

West of Stonehouse
Agricultural Land Classification
July 1998

Resource Planning Team
Worcester
FRCA Western Region

RPT Job Number: 50/98

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WEST OF STONEHOUSE

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 783.8ha of land, west of Stonehouse. Field survey was based on 246 auger borings and 7 soil profile pits, and was completed in June 1998. During the survey 2 samples were 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 to provide information on the agricultural land quality for long-term planning purposes.
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 Grade 3, part of the site was previously surveyed in 1988 at a scale of 1:12000 (ADAS, 1988). 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 1988 survey included land which is both coincident with and adjacent to the current survey area. This survey graded coincident land as a mixture of Subgrades 3a, 3b and 3c, whilst adjacent land (to the south of Eastington and east of the M5) was shown as Subgrades 3b, 3c and Grade 4 quality. Two further surveys adjacent to the current site were carried out more recently, in 1997 and 1998, the former covered an area to the north-east of Old End Farm, whilst the rather extended north and east from Nastend Farm. Both surveys showed the land to be of Subgrade 3b quality. Attention was paid to the grading of these previous surveys, when grading land in the current survey.
5. At the time of survey land cover was arable, grass and set aside. An area of 65.8ha of agricultural land within the survey area was not surveyed because access could not be obtained. Other land which was not surveyed included residential areas, agricultural buildings, industrial units, roads, tracks, railway and woodland.

SUMMARY

6. The distribution of ALC grades is shown on the accompanying 1:20000 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: West of Stonehouse

Grade	Area (ha)	% Surveyed Area (783.8 ha)
3a	107.0	14
3b	455.9	58
4	8.9	1
Agricultural land not surveyed	65.8	8
Other land	146.2	19
Total site area	783.8	100

7. The majority of the site is not best and most versatile agricultural land, and has been graded as Subgrade 3b due to a wetness limitation. Four discrete areas of Subgrade 3a are found as a band across the north of the site, to the east of Nupend Farm, to the south of Fromebridge Cottage and to the north of Eastington. The limitations are wetness, droughtiness and workability depending upon the soil profile. A single field to the south-east of Fromebridge Cottage is Grade 4. The main limitation being micro-relief as this field has been previously quarried and the spoil mounds remain in the field.

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: West of Stonehouse

Grid Reference	SO 808 076	SO 788 085	SO 775 060
Altitude (m)	60	26	20
Accumulated Temperature (day °C)	1461	1499	1508
Average Annual Rainfall (mm)	773	752	765
Overall Climatic Grade	1	1	1
Field Capacity Days	166	164	168
Moisture deficit (mm):			
Wheat	100	105	104
Potatoes	91	97	97

RELIEF

11. Altitude ranges from 15 metres north of Eastington to 60 metres south of Stroud Green with generally gentle slopes which do not impose any limitation on the ALC of this site.

GEOLOGY AND SOILS

12. The underlying geology of the site is shown on the published geology map IGS, 1972 as Jurassic Lower Lias clay over the majority of the site, with Alluvium along the banks of the River Frome and isolated pockets of Recent Fan and Terrace Gravels over the south and northern part of the site. The ALC survey reflects the geology of the site with the best and most versatile land occurring on the soils of the River Terrace Gravels.
13. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW, 1983) as Evesham 2 Association over the majority of the site. The Badsey 1 Association is mapped in a discrete block to the south of Standish and north of Pidgemore Farm, this extends east across the railway line stopping short of Stroud Green. Another area of Badsey 1 Association soils runs in a band, north-west, south-east, from Fromebridge Cottage to Eastington and passes along the southern side of the River Frome. Fladbury 1 Association soils are mapped along the banks of the River Frome.
14. The Evesham 2 Association and Fladbury 1 Association soils are described as having stoneless clay topsoils over clay to depth. The Evesham soils are calcareous with slowly permeable subsoils which are seasonally waterlogged when undrained. The Fladbury soils also have a slowly permeable subsoil but the primary source of waterlogging is due to the groundwater which fluctuates seasonally. The Badsey 1 Association soils are described as stoneless or slightly stony sandy silt loam or clay loam topsoils over slightly stony sand. The whole of the profile is described as calcareous and the soils are well drained and the variations in available water and droughtiness reflect the depth to the gravel.

15. The majority of the soils in the present survey were found to closely follow the distribution described above, soils were stonier in the north-east and southern part of the site reflecting the distribution of the Badsey 1 Association soil type and the Fan and Terrace Gravels. The remainder of the survey found clay loam over clay soils which correspond well to the location of the Evesham 2 and Fladbury 1 Association's mapped by SSEW, and overlying the Lias clay.

AGRICULTURAL LAND CLASSIFICATION

16. The distribution of ALC grades found by the current survey is shown on the accompanying 1:20000 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.

