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Vale of the White Horse District Local Plan
Site H26 : Blenheim Hill, Harwell
Agricultural Land Classification
ALC Map and Report
October 1994

AGRICULTURAL LAND CLASSIFICATION REPORT

VALE OF THE WHITE HORSE DISTRICT LOCAL PLAN SITE H26 : BLENHEIM HILL, HARWELL

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 H26 comprises 4.2 hectares of land at Blenheim Hill, Harwell, in the district of the Vale of the White Horse, 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 six 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 survey 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 whole of the site was in permanent grass.
- 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 | % of Agriculture |
|------------------------|------------|------------|------------------|
| 3a | 2.6 | 61.9 | 65 |
| 3b | 1.4 | 33.3 | <u>35</u> |
| Agricultural Buildings | <u>0.2</u> | <u>4.8</u> | 100% (4.0 ha) |
| Total area of site | 4.2 | 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 as good, Subgrade 3a, to moderate, Subgrade 3b quality. Soils consist of well to imperfectly drained silty clay loam and clays. Where Subgrade 3a has been mapped the land is limited by moderate soil droughtiness restrictions, whilst land assigned to Subgrade 3b is limited by gradient and micro relief restrictions.

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.

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.

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. However, climatic factors do interact with soil properties to influence soil wetness and droughtiness limitations. At this locality the climate is relatively warm and dry in national terms.

2.4 No local climatic factors such as frost risk or exposure are believed to affect the site.

Table 2 : Climatic Interpolation

| | |
|--|----------|
| Grid Reference | SU495895 |
| Altitude (m) | 75 |
| Accumulated Temperature (degree days, Jan-June) | 1435 |
| Average Annual Rainfall (mm) | 585 |
| Field Capacity (days) | 124 |
| Moisture Deficit, Wheat (mm) | 114 |
| Moisture Deficit, Potatoes (mm) | 109 |
| Overall Climatic Grade | 1 |

3. Relief

3.1 The majority of the site is level to gently sloping, with the eastern part having gradient and microrelief restrictions. The site lies at an altitude of between 70m and 75m AOD.

4. Geology and Soil

4.1 The published geological sheet for the site, Sheet 253 (BGS, 1971) shows the whole of the site to be underlain by Upper Greensand with head and younger Coombe deposits over the eastern part of the site.

- 4.2 The published soils information for the area, Sheet 253 (SSEW, 1971, 1:63,360) and Sheet 6 (SSEW, 1983, 1:250,000) shows the predominant soil type to be the Harwell Association - "Well drained loamy soils over sandstone and some similar soils with slight seasonal waterlogging. Shallow stony soils locally. Some slowly permeable seasonally waterlogged fine loamy or fine silty over clayey soils mainly on scarp slopes. Risk of water erosion". (SSEW, 1971).
- 4.3 Detailed examination of the soils on the site found them to comprise well-drained silty clay loam profiles overlying hard sandstone at variable depths.

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

Subgrade 3a

- 5.3 Good quality land covers the west and centre of this site. Soil profiles typically consist of medium silty clay loam topsoils containing 2-4% hard sandstone over heavy silty clay loam subsoils containing approximately 15% hard sandstone. Impenetrable hard sandstone is encountered at approximately 50-75 cm depth or occasional profiles pass to gleyed clay at depth. Soil Pit 1 is typical of these soils. Profiles are well drained falling into Wetness Class I. Stone content and relatively shallow soil depth over sandstone deposits in combination with local climatic factors imparts a moderate restriction on profile available water reserves for adequate crop growth and the land is therefore limited to Subgrade 3a by soil droughtiness restrictions.

Subgrade 3b

- 5.4 The remaining agricultural land is of moderate quality. Soil physical characteristics are similar to the Subgrade 3a profiles described above. However the slope of the land as measured by a hand held optical clinometer was 8°, causing significant restrictions to its agricultural potential. Frequent undulations in the land also produce microrelief restrictions. This land is thereby limited by gradient and microrelief limitations, causing restrictions on the safe and efficient operation of farm machinery.

SOURCES OF REFERENCE

British Geological Survey (1971) Sheet No. 253, 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 (1971), Sheet 253, 1:63,360 and accompanying legend.

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

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, 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. 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.

¹The 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 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 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. **GLEYSPL** : 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. **GLEYS** : 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).

