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Vale of the White Horse District Local Plan
Site H40: Land Between A415 and School Lane, Kingston Bagpuize
Agricultural Land Classification
Report
October 1994

AGRICULTURAL LAND CLASSIFICATION REPORT

VALE OF THE WHITE HORSE DISTRICT LOCAL PLAN
SITE H40 : LAND BETWEEN A415 AND SCHOOL LANE, KINGSTON BAGPUIZE

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 H40 comprises 5.1 hectares of land to the north of Kingston Bagpuize. 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 5 borings and 2 soil inspection pits 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 all of the site was growing winter cereals.

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
2	2.0	39.2
3a	3.1	60.8
Total area of site	5.1 ha	100%

1.5 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.

1.6 To the north of the site are medium textured, moderately well drained soils limited to grade 2 by slight wetness restrictions.
The remainder of the site comprises light textured soils which are freely drained but limited by moderate soil droughtiness to Subgrade 3a.

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 405 985
Altitude (m)	81
Accumulated Temperature (degree days, Jan-June)	1429
Average Annual Rainfall (mm)	636
Field Capacity (days)	134
Moisture Deficit, Wheat (mm)	111
Moisture Deficit, Potatoes (mm)	104
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 warm and dry in regional terms. As a result the likelihood of soil droughtiness problems will be enchanced whilst soil wetness limitations may be reduced.

3. Relief

3.1 The site lies at an altitude of approximately 80 metres and is level to gently sloping with a northerly aspect. Nowhere on the site do gradient or microrelief affect agricultural land quality.

4. Geology and Soil

4.1 The British Geological Survey (1971) published map, sheet 253, shows the whole site to be underlain with Corallian Beds, comprising mostly sand to the south and silt to the north.

4.2 Soil Survey of England and Wales (1971) sheet 253, shows the north of the site to contain Kingston Series with Fyfield Series, to the south. Kingston Series are surface water gleys, loamy over clayey and Fyfield Series are well drained and loamy.

4.3 Field examination of the soils on the site revealed the presence of gleyed subsoils across land to the north of the site, suggesting drainage is impeded, whilst freely draining sandy soils were observed across the southern part of the site.

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 soil observation points is shown on the attached sample point map.

Grade 2

5.3 Very good quality land has been mapped across the north of the site. Profiles typically comprise a sandy clay loam topsoil and upper subsoil over a heavy clay loam or clay lower subsoil. These soils are gleyed below about 30-45 cm as a result of impeded drainage through slowly permeable lower subsoil horizons. As a result the soils are assigned to Wetness Class II. Soil Pit 1 is typical of these profiles. This slight wetness and workability limitation restricts this land to Grade 2. This land can be expected to support a wide range of arable and horticultural crops.

Subgrade 3a

5.4 Elsewhere on the site land is classed as Subgrade 3a, good quality land. Soils are well drained (Wetness Class I) with a loamy sand topsoil and upper subsoil. The lower subsoil is similar but often becomes a medium sand from about 65cm depth. Soil Pit 2 is typical of these profiles. The freely draining, coarse textured nature of these soils interact with the local climate to cause profile available water to be restricted. This light textured land is therefore limited to Subgrade 3a by droughtiness. This subgrade of land is 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, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

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Resource Planning Team
Leeds Statutory Centre
ADAS Leeds

SOURCES OF REFERENCE

British Geological Survey (1971) Sheet No. 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.

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 H40 Pit Number : 1P

Grid Reference: SU40609860
Average Annual Rainfall : 636 mm
Accumulated Temperature : 1429 degree days
Field Capacity Level : 134 days
Land Use : Arable
Slope and Aspect : 02 degrees NE

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 32	SCL	10YR42 00	0	0						
32- 45	SCL	10YR54 00	0	0		F	SDMAB	FR	G	
45- 63	HCL	10YR52 00	0	0		M	MDMSAB	FR	G	
63-120	HCL	10YR63 00	0	0		C	WKCAB	FM	M	

Wetness Grade : 2
Wetness Class : II
Gleying :045 cm
SPL :063 cm

Drought Grade : 1
APW : 165mm MBW : 54 mm
APP : 128mm MBP : 24 mm

FINAL ALC GRADE : 2
MAIN LIMITATION : Wetness

SOIL PIT DESCRIPTION

Site Name : VALE OF WHITE HORSE H40 Pit Number : 2P

Grid Reference: SU40519851 Average Annual Rainfall : 636 mm
Accumulated Temperature : 1429 degree days
Field Capacity Level : 134 days
Land Use : Arable
Slope and Aspect : 02 degrees NE

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 32	LMS	10YR32 00	0	0						
32- 79	LMS	10YR43 00	0	0			SDCSAB	FR	G	
79-120	MS	25 Y86 00	0	0			SDMSAB	VF	M	

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

Drought Grade : 3A APW : 096mm MBW : -15 mm
APP : 078mm MBP : -26 mm

FINAL ALC GRADE : 3A
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	SU40509857	ARB			030	75	2	2	156	45	127	23	1				WE	2	
1P	SU40609860	ARA	NE	02	045	063	2	2	165	54	128	24	1				WE	2	
2	SU40509850	CER	NE	01	085		1	1	125	14	091	-13	3A				DR	3A	SL.GLEY 50
2P	SU40519851	ARA	NE	02			1	1	096	-15	078	-26	3A				DR	3A	
3	SU40609850	ARB					1	1	143	32	085	-19	3A				DR	3A	
4	SU40609840	CER	NE				1	1	087	-24	076	-28	3B				DR	3B	SL.GLEY 50

				----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	scl	10YR42 00						0	0		0						
	30-75	scl	10YR52 00	10YR68 00	C			Y	0	0		0		G				
	75-120	c	10YR61 00	10YR66 68	M			Y	0	0		0		P			Y	
1P	0-32	scl	10YR42 00						0	0		0						
	32-45	scl	10YR54 00	10YR68 00	F				0	0		0	SDMAB	FR	G			
	45-63	hcl	10YR52 00	10YR68 62	M			Y	0	0		0	MDMSAB	FR	G			
	63-120	hcl	10YR63 00	10YR68 62	C			Y	0	0		0	WKCAB	FM	M		Y	
2	0-25	lms	10YR32 00						0	0		0						
	25-50	lms	10YR56 00						0	0		0		G				
	50-85	msl	10YR54 00	10YR56 00	C			S	0	0		0		G				
	85-100	scl	10YR52 00	10YR68 00	C			Y	0	0		0		G				
	100-120	ms	10YR76 00	10YR58 00	C			Y	0	0		0		M				
2P	0-32	lms	10YR32 00						0	0		0						
	32-79	lms	10YR43 00						0	0		0	SDCSAB	FR	G			
	79-120	ms	25 Y86 00						0	0		0	SDMSAB	VF	M			
3	0-30	lms	10YR42 00						0	0		0						
	30-60	lms	10YR44 00						0	0		0		G				
	60-120	msl	10YR46 00						0	0		0		G				
4	0-30	lms	10YR32 00						0	0		0						
	30-50	ms	10YR43 00						0	0		0		M				
	50-65	scl	10YR43 00	10YR54 00	C			S	0	0		0		G				
	65-120	ms	10YR86 00						0	0		0		M				