

**Elton Westbury on Severn**  
**Agricultural Land Classification**  
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Bristol  
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**ELTON WESTBURY ON SEVERN  
AGRICULTURAL LAND CLASSIFICATION SURVEY**

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# ELTON WESTBURY ON SEVERN

## AGRICULTURAL LAND CLASSIFICATION SURVEY

### INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 14.3 ha of land at Elton Westbury on Severn. Field survey was based on 14 auger borings and 2 soil profile pits and was completed in April 1999.

2 The survey was conducted by the Resource Planning Team of FRCA Western Region on behalf of MAFF in its statutory role in connection with an application to the Planning Authority under the Town and Country Planning Act 1990 for a railway halt and park and ride.

3 Information on climate, geology and soils and from previous ALC surveys was considered and is presented in the relevant sections. Apart from the published regional ALC map (MAFF 1977) which shows the site at a reconnaissance scale as Grade 2 with Grade 3 to the east of the railway, the site had not been surveyed previously. The current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF 1988) and supersedes any previous ALC survey. Grade descriptions are summarised in Appendix I.

4 At the time of survey, land cover was in arable production except for the north eastern field which was in pasture.

5 The distribution of ALC grades is shown on the accompanying 1:10,000 scale ALC map. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas. Areas are summarised in the Table 1.

**Table 1 Distribution of ALC grades Elton**

Grade	Area (ha)	% Surveyed Area (13.9 ha)
3a	7.1	51
3b	6.8	49
Other land	0.4	
Total site area	14.3	

6 Just over half of the site has been mapped as Subgrade 3a, best and most versatile land. The remaining land being mapped as Subgrade 3b. The soils across the site experience

a moderate wetness limitation imposed by slowly permeable layers in the lower subsoils. The topsoils in the areas mapped as Subgrade 3a are medium silty clay loams whereas the heavy clay loams elsewhere downgrade the rest of the site to Subgrade 3b.

## CLIMATE

7 Estimates of climatic variables for this site were derived from the published agricultural climate dataset Climatological Data for Agricultural Land Classification (Meteorological Office 1989) using standard interpolation procedures. Data for key points around the site are given in Table 2 below.

8 Since the ALC grade of land is determined by the most limiting factor present, overall climate is considered first because it can have an overriding influence by restricting land to a lower grade despite more favourable site and soil conditions. Parameters used for assessing overall climate are accumulated temperature, a measure of relative warmth and average annual rainfall, a measure of overall wetness. The results shown in Table 2 indicate that there is no overall climatic limitation.

9 Climatic variables also affect the ALC grade through interactions with soil conditions. The most important interactive variables are Field Capacity Days (FCD) which are used in assessing soil wetness and potential Moisture Deficits calculated for wheat and potatoes which are compared with the moisture available in each profile in assessing soil droughtiness limitations. These are described in later sections.

**Table 2 Climatic Interpolations Elton**

Grid Reference	SO 706 139
Altitude (m)	10
Accumulated Temperature (day °C)	1517
Average Annual Rainfall (mm)	791
Overall Climatic Grade	1
Field Capacity Days	175
Moisture deficit (mm) Wheat	102
Potatoes	94

## RELIEF

10 Altitude ranges from 10 metres in the north of the site to 14 metres south of Pound Farm.

## GEOLOGY AND SOILS

11 The underlying geology of the site is shown on the published geology map (IGS 1975) as Fourth Terrace Gravels north of Pound Farm and Triassic Keuper Marl to the south.

