A1

Vale of the White Horse District Local Plan
Site H39: Land at Drayton Road, Abingdon
Agricultural Land Classification Report
October 1994
(Revised December 1996)

AGRICULTURAL LAND CLASSIFICATION REPORT

VALE OF THE WHITE HORSE DISTRICT LOCAL PLAN
SITE H39: LAND WEST OF DRAYTON ROAD, ABINGDON

1. Summary

1.1 ADAS was commissioned by MAFF's Land Use Planning Unit to provide information on land quality on a number of sites in the Vale of the White Horse District of Oxfordshire. The work forms part of MAFF's statutory input to the preparation of the Vale of the White Horse District Local Plan.

1.2 Site H39 comprises 5 hectares of land to the south-west of Abingdon, adjoining Drayton Road. An Agricultural Land Classification, (ALC), survey was carried out during October 1994. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of seven borings and one soil inspection pit were described in accordance with MAFF's revised guidelines and criteria for grading the quality of agricultural land, (MAFF, 1988). These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose a long term limitation on its use for agriculture.

1.3 The work was carried out by members of the Resource Planning Team in the Leeds Statutory Centre of ADAS.

1.4 At the time of the survey the land was in permanent pasture.

1.5 The distribution of grades and subgrades is shown in the attached ALC map and the areas and extent are given in the table below. The map has been drawn at a scale of 1:10,000. It is accurate at this scale, but any enlargement would be misleading.

Table 1 : Distribution of Grades and Subgrades

Grade	Area (ha)	% total site area
2	4.1	82.0
4	0.9	18.0
Total site area	5.0	100.0

1.6 Appendix 1 gives a general description of the grades, subgrades and land use categories identified in the survey. The main classes are described in terms of the type of limitation that can occur, the typical cropping range and the expected level and consistency of yield.

1.7 The area surveyed has been classified as Grade 2 (very good quality) land, and Grade 4 (poor quality). The soils are well drained, with medium clay loam topsoils overlying either moderately stony medium clay loam or permeable heavy clay loam subsoils. The agricultural use of this land is restricted by soil droughtiness to varying extents depending upon the degree of subsoil stoniness.

2. Climate

2.1 Estimates of climatic variables relevant to the assessment of agricultural land quality were obtained by interpolation from a 5km grid point dataset (Met. Office, 1989) for a representative location in the survey area.

Table 2 : Climatic Interpolation

Grid reference	SU 486958
Altitude (m)	55
Accumulated temperature (degree days, Jan-June)	1456
Average Annual Rainfall (mm)	599
Field Capacity (days)	126
Moisture Deficit, Wheat (mm)	116
Moisture Deficit, Potatoes (mm)	110
Overall Climatic Grade	1

2.2 Climatic factors are considered first when classifying land since climate can be overriding in the sense that adverse weather conditions may restrict land quality irrespective of favourable site and soil conditions. The details in the table above show that there is no overall climatic limitation affecting this site. In addition, no local climatic factors such as exposure or frost risk affect the land quality.

2.3 However, climatic factors do interact with soil factors to influence soil wetness and droughtiness limitations. At this locality, the climate is relatively warm and dry. As a result the likelihood of soil droughtiness problems will be enhanced whilst soil wetness limitations may be reduced.

3. Relief

3.1 The site lies at an altitude of approximately 55 metres and is gently sloping (1° to 3°) with a north-easterly aspect.

4. Geology And Soil

4.1 The British Geological Survey published map (1971, Sheet 253, Abingdon) shows the site to be underlain by beds of Kimmeridge Clay, with drift cover consisting of second terraces over parts of the site.

4.2 Soil Survey of England and Wales (1971), Sheet 253, shows the site to be mainly Isle Abbots Series, with Sutton Series soils in the south and north-east. The Soil Survey of England and Wales (1971) describes the Isle Abbots Series as 'fine loamy material over

calcareous gravel' and the Sutton Series as 'well drained fine and coarse loamy soils locally calcareous and in places shallow over limestone gravel.'

4.3 Detailed field examination of the soils on the site found fine loamy topsoils overlying fine loamy subsoils, some of which are moderately to very stony, containing between 30% and 60% gravel and stones greater than 2mm in diameter. Generally the soils are well drained, falling in Wetness Class 1.

5. Agricultural Land Classification

5.1 Table 1 provides the details of the area measurements for each grade and the distribution of each grade is shown on the attached ALC map.

