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WYCOMBE DISTRICT LOCAL PLAN
Land At Slate Meadow, Bourne End, High Wycombe, Buckinghamshire

Agricultural Land Classification
ALC Map and Report

May 1997

Resource Planning Team
Eastern Region
FRCA Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

WYCOMBE DISTRICT LOCAL PLAN
LAND AT SLATE MEADOW, BOURNE END, HIGH WYCOMBE, BUCKINGHAMSHIRE

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 10.2 ha of land at Slate Meadow, Bourne End, High Wycombe, Buckinghamshire. The survey was carried out during May 1997.

2. The survey was undertaken by the Farming and Rural Conservation Agency (FRCA) on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with the Wycombe District Local Plan. This survey supersedes any previous ALC information for this land.

3. The work was conducted by members of the Resource Planning Team in the Eastern Region of FRCA. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). A description of the ALC grades and subgrades is given in Appendix I.

4. At the time of the survey the majority of the land on the site was in rough grass. The areas mapped as 'Other land' included dense scrub and woodland. Towards the south east of the site, an area of 'Agricultural land not surveyed' is shown where permission to enter the land for the purposes of the survey was not granted.

SUMMARY

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:10,000. It is accurate at this scale, but any enlargement would be misleading.

6. The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
2	2.8	66.7	27.5
3a	1.4	33.3	13.7
Agricultural land not surveyed	4.1	N/A	40.2
Other land	1.9	N/A	18.6
Total surveyed area	4.2	100	41.2
Total site area	10.2	-	100

7. The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. A total of 7 borings and 1 soil pit were described.

8. The majority of the survey area has been classified as Grade 2 (very good quality) agricultural land. Grade 2 land comprises deep, well drained, highly calcareous loams which are believed to be derived from Chalk drift. The highly calcareous nature of these soils, and the potential for damaging frosts in this valley bottom situation, may act to impose minor restrictions on the agricultural versatility, giving Grade 2 as the appropriate classification.

9. The remainder of the survey area has been classified as Subgrade 3a (good quality) agricultural land. Subgrade 3a land comprises similar but shallower, well drained, highly calcareous loams, resting upon a gravel layer. Moisture balance calculations for the local climate indicate that there is a slight to moderate soil droughtiness limitation.

FACTORS INFLUENCING ALC GRADE

Climate

10. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

11. The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met. Office, 1989).

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	SU 903 876
Altitude	m, AOD	33
Accumulated Temperature	day°C (Jan-June)	1475
Average Annual Rainfall	mm	678
Field Capacity Days	days	144
Moisture Deficit, Wheat	mm	109
Moisture Deficit, Potatoes	mm	102
Overall climatic grade	N/A	Grade 1

12. The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

13. The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR), as a measure of overall wetness, and accumulated temperature (AT0, January to June), as a measure of the relative warmth of a locality.

14. The combination of rainfall and temperature at this site mean that there is no overall climatic limitation. The site is climatically Grade 1 on this basis. However, the site is very

close to an area which the Met Office (unpublished report) has shown to be rather frost prone. After an initial field inspection the site was also considered to be potentially affected by frost risk and consequently the survey area has been down graded to a maximum of Grade 2 due to this local climatic factor.

Site

15. The site is flat, lying at an altitude of approximately 33 - 34m and is located at the foot of a valley side, in the Chilterns, within the flood plain of the river Wye. The Environment Agency has indicated that part of the site, adjoining the river, may have flooded in the past, but works have been carried out to alleviate this. This part of the site was not graded as permission to enter the land was not granted. A flooding limitation is not believed to affect the parts of the site which were surveyed.

Geology and soils

16. The most detailed published geological information for the area (BGS, 1949), maps the entire site as flood plain gravels.

17. The most detailed published soils information for the area (SSEW, 1983) shows the site to be mapped as soils of the Frome Association immediately adjoining the River Wye, or the Frilsham Association elsewhere. Frome Association soils have been described as 'Shallow calcareous and non-calcareous loamy soils over flint gravel affected by groundwater. Small areas of peat. Risk of flooding.' Soils of the Frilsham Association have been described as 'Well drained mainly fine loamy soils over chalk, some calcareous. Shallow calcareous fine loamy and fine silty soils in places' (SSEW, 1983).

