PAYNES HEATH FARM WORCESTER

AGRICULTURAL LAND CLASSIFICATION

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Resource Planning Team
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AGRICULTURAL LAND CLASSIFICATION SURVEY

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INTRODUCTION

1 This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 81 7ha of land at Paynes Heath Farm to the north west of Worcester Field survey was based on 38 auger borings and 3 soil profile pits and was completed in December 1998

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 the Worcestershire Structure 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 site at a reconnaissance scale as mainly Grade 2 with Grade 3 land being found across the southern part of the site and along the eastern boundary An area of Grade 3 land is also mapped around Paynes Heath farm The site had not been surveyed previously 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 A detailed ALC survey was carried out on land to the west of the site in 1994 at a scale of 1 10000 (ADAS 1994) This survey uses the Revised Guidelines and criteria for grading the quality of agricultural land (MAFF 1988)

5 At the time of survey land cover was arable permanent grassland and horticultural crops Other land included farm buildings stables lakes and streams An area of land was not surveyed as access could not be obtained

6 The distribution of ALC grades is shown on the accompanying 1 10000 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

SUMMARY

Table 1 Distribution of ALC gradesPaynes Heath Farm Worcester

Grade	Area (ha)	% Surveyed Area (66 ha)
2	51 7	78 3
3a	9 9	15 0
3b	4 4	6 7
Agricultural land not surveyed	12 8	
Other land	2 9	
Total site area	81 7	100

7 Best and most versatile land occurs across the majority of the site Grade 2 quality land occurs over the northern and southern part of the site These soils have a slight droughtiness limitation Subgrade 3a land occurs over the central part of the site These soils have a droughtiness limitation Subgrade 3b land occurs in the central eastern and central part of the site on the lower land These soils have a wetness limitation

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** Paynes Heath Farm, Worcester

Grid Reference		SO 829 555	SO 828 559	SO 825 562
Altitude (m)		21	30	40
Accumulated Temperature (day C)		1484	1473	1462
Average Annual Rainfall (mm)		638	643	650
Overall Climatic Grade		1	1	1
Field Capacity Days		137	138	139
Moisture deficit (mm)	Wheat	111	110	108
	Potatoes	105	103	101

RELIEF

11 Altitude ranges from 21 metres at Ambrose Farm in the South East corner of the site to 40 metres along the western edge of the site with only gentle slopes of less than 7° being found over the site

GEOLOGY AND SOILS

12 The underlying geology of the site is shown on the published geology map (BGS 1993) as mudstone over the northern and eastern part of the site Aluvium drift deposits are found along the stream which passes across the southern part of the site and along the eastern edge The majority of the site is covered with terrace deposits of the River Severn

13 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as Wick 1 association More detailed soils information is also available in the 1 25000 scale survey of the Hereford and Worcester area (SSEW 1982)

14 The SSEW show a complex pattern of soil types over the site with the sandier soils of the Wick, Salwick and Arrow associations over the majority of the site which ties in well with the location of river terrace deposits according to the geology map The heavier clay soils of Whimple Compton and Dunnington Heath associations are found along the stream and in a band to the north east of Paynes Heath Farm which follows the mudstone as shown on the geology map

AGRICULTURAL LAND CLASSIFICATION

15 The distribution of ALC grades found by the current survey is shown on the accompanying 1 10000 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

16 **Grade 2**

The majority of the site was found to be of very good quality This is found across the northern and southern part of the site The soils were described as having clay loam or sandy loam topsoil overlying sandy clay loam or heavy clay loam onto clay to depth Although the soils were in Wetness Class I (see Appendix II) their sandy nature together with the low number of field capacity days resulted in a droughtiness limitation A soil profile pit confirmed this

17 **Subgrade 3a**

The Subgrade 3a land is found over the central part of the site The soils were described as having sandy loam topsoil over stony loamy sand to depth A soil profile pit enabled an assessment of the stone content to be made Although the soils were in

Wetness Class I their sandy and stony nature together with the low number of field capacity days resulted in a droughtiness limitation

18 **Subgrade 3b**

The Subgrade 3b land is found in the central and central eastern part of the site generally on the lower land The soils were described as having clay loam topsoil over clay to depth A soil profile pit confirmed that the clay was slowly permeable which placed the soils in Wetness Class IV Subgrade 3b

19 **Other Land**

An area of 12 8ha was classed as other land This included farm buildings stables lakes and streams

S KANGH
Resource Planning Team
FRCA Worcester
December 1998

REFERENCES

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

SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 3 Soils of Midland and Western England 1 250 000 scale SSEW Harpenden

SOIL SURVEY OF ENGLAND AND WALES (1984) Soils and Their Use in Midland and Western England Bulletin No 12 SSEW Harpenden

SOIL SURVEY OF ENGLAND AND WALES (1982) Sheet SO 85/95 Hereford and Worcester I 1 25000 scale 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

