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Vale of White Horse Local Plan
Land at Frilford Heath Golf Course
Agricultural Land Classification Survey
June 1996.

Resource Planning Team
Guildford Statutory Group
ADAS Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

VALE OF WHITE HORSE LOCAL PLAN LAND AT FRILFORD HEATH GOLF COURSE

Introduction

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey on approximately 6 hectares of land situated to the east of the A338, north of Frilford Heath Golf Club, in Oxfordshire. The survey was carried out during June 1996.
2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) from its Land Use Planning Unit, in Reading, in connection with the Vale of White Horse Local Plan. The results of this survey supersede any previous ALC information for this land.
3. The work was conducted by members of the Resource Planning Team in the Guildford Statutory Group of 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 grassland on this site was being used as a golf practice range. The area shown as 'Other Land' comprised a car park and telephone exchange.

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 below.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% site area	% surveyed area
3b	6.2	98.4	100.0
Other Land	0.1	1.6	-
Total surveyed area	6.2	-	100.0
Total site area	6.3	100.0	-

7. The fieldwork was conducted at an average density of 1 boring per hectare. A total of 7 borings and one soil pit were described.
8. All of the agricultural land on this site has been classified as Subgrade 3b (moderate quality), the key limitation being soil droughtiness. The soil profiles comprise deep well

drained sandy soils with very little stone. The topsoils vary from loamy medium sands to medium sands generally overlying medium sand subsoils. The combination of soil textures and structures acts to restrict the amount of profile available water for crops. In this locally dry climate crop growth and yields will therefore be adversely affected. Occasional borings of higher or lower quality land also occur on this site but were too limited in number and extent to map separately.

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	SU 448 985
Altitude	m, AOD	75
Accumulated Temperature	day°C	1433
Average Annual Rainfall	mm	619
Field Capacity Days	days	130
Moisture Deficit, Wheat	mm	112
Moisture Deficit, Potatoes	mm	106

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 there is no overall climatic limitation. Other local climatic factors such as exposure and frost risk are also believed not to affect the site. The site is climatically Grade 1.

Site

14. The agricultural land at this site lies at an altitude of 70-80m AOD. The majority of the land at the site is flat. Nowhere does gradient or microrelief affect the land quality.

Geology and soils

15. The published geological information for the sites (BGS, 1971) show the site to consist dominantly of Corallian Beds.

16. The detailed published soil information for the site (Jarvis, 1973) shows the Fyfield series to be mapped across the site. These soils are said to be described as 'well drained coarse loamy soils over loose sands and sandstones.'

17. Detailed field survey broadly confirms the existence of such soils, with sandy soils predominating.

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 III.

Grade 3b

20. Land of moderate quality has been mapped across the survey area. The principal limitation is soil droughtiness.

21. The soil profiles in the Grade 3b area comprise freely draining loamy medium sand and medium sand topsoils overlying stoneless medium sand and sandy clay loam subsoils. The soils are non-calcareous and friable. The soils are assessed as Wetness Class 1. Due to the susceptibility to drought risk the profiles with medium sand topsoils are not eligible for Grades 1, 2 or 3a and those with loamy sand topsoils are not eligible for grade 1 irrespective of the moisture balances achieved. The soil inspection pit 1 shows that both the upper and lower subsoils are well structured. The combination of soil texture and the structure of the soil, given the prevailing climatic regime, results in severe droughtiness limitation restricting the land to Subgrade 3b. Soil droughtiness reduces crop yield potential and the consistency of yields from year to year. This may restrict the choice of crops which can be economically grown..

22. Moisture balance calculations for pit 1 indicate that the soil droughtiness restriction is severe enough for Grade 4 to be appropriate. This is due to sandy textures throughout and a relatively shallow topsoil at this location. However, topsoils across the remainder of the site were typically deeper, and soil textures in the upper part of the profile, slightly less sandy. As a result, these soils are slightly less droughty and have sufficient reserves of soil moisture to allow the land to be placed in Subgrade 3b.

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SOURCES OF REFERENCE

British Geological Survey (1971) Sheet No. 253, Abingdon 1:63,360 scale (Solid & Drift Edition). BGS: London.

Jarvis (1973) Soils of the Wantage and Abingdon District (Memoir and Soil Map at 1:63360 scale). SSEW: Harpendon.

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 (1984) *Soils and their Use in South East England*
SSEW: Harpenden.

