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**Gloucestershire Minerals Plan  
Cerney Wick  
Agricultural Land Classification  
September 1997**

Resource Planning Team  
Bristol  
FRCA Western Region

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**CERNEY WICK**  
**AGRICULTURAL LAND CLASSIFICATION SURVEY**

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## CERNEY WICK

### AGRICULTURAL LAND CLASSIFICATION SURVEY

#### INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 33.0 ha of land at Cerney Wick Cirencester. Field survey was based on 28 auger borings and 2 soil profile pits and was completed in September 1997. During the survey 1 sample was analysed for particle size distribution (PSD).

2 The survey was conducted by the Resource Planning Team of FRCA Western Region on behalf of MAFF in its statutory role in the preparation of Gloucestershire Minerals Plan.

3 Information on climate, geology and soils and from previous ALC surveys was considered and is presented in the relevant section. Apart from the published regional ALC map (MAFF 1977) which shows the sites at a reconnaissance scale as mainly Grade 3 with Grade 2 at the western site, the area was previously surveyed in 1979 at a scale of 1:25,000 (ADAS 1979). However, 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 The sites were surveyed in 1979 to the Guidelines in force at that time as part of a much larger survey of the Cotswold Water Park. The southern block and the block east of Cerney Wick Farm were mapped as Subgrade 3b and 3c reflecting the poorly drained soils found in the current survey. The rest of the area was mapped as Subgrade 3a. In the Cerney Wick Farm block stony soils were so mapped and at Elm Lea mottled clays were mapped as Subgrade 3a based on 4 auger borings. The current survey found such soils but the Revised Guidelines takes account of the slowly permeable subsoils and downgrades such soils further. The 1979 Survey had no borings in the area now mapped as Grade 2 as it was a less detailed survey.

5 At the time of survey land cover was grass. An area of 1.5 ha of agricultural land within the survey area was not surveyed because ownership could not be established. Other land which was not surveyed included two fields at Rosemary which had been converted into a garden and land associated with new houses at Cerney Wick Farm which was no longer in agricultural use.

#### SUMMARY

6 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**    **Cerney Wick**

<b>Grade</b>	<b>Area (ha)</b>	<b>% Surveyed Area (28 0 ha)</b>
2	2 4	9
3a	5 3	19
3b	20 3	72
Agricultural land not surveyed	1 5	
Other land	3 5	
Total site area	33 0	

7            28 % of the site has been mapped as best and most versatile Grade 2 and Subgrade 3a. These soils are well drained but are stony at depth experiencing minor and moderate droughtiness limitations respectively. The Subgrade 3b land mapped in three locations has moderate wetness limitations imposed by slowly permeable clay subsoils.

### **CLIMATE**

8            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.

9            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.

10          Climatic variables also affect 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**    **Cerney Wick**

<b>Grid Reference</b>	<b>SU 078954</b>	<b>SU 078956</b>	<b>SU 085 949</b>
Altitude (m)	82	82	82
Accumulated Temperature (day C)	1435	1434	1435
Average Annual Rainfall (mm)	704	705	691
Overall Climatic Grade	1	1	1
Field Capacity Days	161	161	157
Moisture deficit (mm)    Wheat	102	102	103
Potatoes	93	93	95

## **RELIEF**

11 Altitude at all sites is shown as 82 m on the Ordnance Survey 1:10 000 Scale map

## **GEOLOGY AND SOILS**

12 The underlying geology of the site is shown on the published geology map (IGS 1974) as First Terrace River deposit on the north west and alluvium in the south east of the site. The recent survey found a small patch of Kellaways Clay in the western site to be more widespread than indicated on the published map.

13 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW 1983) as Thames Association in the south along the River Thames and Kelmscot Association over the rest of the sites.

14 Thames Association is described as stoneless mainly calcareous clayey soils affected by ground water. Kelmscot Association is described as calcareous fine loamy soils over gravel, variably affected by groundwater associated with non calcareous clayey soils over gravel. Both occur on flat land at risk from flooding.

15 The recent survey found more extensive poorly drained soils with slowly permeable subsoils than the published soils information would suggest. The soils map reflects the geology map which as indicated above was not found to be closely represented on the ground.

## **AGRICULTURAL LAND CLASSIFICATION**

16 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.

### **Grade 2**

17 A small area of Grade 2 very good quality land has been mapped in the western site. These soils have a minor workability limitation and are stony at depth also imposing a minor droughtiness limitation. The upper horizons are clay loams becoming sandier with depth where the stone content increases. The soil profile is well drained. Wetness Class I (see Appendix II).

### **Subgrade 3a**

18 Subgrade 3a good quality land has been mapped in two of the sites. These soils have a moderate droughtiness limitation. The heavy clay loam topsoils and upper subsoils have few stones but the lower subsoils are stony with over 50% stone measured in a soil profile pit. These horizons are lighter textured which also reduces the available water in the profile. The soils are generally well drained. Wetness Class I.