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

GRDNT Gradient as estimated or measured by hand held optical clinometer

GLEY SPL *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

MREL	Microrelief limitation	**FLOOD**	Flood risk	**EROSN**	Soil erosion risk
EXP	Exposure limitation	**FROST**	Frost prone	**DIST**	Disturbed land
CHEM	Chemical limitation				

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				

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)

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

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

PED COL Ped face colour using Munsell notation

GLEY 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

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 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

Degree of development	**WA**	Weakly developed Adherent	**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		

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		

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

VIS	Visual	**S**	Sieve	**D**	Displacement

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^2		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

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Paynes Heath Farm	Pit 1 (ASP26)	1 East	Cereals	Av Rainfall 643 mm ATO 1473 day C FC Days 138 Climatic Grade 1 Exposure Grade	Terrace deposits (Drift)
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
83/98	3 12 98	SO 829549	SK/SH		None

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	24	MSL	75YR3/2	1 / t tal	none	none				Good	MF&VF		wavy abrupt
2	45	MSL	75YR4/3	2 /o>2cm 25 / <2cm (S&D) 27 / total	none	none	MDCSAB	VF	M	Good	CF&VF		smooth clear
3	79	LMS	75YR4/4	35 /o(S&D) t tal	none	none	WKCSAB	VF	M	Good	CF&VF		smooth gradual
4	120	LMS	75YR4/4 4/6	35 /o(S&D) total	none	none	WKMSAB	VF	M	Good	FVF		

Profile Gleyed From	Not gleyed	Available Water	Wheat	89 mm	Final ALC Grade 3a
Slowly Permeable Horizon From	Not slowly permeable		Potatoes	76 mm	Main Limiting Factor(s) Droughtiness
Wetness Class	I	Moisture Deficit	Wheat	110 mm	Remarks
			Potatoes	103 mm	
Wetness Grade	1	Moisture Balance	Wheat	21 mm	
		Droughtiness Grade 3a	Potatoes	27 mm (Calculated to 120 cm)	

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Paynes Heath Farm	Pit 2(ASP31)	2 East	Cereals	Av Rainfall 643 mm ATO 1473 day C FC Days 138 Climatic Grade 1 Exposure Grade	Eldersfield mudstone
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
83/98	3 12 98	S0 827 548	SK/SH		None

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	34	MCL/SCL	75YR 3/2	2/ HR	NONE	NONE					FF&VF		sharp smooth
2	100	C	5YR 4/4 (5YR5/ 2)	NONE	NONE	common small concretions	MDCPR	FM	Poor	Low	FVF		

Profile Gleyed From	Not gleyed	
Slowly Permeable Horizon From	34	Red soil clay starts at 34 and continues to 100 cm
Wetness Class	IV	
Wetness Grade	3b	

Available Water	Wheat	mm
	Potatoes	mm
Moisture Deficit	Wheat	mm
	Potatoes	mm
Moisture Balance	Wheat	mm
Droughtiness Grade	Potatoes	mm (Calculated to cm)

Final ALC Grade 3b

Main Limiting Factor(s) Wetness

Remarks

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE			PARENT MATERIAL
Paynes Heath Farm	Pit 3 (ASP13)	2 East	Sugar beet	Av Rainfall	643mm	Head undifferentiated (Drift)
				ATO	1473 day C	
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days	138	PSD SAMPLES TAKEN
83/98	8 12 98	SO 825 552	SH/SK	Climatic Grade	1	None
				Exposure Grade		

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	35	SCL	75YR3/2	1/ > 2cm HR 21/6 (S&D)HR 22/ T tal	none	none				Good	CF&VF		Smooth Clear
2	48	SCL	75YR4/3	21/HR(S&D)	none	none	MDCAB	FR	moderate	Good	FVF		Smooth Clear
3	70 (59 70cm SZL stony)	FSZL	10YR5/3 (10YR5/4)	St es in band t base f hosizon into l y 21/HR (S&D)	common fine distinct 75YR 5/6	none	MDCSAB	FR	moderate	Good			Smooth Abrupt
4	120	C	5YR4/4 (5YR5/3)	45/HR (S&D)	common fine distinct 5YR5/6-4/6	common	Too stony to assess	FM					

Profile Gleyed From	48	Available Water	Wheat 117mm
Slowly Permeable Horizon From	now slowly permeable		Potatoes 104mm
Wetness Class	I	Moisture Deficit	Wheat 110mm
			Potatoes 103mm
Wetness Grade	I	Moisture Balance	Wheat +7mm
		Droughtiness Grade	Potatoes +2mm 2 (Calculated to 120cm)

Final ALC Grade 2

Main Limiting Factor(s) Droughtiness

Remarks

Horizon 4 clay is so stony that any attempt to determine structure is difficult Clay pulls away from around stones