South Marston, Swindon

Agricultural Land Classification

December 1996

Resource Planning Team
Taunton Statutory Group
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Ministry of Agriculture, Fisheries and Food
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AGRICULTURAL LAND CLASSIFICATION SURVEY

CONTENTS

SOUTH MARSTON, SWINDON

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a reconnaissance Agricultural Land Classification (ALC) survey of 823 ha of land at South Marston. Field survey was based on 254 auger borings and 11 soil profile pits, and was completed in December 1996.

2. The survey was conducted by the Resource Planning Team of ADAS Taunton Statutory Group on behalf of MAFF Land Use Planning Unit in its statutory role in the preparation of the Wiltshire 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 3, with Grade 4 mapped along the River Cole and there are patches of Grade 2 at Queenlaines Farm, Burton Grove Farm, Rowborough Farm, Nightingale Farm and Roves Lane, 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. Account has been taken of adjacent surveys to the North (ADAS 1995; 1996a) and the South (ADAS 1996b) in the preparation of this report.

5. At the time of survey land cover was grazing pasture and arable crops with some small areas of biomass. Other land which was not surveyed included areas which have been planted with trees as part of the Great Western community forest. Many of these trees were still very young at the time of survey and their survival into maturity not guaranteed.

SUMMARY

6. The distribution of ALC grades is shown on the accompanying 1: 25 000 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: South Marston

Grade	Area (ha)	% Surveyed Area (722 ha)
2	39	5
3a	102	14
3b	581	81
Other land	101	
Total site area	823	

7. The majority of the survey area is mapped as Subgrade 3b. Two types of soil are so mapped. In the south and east, poorly drained clays have a moderate wetness limitation, whilst brashy limestone soils in the north have variable moderate droughtiness limitations which at the scale of survey and mapping are mapped as Subgrade 3b. A small area of Grade 2 is mapped at Rowborough Farm where well drained lighter textured soils were found. Grade 2 land with a minor wetness limitation is mapped at Queenlaines Farm where there are also some profiles with minor workability limitations.

8. Several areas of Subgrade 3a are mapped. Where the clay soils developed over Coral Rag are less stony and less droughty, they are mapped as Subgrade 3a. Heavy clay loams with moderate wetness limitations and clays with moderate workability limitations are found at various locations, both being subgrade 3a.

CLIMATE

9. 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.

10. 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.

11. 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: South Marston

Grid Reference		SU200894
Altitude (m)		105
Accumulated Temperature (day °C)		1408
Average Annual Rainfall (mm)		689
Overall Climatic Grade		1
Field Capacity Days		152
Moisture deficit (mm):	Wheat	103
	Potatoes	94

RELIEF

12. Altitude ranges from 86 metres in the east by the River Cole to 125 metres at the northern end of the site with gently undulating land throughout the site.

GEOLOGY AND SOILS

13. The underlying geology of the site is shown on the published geology map (IGS, 1974). All the underlying geology is of the Upper Jurassic era. Kimmeridge Clay is found on the southern fringes. Lower Corallian silt and sand is mapped from Burton Grove Farm across to Sevenhampton and from South Marston village eastwards. Between these two areas and to the north Coral Rag, Red Down Clay and Sand from the Upper Corallian is mapped. Recent deposits of aluvium are found along watercourses and a small area of First Terrace deposits are mapped south of Hill Farm. The geology is more complex than the soils developed over it. The complexity is generally removed with small localised variations in the soils not always closely linked to whole geological units, but parts of units.

14. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW, 1983). Two areas around Queenlaines Farm and Marston Copse are mapped as the Sherborne Association. Much of the surrounding area is mapped as the Bursledon Association. Fladbury 1 Association is mapped along the River Cole and Denchworth on the southern fringes. A small area of Fyfield 4 is mapped in the north.

15. Sherborne Association soils are described as shallow well drained brashy calcareous clayey soils over limestone. Fyfield 4 soils are also described as well drained but deep coarse loamy and sandy soils, although some may have slowly permeable subsoils with seasonal waterlogging. Bursledon and Denchworth Associations are slowly permeable soils. Bursledon being loamy and Denchworth clayey. Fladbury 1 is described as stoneless clayey soils variably affected by groundwater.

16. Soils in the area mapped as Fladbury 1 were found to have slowly permeable subsoils little different from surrounding soils. Soils typical of Denchworth were identified in the survey. Bursledon soils were found to be variable ranging from well drained loamy soils to poorly drained clays. Some relationship with the distribution of the underlying geology was identified in these areas. Soils typical of the Sherborne Association seemed to be more extensive in the north than suggested by the Soil Survey map. The presence of Fyfield 4 soils was barely indicated by the survey.

