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West Oxfordshire District
Local Plan
Site 524: Old Woodstock
Agricultural Land Classification Report
May 1994

AGRICULTURAL LAND CLASSIFICATION, REPORT

WEST OXFORDSHIRE DISTRICT LOCAL PLAN
SITE 524: OLD WOODSTOCK

1. Summary

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

1.2 Approximately 9 hectares of land relating to Site 524, north of the village of Old Woodstock was surveyed in May 1994. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 8 borings and two soil inspection pits were assessed 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 long term limitations on its use for agriculture.

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

1.4 At the time of the survey the agricultural land was under a cereal crop.

1.5 The distribution of grades and subgrades is shown on the attached ALC map The map has been drawn at a scale of 1:5,000. It is accurate at this scale, but any enlargement would be misleading. This map supersedes any previous survey information for this site.

1.6 The entire site, an area of 9.5 hectares, has been classified as moderate quality (Subgrade 3b). The main limitations are soil droughtiness, wetness and excessive stoniness (brashy limestone) in the topsoil. Soils comprise slightly to very stony fine loamy topsoils over very to extremely stony clayey subsoils. Profiles are well drained but experience a significant droughtiness limitation due to the presence of high stone contents which reduce available water reserves. In places, land is limited to 3b due to significant stone volumes over 2 cm in diameter in the topsoil. Elsewhere, poorly structured slowly permeable clay below the topsoil results in a significant wetness limitation to the same grade. The combination of these different limitations to land quality reduces the flexibility with which the land can be cultivated and this is reflected in the overall grade for the site.

2. Climate

2.1 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.

Table 2 :Climatic Interpolation

Grid Reference	SP 444 177
Altitude, (m, AOD)	95
Accumulated Temperature (°days, Jan-June)	1401
Average Annual Rainfall (mm)	696
Field Capacity Days	152
Moisture deficit, wheat (mm)	101
Moisture deficit, potatoes (mm)	92

2.2 The main parameters used in the assessment of an overall climatic limitation are average annual rainfall, as a measure of overall wetness, and accumulated temperature, as a measure of the relative warmth of a locality. The details in the above table 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 It should be noted that climatic characteristics do interact with soil properties to increase the risk of soil wetness and droughtiness problems. In particular, moisture deficits interact with the shallow stony soils over much of the site to increase the risk of soil droughtiness

3. Relief

3.1 The site lies at an altitude of approximately 90-100 metres AOD with land, for the most, lying almost flat before dropping gently away to the eastern boundary.

4. Geology and Soils

4.1 The published geology map for the site area, Sheet 236 (BGS, 1982) shows the majority of the site to be underlain by Forest Marble Clays with Limestones. To the west is mapped Cornbrash (fine grained shell debris limestones) and to the north east, White Limestone including Fimbriata-Waltoni Beds.

4.2 The published soils information for the area, Sheet 6 (SSEW, 1983) shows the majority of the site, where land lies flat, to comprise soils of the Elmton 3 association which are described as "Shallow well drained calcareous fine loamy soils over limestone. Some deeper slowly permeable seasonally waterlogged, mainly calcareous clayey soils" (SSEW, 1983). Where the land drops gently away to the eastern boundary, soils of the Aberford association are mapped. These are

described as "Shallow, locally brashy, well drained calcareous fine loamy soils over limestone. Some deeper calcareous soils in colluvium" (SSEW , 1983). A detailed field examination on the site broadly confirms the presence of soils similar to those described above; shallow soils over brashy limestone. In places deeper slowly permeable clay profiles were also found.

5. Agricultural Land Classification

Subgrade 3b

5.1 The entire site is classified as Subgrade 3b (moderate quality agricultural land). with the majority of land limited by soil droughtiness. Auger boring information across the site is relatively limited due to their being impenetrable at shallow depths. Consequently, information gained from Soil Pit 2 provides the majority of detail for profile descriptions within the map unit. Soil profiles typically comprise heavy clay loam topsoils containing 15-38% total limestones. Of this total, 5-28% is over 2 cm in diameter resulting in some profiles being limited to Subgrade 3b on topsoil stoniness where stone volumes exceed 15%. Upper subsoils consist of clay containing approximately 40% brashy limestone which passes to lower subsoils of similar texture with up to 70% brashy limestones. Soil Pit 2 is typical of these soils and was dug to a depth of 50 cm , becoming impenetrable thereafter. Rooting was evident to this depth and is likely to continue a little further. However, even if this extends to 120 cm there would be no overall effect on the droughtiness of these soils, as 2Q demonstrates (2Q is an example boring, not a field auger boring). Profiles are well drained and assigned to Wetness Class I but they do suffer from a significant droughtiness limitation. The high stone volumes in these soils severely restrict water reserves in the profile for plant growth and this, in combination with climatic characteristics, results in a land classification of Subgrade 3b.

5.2 The topsoil stoniness limitation mentioned previously can have detrimental effects on crop yields in terms of poor crop establishment (which was evident at the time of survey) and increased wear and tear on farm machinery.