5.2 The location of the soil observation points are shown on the attached sample point map.

Grade 2

5.3 Most of this site has been mapped as very good quality land, the principle limitation being that of soil droughtiness. Profiles consist of very slightly stony medium clay loam topsoils overlying slightly, moderately or very stony, medium clay loam or heavy clay loam subsoils. Most profiles are well drained, falling in Wetness Class I. However, the combination of a relatively dry climatic regime (i.e. high soil moisture deficits) and the fine loamy soils which contain between 30% and 60% chalk stones in the subsoil in places, gives rise to land which is slightly droughty. Moisture balance figures indicate that there is a slight restriction in soil water available throughout the growing season such that crops, particularly those which are more shallow rooting, such as potatoes, may suffer slight drought stress. Crop yields and consistency may be affected as a result. Overall though Grade 2 land may be expected to support a wide range of arable and horticultural crops, but the flexibility and yield potential of the land may be reduced in comparison to land assigned to Grade 1.

Grade 4

5.4 A small area of land has been mapped as poor quality on the basis of a severe soil droughtiness restriction. Profiles comprise medium clay loam topsoils which contain 17% total flints (2% >2cm). These directly overlie subsoils which are sandy and very gravelly, having about 65% total stones. Moisture balance calculations indicate that such soil characteristics combine with the local climatic regime to significantly restrict profile available water, to the extent that Grade 4 is appropriate on the basis of soil droughtiness.

SOURCES OF REFERENCE

British Geological Survey (1971), Sheet No 253, Abingdon.

MAFF (1988) "Agricultural Land Classification of England and Wales : Revised guidelines and criteria for grading the quality of agricultural land."

Meteorological Office (1989), Climatological Data for Agricultural Land Classification.

Soil Survey of England and Wales (1971), Sheet 253.

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 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 (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 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:

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. **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	**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. **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	**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 **ST**: strongly developed	**MD**: moderately developed
ped size	**F**: fine **C**: coarse	**M**: medium **VC**: very coarse
ped shape	**S** : single grain **GR**: granular **SAB**: sub-angular blocky **PL**: platy	**M**: massive **AB**: angular blocky **PR**: prismatic

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 appropiate 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 : VALE OF WHITE HORSE H39 Pit Number : 1P

Grid Reference: S048609580 Average Annual Rainfall : 599 mm
Accumulated Temperature : 1456 degree days
Field Capacity Level : 126 days
Land Use : Permanent Grass
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 30	MCL	10YR33 00	5	7	HR					
30-120	MCL	10YR44 00	0	30	HR		MDMSAB	FM	G	Y

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

Drought Grade : 2 APW : 150mm MBW : 34 mm
APP : 110mm MBP : 0 mm

FINAL ALC GRADE : 2
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	SU48509580	GRS	SE	03			1	1	165	49	133	23	1					1	
1P	SO48609580	PGR					1	1	150	34	110	0	2				DR	2	
2	SU48609580	GRS					1	1	151	35	111	1	2				DR	2	
3	SU48709580	GRS					1	1	180	64	128	18	1					1	
4	SU48409570	PGR	SE	01	065	065	2	2	138	22	114	4	2				WD	2	
5	SU48509570	PGR	SE	03			1	1	109	-7	93	-17	3A				DR	3A	
6	SU48609570	PGR	SE	03			1	1	95	-21	100	-10	3B				DR	3B	IMPEN 60
7	SU48709570	PGR	SE	03			1	1	158	42	137	27	1					1	IMPEN 95

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	0-30	mcl	10YR33 00						0	0	HR	4							
	30-70	mcl	10YR44 00						0	0	HR	4		G					
	70-120	hcl	10YR44 00						0	0	HR	8		M					
1P	0-30	mcl	10YR33 00						5	1	HR	7							
	30-120	mcl	10YR44 00						0	0	HR	30	MDMSAB	FM G				Y	
2	0-30	mcl	10YR42 00						5	0	HR	6							
	30-120	mcl	10YR44 00						0	0	HR	30		G					
3	0-30	mcl	10YR42 00						5	1	HR	7							
	30-120	mcl	10YR43 00						0	0	HR	8		G					
4	0-30	mcl	10YR33 00						0	0	HR	2							
	30-65	hcl	10YR44 00						0	0	HR	2		M					
	65-120	c	10YR51 00	10YR58 00	C			Y	0	0		0		P			Y		
5	0-25	mcl	10YR33 00						3	0	CH	3							
	25-45	hcl	10YR53 00						0	0	CH	3		M					
	45-120	scl	25 Y76 00						0	0	HR	60		M					
6	0-30	mcl	10YR32 00						3	0	CH	3							
	30-60	mcl	10YR54 00						0	0	CH	50		G					IMP 60 CHALK
7	0-25	mcl	10YR32 00						3	0	CH	3							
	25-95	mcl	10YR54 00						0	0	CH	3		G					IMP 95 CHALK