The Compton soil Association is described as having stoneless mostly reddish clayey soils affected by groundwater. The Hodnet soil Association is described as having reddish fine and coarse loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Brockhurst soils are defined as those that are slowly permeable, seasonally waterlogged, reddish, fine loamy over clayey and clayey soils. The soils of the Crwbin Association are very shallow and shallow, well drained, loamy soils over limestone.

19. In the recent survey many of the soils were identified as having either red clay subsoils, which were not found to be slowly permeable, although there were minor wetness limitations, or grey alluvial clay subsoill which were found to be slowly permeable. Shallow soils over limestone of the Crwbin Association were mapped around Flax Bourton Quarry.

AGRICULTURAL LAND CLASSIFICATION

20. 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 1

21. Soils of excellent quality were found in the present survey north of Southfield Farm and around Priory Farm. These soils were described as having sandy loam topsoils overlying sandy loam and sandy clay loam subsoils.A profile pit confirmed the soils were neither limited by soil wetness nor soil droughtiness.

Grade 2

22. Land of very good quality was mapped around the areas of Grade 1 soils and in addition, west of Farleigh Hospital, immediately north of Chelvey Road and west of Chelvey Farm. The soils were described as having medium clay loam topsoils overlying heavy clay loam subsoils and clay to depth. Two profile pits confirmed that the subsoils are not slowly permeable although gleying was sometimes found to occur below 40 cm. The soils were assesssed as Wetness Class I (See Appendix II). The soils are restricted by a minor topsoil workability limitation due to the high number of Field Capacity Days in this area.

Subgrade 3a

23. Good quality land was mapped in the recent survey around and north west of Grove Farm; around and east of Woolleys Farm; immediately east of Station Road; south of Pit Lane and west of Backwell Hill Road. This Subgrade 3a land can be differentiated on the basis of its limitations.

24. The Subgrade 3a land mapped west of Backwell Hill Road, and south of Cherry Wood has shallow silty clay loam topsoils overlying limestone. A profile pit confirmed that these soils are limited by soil droughtiness.

25. Elsewhere, the Subgrade 3a land is limited by soil wetness, with medium clay loam topsoil overlying heavy clay loam or sandy clay loam subsoil and clay to depth. These soils can be distinguished by the nature of their subsoils. Those west of Backwell, around Grove Farm, have alluvial clay subsoils, which were confirmed by a soil profile pit to be gleyed and slowly permeable and were assessed as Wetness Class II. The soils of the remaining Subgrade 3a land have red clay subsoils which were also assessed as Wetness Class II, confirmed by a soil profile pit, but these soils are not slowly permeable even though they have gleying present within 40 cm of the surface.

Subgrade 3b

26. Several areas of moderate quality land were identified in the recent survey. The soils in the area South of Moor Lane are described as having clay loam topsoil textures over heavy clay loam and clay subsoils. These soils have a slowly permeable layer at shallow depth, which puts them into Wetness Class IV.

27. Soils southeast of Jubilee Stone are described as having shallow silty clay loam topsoils overlying stony silty clay loam subsoils over limestone. The high topsoil stone contents which put them into Subgrade 3b, were confirmed by a soil profile pit.

28. The areas of Subgrade 3b land around Cherry Wood and north of Farleigh Road are limited by gradients of 9° - 10°.

Grade 5

29. A small strip of land along the path from Cherry Wood is limited to very Poor Quality land by gradients of around 24°

Other Land

30. Other land includes urban areas, playing fields, sports grounds and farm buildings.

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October 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 (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 (Ed) (1997) Soil Survey Field Handbook. Soil Survey Technical Monograph No 5, SSLRC, Cranfield.

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.