5.3 In a small number of profiles across the site, mainly concentrated in the centre, excessive stoniness in the subsoil was found not to be present. In this case, soils suffer from a significant wetness limitation due to poorly structured slowly permeable clay horizons below the topsoil. Soil Pit 1 is typical of these soils and displayed clear evidence of gleying within 40 cm depth and describes coarse angular blocky peds of a poor subsoil structural condition. Profiles are assigned to wetness class IV and land classified as Subgrade 3b; the grade reflecting the poor drainage status of the soils and the potential difficulties in cultivating the land.

REFERENCES

* British Geological Survey (1982), Sheet No. 236 (Solid and Drift Edition), Witney, 1:50,000 scale.

* 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 (1983), Sheet 6, Soils of South East England, 1:250,000 scale and accompanying legend. Bulletin 15, Soils of South East England (1984).

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 : W OXON LP SITE 524 Pit Number : 1P

Grid Reference: SP44401770 Average Annual Rainfall : 696 mm
Accumulated Temperature : 1401 degree days
Field Capacity Level : 152 days
Land Use : Cereals
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 25	C	10YR43 00	6	10	HR					Y
25- 50	C	05Y 63 64	0	3	HR	C	MDCAB	FM	P	

Wetness Grade : 3B Wetness Class : IV
Gleying :025 cm
SPL :025 cm

Drought Grade : APW : mm MBW : 0 mm
APP : mm MBP : 0 mm

FINAL ALC GRADE : 3B
MAIN LIMITATION : Wetness

SOIL PIT DESCRIPTION

Site Name : W OXON LP SITE 524 Pit Number : 2P

Grid Reference: SP44181760 Average Annual Rainfall : 696 mm
Accumulated Temperature : 1401 degree days
Field Capacity Level : 152 days
Land Use : Cereals
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 27	HCL	10YR43 00	5	15	HR					Y
27- 45	C	75YR56 00	0	40	HR				M	Y
45- 50	C	75YR56 00	0	70	HR				P	Y

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

Drought Grade : 3B APW : 62 mm MBW : -39 mm
APP : 62 mm MBP : -30 mm

FINAL ALC GRADE : 3B
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	SP44201770	CER				1	2	36	-65	36	-56	4				DR	3B	IMP253BST AS2P
1P	SP44401770	CER		025	025	4	3B		0		0					WE	3B	
2	SP44301770	CER				1	2	32	-69	32	-60	4				DR	3B	IMP25 AS2P
2P	SP44181760	CER				1	2	62	-39	62	-30	3B				DR	3B	PIT IMP 50
2Q	SP44181760	CER				1	2	79	-22	71	-21	3B				DR	3B	DR 2P TO 120
3	SP44401770	CER		025	025	4	3B		0		0					WE	3B	
4	SP44201760	CER				1	2	40	-61	40	-52	4				DR	3B	IMP483BST AS2P
5	SP44301760	CER		025	025	4	3B		0		0					WE	3B	IMP87 AS1P
6	SP44201750	CER				1	2	36	-65	36	-56	4				DR	3B	IMP253BST AS2P
7	SP44301750	CER				1	2	35	-66	35	-57	4				DR	3B	IMP303BST AS2P
8	SP44381760	CER				1	2	59	-42	59	-33	3B				DR	3B	IMP45 AS2P

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	CALC	
1	0-25	hcl	10YR43 00						17	0	HR	22						Y	IMP25 LIMESTONES
1P	0-25	c	10YR43 00						6	0	HR	10						Y	
	25-50	c	05Y 63 64	75YR56 00	C			Y	0	0	HR	3	MDCAB	FM	P	Y	Y		
2	0-25	hcl	10YR43 00						20	0	HR	30						Y	IMP25 LIMESTONES
2P	0-27	hcl	10YR43 00						5	0	HR	15						Y	
	27-45	c	75YR56 00						0	0	HR	40		M				Y	BRASHY LIMESTONE
	45-50	c	75YR56 00						0	0	HR	70		P				Y	BRASHY LIMESTONE
2Q	0-27	hcl	10YR43 00						5	0	HR	15						Y	
	27-45	c	75YR56 00						0	0	HR	40		M				Y	
	45-120	c	75YR56 00						0	0	HR	70		P				Y	2P TAKEN TO 120
3	0-25	c	10YR43 00						6	0	HR	10						Y	
	25-60	c	05Y 63 00	75YR56 00	C			Y	0	0	HR	3		P		Y			
4	0-25	hcl	10YR43 00						12	0	HR	27						Y	
	25-30	c	10YR46 00						0	0	HR	40		M				Y	
	30-48	hr	10YR82 00						0	0		0		P				Y	IMP48 LIMESTONES
5	0-25	c	10YR43 00						10	0	HR	15						Y	
	25-87	c	25Y 63 64	10YR56 00	C			Y	0	0	HR	2		P		Y	Y	Y	IMP87 LIMESTONES
6	0-25	hcl	10YR43 00						15	0	HR	21						Y	IMP25 LIMESTONES
7	0-30	hcl	10YR43 00						28	0	HR	38						Y	IMP30 LIMESTONES
8	0-25	hcl	10YR43 00						5	0	HR	15						Y	
	25-45	c	75YR44 54						0	0	HR	40		M				Y	IMP45 LIMESTONES