AGRICULTURAL LAND CLASSIFICATION

18. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1, page 1.

19. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II.

Grade 2

20. Most of the site has been classified as Grade 2 (very good quality) agricultural land. The land is mainly affected by a frost risk and soil chemical limitation, although close to the Subgrade 3a mapping unit, slight soil droughtiness is also a limitation.

21. Typically, Grade 2 profiles comprise deep, well drained (wetness class I), very slightly to slightly stony medium silty clay loam, fine sandy silt loam or silt loam topsoils. These overlie similarly stony and textured upper subsoils. From approximately 45 - 85cm these pass into slightly stony lower subsoils which are pale coloured and chalky. Soil textures are similar or may become coarser (medium sandy loam) and in some locations the flint content increases to about 20 %. Occasionally, from 80 - 90cm stony layers,

impenetrable to the auger, are encountered. All horizons were extremely calcareous throughout.

22. These soils are either non-droughty or experience a minor soil droughtiness limitation. Although no soil pit was dug for Grade 2 land where stony layers occurred at depth it was assumed that roots could penetrate and exploit any moisture reserves.

23. The highly calcareous nature of these soils is judged to act as a long term chemical impediment which is not easily correctable by normal fertiliser applications. This restricts the micro-nutrient availability to plants thus affecting the crop yield and the range of crops that may be safely grown. In particular, fruit crops may be adversely affected. In addition, the drainage of cold air into the valley bottom may result in a high incidence of damaging frosts, which are locally common along the Thames Valley (Met Office). Again the more sensitive horticultural crops are likely to be precluded giving Grade 2 as the appropriate classification..

Subgrade 3a

24. The remainder of the site has been classified as Subgrade 3a (good quality) agricultural land and is mainly limited by a soil droughtiness restriction due to the gravel substratum being closer to the surface. In common with the Grade 2 areas frost risk and the highly calcareous nature of the soils also affect this area but droughtiness is the overriding limitation causing the land to be placed in this mapping unit. Pit 1 is typically of the well drained soils in this mapping unit.

25. Topsoils comprise slightly stony, calcareous, fine sandy silt loam or medium silty clay loam overlying a similar upper subsoil. From about 40cm the soils were impenetrable to the auger at the time of the survey due to stony horizons. Pit 1 was dug to determine the nature of the soil resource beneath this stony horizon. From Pit 1, lower subsoils were found to be moderately to very stony (20 - 65% flints > 2mm), with highly calcareous medium sandy or medium sandy silt loam textures down to 75 cm before encountering gravel (70%+ flints >2mm). The combination of soil textures, depths, moderate subsoil structures, and high stone contents has the effect of reducing the total amount of moisture available to the crop. Consequently, moisture balance calculations for the local climate conditions indicate the land quality to be no higher than Subgrade 3a on the basis of soil droughtiness.

26. Land with a soil droughtiness limitation has the affect of reducing the level and consistency of crop yields as well as restricting the types of crops that can be grown.

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SOURCES OF REFERENCE

British Geological Survey (1949) *Sheet No. 255, Beaconsfield.* BGS: London.

Ministry of Agriculture, Fisheries and Food (1988) *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.* MAFF: London.

Met. Office. Data contained in unpublished report.

Met. Office (1989) *Climatological Data for Agricultural Land Classification.* Met. Office: Bracknell.

Soil Survey of England and Wales (1983) *Sheet 6, Soils of England and Wales, South East England.* SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in South East England* SSEW: Harpenden

APPENDIX I

DESCRIPTIONS OF THE 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 includes 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 or horticultural crops can usually be grown but on some land of this 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 land.

Grade 3: Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When 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 the 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 moist 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 severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

APPENDIX II

SOIL DATA

Contents:

SOIL PROFILE DESCRIPTIONS: EXPLANATORY NOTE

Soil pit and auger boring information collected during ALC fieldwork is held on a computer database. This uses notations and abbreviations as set out below.

Boring Header Information

1. **GRID REF**: national 100 km grid square and 8 figure grid reference.

