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WEST OXFORDSHIRE LOCAL PLAN
SITE 235 : WITNEY
AGRICULTURAL LAND CLASSIFICATION
ALC MAP & REPORT
AUGUST 1993

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AGRICULTURAL LAND CLASSIFICATION REPORT

1.0 Summary

1.1 ADAS was commissioned by MAFF's Land Use Planning Unit to provide information on land quality on 8 sites in West Oxfordshire. The work forms part of MAFF's statutory input to the West Oxfordshire Local Plan.

1.2 Approximately 4 hectares of land relating to site 235 at Witney, Oxfordshire was surveyed during August 1993. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 5 soil auger borings and 2 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 longterm limitations on its use for agriculture.

At the time of the survey land was in permanent grass.

1.3 The distribution of grades and subgrades is shown on the attached ALC map and the areas are given in the table below. The map has been drawn at a scale of 1:5000. It is accurate at this scale, but any enlargement would be misleading.

Table 1 : Distribution of Grades and Subgrades

Grade	Area (ha)	% of Agricultural Area
3B	0.9	25
4	2.7	75
Total agricultural area	3.6	100

1.4 Appendix 1 gives a general description of the grades, subgrades and land use categories identified in the survey.

1.5 The majority of the site has been classified as Grade 4 due to a severe droughtiness limitation associated with very high volumes of limestone fragments in the profile. As a consequence reserves of available water for plant growth are severely restricted. Bordering Hailey Road, a small area of land is classified as Subgrade 3B. Here, poorly structured slowly permeable clayey subsoils significantly impair soil water drainage.

2.0 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.

2.2 The main parameters used in the assessment of the overall climatic limitation are annual average rainfall, as a measure of overall wetness, and accumulated temperature, as a measure of the relative warmth of a locality.

2.3 A detailed assessment of the prevailing climate was made by interpolation from a 5km gridpoint dataset (Met. Office 1989). The details are given in the table below and these show that there is no overall climatic limitation affecting the site.

2.4 No local climatic factors such as exposure or frost risk affect the site. However, climatic factors do interact with soil properties to affect soil droughtiness and wetness limitations.

Table 2 : Climatic Interpolation

Grid Reference :	SP 356 114
Altitude (m) :	100
Accumulated Temperature (days) :	1401
Average Annual Rainfall (mm) :	715
Field Capacity (days) :	157
Moisture Deficit, Wheat (mm) :	100
Moisture Deficit, Potatoes (mm) :	90
Overall Climatic Grade :	1

3.0 Relief

3.1 The site lies at an altitude of approximately 100 metres with land sloping gently east to the boundary with Hailey Road. Nowhere on the site does relief or gradient affect agricultural land quality.

4.0 Geology and Soil

4.1 The relevant geological sheet for the site, Sheet 236 (BGS, 1982) shows the underlying geology to be Jurassic Cornbrash with Jurassic Forest Marble (clays with limestones) bordering Hailey Road to the east.

4.2 The published soils information for the area, Sheet 6 (SSEW, 1983) shows the soils on the site to be mapped as the Denchworth association -"Slowly permeable seasonally waterlogged clayey soils with similar fine loamy over clayey soils..." (SSEW, 1983). A detailed inspection of soils on the site confirmed the presence of slowly permeable clayey soils bordering Hailey Road and very shallow stony soils over weathered limestone on the remainder.

5.0 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.

Subgrade 3b

5.3 A small area of land adjacent to Hailey Road is classified as subgrade 3b. Soil profiles are calcareous throughout and typically comprise topsoils of heavy clay loam or clay containing 1-10% total hard limestones by volume over poorly structured slowly permeable clay subsoils containing 0-10% hard limestones. Movement of water through these soils is significantly impeded due to the presence of slowly permeable clay from 16-20 cm depth in the profile. Soils are assigned to wetness class IV and this combined with heavy topsoil textures and climatic factors results in a land classification of subgrade 3b. The above conditions reduce the period in which the land can be effectively cultivated and grazed by livestock. Soil wetness also adversely affects the growth and development of crops.

