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COMPTON BASSETT, CALNE
AGRICULTURAL LAND CLASSIFICATION SURVEY

CONTENTS

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 47.5 ha of land at Compton Bassett, Calne. Field survey was based on 39 auger borings and 3 soil profile pits, and was completed On 5 March 1998. During the survey 3 samples were 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 Wiltshire Minerals 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 mainly Grade 3 with some Grade 4 in the north east and a large area of Grade 2 through the centre of the site. The site had not been surveyed previously and the current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF, 1988) and therefore supersedes the published map. Grade descriptions are summarised in Appendix I.

4. A previous survey of land at Old Camp Farm, to the south of the current site (ADAS 1990) found Subgrade 3b, limited by wetness.

5. At the time of survey land cover was mainly oilseed rape and winter wheat with a smaller area of permanent grass on a corner of a restored landfill site. Other land which was not in agricultural use included three small areas of woodland.

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: Compton Bassett

Grade	Area (ha)	% Surveyed Area (46.8 ha)
2	6.0	13
3b	36.6	78
4	4.2	9
Other land	0.7	
Total site area	47.5	

7. This shows that only 13% of the area surveyed was found to be best and most versatile. This was a rather mixed area of Grade 2 with minor limitations due to both wetness and droughtiness. The rest of the land was found to be Subgrade 3b limited by wetness.

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8. The site has been divided into 4 distinct areas, shown as Soil Units on the attached map of soil resources. This is not a soil stripping map but is intended to illustrate the soil resources available for restoration.

Table 3: Soil Resources: Compton Bassett

Map Unit	Depth, cm	Area, ha	Texture	Stones %	Volume, m^3
Topsoil					
I	0-25	1.6	MSL	0	4 000
II	0-25	4.5	MCL	0	11 250
III	0-22	36.5	HCL	0	80 300
				Total Topsoil	95 550 m^2
Subsoil					
I	25-75	1.6	MSL (variable)	0	8 000
	75-120	1.6	MS	0	7 200
II	25-70	4.5	HCL	0	20 250
	70-120	4.5	C	0	22 500
III	22-120	36.5	C	0	357 700
				Total Subsoil	415 650 m^3

9. Depths and volumes quoted should be treated with caution due to soil variability. Soil resources may extend below 120 cm.

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23 March 1998

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: Compton Bassett

Grid Reference		SU 016722	SU 023 717
Altitude (m)		79	94
Accumulated Temperature (day °C)		1450	1433
Average Annual Rainfall (mm)		765	771
Overall Climatic Grade		1	1
Field Capacity Days		170	171
Moisture deficit (mm):	Wheat	103	101
	Potatoes	95	92

RELIEF

11. Altitude ranges from 78 metres at Abberd Brook to 95 metres at the wood known as Andrew's Patch with mainly gentle and moderate slopes which are not limiting.

12. A relatively large level and low lying area on the south east side of Abberd Brook showed extensive evidence of standing surface water with associated crop failure despite having adequate outfall for underdrainage.

GEOLOGY AND SOILS

13. The underlying geology of the site is shown on the published geology map (IGS, 1974) as mainly Lower Greensand with Kimmeridge Clay on the lower lying land in the north west and a small area of Gault clay in the south east of the site. The current survey found most of the site to be underlain by stiff impervious clay with better drained upper subsoil only in a small area at the centre of the site. Greensand deposits were found to be confined to a narrow strip running south west from Andrew's Patch.

14. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW, 1983) as Wickham 2, Wickham 3 and Bursledon associations.

15. Wickham 2 association is described as slowly permeable seasonally waterlogged fine loamy over clayey, fine silty over clayey and clayey soils. Wickham 3 association is described as slowly permeable seasonally waterlogged fine loamy over clayey and coarse loamy over clayey soils. Bursledon association is described as deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

16. Over most of the site soils found by the current survey most closely match the descriptions for Wickham 2 and Wickham 3 associations with the heavier phase of topsoils and clay subsoils. The area shown as Bursledon association was found to be considerably smaller than indicated on the published map and including a narrow strip of soils developed on Greensand with distinctive light sandy subsoils matching none of the published descriptions.

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.

Grade 2

18. Much of the area shown as Grade 2 was found to have medium clay loam topsoil at Wetness Class I or Wetness Class II with some gleying and possibly a slowly permeable horizon in the lower subsoil. This is illustrated by Pit 2.

19. The area shown as Grade 2 also includes the strip of land developed on Greensand parent material. This is illustrated by 3 borings, all with medium sandy loam topsoil over variably sandy subsoil and medium sand parent material at depths varying from 60 to 85 cm. These borings were found to be Grade 1, Grade 2 and Subgrade 3a limited by droughtiness and depending on the depth to sand.

20. The Grade 2 mapping unit shows several Subgrade 3a borings around the edge of the unit which were considered to be borderline to the surrounding Subgrade 3b.

Subgrade 3b

21. The area shown as Subgrade 3b was found to have mainly heavy clay loam or clay topsoil with slowly permeable clay starting immediately below the topsoil. This clay SPL was generally found to be heavily mottled at first with many or abundant ochreous mottles in the upper subsoil, rapidly diminishing in the lower subsoil where hydraulic conditions are likely to be saturated for longer periods. These conditions are illustrated by Pits 1 and 3, both of which found Wetness Class IV indicating a severe limitation due to wetness.