17. **Subgrade 3a**

Four discrete areas of the site; to the north of the Hawthornes at Clay Pits, north of Eastington, south-east of Nupend Farm, Nupend, and in a band across the northern part of the site were found to be of good quality. The Subgrade 3a land is generally found on the gently sloping areas of the site. Across the northern part of the site the Subgrade 3a soils were described as heavy clay loam or clay topsoil textures over clay. The soils generally have slightly or moderately stony topsoil to a depth of around 25cm over very stony subsoil. Soil profile pit number 4 confirmed that evidence of wetness and the depth to a slowly permeable layer place these soils in Wetness Class II (see Appendix II). The profiles with clay topsoil have a workability limitation, again these are located in the northern part of the site. A particle size analysis carried out as part of soil profile pit number 5 confirms the topsoil texture. The Subgrade 3a soils to the south-east of Nupend Farm have a moderately stony heavy clay loam topsoil over very stony heavy clay loam upper subsoil over extremely stony coarse loamy sand onto gravel to depth. A soil profile pit confirmed that the heavy clay loam was well structured and not slowly permeable placing the soils in Wetness Class I, however the high stone content of the subsoil limits the water holding capacity of the soil and the soils are limited by droughtiness. The areas of Subgrade 3a in the south of the site have very slightly stony heavy clay loam topsoils and upper subsoils which passes onto a moderately stony clay and then onto stoneless sandy clay and sandy clay loam to depth. Soil profile pit number 2 confirmed that evidence of wetness and the depth to the slowly permeable layer places these soils in Wetness Class II.

18. **Subgrade 3b**

The majority of the site is found to be of moderate quality. The Subgrade 3b land has medium or heavy clay loam or clay topsoils onto clay to depth. Three soil profile pits confirmed that the evidence of wetness and the depth to the slowly permeable layer places these soils in Wetness Class IV.

19. **Grade 4**

A field to the south-east of Fromebridge Cottage was previously quarried for sand and gravel and has been graded as poor quality land. The soils in this area were found to have medium or heavy clay loam topsoil over very stony heavy clay loam subsoil to depth and were graded as Subgrade 3a due to soil droughtiness. However as a result of the irregular nature of the surface this area has been further downgraded due to a micro-relief limitation which severely restricts the agricultural potential of the land.

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July 1998

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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 (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.

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.

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

<u>Degree of development</u>	WA: Weakly developed Adherent	WK: Weakly developed
	MD: Moderately developed	ST: Strongly developed
<u>Ped size</u>	F: Fine	M: Medium
	C: Coarse	VC: Very coarse
<u>Ped Shape</u>	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
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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 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 WEST OF STONEHOUSE		PROFILE NO. PIT1 (ASP 204-205)	SLOPE AND ASPECT LEVEL	LAND USE PGR	Av Rainfall: 773 mm ATO: 1461 day °C	PARENT MATERIAL ALLUVIUM
JOB NO. 50/98		DATE 20.5.98	GRID REFERENCE SO775 068	DESCRIBED BY SK&SH	FC Days: 166 Climatic Grade: 1 Exposure Grade: -	PSD SAMPLES TAKEN 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	14	HCL	25Y3/2	NONE	few fine distinct 10YR5/6	NONE	-	-	-	-	MF+VF	Y	Clear Smooth
2	35	C	25Y5/3 (25Y 51-61)	NONE	many fine distinct 10YR5/8	NONE	STCAB	FM	-	POOR	CF+VF	Y	(Gradual smooth)
3	60	C	25Y5/3 (25Y5/2) with (25Y5/1)	NONE	many fine distinct 10YR5/8	NONE	STCPR-STCAB	FM	-	POOR	CVF	Y	

Profile Gleyed From: 14
Slowly Permeable Horizon From: 35
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) WE

Remarks:

Horizon 2 is not a distinct boundary, merely where clay becomes slowly permeable for the 35cm cut off.

SITE NAME WEST OF STONEHOUSE		PROFILE NO. PIT2 (ASP368)	SLOPE AND ASPECT 4° NE	LAND USE CER	Av Rainfall: 773 mm ATO: 1461 day °C	PARENT MATERIAL 3rd Terrace Gravels	
JOB NO. 50/98		DATE 20/5/98	GRID REFERENCE SO 776 058	DESCRIBED BY SK&SH	FC Days: 166 Climatic Grade: 1 Exposure Grade: -	PSD SAMPLES TAKEN 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	29	HCL	10YR4/2-25Y4/2	2% SLST (vis)	NONE	-	-	-	-		MF+VF	Y	Smooth clear
2	40	HCL	10YR4/3-5/4	3% SLST (vis)	NONE	-	MDCSAB	FM	Moderate	Poor	CF+VF	Y	Smooth clear
3	74	C	10YR4/4	21% SLST S&D	NONE	-	WKCSAB	FM	Moderate	Moderate	FF+VF	Y	Smooth abrup
4	102	SC	10YR5/3 (25Y5/3)	NONE	common fine and distinct 10YR5/8	some in fine bands	WKCSAB	FR	Moderate	Poor	FF+VF	Y	Smooth merging
5	120	SCL	10YR5/4	NONE	common distinct 10YR5/8 25Y6/1	-	WKCPL	VF	Moderate	Good	FF+VF		