2. **USE**: Land use at the time of survey. The following abbreviations are used:

ARA:	Arable	**WHT:**	Wheat	**BAR:**	Barley
CER:	Cereals	**OAT:**	Oats	**MZE:**	Maize
OSR:	Oilseed rape	**BEN:**	Field beans	**BRA:**	Brassicae
POT:	Potatoes	**SBT:**	Sugar beet	**FCD:**	Fodder crops
LIN:	Linseed	**FRT:**	Soft and top fruit	**FLW:**	Fallow
PGR:	Permanent pasture	**LEY:**	Ley grass	**RGR:**	Rough grazing
SCR:	Scrub	**CFW:**	Coniferous woodland	**OTH**	Other
DCW:	Deciduous woodland	**BOG:**	Bog or marsh	**SAS:**	Set-Aside
HTH:	Heathland	**HRT:**	Horticultural crops	**PLO:**	Ploughed

3. **GRDNT**: Gradient as estimated or measured by a hand-held optical clinometer.

4. **GLEY/SPL**: Depth in centimetres (cm) to gleying and/or slowly permeable layers.

5. **AP (WHEAT/POTS)**: Crop-adjusted available water capacity.

6. **MB (WHEAT/POTS)**: Moisture Balance. (Crop adjusted AP - crop adjusted MD)

7. **DRT**: Best grade according to soil droughtiness.

8. 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				

9. **LIMIT**: The main limitation to land quality. The following abbreviations are used:

OC:	Overall Climate	**AE:**	Aspect	**ST:**	Topsoil Stoniness
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
EX:	Exposure				

Soil Pits and Auger Borings

1. **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)

2. **MOTTLE COL**: Mottle colour using Munsell notation.

3. **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% +

4. **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

5. **PED. COL**: Ped face colour using Munsell notation.

6. **GLEY:** If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

7. **STONE LITH**: Stone Lithology - one of the following is used:

HR:	all hard rocks and stones	**FSST:**	soft, fine grained sandstone
ZR:	soft, argillaceous, or silty rocks	**CH:**	chalk
MSST:	soft, medium grained sandstone	**GS:**	gravel with porous (soft) stones
SI:	soft weathered igneous/metamorphic rock	**GH:**	gravel with non-porous (hard) stones

Stone contents (>2cm, >6cm and total) are given in percentages (by volume).

8. **STRUCT**: the degree of development, size and shape of soil peds are described using the following notation:

Degree of development	**WK:**	weakly developed	**MD:**	moderately developed
	ST:	strongly developed		
Ped size	**F:**	fine	**M:**	medium
	C:	coarse		
Ped shape	**S:**	*single grain*	**M:**	*massive*
	GR:	granular	**AB:**	angular blocky
	SAB:	sub-angular blocky	**PR:**	prismatic
	PL:	platy		

9. **CONSIST**: Soil consistence is described using the following notation:

L: loose	**FM**: firm	**EH**: extremely hard
VF: very friable	**VM**: very firm	
FR: friable	**EM**: extremely firm	

10. **SUBS STR**: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G**: good **M**: moderate **P**: poor

11. **POR**: Soil porosity. If a soil horizon has less than 0.5% biopores >0.5 mm, a 'Y' will appear in this column.

12. **IMP**: If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

13. **SPL**: Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

14. **CALC**: If the soil horizon is calcareous, a 'Y' will appear in this column.

15. Other notations:

APW:	available water capacity (in mm) adjusted for wheat
APP:	available water capacity (in mm) adjusted for potatoes
MBW:	moisture balance, wheat
MBP:	moisture balance, potatoes

SOIL PIT DESCRIPTION

Site Name : SLATE MEADOW, BOURNE END Pit Number : 1P

Grid Reference: SU90328765 Average Annual Rainfall : 678 mm
Accumulated Temperature : 1475 degree days
Field Capacity Level : 144 days
Land Use : Rough Grazing
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 21	MZCL	10YR42 00	4	8	HR					Y
21- 39	MZCL	10YR52 00	0	12	HR		MDCSAB	FR	M	Y
39- 52	MSL	25Y 72 52	0	20	HR				M	Y
52- 75	MSZL	25Y 72 00	0	65	HR				M	Y
75- 80	GH	00ZZ00 00	0	0					M	Y