Little evidence was found for the terrace gravels during the recent survey and marl was found within most borings at depth

12 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as Whimple 1 Association west of the railway and Newchurch 2 Association to the east of the railway

13 Whimple 1 Association is described as reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging Newchurch 2 Association is described as deep stoneless calcareous clayey soils

14 The majority of the survey area had soils typical of the Whimple Association The lower subsoils were found to be slowly permeable To the west of the railway the soils were more variable with some similarities to Newchurch Association in the north

### **AGRICULTURAL LAND CLASSIFICATION**

15 The distribution of ALC grades found by the current survey is shown on the accompanying 1 10 000 scale map and areas are summarised in Table 1 The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas

#### **Subgrade 3a**

16 Just over half of the area surveyed has been mapped as Subgrade 3a good quality land These soils experience a moderate wetness limitation The topsoils are medium silty clay loam over heavy clay loam and clay subsoils The lower subsoils are slowly permeable These reddish soils sometimes display gleying The soils are assessed as Wetness Class III (see Appendix II) The combination of wetness class topsoil texture and the prevailing climate allow these soils to be Subgrade 3a These soils are described by soil profile pit 2

#### **Subgrade 3b**

17 The rest of the survey area is mapped as Subgrade 3b moderate quality land These soils are similar to those described above except that the topsoil texture is heavier heavy clay loam This downgrades the soils to 3b compared to the soils described above The lower subsoils are slowly permeable The upper subsoils are quite variable but the soil profile pit (pit 1) to the east of the railway showed that these upper horizons were not slowly permeable The soils are also assessed as Wetness Class III and IV depending on the depth to the slowly permeable layer The pit also showed a stony layer in the subsoil but the soils do not experience a droughtiness limitation greater than that imposed by wetness

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17 May 1999

## **REFERENCES**

**HODGSON J M (Ed) (1997) Soil Survey Field Handbook Soil Survey Technical Monograph No 5 Silsoe**

**INSTITUTE OF GEOLOGICAL SCIENCES (1975) Sheet 234 Gloucester 1 50 000 series Solid and Drift edition IGS London**

**MAFF (1977) 1 250 000 series Agricultural Land Classification South West Region MAFF Publications Alnwick**

**MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for grading the quality of agricultural land MAFF Publications Alnwick**

**METEOROLOGICAL OFFICE (1989) Climatological Data for Agricultural Land Classification Meteorological Office Bracknell**

**SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 5 Soils of South West England 1 250 000 scale SSEW Harpenden**

**SOIL SURVEY OF ENGLAND AND WALES (1984) Soils and Their Use in South West England Bulletin No 14 SSEW Harpenden**

## **APPENDIX I**

### **DESCRIPTION OF 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 include 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 and horticultural crops can usually be grown but on some land in 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. Where 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 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 most 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

**Source** MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land MAFF Publications Alnwick

## **APPENDIX II**

### **DEFINITION OF SOIL WETNESS CLASSES**

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile

#### **Wetness Class I**

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

#### **Wetness Class 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 not wet within 40 cm depth for more than 30 days in most years

#### **Wetness Class 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 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 and 90 days in most years

#### **Wetness Class IV**

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

#### **Wetness Class V**

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

#### **Wetness Class VI**

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

**Notes** The number of days specified is not necessarily a continuous period

In most years is defined as more than 10 out of 20 years

**Source** Hodgson J M (Ed) (1997) Soil Survey Field Handbook Soil Survey Technical Monograph No 5 Silsoe

## APPENDIX III

### ABBREVIATIONS AND TERMS USED IN SURVEY DATA

Soil pit and auger boring information collected during ALC survey is held on a computer database and is reproduced in this report. Terms used and abbreviations are set out below. These conform to definitions contained in the Soil Survey Field Handbook (Hodgson 1997)

#### 1 Terms used on computer database in order of occurrence

**GRID REF** National 100 km grid square and 8 figure grid reference

**LAND USE** At the time of survey

<b>WHT</b>	Wheat	<b>SBT</b>	Sugar Beet	<b>HTH</b>	Heathland
<b>BAR</b>	Barley	<b>BRA</b>	Brassicas	<b>BOG</b>	Bog or Marsh
<b>OAT</b>	Oats	<b>FCD</b>	Fodder Crops	<b>DCW</b>	Deciduous Wood
<b>CER</b>	Cereals	<b>FRT</b>	Soft and Top Fruit	<b>CFW</b>	Coniferous Woodland
<b>MZE</b>	Maize	<b>HRT</b>	Horticultural Crops	<b>PLO</b>	Ploughed
<b>OSR</b>	Oilseed Rape	<b>LEY</b>	Ley Grass	<b>FLW</b>	Fallow (inc Set aside)
<b>POT</b>	Potatoes	<b>PGR</b>	Permanent Pasture	<b>SAS</b>	Set Aside (where known)
<b>LIN</b>	Linseed	<b>RGR</b>	Rough Grazing	<b>OTH</b>	Other
<b>BEN</b>	Field Beans	<b>SCR</b>	Scrub		