Profile Gleyed From: 74

Slowly Permeable Horizon From: 74

Wetness Class: II

Wetness Grade: 3a

Available Water Wheat: 145 mm

Potatoes 109 mm

Moisture Deficit Wheat 100 mm

Potatoes 91 mm

Moisture Balance Wheat: +45 mm

Droughtiness Potatoes: +18 mm
Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3a

Main Limiting Factor(s) WE

Remarks:

Horizon 2 compacted at base due to plough compaction.

Horizon 4 + 5 banded from deposition

Horizon 5 structure determined by natural depositional bands.

SITE NAME WEST STONEHOUSE		PROFILE NO. PIT3 (ASP 201-226)	SLOPE AND ASPECT UNDULATING		LAND USE PGR	Av Rainfall: 773 mm ATO: 1461 day °C	PARENT MATERIAL 3rd TERRACE GRAVELS	
JOB NO. 50/98		DATE 21.5.98	GRID REFERENCE SO770 067		DESCRIBED BY SK&SH	FC Days: 166 Climatic Grade: 1 Exposure Grade: -	PSD SAMPLES TAKEN 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.	13	MCL	10YR2/2	2% SLST (VIS)	-	-	-	-	-	GOOD	MF&VF	Y	Smooth clear
2.	25	MCL	10YR4/3	49% SLST S+D	-	-	*	-	-	GOOD	CF&VF	Y	Smooth clear
3	36	HCL	10YR4/2	17% SLST S&D	-	-	WKCSAB	FR	Moderate	POOR	FF&VF	Y	Smooth abrupt
4	120 (Dug 95)	HCL	10YR3/2 2/2	52% SLST S&D	-	-	WKCSAB	FR	Moderate	POOR	FVF	Y	-

Profile Gleyed From: -	Available Water	Wheat: 109 mm	Final ALC Grade: 2 Main Limiting Factor(s) DR Remarks: * Horizon 2 - too stony to assess structures of this horizon.
Slowly Permeable Horizon From: 36	Potatoes	84 mm	
Wetness Class: I	Moisture Deficit	Wheat 100 mm Potatoes 91 mm	
Wetness Grade: 1	Moisture Balance	Wheat: +9 mm	
	Droughtiness Grade: 2	Potatoes: -7 mm (Calculated to 120 cm)	

SITE NAME WEST OF STONEHOUSE		PROFILE NO. PIT 4 (ASP 94)	SLOPE AND ASPECT LEVEL	LAND USE LEY	Av Rainfall: 773 mm ATO: 1461 day °C	PARENT MATERIAL TERRACE GRAVELS	
JOB NO. 50/98		DATE 4.6.98	GRID REFERENCE SO 799076	DESCRIBED BY SK+SH	FC Days: 166 Climatic Grade: 1 Exposure Grade: -	PSD SAMPLES TAKEN 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	20	HCL	10YR 3/2-4/2	21% SLST S+D	NONE	-	-	-	-	-	MF + VF	Y	Smooth gradual
2	64	HCL	10YR 4/6	45% SLST S+D	NONE	NONE	MDCSAB Breaking to MSAB	FR	Moderate	GOOD	CF + VF	Y	Smooth abrupt
3	72*	C	25Y 5/3	45% SLST S+D	10YR5/6 MANY	NONE	WKCSAB	FR	Moderate	GOOD	FVF	Y	Wavy abrupt
4	120*	C	10YR 6/1	1% SLST (VIS)	25Y 5/6 10YR 5/6 COMMON	NONE	MASSIVE	VM	Poor	POOR	FVF	Y	

Profile Gleyed From: 64
Slowly Permeable Horizon From: 72
Wetness Class: II
Wetness Grade: 3a

Available Water Wheat: 110 mm
Potatoes 83 mm
Moisture Deficit Wheat 100 mm
Potatoes 91 mm
Moisture Balance Wheat: +10 mm
Droughtiness Potatoes: -8 mm
Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3a
Main Limiting Factor(s) WE
Remarks:
* Horizon 3 dips to 84 cm in one area
* Horizon 4 - Pit dug to 100 augered to 120cm