Grade 4

5.4 Poor quality agricultural land covers the majority of the site. Soil profiles are calcareous throughout and typically comprise topsoils of heavy clay loam or clay containing 2-15% total hard limestones by volume. Topsoils are thin and pass to upper subsoils from 16-20 cm depth in the profile. These consist of clay containing 40-70% hard limestone fragments of which 37% is >2 cm. Pit 2, typical of these soils, revealed effective rooting in the subsoil to a depth of 55 cm in the profile. Soils do not suffer a wetness limitation and are assigned to wetness class I. However, they do suffer severe droughtiness due to the extremely high volumes of hard platy limestone in the subsoil reducing available water for crop growth. This combined with the restricted rooting depth and climatic factors results in a land classification of grade 4. Together with this limitation soils are also limited to grade 4 due to the presence of stone volumes of 37% >2 cm within the top 25 cm of soil. This results in a topsoil stone limitation and land is classified as grade 4. The high stone content in the topsoil can increase production costs by causing wear and tear to farm machinery and impair the quality of crops.

ADAS REFERENCE : 3305/141/93
MAFF REFERENCE : EL 33/225

Resource Planning Team
Guildford Statutory Group
ADAS Reading

APPENDIX I

DESCRIPTION OF THE GRADES AND SUB-GRADES

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 on the 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.

Grade 3 : Good To Moderate Quality Agricultural Land

Land with moderate limitations which affect the choice of crops, 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.

Sub-grade 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.

Sub-grade 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 very 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 : housing, industry, commerce, education, transport, religious buildings, cemeteries. 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/airfields. Also active mineral workings and refuse tips where restoration conditions to 'soft' after-uses may apply.

Woodland

Includes commercial and non-commercial 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

REFERENCES

* BRITISH GEOLOGICAL SURVEY (1982), Sheet No.236, 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 No.6,"Soils of South East England", 1:250,000 scale and accompanying legend.

APPENDIX III

DEFINITION OF SOIL WETNESS CLASSES

Wetness Class I

The soil profile is not wet within 70cm depth for more than 30 days in most years.

Wetness Class II

The soil profile is wet within 70cm depth for 31-90 days in most years **or**, if there is no slowly permeable layer within 80cm depth, it is wet within 70cm for more than 90 days, but not wet within 40cm depth for more than 30 days in most years.

Wetness Class III

The soil profile is wet within 70cm depth for 91-180 days in most years **or**, if there is no slowly permeable layer within 80cm depth, it is wet within 70cm for more than 180 days, but only wet within 40cm depth for 31-90 days in most years.

Wetness Class IV

The soil profile is wet within 70cm depth for more than 180 days but not wet within 40cm depth for more than 210 days in most years **or**, if there is no slowly permeable layer within 80cm depth, it is wet within 40cm depth for 91-210 days in most years.

Wetness Class V

The soil profile is wet within 40cm depth for 211-335 days in most years.

Wetness Class VI

The soil profile is wet within 40cm depth for more than 335 days in most years.

(The number of days is not necessarily a continuous period. 'In most years' is defined as more than 10 out of 20 years.)

APPENDIX IV

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 database. This has commonly used notations and abbreviations as set out below.

Boring Header Information

1. **GRID REF** : national 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 **HRT** : Horticultural Crops **PGR** : Permanent Pasture **LEY** : Ley Grass **RGR** : Rough Grazing
SCR : Scrub **CFW** : Coniferous Woodland **DCW** : Deciduous Woodland **HTH** : Heathland **BOG** : Bog or Marsh
FLW : Fallow **PLO** : Ploughed **SAS** : Set aside **OTH** : Other

3. **GRDNT** : Gradient as measured by a hand-held optical clinometer.

4. **GLEY/SPL** : Depth in cm to gleying or slowly permeable layers.

5. **AP (WHEAT/POTS)** : Crop-adjusted available water capacity.

6. **MB (WHEAT/POTS)** : Moisture Balance.

7. **DRT** : Best grade according to soil droughtiness.

8. If any of the following factors are considered significant, an entry of 'Y' will be entered in the relevant column.

MREL : Microrelief limitation **FLOOD** : Flood risk **EROSN** : Soil erosion risk **EXP** : Exposure limitation **FROST** : Frost
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** : Soil Erosion Risk **WD** : Combined 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
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 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

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

6. STONE LITH : One of the following is used.

HR : all hard rocks and stones MSST : soft, medium or coarse grained sandstone
SI : soft weathered igneous or metamorphic SLST : soft oolitic or dolimitic limestone
FSST : soft, fine grained sandstone ZR : soft, argillaceous, or silty rocks CH : chalk
GH : gravel with non-porous (hard) stones GS :gravel with porous (soft) stones

Stone contents (> 2cm, > 6cm and total) are given in percentages (by volume).