APPENDIX I

DESCRIPTION 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 that 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 (eg. 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 that restricts 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. **GLEYS/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	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 : VWH; FRILFORD HEATH GC Pit Number : 1P

Grid Reference: SU44809860 Average Annual Rainfall : 619 mm
 Accumulated Temperature : 1433 degree days
 Field Capacity Level : 130 days
 Land Use : Permanent Grass
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 20	MS	10YR44 00	0	0						
20- 40	MS	10YR46 56	0	0			MDVCAB	FR	G	
40- 55	MS	10YR54 56	0	0			MDCSAB	FR	G	
55-120	MS	25Y 74 76	0	0			MDCAB	VF	G	

Wetness Grade : 1 Wetness Class : I
 Gleying : cm
 SPL : cm

Drought Grade : 4 APW : 64 mm MBW : -48 mm
 APP : 47 mm MBP : -59 mm

FINAL ALC GRADE : 4
 MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	ASPECT USE	--WETNESS--		-WHEAT-		-POTS-		M.REL		EROSN	FROST	CHEM	ALC	COMMENTS
			GRDNT	GLEYSPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP	DIST	
1	SU44809870	PGR	1	1	76	-36	59	-47	3B				DR	3B	
1P	SU44809860	PGR	1	1	64	-48	47	-59	4				DR	4	At Boring 3
2	SU44709860	PGR	1	1	78	-34	62	-44	3B				DR	3B	
3	SU44809860	PGR	1	1	68	-44	51	-55	3B				DR	3B	See 1P
4	SU44709850	PGR	1	1	76	-36	60	-46	3B				DR	3B	
5	SU44809850	PGR	1	1	75	-37	58	-48	3B				DR	3B	
6	SU44909850	PGR	1	1	58	-54	54	-52	4				DR	3B	I88 Q BEDROCK
7	SU44909840	PGR	1	1	152	40	110	4	2				WE	2	S1 Gley 65

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED		----STONES-----			STRUCT/ CONSIST	SUBS STR POR IMP SPL	CALC
				COL	ABUN	CONT	COL	GLE	>2	>6	LITH			
1	0-20	1ms	10YR43 00						0	0	0			
	20-45	1ms	10YR44 46						0	0	0		G	
	45-55	ms	10YR66 56						0	0	0		G	
	55-120	ms	25Y 66 76						0	0	0		G	
1P	0-20	ms	10YR44 00						0	0	0			PSD Taken
	20-40	ms	10YR46 56						0	0	0	MDVCAB FR	G	PSD Taken
	40-55	ms	10YR54 56						0	0	0	MDCSAB FR	G	PSD Taken
	55-120	ms	25Y 74 76						0	0	0	MDCAB VF	G	PSD Taken
2	0-30	1ms	10YR43 00						0	0	0			
	30-50	1ms	10YR44 00						0	0	0		G	
	50-95	ms	10YR56 00						0	0	0		G	
	95-120	ms	25Y 66 00						0	0	0		G	
3	0-30	ms	10YR43 00						0	0	0			PSD Taken
	30-48	ms	10YR46 00						0	0	0		G	PSD Taken
	48-73	ms	10YR54 56						0	0	0		G	PSD Taken
	73-120	ms	25Y 66 76						0	0	0		G	PSD Taken
4	0-30	1ms	10YR44 00						0	0	0			
	30-45	1ms	10YR43 00						0	0	0		G	
	45-90	ms	10YR56 00						0	0	0		G	
	90-120	ms	25Y 64 00						0	0	0		G	
5	0-30	1ms	10YR44 00						0	0	MSST 5			Y
	30-45	1ms	10YR43 00						0	0	MSST 1		G	Y
	45-70	ms	25Y 56 00						0	0	0		G	
	70-120	ms	25Y 66 56						0	0	0		G	
6	0-30	1ms	10YR44 00						0	0	0			
	30-70	ms	10YR54 00						0	0	0		G	
	70-88	ms	10YR56 00						0	0	0		G	I88 QBedrock
7	0-30	ms1	10YR44 00						0	0	HR 1			
	30-40	ms1	10YR54 00				00MNO0 00		0	0	HR 1		M	
	40-65	ms1	10YR44 56				00MNO0 00		0	0	HR 1		M	
	65-100	sc1	10YR54 00	10YR58 00 C			00MNO0 00 S		0	0	0		M	
	100-120	sc1	10YR56 00	10YR58 00 C			00MNO0 00 S		0	0	0		M	