SITE NAME WEST OF STONEHOUSE		PROFILE NO. PIT 5 (ASP 17)	SLOPE AND ASPECT 1° NW	LAND USE LEY	Av Rainfall: 773 mm ATO: 1461 day °C	PARENT MATERIAL TERRACE GRAVELS	
JOB NO. 50/98		DATE 4.6.98	GRID REFERENCE SO 791 084	DESCRIBED BY SK + SH	FC Days: 166 Climatic Grade: 1 Exposure Grade: -	PSD SAMPLES TAKEN TOPSOIL 0-25 CM S-31%, Z-31%, C-38%	

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	25	C	10YR 4/2-4/3	10% SLST S & d	NONE	NONE	-	-	-	-	CF + VF	Y	Smooth abrupt
2	50	C	10YR5/3	21% SLST S & d	NONE	NONE	MD CSAB	FR	Moderate	GOOD	CF + VF	Y	Smooth clear
3*	88	C	10YR 5/6	49% SLST S & d	NONE	NONE	WK MSAB	VFR	Good	GOOD	FF + VF	Y	Smooth gradual
4	120	C	25Y 6/4	49% SLST S & d	common distinct 10YR 5/6 6/8	NONE	MD CSAB	FM	Good	POOR	VF VF	Y	

Profile Gleyed From: 88
Slowly Permeable Horizon From: 88
Wetness Class: I
Wetness Grade: 3a

Available Water Wheat: 137 mm
Potatoes 101 mm
Moisture Deficit Wheat 100 mm
Potatoes 91 mm
Moisture Balance Wheat: + 37mm
Droughtiness Potatoes: +10 mm
Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3a

Main Limiting Factor(s) WK

Remarks:

Horizon 3. Texture difficult due to high % of small stone

SITE NAME WEST OF STONEHOUSE		PROFILE NO. PIT 6 (ASP 117)	SLOPE AND ASPECT 1° SW	LAND USE PGR	Av Rainfall: 773 mm ATO: 1461 day °C	PARENT MATERIAL Jurassic Lower Lias mainly clay
JOB NO. 50/98		DATE 9.6.98	GRID REFERENCE SO 806074	DESCRIBED BY SK & SH	FC Days: 166 Climatic Grade: 1 Exposure Grade: -	PSD SAMPLES TAKEN TOPSOIL 0-21cm S-17%, Z-35%, C-48%

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	21	C	10YR 4/2	2% SLST (VIS)	-	-				GOOD	CF+VF	Y	Smooth abrupt
2	30	C	25Y 5/3	5% SLST (VIS)	10YR 5/6 FEW	-				GOOD	FF+VF	Y	Smooth abrupt
3	42	C	25Y 5/3 (25Y5/3)	2% SLST (VIS)	10YR 5/6 COMMON	-	(DESCRIPTION BELOW 35CM) STCSAB + PRISMATIC	Moderate		POOR	FF+VF	Y	Smooth abrupt
4	100	C	25Y5/2 (25Y5/3-6/3)	1% SLST (VIS)	10YR 5/6 MANY	-	ST CPR	Poor		POOR	F VF	Y	

Profile Gleyed From: 30
Slowly Permeable Horizon From: 42
Wetness Class: IV
Wetness Grade: 3b

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

Final ALC Grade: 3b

Main Limiting Factor(s) WE

Remarks:

SITE NAME WEST OF STONEHOUSE		PROFILE NO. PIT 7 (ASP 240)	SLOPE AND ASPECT 1° SW	LAND USE BEANS	Av Rainfall: 773 mm ATO: 1461 day °C	PARENT MATERIAL TERRACE GRAVELS
JOB NO. 50/98		DATE 9.6.98	GRID REFERENCE SO 791 066	DESCRIBED BY SH & SK	FC Days: 166 Climatic Grade: 1 Exposure Grade: -	PSD SAMPLES TAKEN 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	25	HCL	10YR 42	21% SLST S+D	-	-	-	-	-	-	CF +VF	Y	Smooth clear
2	52	HCL	10YR 43	53% SLST S+D	-	-	WKCSAB	VF	Moderate	GOOD	FVF	Y	Smooth gradual
3*	82	LCS	25YR 68	84 % SLST S+D	-	-				GOOD	FVF	Y	Smooth gradual
4*	120	GRAVEL	10YR 68	84 % SLST S+D	-	-				GOOD	-	Y	

Profile Gleyed From: -
Slowly Permeable Horizon From: -
Wetness Class: 1
Wetness Grade: 2

Available Water Wheat: 83 mm
 Potatoes 70 mm

Moisture Deficit Wheat 100 mm
 Potatoes 91 mm

Moisture Balance Wheat: -17 mm

Droughtiness Potatoes -21 mm
Grade: 3a (Calculated to 120 cm)

Final ALC Grade: 3a

Main Limiting Factor(s) DR

Remarks:

*Horizons 3 & 4 unable to assess structure due to high stone content.