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**Aylesbury Vale Local Plan
Additional land at Haddenham**

**Agricultural Land Classification
February, 1997**

**Resource Planning Team
Guildford Statutory Group
ADAS Reading**

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AGRICULTURAL LAND CLASSIFICATION REPORT

AYLESBURY VALE LOCAL PLAN ADDITIONAL LAND AT HADDENHAM

Introduction

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 3.8 ha of land adjoining the northern boundary of Haddenham. The survey was carried out in February 1997.
2. The survey was commissioned by Ministry of Agriculture, Fisheries and Food (MAFF), Land Use Planning Unit (Reading), in connection with the Aylesbury Vale Local Plan. This survey supersedes previous ALC surveys on this land.
3. The work was conducted by members of the Resource Planning Team in the Guildford Statutory Group in ADAS. 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 on the site was in arable and grassland uses, including an area to the west of the site in rough grassland. An area of garden associated with a residential property is denoted as 'Other Land'

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)	% Total site area	% Surveyed Area
2	1.0	26.3	27.8
3a	2.6	68.4	72.2
Other land	0.2	5.3	-
Total surveyed area	3.6		100
Total site area	3.8	100	-

7. The fieldwork was conducted at an average density of nearly 2 borings per hectare. A total of 7 borings and 1 soil inspection pit were described.

8. Land within this site is graded 2 (very good quality agricultural land) and Subgrade 3a (good quality agricultural land). Soils typically comprise well drained heavy clay loam, or clay topsoils, overlying similar textured subsoils which are calcareous throughout. The soils rest over soft fractured limestone, and the lower subsoil horizons contain varying amounts of soft limestone materials. The grade 2 land is mapped to the north of the site where soils are deep over the underlying soft limestone substrate, and are restricted by minor droughtiness and workability limitations. To the south of the area, the soils are similar, but usually shallower (to about 60cm or less), over horizons containing high volumes of fractured limestone. In these areas the soil available water capacity is lower and the land is more drought prone as a consequence.

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	SP 739 091
Altitude	m, AOD	85
Accumulated Temperature	day°C (Jan-June)	1410
Average Annual Rainfall	mm	630
Field Capacity Days	days	132
Moisture Deficit, Wheat	mm	108
Moisture Deficit, Potatoes	mm	100

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 (AT0, 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 the site is climatically grade 1. No local climatic factors, such as frost risk or exposure, are believed to have a significant adverse effect on land quality on this site.

Site

14. The site lies at an altitude of around 85m AOD and is very gently sloping. Nowhere on the site do steep gradients adversely affect agricultural land quality.

Geology and soils

15. The published 1:50,000 scale (solid and drift) geological map sheet covering the survey area (BGS, 1994) shows the site to be underlain by Portland Stone (limestone), possibly passing to Purbeck Limestones, marls and clay to the extreme north eastern corner.

16. The most detailed published soil map for the area is the 1:250,000 scale Soil Map of South East England (SSEW, 1983). The area is shown as the Moreton Association, which is described in the accompanying legend to the map as comprising 'Well drained calcareous clayey and fine loamy soils over limestone, in places shallow and brashy. Some deeper slowly permeable clayey soils'.

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 III.

Grade 2

19. Grade 2 (very good quality) land occurs to the north of the site where soils are deep over limestone. Soils typically comprise calcareous heavy clay loam or clay topsoils and subsoils, overlying soft shattered limestone at about 70-80 cm. The topsoils typically contain about 3-5% volume of stones, mainly hard pebbles and ironstone fragments, whilst the subsoils contain up to 10% volume of soft limestone. The soils are well drained (wetness class I - see Appendix II) but due to the high clay content of the topsoils, such land has a workability limitation which restricts it to this grade. This is because the soils are slower than other, less clayey types, to return to a workable condition after wetting. This reduces the period over which they may be in a suitable condition for mechanised operations to take place.

20. In addition, the comparatively dry local climate means that these soils contain moisture reserves which may not be fully adequate to supply crops with all the moisture they need during the growing season. Moisture balance calculations assume, (using evidence from soil pit 1), that where the limestone is impervious to the soil auger, 40% volume of limestone is present for a further 10-20cm before the fractured bedrock is encountered. Rooting could only be observed for 20cm into the bedrock, and, although in reality rooting may be deeper, the drought calculations were terminated at the observed rooting depth. Given these assumptions, the moisture balance calculations indicate that the soils have a slight droughtiness limitation, which may in turn, affect the level and consistency of crop yields.

Subgrade 3a

21. Land mapped as Subgrade 3a (good quality land) covers the majority of the survey area. The soils are very similar to those described above for the Grade 2 land, but tend to be shallower (to 50-60cm) over the soft fractured limestone, and contain higher volumes of soft limestone in the subsoil. This increases the risk of drought, with moisture balance calculations (using the same assumptions outlined previously) which indicate a moderate degree of droughtiness. Soil pit 1 is typical of land of this quality on the site.

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SOURCES OF REFERENCE

British Geological Survey (1994), *Sheet No.237, Thame*,
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 ([date]) *Sheet 6. Soils of South East England*.
SSEW: Harpenden.

Soil Survey of England and Wales ([date]) *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 WETNESS CLASSIFICATION

Definitions of Soil Wetness Classes

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

Wetness Class	Duration of waterlogging ¹
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years. ²
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 only wet within 40 cm depth for 30 days in most years.
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 present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years.
IV	The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer present within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.
V	The soil profile is wet within 40 cm depth for 211-335 days in most years.
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years.