**GRDNT** Gradient as estimated or measured by hand held optical clinometer

**GLEYSPL** Depth in centimetres to gleying or slowly permeable layer

**AP (WHEAT/POTS)** Crop adjusted available water capacity

**MB (WHEAT/POTS)** Moisture Balance (Crop adjusted AP - crop potential MD)

**DRT** Best grade according to soil droughtiness

If any of the following factors are considered significant Y will be entered in the relevant column

<b>MREL</b>	Microrelief limitation	<b>FLOOD</b>	Flood risk	<b>EROSN</b>	Soil erosion risk
<b>EXP</b>	Exposure limitation	<b>FROST</b>	Frost prone	<b>DIST</b>	Disturbed land
<b>CHEM</b>	Chemical limitation				

**LIMIT** The main limitation to land quality. The following abbreviations are used

<b>OC</b>	Overall Climate	<b>AE</b>	Aspect	<b>EX</b>	Exposure
<b>FR</b>	Frost Risk	<b>GR</b>	Gradient	<b>MR</b>	Microrelief

<b>FL</b>	Flood Risk	<b>TX</b>	Topsoil Texture	<b>DP</b>	Soil Depth
<b>CH</b>	Chemical	<b>WE</b>	Wetness	<b>WK</b>	Workability
<b>DR</b>	Drought	<b>ER</b>	Erosion Risk	<b>WD</b>	Soil Wetness/Droughtiness
<b>ST</b>	Topsoil Stoniness				

**TEXTURE** Soil texture classes are denoted by the following abbreviations

<b>S</b>	Sand	<b>LS</b>	Loamy Sand	<b>SL</b>	Sandy Loam
<b>SZL</b>	Sandy Silt Loam	<b>CL</b>	Clay Loam	<b>ZCL</b>	Silty Clay Loam
<b>ZL</b>	Silt Loam	<b>SCL</b>	Sandy Clay Loam	<b>C</b>	Clay
<b>SC</b>	Sandy clay	<b>ZC</b>	Silty clay	<b>OL</b>	Organic Loam
<b>P</b>	Peat	<b>SP</b>	Sandy Peat	<b>LP</b>	Loamy Peat
<b>PL</b>	Peaty Loam	<b>PS</b>	Peaty Sand	<b>MZ</b>	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

<b>F</b>	Fine (more than 66% of the sand less than 0.2mm)
<b>M</b>	Medium (less than 66% fine sand and less than 33% coarse sand)
<b>C</b>	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)

**MOTTLE COL** Mottle colour using Munsell notation

**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%+

**MOTTLE CONT** Mottle contrast

<b>F</b>	faint indistinct mottles evident only on close inspection
<b>D</b>	distinct mottles are readily seen
<b>P</b>	Prominent mottling is conspicuous and one of the outstanding features of the horizon

**PED COL** Ped face colour using Munsell notation

**GLEYS** If the soil horizon is gleyed a **Y** will appear in this column If slightly gleyed an **S** will appear

**STONE LITH** Stone Lithology One of the following is used

<b>HR</b>	All hard rocks and stones	<b>SLST</b>	Soft oolitic or dolimitic limestone
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<b>CH</b>	Chalk	<b>FSST</b>	Soft fine grained sandstone
<b>ZR</b>	Soft argillaceous or silty rocks	<b>GH</b>	Gravel with non porous (hard) stones
<b>MSST</b>	Soft medium grained sandstone	<b>GS</b>	Gravel with porous (soft) stones
<b>SI</b>	Soft weathered igneous or metamorphic rock		

