A1

WYCOMBE DISTRICT LOCAL PLAN
Site 4, Bourne End, Buckinghamshire

Agricultural Land Classification
ALC Map and Report

December 1997

Resource Planning Team
Eastern Region
FRCA Reading

RPT Job Number: 0305/151/97
MAFF Reference: EL03/01404

AGRICULTURAL LAND CLASSIFICATION REPORT

WYCOMBE DISTRICT LOCAL PLAN
SITE 4, BOURNE END, BUCKINGHAMSHIRE

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 25.6 ha of land on the south-eastern edge of Bourne End in Buckinghamshire. The survey was carried out during December 1997.

2. The survey was undertaken by the Farming and Rural Conservation Agency (FRCA)[1] on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with MAFF's statutory input to 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 survey the land use on the site was a mixture of recently sown cereals and grass. The areas mapped as 'Other land' include agricultural buildings and a derelict and overgrown cherry orchard.

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	22.5	100	87.9
Other land	3.1	N/A	12.1
Total surveyed area	22.5	100	87.9
Total site area	25.6	-	100

7. The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. A total of 22 borings and 2 soil pits was described.

[1] FRCA is an executive agency of MAFF and the Welsh Office

8. All of the agricultural land (22.5 ha) has been classified as Grade 2, very good quality agricultural land. The lower land in the centre and west of the site comprises deep, free-draining, loamy soils which are occasionally very stony in the lower subsoils or highly calcareous. These may either experience a droughtiness limitation or a chemical limitation which imposes minor restrictions on the agricultural versatility of the land. The slightly higher land in the eastern half of the site comprises heavier soils, often with clay textures in the lower subsoils. These may also be stony at depth which produces a slight droughtiness limitation, or may exhibit signs of slightly impeded drainage which produce a slight wetness limitation.

FACTORS INFLUENCING ALC GRADE

Climate

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

10. 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	SU900868	SU903871
Altitude	m, AOD	30	35
Accumulated Temperature	day°C (Jan-June)	1497	1473
Average Annual Rainfall	mm	675	679
Field Capacity Days	days	142	143
Moisture Deficit, Wheat	mm	111	109
Moisture Deficit, Potatoes	mm	105	103
Overall climatic grade	N/A	Grade 1	Grade 1

11. 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.

12. 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 (ATO, January to June), as a measure of the relative warmth of a locality.

13. The combination of rainfall and temperature at this site mean that there is no overall climatic limitation. In addition, no local factors such as frost risk or exposure are believed to be significant enough to downgrade the land. The site is climatically Grade 1.

Site

14. There are two topographic units on the site. The centre and western half are flat, lying at just below 30 metres; the eastern section contains higher land, ranging from 30-50 metres,

with gentle slopes. Nowhere on the site do gradient, microrelief or flooding significantly affect the land quality.

Geology and soils

15. The most detailed published geological information for the site (BGS, 1948) shows the lower, flatter land in the west to comprise alluvium, with the higher, gently sloping land in the east shown as undivided river terrace gravels.

16. The most detailed published soils information for the site (SSEW, 1983 and 1984) shows the area to comprise soils of the Frilsham Association. These are described as "well drained, mainly fine loamy soils over chalk; some calcareous. Shallow, calcareous, fine loamy and fine silty soils in places." The detailed fieldwork revealed deep, calcareous loamy soils on the flatter land with much heavier, stony soils on the higher land.

AGRICULTURAL LAND CLASSIFICATION

17. 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.

18. 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

19. All of the agricultural land has been placed in this grade, and is described as very good quality agricultural land. Two soil pits were placed in this map unit to investigate the range of soils that occur.

20. Pit 1 was placed in the west of the site, on the lower-lying land, where soils proved impenetrable to the auger at 60-70 cm. The pit revealed very stony subsoils and was only examined to 85 cm. This confirmed soil droughtiness as the key limiting factor. Calcareous medium silty clay loam topsoils and upper subsoils overlie lower subsoils with a heavy clay loam texture and 53-59% stone content. Roots were observed to penetrate into this resource, where the subsoil structure has been described as 'moderate'. It is believed that the soil resource continues below 85 cm, perhaps becoming stonier, and that there is therefore sufficient available water in the profile for this pit to be classified as Grade 2 on the basis of a minor soil droughtiness limitation.

21. The soils on the rest of the lower-lying land in the centre of the site are relatively stone-free. Here, however, the subsoils are often extremely calcareous. This is judged to act as a long-term chemical impediment which is not easily correctable by normal fertiliser applications. As a result, this restricts the micro-nutrient availability to plants, thus affecting the crop yield and the range of crops that can be grown safely. In particular, fruit crops may be adversely affected. Occasional borings in this area are less calcareous in the subsoil and have therefore been classified as Grade 1 but, given the variability of the soils on this lower land, these have been subsumed within the Grade 2 unit.