### **Subgrade 3b**

19 The rest of the agricultural land has been mapped as Subgrade 3b moderate quality land. These soils are poorly drained. The southern site has heavy clay loam and heavy silty clay loam topsoils over clays which are slowly permeable. Gleying is often present from the surface and these soils are assessed as Wetness Class IV. Similar soils are found in the Cerney Wick Farm site. The Subgrade 3b land in the western site also has a moderate Wetness limitation but in these soils the slowly permeable layer occurs in the lower subsoil. A soil profile pit in this area confirmed the slowly permeable layer and the soils are assessed as Wetness Class III. However with the heavy clay loam topsoil these soils are also Subgrade 3b.

G M SHAW  
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FRCA Bristol  
September 1997

## REFERENCES

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

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## **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 (e.g. 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

SITE NAME Cerney Wick		PROFILE NO Pit 1 (ASP 7)	SLOPE AND ASPECT Flat	LAND USE Permanent grass	Av Rainfall 705 mm	PARENT MATERIAL River gravel	
JOB NO 56/97		DATE 17/9/97	GRID REFERENCE SU07619558	DESCRIBED BY HLJ	ATO 1434 day C	PSD SAMPLES TAKEN Topsoil HCL (S34 Z 36 2 30%)	
					FC Days 161		
					Climatic Grade 1		
					Exposure Grade 1		

Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness Size Type and Field Method	Mottling Abundance Contrast Size and Colour	Mangan Concs	Structure Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots Abundance and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form
1	18	HCL	10YR42	<1% > 2 m (s) 2% < 2 m ( +d) 2% HR T t l	None	None	MMSAB	Friable	Good	Good	MF + VF		Clear Smooth
2	44	HCL	2 5Y54	<1% > 2 cm (s) 2% < 2 m (s + d) 2% HR T t l	None	None	MCSAB	Friable	Moderate	Good	CF + VF		Abrupt Smooth
3	74	MSL	10YR66,68	1% > 2 cm ( ) 49% < 2 m ( + d) 50% HR t t l	None	Few*	WFSAB	Friable	Good	Good	FF + VF		Clear Smooth
4	110	LMS	10YR73 72	3% > 2 m ( ) 54% < 2 cm (s + d) 57% HR T t l	None	None	Single Grain	Loose	Moderate	Good	FF + VF		

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From No spl

Wetness Class I

Wetness Grade 2

Available Water Wheat 105 mm

Potatoes 96 mm

Moisture Deficit Wheat 102 mm

Potatoes 93 mm

Moisture Balance Wheat 3 mm

Potatoes 3 mm

Droughtiness Grade 3a (Calculated to 120 cm)

Final ALC Grade 3a

Main Limiting Factor(s) Droughtiness

Remarks \* on surface of stones

SITE NAME Cerne Wick		PROFILE NO Pit 2 (ASP 11)	SLOPE AND ASPECT Flat	LAND USE Permanent grass	Av Rainfall 704 mm	PARENT MATERIAL Kellaways Clays	
JOB NO 56/97		DATE 18/9/97	GRID REFERENCE SU06709562	DESCRIBED BY HLJ	ATO 1435 day C	PSD SAMPLES TAKEN	
					FC Days 161		
					Chmatic Grade 1		
					Exposure Grade 1		

Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness Size Type and Field Method	Mottling Abundance Contrast Size and Colour	Mangan Concs	Structure Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots Abundance and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form
1	27	HCL	10YR42	1% HR ( s)	None	None	MMSAB	Friable	Good	Good	MF + VF		Clear Smooth
2	43	C	10YR53,54	<1% HR ( )	FDFO (10YR66)	None	MCSAB* <sup>1</sup>	Friable	Moderate	Good* <sup>2</sup>	CF + VF		Clear Smooth
3	115+	C	25Y62,63	0% ( )	MDFO (10YR58)	Few*	MCAB	Firm	Poor	Poor	FF + VF		

Profile Gleyed From 43 cm  
 Slowly Permeable Horizon From 43 cm  
 Wetness Class III  
 Wetness Grade 3b

Available Water Wheat 129 mm  
 Potatoes 109 mm  
 Moisture Deficit Wheat 102 mm  
 Potatoes 93 mm  
 Moisture Balance Wheat 17 mm  
 Potatoes 16 mm  
 Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 3b  
 Main Limiting Factor(s) Wetness

Remarks \*<sup>1</sup> Close to WCSAB  
 \*<sup>2</sup> borderline  
 Close to Wetness Class 4

## 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 subdivided 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 peds 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>VIS</b>	Visual	<b>S</b>	Sieve	<b>D</b>	Displacement
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## MOTTLE SIZE

EF	Extremely fine <1mm	M	Medium 5-15mm
VF	Very fine 1-2mm	C	Coarse >15mm
F	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 should also be noted

**MANGANESE CONCRETIONS** Assessed by volume

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

## POROSITY

P	Poor	less than 0.5% biopores at least 0.5mm in diameter
G	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
F	Few	1-10	1 or 2
C	Common	10-25	2-5
M	Many	25-200	>5
A	Abundant	>200	

## ROOT SIZE

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

## HORIZON BOUNDARY DISTINCTNESS

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

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

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