Assessment of Wetness Class

Soils have been allocated to wetness classes by the interpretation of soil profile characteristics and climatic factors using the methodology described in *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988).

¹ The number of days is not necessarily a continuous period.

² 'In most years' is defined as more than 10 out of 20 years.

APPENDIX III

SOIL DATA

Contents:

Sample location map

Soil abbreviations - Explanatory Note

Soil Pit Descriptions

Soil boring descriptions (boring and horizon levels)

Database Printout - Horizon Level Information

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	
DCW: Deciduous Wood		
HTH: Heathland	BOG: Bog or Marsh	FLW: Fallow
PLO: Ploughed	SAS: Set aside	OTH: Other
HRT: Horticultural Crops		

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

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. **GLEYS:** 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	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/metamorphic rock	

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

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 : ADD SITE AT HADDENHAM Pit Number : 1P

Grid Reference: SP73990915 Average Annual Rainfall : 630 mm
 Accumulated Temperature : 1410 degree days
 Field Capacity Level : 132 days
 Land Use : Cereals
 Slope and Aspect : degrees S

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 32	HCL	10YR42 00	0	3	HR					Y
32- 50	HCL	10YR54 00	0	5	SLST		MDCSAB	FR	M	Y
50- 60	HCL	25Y 64 00	0	20	SLST		WKCSAB	FR	M	Y
60- 72	HCL	25Y 64 00	0	40	SLST		WKCSAB	FR	M	Y
72- 92	SLST	22XX22 00	0	0					P	Y

Wetness Grade : 2 Wetness Class : I
 Gleying : 000 cm
 SPL : No SPL

Drought Grade : 3A APW : 107mm MBW : -1 mm
 APP : 108mm MBP : 8 mm

FINAL ALC GRADE : 3A
 MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	USE	ASPECT		--WETNESS--		-WHEAT-		-POTS-		M. REL		EROSN	FROST	CHEM	ALC	COMMENTS
			GRDNT	GLEYSPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP	DIST	LIMIT		
1	SP73900920	CER		000	1	2	94	-14	108	8	3A				WD	2	IMP 70CM
1P	SP73990915	CER S		000	1	2	107	-1	108	8	3A				DR	3A	
2	SP74000920	LEY SE	01	000	1	2	94	-14	101	1	3A				DR	3A	SEE 1P
3	SP73900910	CER S		000	1	2	91	-17	96	-4	3A				DR	3A	SEE 1P
4	SP74000910	CER S	01	000	1	2	83	-25	85	-15	3B				DR	3A	IMP 53CM
5	SP73900900	RGR S		000	1	2	105	-3	106	6	3A				WD	2	IMP 80CM
6	SP73850912	RGR S		000	1	2	71	-37	71	-29	3B				DR	3B	IMP 45CM
7	SP73950932	CER S		000	1	2	98	-10	108	8	3A				WD	2	IMP 70CM

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED		----STONES-----			STRUCT/ CONSIST	SUBS			SPL	CALC
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH		TOT	STR	POR		
1	0-33	c	10YR42 00						0	0	HR	5				Y	
	33-70	c	10YR54 00						0	0	SLST	10		M		Y	IMP 70CM
1P	0-32	hc1	10YR42 00						0	0	HR	3				Y	
	32-50	hc1	10YR54 00						0	0	SLST	5	MDCSAB	FR M		Y	
	50-60	hc1	25Y 64 00						0	0	SLST	20	WKCSAB	FR M		Y	TO MDCSAB
	60-72	hc1	25Y 64 00						0	0	SLST	40	WKCSAB	FR M		Y	TO MDCSAB
	72-92	s1st	22XX22 00						0	0		0		P		Y	
2	0-30	hc1	10YR42 00						0	0	HR	2				Y	
	30-60	hc1	10YR56 00						0	0	SLST	10		M		Y	
	60-68	s1st	22XX22 00						0	0		0		P		Y	IMP 68CM
3	0-28	hc1	10YR42 00						1	0	HR	3				Y	
	28-43	c	10YR43 00						0	0	SLST	10		M		Y	
	43-60	hc1	10YR56 00						0	0	SLST	20		M		Y	
	60-65	s1st	22XX22 00						0	0		0		P		Y	IMP 65CM
4	0-28	hc1	10YR42 00						0	0	HR	5				Y	
	28-53	c	25Y 54 00						0	0	SLST	10		M		Y	IMP 53CM
5	0-25	hc1	10YR42 00						0	0	HR	3				Y	
	25-35	c	10YR56 00						0	0	SLST	10		M		Y	
	35-80	hc1	25Y 64 00						0	0	SLST	20		M		Y	IMP 80CM
6	0-18	hc1	10YR42 00						1	0	HR	3				Y	
	18-38	c	10YR54 00						0	0	SLST	3		M		Y	
	38-45	c	25Y 64 00						0	0	SLST	10		P		Y	IMP 45CM
7	0-27	hc1	10YR42 00						0	0	HR	3				Y	
	27-47	c	10YR54 56						0	0	SLST	10		M		Y	
	47-70	hc1	25Y 64 00						0	0	SLST	20		M		Y	IMP 70CM