22. Pit 2 was located on the higher land to investigate the heavier subsoils which sometimes showed evidence of slight soil wetness. The description of Pit 2 actually showed that there was no significant wetness, with the subsoils being much stonier than anticipated. Medium silty clay loam topsoils overlie upper subsoils of similar texture with approximately 20% hard rock. The texture of the lower subsoils is much heavier, being initially clay and then changing into heavy clay loam, with stone contents in the range 27-35%. Some of the borings in this area showed some evidence of deep gleying with potential slowly permeable clay layers from approximately 75 cm, which would place these soils in Wetness Class II and Grade 2. At the pit there was no gleying and the subsoil structural conditions have been assessed as moderate. Soil droughtiness is, therefore, the main limiting factor. The pit was dug to 90 cm and then augered to 100 cm before becoming impenetrable. It is believed that the soil resource continues to depth and may be exploited by roots, so that there is sufficient available water for this land to be classified as Grade 2. The minor soil droughtiness limitation acts to reduce the level and consistency of yields and, therefore, the flexibility of the land.

DE Black
Resource Planning Team
Eastern Region
FRCA Reading

SOURCES OF REFERENCE

British Geological Survey (1948) *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 (1989) *Climatological Data for Agricultural Land Classification.*
Met. Office: Bracknell.

Soil Survey of England and Wales (1983) *Sheet 6, 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

SAMPLE NO.	GRID REF	ASPECT USE		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	SU902 872	ARA					1	1	112	1	121	16	A				DR	2		IMPQDR
2	SU903 872	ARA					1	1	103	-8	115	10	A				DR	2		IMPQDR
3	SU899 871	ARA					1	1	158	47	124	19	1				CH	2		VCALC
4	SU900 871	ARA					1	1	99	-12	106	1	A				DR	2		IMPQDR
5	SU901 871	ARA					1	1	159	48	122	17	1					1		CALCTOP
7	SU903 871	ARA	NW	4			1	1	101	-10	115	10	A				DR	2		IMPQDR
8	SU899 870	ARA					1	1	105	-6	118	13	A				DR	2		vcalc
9	SU900 870	ARA					1	1	151	40	117	12	1				CH	2		vcalc
12	SU898 869	LEY					1	1	97	-14	103	-2	A				DR	3A		imp 60cm
13	SU899 869	PGR					1	1	146	35	113	8	2				DR	2		VCALC
14	SU900 869	PGR					1	1	149	38	116	11	1				CH	2		VCALC
15	SU901 869	ARA	W	4	75	75	2	2	115	4	114	9	A				WE	2		
16	SU902 869	ARA	W	4	75	75	2	2	112	1	113	8	A				DR	2		IMP90QDR
17	SU898 868	LEY					1	1	105	-6	117	12	A				DR	3A		imp 70cm
18	SU899 868	PGR					1	1	155	44	121	16	1				CH	2		VCALC
19	SU900 868	LEY					1	1	155	44	120	15	1				CH	2		VCALC
20	SU901 869	ARA	W	3			1	1	152	41	115	10	1					1		
21	SU898 867	PGR					1	1	93	-18	97	-8	A				DR	3A		imp 57cm
22	SU899 867	PGR			52		1	1	157	46	121	16	1					1		
23	SU900 867	ARA					1	1	71	-40	71	-34	B				DR	3A		IMPX2
24	SU901 867	ARA	W	3			1	1	154	43	116	11	1					1		
25	SU902 867	ARA	SW	3	75		2	2	114	3	112	7	A				WE	2		I88QSPLQDR
1P	SU898 869	LEY			75		1	1	110	-1	113	8	A				DR	2		DEEPER
2P	SU902 869	ARA	W	3			1	1	111	0	103	-2	A				DR	2		p90aug100imp