Stone contents are given in % by volume for sizes >2cm >6cm and total stone >2mm

**STRUCT** The degree of development size and shape of soil pedes are described using the following notation

<b><u>Degree of development</u></b>	<b>WA</b>	Weakly developed Adherent	<b>WK</b>	Weakly developed
	<b>MD</b>	Moderately developed	<b>ST</b>	Strongly developed
<b><u>Ped size</u></b>	<b>F</b>	Fine	<b>M</b>	Medium
	<b>C</b>	Coarse	<b>VC</b>	Very coarse
<b><u>Ped Shape</u></b>	<b>S</b>	Single grain	<b>M</b>	Massive
	<b>GR</b>	Granular	<b>AB</b>	Angular blocky
	<b>SAB</b>	Sub angular blocky	<b>PR</b>	Prismatic
	<b>PL</b>	Platy		

**CONSIST** Soil consistence is described using the following notation

<b>L</b>	Loose	<b>VF</b>	Very Friable	<b>FR</b>	Friable	<b>FM</b>	Firm
<b>VM</b>	Very firm	<b>EM</b>	Extremely firm		<b>EH</b>		Extremely Hard

**SUBS STR** Subsoil structural condition recorded for the purpose of calculating profile droughtiness **G** Good **M** Moderate **P** Poor

**POR** Soil porosity If a soil horizon has poor porosity with less than 0.5% biopores >0.5mm a **Y** will appear in this column

**IMP** If the profile is impenetrable to rooting a **Y** will appear in this column at the appropriate horizon

**SPL** Slowly permeable layer If the soil horizon is slowly permeable a **Y** will appear in this column

**CALC** If the soil horizon is calcareous with naturally occurring calcium carbonate exceeding 1% a **Y** will appear this column

## 2 Additional terms and abbreviations used mainly in soil pit descriptions

### STONE ASSESSMENT

<b>V</b>	Visual	<b>S</b>	Sieved	<b>D</b>	Displacement
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## MOTTLE SIZE

<b>EF</b>	Extremely fine <1mm	<b>M</b>	Medium 5-15mm
<b>VF</b>	Very fine 1-2mm	<b>C</b>	Coarse >15mm
<b>F</b>	Fine 2-5mm		

**MOTTLE COLOUR** May be described by Munsell notation or as ochreous (OM) or grey (GM)

**ROOT CHANNELS** In topsoil the presence of rusty root channels might be noted as RRC

**MANGANESE CONCRETIONS** Assessed by volume

<b>N</b>	None	<b>M</b>	Many	20-40%
<b>F</b>	Few <2%	<b>VM</b>	Very Many	>40%
<b>C</b>	Common 2-20%			

## POROSITY

<b>P</b>	Poor	less than 0.5% biopores at least 0.5mm in diameter
<b>G</b>	Good	more than 0.5% biopores at least 0.5mm in diameter

## ROOT ABUNDANCE

The number of roots per 100cm <sup>2</sup>		Very Fine and Fine	Medium and Coarse
<b>F</b>	Few	1-10	1 or 2
<b>C</b>	Common	10-25	2-5
<b>M</b>	Many	25-200	>5
<b>A</b>	Abundant	>200	

## ROOT SIZE

<b>VF</b>	Very fine	<1mm	<b>M</b>	Medium	2-5mm
<b>F</b>	Fine	1-2mm	<b>C</b>	Coarse	>5mm

## HORIZON BOUNDARY DISTINCTNESS

<b>Sharp</b>	<0.5cm	<b>Gradual</b>	6-13cm
<b>Abrupt</b>	0.5-2.5cm	<b>Diffuse</b>	>13cm
<b>Clear</b>	2.5-6cm		

**HORIZON BOUNDARY FORM** Smooth wavy irregular or broken \*

\* See Soil Survey Field Handbook (Hodgson 1997) for details