7. 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

8. 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

9. SUBS STR : Subsoil structural condition recorded for the purpose of calculating profile droughtiness.

G : good M : moderate P : poor

10. POR : Soil porosity. If a soil horizon has less than 0.5% biopores > 0.5 mm, a 'Y' will appear in this column.

11. IMP : If the profile is impenetrable a 'Y' will appear in this column at the appropiate horizon.

12. SPL : Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

13. CALC : If the soil horizon is calcareous, a 'Y' will appear in this column.

14. 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 : WEST OXON LP - SITE 235 Pit Number : 1P

Grid Reference: SP35621130 Average Annual Rainfall : 715 mm
Accumulated Temperature : 1401 degree days
Field Capacity Level : 157 days
Land Use : Permanent Grass
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 16	C	10YR42 00	0	10		
16- 46	C	25Y 53 00	0	2	M	WKVCSB
46- 55	C	05Y 63 00	0	3	M	MDCAB

Wetness Grade : 3B Wetness Class : IV
Gleying :016 cm
SPL :016 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 : WEST OXON LP - SITE 235 Pit Number : 2P

Grid Reference: SP35541144 Average Annual Rainfall : 715 mm
Accumulated Temperature : 1401 degree days
Field Capacity Level : 157 days
Land Use : Permanent Grass
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 16	C	10YR44 00	0	5		
16- 25	C	10YR54 00	37	40		
25- 35	C	10YR54 00	0	55		
35- 55	C	10YR54 00	0	70		

Wetness Grade : 3A Wetness Class : I
Gleying : cm
SPL : cm

Drought Grade : 4 APW : 049mm MBW : -51 mm
APP : 051mm MBP : -39 mm

FINAL ALC GRADE : 4
MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	M.REL DRT	EROSN FLOOD	FROST EXP	CHEM DIST	ALC LIMIT		COMMENTS
1	SP35501140	PGR					1	3A	059	-41	059	-31	3B				DR	3B	IMP HR AS 2P
1P	SP35621130	PGR			016	016	4	3B		0		0					WE	3B	
2	SP35601140	PGR			020	020	4	3B		0		0					WE	3B	
2P	SP35541144	PGR					1	3A	049	-51	051	-39	4				DR	4	
3	SP35571148	PGR	SE	01			1	2	041	-59	041	-49	4				DR	3B	IMP HR AS 2P
4	SP35451135	PGR					1	2	031	-69	031	-59	4				DR	4	IMP HR AS 2P
5	SP35631130	PGR			020	020	4	3B		0		0					WE	3B	

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	0-20	c	10YR44 00						0	0	HR	2						Y
	20-40	c	10YR54 00	10YR56 00	C				0	0	HR	3		P				Y
1P	0-16	c	10YR42 00						0	0	HR	10						Y
	16-46	c	25Y 53 00	10YR56 00	M		00MN00 00	Y	0	0	HR	2	WKVCSB VM	P	Y		Y	
	46-55	c	05Y 63 00	10YR56 00	M			Y	0	0	HR	3	MDCAB VM	P	Y		Y	Y
2	0-20	hcl	10YR53 00						0	0	HR	5						Y
	20-70	c	25Y 63 00	10YR58 00	M			Y	0	0	HR	8		P			Y	Y
	70-90	c	25Y 53 00	10YR58 61	M			Y	0	0		0		P			Y	Y
2P	0-16	c	10YR44 00						0	0	HR	5						Y
	16-25	c	10YR54 00						37	0	HR	40		M				Y
	25-35	c	10YR54 00						0	0	HR	55		P				Y
	35-55	c	10YR54 00						0	0	HR	70		P				Y
3	0-20	hcl	10YR43 00						0	0	HR	3						Y
	20-25	c	10YR46 00						0	0	HR	25		M				Y
4	0-20	hcl	10YR42 00						0	0	HR	15						Y
5	0-20	hcl	10YR42 00						0	0	HR	1						Y
	20-40	c	25Y 53 00	10YR56 00	C			Y	0	0	HR	2		P			Y	Y
	40-60	c	25Y 53 00	10YR56 00	C			Y	0	0	HR	10		P			Y	Y
	60-120	c	25Y 54 00	10YR56 00	C				0	0	HR	10		M				Y