Grade 4

22. The corner of a field in the centre of the survey area comprises a landfill site believed to have been restored in the 1960's. Auger borings in this area found a mixture of Subgrade 3b and Grade 4 limited mainly by wetness due to the presence of the clay cap forming a slowly permeable layer in the upper subsoil. At the time of survey several areas of standing water were evident with tussock grass, Deschampsia caespitosa, developing in the permanent grass sward. Three of these borings reached the decomposing waste which was generally impenetrable and was not described.

SOIL RESOURCES

23. The site has been divided into 4 distinct areas, shown as Soil Units on the attached map of soil resources. This is not a soil stripping map but is intended to illustrate the soil resources available for restoration.

Soil Unit I

24. No pit was dug within this soil unit so the following description relates only to characteristics apparent from examination of three auger borings.

25. Topsoil was generally found to be medium sandy loam, around 25 cm deep, 10YR43 in colour and virtually stoneless.

26. The upper subsoil was found to be variable, ranging from loamy medium sand to sandy clay loam to a depth of between 60 and 85 cm and virtually stoneless. Colour in two of the borings was 10YR44 or 7.5YR44.

27. The lower subsoil was generally found to be medium sand at least to 105 cm, maximum depth to the auger, typically whiteish 10YR81 or ochreous 10YR68 and virtually stone free. This horizon was generally found to be gleyed with many distinct ochreous mottles.

Soil Unit II

28. This soil unit, although not developed on Greensand deposits and lacking the characteristic sand lower subsoil, nevertheless shows a significant sand content in at least some horizon in the subsoil. The subsoil is also significantly deeper above any gleying and slowly permeable clay.

29. Topsoil was generally medium clay loam around 25 cm deep, typically 10YR43 and stone free. Pit 2 found this to be a friable weakly developed medium sub-angular blocky with good porosity and common fine and very fine roots. Abrupt smooth boundary.

30. The upper subsoil was generally found to be medium, occasionally heavy clay loam, or sandy clay loam texture to around 70 or 80 cm. Pit 2 found this to be friable weakly or moderately developed medium or coarse sub-angular blocky with good porosity and common fine and very fine roots. At this pit gleying was evident from 55 cm with 10YR63 - 62 matrix colour and common distinct fine ocherous and grey mottles.

31. The lower subsoil was generally a clay, sandy clay at Pit 2, generally 10YR53 and with at least common distinct medium ochreous mottles. At Pit 2 this was found to be firm and massive, possibly weakly developed adherent structure with poor porosity and assessed as a slowly permeable layer.

Soil Unit III

32. This is the main unit on the site, extending to 36.5 ha and universally stone free, mainly Wetness Class IV with a slowly permeable layer below the topsoil as illustrated by Pits 1 and 3.

33. Topsoil was found to be mainly heavy clay loam or clay, variable in depth up to around 22 cm but frequently less. Colour 10YR42 or 43. Consistency was variable, friable or firm with weakly developed sub-angular blocky structure, tending to massive where wet. Porosity was also found to be variable, assessed as poor, at least in Pit 3. The abundance of roots reflects these variable conditions, ranging from many to only few fine and very fine. Sharp smooth boundary.

34. Clay subsoil is generally firm with poor porosity, weakly developed structure and few very fine roots. The matrix colour and abundance of mottles varies with depth. The first 20 cm or so tend to be 2.5YR63 with abundant distinct fine and medium ochreous and grey mottles with pale grey colour, 5Y61 or 62 and rather fewer mainly ochreous mottles below 40 or 45 cm.

Soil Unit IV

35. This soil unit is not described as it comprises restored landfill and is unlikely to be quarried again.

Table 3: Soil Resources: Compton Bassett

Map Unit	Depth, cm	Area, ha	Texture	Stones %	Volume, m^3
Topsoil					
I	0-25	1.6	MSL	0	4 000
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III	0-22	36.5	HCL	0	80 300
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Subsoil					
I	25-75	1.6	MSL (variable)	0	8 000
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II	25-70	4.5	HCL	0	20 250
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36. Depths and volumes quoted should be treated with caution due to soil variability. Soil resources may extend below 120 cm.

RESTORATION

37. Soil Unit I is too small to hold any prospect of restoration on its own. Materials from this unit should be used to enhance the restoration of Unit II. It should be possible to reinstate an area of better quality land equivalent to Units I and II provided the materials from these units are kept separate from those from the rest of the site and that restoration takes place under favourable conditions using the established principles of good practice, including loose tipping which would be essential to avoid the creation of a slowly permeable layer within the upper subsoil. The depth to SPL after restoration, and subsequent settlement, must be at least 61 cm to achieve Wetness Class II. The clay subsoil from Unit III and from the lower subsoil in Unit II should not be mixed with the other subsoil layers of Units I and II which have distinctly lighter textures and better structure.

38. Restoration of Unit III will be difficult under any conditions. Acceptable results will depend on accurate scavenging of the topsoil, separate storage of topsoil and subsoil and loose tipping at restoration. This unit should be restored to a continuous surface gradient of at least 2° (1 in 28) to encourage surface drainage and lateral flow in the topsoil. Effective underdrainage will be essential and should include stone backfill extending at least to connect with the topsoil to permit secondary treatment by mole drainage or subsoiling.

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23 March 1998

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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.

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.