SOIL PIT DESCRIPTION

Site Name : VALE OF WHITE HORSE H26 Pit Number : 1P

Grid Reference: SU49498960 Average Annual Rainfall : 585 mm
 Accumulated Temperature : 1435 degree days
 Field Capacity Level : 124 days
 Land Use : Permanent Grass
 Slope and Aspect : degrees

| HORIZON | TEXTURE | COLOUR | STONES >2 | TOT.STONE | LITH | MOTTLES | STRUCTURE | CONSIST | SUBSTRUCTURE | CALC |
|---------|---------|-----------|-----------|-----------|------|---------|-----------|---------|--------------|------|
| 0- 25 | MCL | 10YR31 00 | 0 | 2 | MSST | | | | | |
| 25- 73 | HZCL | 25Y 63 00 | 0 | 15 | FSST | | STCSAB | FM | M | |
| 73- 93 | FSST | 25Y 63 00 | 0 | 0 | | | | | P | |

Wetness Grade : 1 Wetness Class : I
 Gleying : 000 cm
 SPL : No SPL

Drought Grade : 3A APW : 109mm MBW : -6 mm
 APP : 113mm MBP : 3 mm

FINAL ALC GRADE : 3A
 MAIN LIMITATION : Droughtiness

| SAMPLE NO. | GRID REF | ASPECT USE | GRDNT | SPL | --WETNESS-- | | -WHEAT- | | -POTS- | | M.REL | | EROSN | FROST | CHEM | ALC | COMMENTS |
|------------|------------|------------|-------|---------|-------------|-------|---------|-----|--------|-----|-------|-------|-------|-------|-------|-----|-----------|
| | | | | | CLASS | GRADE | AP | MB | AP | MB | DRT | FLOOD | EXP | DIST | LIMIT | | |
| 1 | SU49498960 | PGR N | 01 | | 1 | 1 | 111 | -3 | 115 | 6 | 3A | | | | DR | 3A | |
| 1P | SU49498960 | PGR | | | 1 | 1 | 109 | -5 | 113 | 4 | 3A | | | | DR | 3A | IMP 93 |
| 2 | SU49578960 | PGR N | 02 | 085 | 1 | 1 | 141 | 27 | 115 | 6 | 2 | | | | DR | 2 | |
| 3 | SU49418950 | PGR E | 02 | | 1 | 1 | 92 | -22 | 96 | -13 | 3B | | | | DR | 3B | ALMOST 3A |
| 4 | SU49488950 | PGR N | 02 | | 1 | 1 | 99 | -15 | 108 | -1 | 3A | | | | DR | 3A | |
| 5 | SU49588950 | PGR N | 08 | | 1 | 1 | 72 | -42 | 72 | -37 | 3B | Y | | | SL | 3B | |
| 6 | SU49508940 | PGR N | 02 | 020 020 | 3 | 3A | 130 | 16 | 121 | 12 | 2 | | | | WE | 3A | 3A-3B |

| SAMPLE | DEPTH | TEXTURE | COLOUR | ----MOTTLES----- | | | PED COL. | ----STONES---- | | | STRUCT/ CONSIST | SUBS | | | SPL | CALC |
|--------|--------|---------|-----------|------------------|------|------|-------------|----------------|----|------|--------------------|--------|-----|-----|-----|----------------|
| | | | | COL | ABUN | CONT | | GLE | >2 | >6 | | LITH | TOT | STR | | |
| 1 | 0-25 | mzc1 | 10YR32 00 | | | | | 0 | 0 | FSST | 2 | | | | | |
| | 25-73 | hzc1 | 25Y 63 00 | | | | | 0 | 0 | FSST | 15 | SDCSAB | VF | M | | |
| | 73-93 | fsst | 25Y 63 00 | | | | | 0 | 0 | | 0 | | | P | | Imp 93, sandst |
| 1P | 0-25 | mc1 | 10YR31 00 | | | | | 0 | 0 | FSST | 2 | | | | | |
| | 25-73 | hzc1 | 25Y 63 00 | | | | | 0 | 0 | FSST | 15 | STCSAB | FM | M | | |
| | 73-93 | fsst | 25Y 63 00 | | | | | 0 | 0 | | 0 | | | P | | Imp 93, sandst |
| 2 | 0-25 | mzc1 | 10YR32 00 | | | | | 0 | 0 | FSST | 2 | | | | | |
| | 25-85 | hzc1 | 25Y 63 00 | | | | | 0 | 0 | FSST | 15 | | | M | | |
| | 85-120 | c | 10YR52 00 | 75YR56 | 00 | C | | Y | 0 | 0 | 0 | | | P | | |
| 3 | 0-30 | mzc1 | 10YR31 00 | | | | | 3 | 1 | FSST | 4 | | | | | |
| | 30-50 | hzc1 | 25 Y62 00 | | | | | 0 | 0 | FSST | 15 | | | M | | |
| | 50-70 | fsst | 25 Y72 00 | | | | | 0 | 0 | | 0 | | | P | | Imp 70, sandst |
| 4 | 0-40 | mc1 | 10YR31 00 | | | | | 0 | 0 | | 0 | | | | | |
| | 40-75 | hzc1 | 10YR52 00 | | | | | 0 | 0 | | 0 | | | P | | Imp 75, sandst |
| 5 | 0-40 | hc1 | 10YR52 00 | | | | | 0 | 0 | | 0 | | | | | Imp 40, sandst |
| 6 | 0-20 | o/mc1 | 10YR31 00 | | | | | 0 | 0 | | 0 | | | | | |
| | 20-100 | c | 05 Y61 00 | 10YR68 | 00 | C | | Y | 0 | 0 | 0 | | | P | | Y |