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WEST OXFORDSHIRE LOCAL PLAN  
SITE 222 : MINSTER LOVELL  
AGRICULTURAL LAND CLASSIFICATION  
ALC MAP & REPORT  
AUGUST 1993

**WEST OXFORDSHIRE LOCAL PLAN  
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**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 3 hectares of land relating to site 222 at Minster Lovell, Oxfordshire was surveyed during August 1993. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 2 soil auger borings and 1 soil inspection pit 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 At the time of the survey the land use was rough grazing.

1.4 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

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
4	2.1	100 (2.1 ha)
Urban	0.4	
Total area of site	2.5	

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

1.6 The site has been classified as Grade 4 due to a severe soil 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. In addition, these profiles can be downgraded due to the high topsoil stone content and shallow soil depth.

## 2.0 Climate

2.1 The climatic criteria are considered first when classifying land since climate can be over-riding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

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

Table 2 : Climatic Interpolation

Grid Reference :	SP 310 105
Altitude (m) :	110
Accumulated Temperature : (degree days, Jan-June)	1391
Average Annual Rainfall (mm) :	726
Field Capacity (days) :	160
Moisture Deficit, Wheat (mm) :	98
Moisture Deficit, Potatoes (mm) :	87

2.3 The main parameters used in the assessment of an overall climatic limitation are, average annual rainfall, a measure of overall wetness, and accumulated temperature, as a measure of the relative warmth of a locality. In this instance, climate does not represent an overall limitation to agricultural land quality. In addition, no local climatic factors such as exposure or frost risk are significant.

2.4 However, climatic factors, specifically field capacity days and soil moisture deficits, do interact with soil factors to influence soil droughtiness and soil wetness limitations. Soil droughtiness is of particular relevance at this locality.

## 3.0 Relief

3.1 The site occupies flat land at an altitude of 110m AOD. Nowhere on the site do altitude or gradient affect agricultural land quality.

## 4.0 Geology and Soil

4.1 British Geological Survey, Sheet 236, Witney (1982) shows the entire site to be underlain by Forest Marble Clays with limestone.

4.2 Soil Survey of England and Wales, Soils in Oxfordshire I (1982) map the Elmtton Association at this locality. These are described as 'shallow well drained brashy calcareous fine loamy soils over limestone' (SSEW, 1982).

4.3 Detailed field examination of the site indicates the presence of soils similar to those described in paragraph 4.2.

## 5.0 Agricultural Land Classification

5.1 The ALC grading of the site is primarily determined by the interaction of soil and climatic factors giving rise to a soil droughtiness limitation. All of the agricultural land surveyed has been graded poor quality, Grade 4.

5.2 Table 1 provides details of the area and extent of each grade. The distribution of ALC grades is shown on the attached ALC map.

5.3 The location of the soil observation points are shown on the attached auger boring map.

### Grade 4

5.4 All of the agricultural land surveyed has been classed as Grade 4, poor quality land, with the key limitation being soil droughtiness. Profiles are calcareous throughout, and typically comprise slightly stony (up to 15% hard limestone by volume) shallow clay topsoils (18 cm) over extremely stony (up to 75% hard limestone by volume) clay subsoils. In the soil inspection pit few fine roots were observed to 42 cm with limited root penetration below this depth. Consequently this land is limited by a severe droughtiness risk arising from the interaction of soil textures and high profile stone contents with the local climatic regime. Reserves of soil water available for crop growth are greatly reduced to the extent that Grade 4 is appropriate. In addition, these profiles can also be downgraded due to shallow soil depth and the high percentage volume of hard limestone within 25 cm. These characteristics act as an impediment to cultivation, harvesting and crop growth.

## 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
- \* 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 (1982), Soils in Oxfordshire I, Record No. 77, 1:25,000 map 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 Abbreviations : Explanatory Note
  - \* Soil Pit Descriptions
  - \* Database Printout : Boring Level Information
  - \* Database Printout : Horizon Level Information

## 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. **GLEYSPL** : 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 appropriate 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 : W. OXON LP - SITE 222      Pit Number : 1P

Grid Reference: SP31051040    Average Annual Rainfall : 726 mm  
Accumulated Temperature : 1391 degree days  
Field Capacity Level : 160 days  
Land Use : Rough Grazing  
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 18	C	10YR43 00	1	15		
18- 38	C	10YR44 00	60	75		
38- 42	C	10YR56 00	60	75		

Wetness Grade : 3A      Wetness Class : I  
Gleying : 000 cm  
SPL : No SPL

Drought Grade : 4      APW : 36 mm    MBW : -62 mm  
APP : 36 mm    MBP : -51 mm

FINAL ALC GRADE : 4  
MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	ASPECT USE	GRDNT	GLEYS	--WETNESS--		-WHEAT-		-POTS-		M.REL		EROSN	FROST	CHEM	ALC	COMMENTS
					CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP	DIST	LIMIT		
1	SP31001040	RGR	000		1	3A	35	-63	35	-52	4					DR 4	IMPEN 25 - LST
1P	SP31051040	RGR	000		1	3A	36	-62	36	-51	4					DR 4	ROOTS 42;PIT50
2	SP31101040	RGR	000		1	3A	42	-56	42	-45	4					DR 4	IMPEN 25 - LST

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED COL.	----STONES----			STRUCT/ CONSIST	SUBS					
				COL	ABUN	CONT		GLEY	>2	>6		LITH	TOT	STR	POR	IMP	SPL
1	0-25	c	10YR43 00					0	0	HR	20						
1P	0-18	c	10YR43 00					1	0	HR	15						Y
	18-38	c	10YR44 00					60	0	HR	75		P				Y
	38-42	c	10YR56 00					60	0	HR	75		P				Y
2	0-25	c	10YR43 00					0	0	HR	2						Y