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	CALC
1	0-32	MCL	10YR52						0	0	HR	2						Y
	32-60	MZCL	10YR62						0	0	CH	2		M				Y
	60-75	MZCL	10YR52						0	0	CH	2		M				Y
2	0-32	MCL	10YR43						1	0	HR	4						Y
	32-52	MCL	10YR54						0	0	CH	1		M				Y
	52-70	MCL	10YR63						0	0	CH	5		M				Y
3	0-35	MZCL	10YR52						0	0	HR	1						Y
	35-65	MZCL	10YR62						0	0	CH	2		M				Y
	65-120	MZCL	10YR81						0	0	CH	20		M				Y
4	0-30	MZCL	10YR42						0	0	HR	1						Y
	30-60	MZCL	10YR62						0	0	CH	2		M				Y
5	0-32	MZCL	10YR52						0	0	HR	1						Y
	32-55	MZCL	10YR62						0	0	CH	5		M				Y
	55-80	MCL	10YR62						0	0	CH	5		M				Y
	80-120	HCL	10YR71						0	0	CH	5		M				Y
7	0-30	MCL	10YR43						1	0	HR	4						
	30-48	HCL	10YR44						0	0	HR	2		M				
	48-72	C	10YR54						0	0	HR	2		M				
8	0-30	MZCL	10YR42						0	0	HR	3						Y
	30-70	MZCL	10YR61						0	0	CH	20		M				Y
9	0-29	MZCL	10YR43						0	0	HR	3						Y
	29-47	MZCL	10YR64						0	0	CH	10		M				Y
	47-120	MZCL	10YR82						0	0	CH	30		M				Y
12	0-27	MZCL	10YR42						0	0	HR	2						Y
	27-60	MZCL	10YR62						0	0	CH	15		M				Y
13	0-32	MZCL	10YR43						0	0	HR	2						Y
	32-38	MZCL	10YR53						0	0	CH	5		M				Y
	38-120	MZCL	10YR81						0	0	CH	45		M				Y
14	0-29	MZCL	10YR42						0	0	HR	3						Y
	29-49	HZCL	10YR54						0	0	CH	10		M				Y
	49-120	MZCL	10YR72						0	0	CH	40		M				Y
15	0-30	MCL	10YR43						3	0	HR	7						
	30-50	MCL	10YR54						0	0	HR	1		M				
	50-60	HCL	10YR54						0	0		0		M				
	60-75	C	75YR44						0	0		0		M				
	75-90	C	75YR53	000C00	C			Y	0	0		0		P			Y	

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC
16	0-30	MCL	10YR42						1	0	HR	4						
	30-40	HCL	75YR44						0	0	HR	5		M				
	40-75	C	75YR44						0	0	HR	5		M				
	75-90	C	75YR53	000C00		C		Y	0	0	HR	5		P			Y	
	90-91	C	75YR53	000C00		C			0	0		0		P				
17	0-27	MZCL	10YR42						0	0	HR	2						Y
	27-70	MZCL	10YR71						0	0	CH	20		M				Y
18	0-31	MZCL	10YR42						0	0	HR	2						Y
	31-55	MZCL	10YR53						0	0	CH	5		M				Y
	55-120	MZCL	10YR71						0	0	CH	20		M				Y
19	0-30	MZCL	10YR42						0	0		0						Y
	30-45	MCL	10YR44						0	0	CH	2		M				
	45-65	HCL	10YR54						0	0	CH	2		M				Y
	65-120	MZCL	10YR73						0	0	CH	25		M				Y
20	0-30	MCL	10YR43						1	0	HR	4						
	30-60	MCL	10YR54						0	0	HR	2		M				
	60-120	HCL	10YR54						0	0	HR	2		M				
21	0-30	MZCL	10YR42						0	0	HR	3						Y
	30-37	MZCL	10YR63						0	0	CH	10		M				Y
	37-57	MZCL	10YR72						0	0	CH	25		M				Y
22	0-27	MZCL	10YR42						0	0	HR	2						Y
	27-52	MZCL	10YR63						0	0	CH	10		M				Y
	52-120	HZCL	10YR62	10YR56		C F		Y	0	0	CH	2		M			N	Y
23	0-28	MZCL	10YR42						1	0	HR	4						Y
	28-40	MZCL	10YR54						0	0	HR	5		M				Y
24	0-30	MCL	10YR42						1	0	HR	2						
	30-70	MCL	10YR54						0	0	HR	1		M				
	70-120	HCL	10YR64						0	0		0		M				
25	0-30	MCL	10YR42						2	0	HR	5						
	30-45	MCL	10YR54						0	0	HR	5		M				
	45-75	HCL	10YR54						0	0	HR	5		M				
	75-88	C	75YR53	000C00		C		Y	0	0	HR	5		P				
1P	0-28	MZCL	10YR42						0	0	HR	2						Y
	28-60	MZCL	10YR62						0	0	CH	5	MCSAB	FR M				Y
	60-75	HCL	25Y 62						0	0	HR	59		M				Y
	75-85	HCL	10YR53	10YR56		C		Y	0	0	HR	53		M			N	Y
2P	0-25	MZCL	10YR42						2	0	HR	7						N
	25-50	MZCL	75YR44						0	0	HR	19	MDCSAB	FR M				N
	50-75	C	75YR54						0	0	HR	27		M				N
	75-100	HCL	10YR64						0	0	HR	35		M				Y