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Vale of the White Horse District Local Plan
Site H18: Chain Hill Road, Wantage
Agricultural Land Classification
Report
October 1994

AGRICULTURAL LAND CLASSIFICATION REPORT

VALE OF THE WHITE HORSE DISTRICT LOCAL PLAN
SITE H18 : CHAIN HILL ROAD, WANTAGE

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. This work forms part of MAFF's statutory input to the preparation of the Vale of the White Horse District Local Plan.

1.2 Site H18 comprises approximately 5 hectares of land to the immediate south of Wantage in Oxfordshire. 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 4 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 survey the majority of the site was sown to cereals, with a small area to the north east in permanent pasture.

1.5 The distribution of grades and subgrades is shown on 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)	% of Site
3a	4.6	90.2
3b	0.5	9.8
Total area of site	5.1 ha	100%

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 mainly as good quality, Subgrade 3a land. Soils are well drained, heavy clay loam and heavy silty clay loams, developed over shallow Lower Chalk. Such land has been mapped as Subgrade 3a, being

restricted by soil droughtiness limitations. A small area to the north-west of the site has been assigned to Subgrade 3b on the basis of a gradient limitation.

2. Climate

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

Table 2 : Climatic Interpolation

Grid Reference	SU403875
Altitude (m)	115
Accumulated Temperature (degree days, Jan-June)	1393
Average Annual Rainfall (mm)	685
Field Capacity (days)	146
Moisture Deficit, Wheat (mm)	103
Moisture Deficit, Potatoes (mm)	93
Overall Climatic Grade	1

2.2 Climatic factors are considered first when classifying land since climate can be overriding in the sense that adverse climatic 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 are believed to 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 cool in regional terms. As a result the likelihood of soil wetness problems may be enhanced whilst soil droughtiness limitations may be partially offset.

3. Relief

3.1 The site lies at an altitude of between 105 and 120 metres and is moderately to strongly sloping (4-8°). A small area to the north west of the site is limited to Subgrade 3b by gradients in the range 7-8° which will affect the safety and efficiency of using farm machinery on this land.

4. Geology and Soil

4.1 The British Geological Survey (1971) published map, Sheet 253, Abingdon, shows the site to be underlain by Cretaceous Lower Chalk.

4.2 Soil Survey of England and Wales (1971) Sheet 253 shows the site to be mainly Gore Series with a lesser amount of Wantage Series. Gore Series covers the majority of the site and consists of 'well drained calcareous silty soils'. (SSEW, 1973). A small area along the southern boundary is shown as Wantage Series

and consists of 'well drained calcareous silty soils, in places over argillaceous chalk'. (SSEW, 1973).

4.3 Detailed field examination of the soils on the site revealed the presence of mainly shallow silty soils, developed over chalk bedrock with occasional deeper soils, which have droughtiness limitations.

5. Agricultural Land Classification

Subgrade 3a

5.1 Good quality agricultural land has been mapped over most of the area surveyed the principal limitation being that of soil droughtiness. Profiles consist of calcareous, very slightly stony (2-5% chalk) heavy clay loam or heavy silty clay loam topsoils over similarly textured, very slightly to slightly stony (5-10% chalk) subsoils. Soft weathering chalk is found between 45 and 75 cm depth. Soils are well drained (Wetness Class I). Soil Pit 1 is typical of these profiles. The combination of the climatic regime and shallow soils with a relatively high clay content gives rise to land which is moderately droughty. Moisture balance figures indicate that there is a moderate restriction in soil water available throughout the growing season such that crops, particularly those which are more shallow rooting, such as potatoes, may suffer moderate drought stress. Crop yields and consistency may be affected as a result. Overall Subgrade 3a land may be expected to consistently produce 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

5.2 Moderate quality agricultural land has been mapped in the north west corner of the site, the principal limitation being gradient. Soil physical characteristics are similar to those of the Subgrade 3a land. However an overall limit of Subgrade 3b has been placed on the land due to gradient limitation. A gradient of 8° was measured across this area using an optical reading clinometer. Such gradients act to limit the safe and efficient use of certain machinery.

SOURCES OF REFERENCE

British Geological Survey (1971), Sheet 253, 1:63,360

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, 1:63,360 and accompanying bulletin.

Soil Survey of England and Wales (1983) Sheet 6, 1:250,000 and accompanying legend.

Soil Survey of England and Wales (1984), Bulletin 15, Soils and their use in South East England.

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.