Wetness Grade : 1 Wetness Class : I
Gleying :000 cm
SPL : No SPL

Drought Grade : 3A APW : 89 mm MBW : -20 mm
APP : 92 mm MBP : -10 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	M.REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	SU90308770	RGR			000		1	1	150	41	110	8	2				CH	2	FROST
1P	SU90328765	RGR			000		1	1	89	-20	92	-10	3A				DR	3A	IMP80FLINTS
2	SU90408770	RGR			026		2	2	167	58	128	26	1				WE	2	POSSDISTURBED
3	SU90208760	RGR			000		1	1	118	9	108	6	2				DR	2	IMP90FLINTS
4	SU90308760	RGR			000		1	1	124	15	119	17	2				DR	2	IMP90FLINTS
7	SU90238753	RGR			000		1	1	79	-30	79	-23	3B				DR	3A	IMP40FLINTS
8	SU90128753	RGR	S	01	000		1	1	140	31	142	40	1				CH	2	IMP80FLINTS
9	SU90088765	RGR	S		092		1	1	172	63	129	27	1				CH	2	FROST

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
1	0-32	mzcl	10YR42 00						5	2	HR	8					Y		FROST
	32-45	mzcl	10YR43 00						0	0	HR	10		M			Y		
	45-85	msl	25Y 71 00						0	0	CH	30		M			Y		
	85-120	mzcl	10YR81 82						0	0	CH	20		M			Y		
1P	0-21	mzcl	10YR42 00						4	2	HR	8					Y		FROST
	21-39	mzcl	10YR52 00						0	0	HR	12	MDCSAB FR	M			Y		
	39-52	msl	25Y 72 52						0	0	HR	20		M			Y		
	52-75	mszl	25Y 72 00						0	0	HR	65		M			Y		
	75-80	gh	00ZZ00 00						0	0		0		M			Y		IMP TO SPADE
2	0-26	mzcl	10YR41 00						0	0	HR	2					Y		FROST
	26-46	mzcl	10YR52 00	10YR46 00	C			Y	0	0	HR	2		M			Y		
	46-55	mszl	10YR81 71						0	0	HR	2		M			Y		
	55-75	fszl	10YR41 31						0	0	HR	2		M			Y		
	75-120	hzcl	10YR31 00	10YR66 00	C			Y	0	0	HR	2		M			Y		
3	0-30	mzcl	25Y 42 00						5	3	HR	10					Y		FROST
	30-55	mzcl	25Y 42 52						0	0	HR	10		M			Y		
	55-90	msl	25Y 62 00						0	0	HR	20		M			Y		EST50%V/V CHMATRIX
4	0-25	mzcl	25Y 42 00						2	0	HR	5					Y		FROST
	25-55	mzcl	25Y 42 52						0	0	HR	3		M			Y		
	55-85	mzcl	25Y 52 62						0	0	HR	5		M			Y		
	85-90	msl	25Y 61 00						0	0	HR	20		M			Y		EST50%V/V CHMATRIX
7	0-23	fszl	10YR33 00						0	0	HR	6					Y		FROST
	23-40	fszl	10YR43 00						0	0	HR	12		M			Y		SEE 1P IMP40CMFLINT
8	0-27	fszl	10YR42 00						5	0	HR	6					Y		FROST
	27-55	zl	10YR53 00						0	0	HR	12		M			Y		
	55-65	zl	10YR51 00						0	0	HR	5		M			Y		EST10%V/V CHMATRIX
	65-80	zl	10YR82 52						0	0	HR	5		M			Y		EST50%V/V CHMATRIX
9	0-20	zl	10YR42 00						0	0	HR	2					Y		FROST
	20-35	zl	10YR53 63						0	0	HR	2		M			Y		
	35-70	msl	10YR82 62						0	0	HR	2		M			Y		
	70-92	csl	10YR82 62						0	0	HR	2		M			Y		
	92-120	mzcl	25Y 72 00	25Y 66 00	C			Y	0	0	HR	2		M			Y		