Urban

Built-up or 'hard' uses with relatively little potential for a return to agriculture including: housing, industry, commerce, education, transport, religous buildings, cemetries. Also, hard-surfaced sports facilities, permanent caravan sites and vacant land; all types of derelict land, including mineral workings which are only likely to be reclaimed using derelict land grants.

Non-agricultural

'Soft' uses where most of the land could be returned relatively easily to agriculture, including: private parkland, public open spaces, sports fields, allotments and soft-surfaced areas on airports. Also active mineral workings and refuse tips where restoration conditions to 'soft' after-uses may apply.

Woodland

Includes commercial and non-commercial woodland. A distinction may be made as necessary between farm and non-farm woodland.

Agricultural Buildings

Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses. Temporary structures (eg. polythene tunnels erected for lambing) may be ignored.

Open Water

Includes lakes, ponds and rivers as map scale permits.

Land Not Surveyed

Agricultural land which has not been surveyed.

Where the land use includes more than one of the above, eg. buildings in large grounds, and where map scale permits, the cover types may be shown separately. Otherwise, the most extensive cover type will be shown.

APPENDIX II

FIELD ASSESSMENT OF SOIL WETNESS CLASS

SOIL WETNESS CLASSIFICATION

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.

Definition of Soil Wetness Classes

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.

Soils can be allocated to a wetness class on the basis of quantitative data recorded over a period of many years or by the interpretation of soil profile characteristics, site and climatic factors. Adequate quantitative data will rarely be available for ALC surveys and therefore the interpretative method of field assessment is used to identify soil wetness class in the field. The method adopted here is common to ADAS and the SSLRC.

[1]The number of days specified is not necessarily a continuous period.
[2]'In most years' is defined as more than 10 out of 20 years.

APPENDIX III

SOIL PIT AND SOIL BORING DESCRIPTIONS

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 H18 Pit Number : 1P

Grid Reference: SU40308750 Average Annual Rainfall : 685 mm
Accumulated Temperature : 1393 degree days
Field Capacity Level : 146 days
Land Use : Arable
Slope and Aspect : 03 degrees NW

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 32	HCL	10YR32 00	4	5	CH					Y
32- 77	HCL	10YR52 00	0	10	CH		MDMSAB	FM	G	Y
77- 90	HCL	10YR72 00	0	80	CH		MASSIV	VM	P	Y

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

Drought Grade : 1 APW : 137mm MBW : 34 mm
APP : 132mm MBP : 39 mm

FINAL ALC GRADE : 2
MAIN LIMITATION : Wetness

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	M.REL DRT	FLOOD	EXP	EROSN DIST	FROST LIMIT	CHEM	ALC	COMMENTS
1	SU40408760	PAS	N	04			1	2	104	1	112	19	3A					DR	3A	
1P	SU40308750	ARA	NW	03			1	2	137	34	132	39	1					WK	2	
2	SU40208750	ARA	NW	07			1	2	092	-11	098	5	3A					DR	3A	
3	SU40308750	ARA	N	04			1	2	137	34	132	39	1					WK	2	
4	SU40408750	ARA	N	04			1	2	104	1	112	19	3A					DR	3A	

				----MOTTLES-----			PED		----STONES----				STRUCT/	SUBS			
SAMPLE	DEPTH	TEXTURE	COLOUR	COL	ABUN	CONT	COL.	GLEY	>2	>6	LITH	TOT	CONSIST	STR	POR	IMP	SPL	CALC
1	0-30	hcl	10YR31 00						4	0	CH	5						Y
	30-45	hcl	10YR52 00						0	0	CH	5		G				Y
	45-70	hzcl	10YR61 00						0	0	CH	80		P				Y
1P	0-32	hcl	10YR32 00						4	0	CH	5						Y
	32-77	hcl	10YR52 00						0	0	CH	10	MDMSAB FM	G				Y
	77-90	hcl	10YR72 00						0	0	CH	80	MASSIV VM	P				Y
2	0-25	hcl	10YR41 00						4	1	CH	5						Y
	25-45	hcl	25 Y62 00						0	0	CH	5		G				Y
	45-65	hcl	25 Y82 00						0	0	CH	80		P				Y
3	0-32	hcl	10YR41 00						4	1	CH	5						Y
	32-77	hcl	10YR52 00						0	0	CH	10		G				Y
	77-90	hcl	10YR72 00						0	0	CH	80		P				Y
4	0-30	hzcl	10YR41 00						0	0	CH	2						Y
	30-50	hzcl	10YR52 00						0	0	CH	5		G				Y
	50-70	hzcl	10YR52 00						0	0	CH	80		P				Y