AGRICULTURAL LAND CLASSIFICATION

17. The distribution of ALC grades found by the current survey is shown on the accompanying 1: 25 000 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

18. Two small areas of Grade 2 have been mapped. In the north of the site the larger area of Grade 2 contains variable soils, some being similar to those at Rowborough and others with some wetness in the profile. These are assessed as Wetness Class II with gleying below 40cm and a deep slowly permeable layer. PSD analysis showed these topsoils are sandier than elsewhere, a sandy clay loam texture. Pit 4 represents these slightly wetter profiles. This Grade 2 unit is developed on Red Down Sand. The smaller area to the north is also on Red Down sand and is mapped on the basis of data collected on the adjacent site (ADAS 1996a) and the mapped geology.

Subgrade 3a

19. There are several small patches of Subgrade 3a mapped within the dominant 3b. These reflect the variability of the two main geology types at the site , Coral Rag and Lower Corallian silt and sand. Soils developed over the Coral Rag are stony clays. The clay soils become impenetrable to the auger at variable depths and soil profile pits are required to accurately assess the extent of a droughtiness limitation. Coral Rag is a limestone which appears to be variable in hardness. Whilst in places at this site the available water in the limestone could be taken as that listed for soft oolitic or dolomitic limestone. (MAFF, 1988). At the generalised scale of survey and mapping, the more severe option of hard rock has been used in assessing the extent of droughtiness at the site. It is recognised that this assessment will be too severe in places, but a more detailed survey with more soil profile pits would be needed to distinguish locations. Soils developed over Coral Rag are typically increasingly stony with depth. At this site, the stone was found to be well fractured and often weathered into fragments. Root penetration observed deep into the profile indicates crops can exploit moisture reserves in these stony soils and this has been taken into account in the droughtiness assessement. Subgrade 3a has been mapped where the profiles are less stony and a higher soil moisture content is available. Pit 9 is typical of these areas, also mapped east of Prior's Farley Cottages, NW of Nightingale Farm and north of Queenlaines Farm.

20. The second geology type, Lower Corallian silt and sand is also more variable than indicated by the published geology or soils maps (IGS, 1974; SSEW 1983). This gives rise to patches of lighter textured, better drained soils. The Subgrade 3a land around South Marston Farm and Old Farm Barn are generally Wetness Class II soils with heavy clay loam topsoils. Pit 3 represents these soils although it is separated from the main block of 3a soils by a small valley containing poorly drained soils developed on alluvium. At Rowborough Farm, the survey found sandy clay topsoils over clay subsoils which are assessed as Wetness Class I (see Appendix II) although there is some evidence of wetness deep in the profile in the form of manganese. Included in this unit is soil profile Pit 3 which is assessed as Wetness Class II, Subgrade 3a. This profile is related to the Subgrade 3a profiles around Old Farm Barn but poorly drained soils developed on alluvium in a valley between, isolate this pit and it has been included in this unit at this scale of mapping The remaining areas of Subgrade 3a around Roves Farm, Priors Farley Cottages and east of Burton Grove Farm are well drained Wetness Class I Clay soils with a moderate workability limitation.

Subgrade 3b

21. The majority of the site has been mapped as Subgrade 3b. Two soils can be described comprising this unit. Soils developed over Coral Rag, as described above (paragraph 19), are variable. Much of the northern part of the site has these soils which are impenetrable to the auger at shallow depths. Four soil profile pits were examined, Pits 1, 5, 6 and 7. These showed the total topsoil stone content ranged from 12% to 33%, upper subsoil from 42% to 85% and lower subsoil 10% to 85%. Roots were observed to depth except in the horizons with the highest stone contents. Pit 5 showed that in places the limestone experiences waterlogging due to slowly permeable clay layers. These stony soils have been mapped as Subgrade 3b based on the evidence obtained in the soil profile pits. These soils in places are borderline to Subgrade 3a with a droughtiness limitation based on the nature of the rock type as described under Subgrade 3a. Additional soil pits in a more detailed survey may lead to areas of Subgrade 3a being mapped.

22. The second soil type mapped as Subgrade 3b is found mainly in the east and south of the site. These soils are poorly drained clays. The soil is gleyed high in the profile with slowly permeable subsoils. These soils are assessed as Wetness Class IV and have a moderate wetness limitation. These soils have developed over alluvium, Kimmeridge Clay and parts of the Lower Corallian silt and sand. Pits 8, 10. and 11 describe the poorly drained soils. Also included in the Subgrade 3b are several fields adjacent to the railway in the south which have been landfilled and have a shallow stony soil.

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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 (In preparation) Soil Survey Field Handbook, Revised Edition.

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, 1974).

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	**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%			

STRUCTURE: Ped Development *

WA:	Weakly adherent	**M:**	Moderately developed
W:	Weakly developed	**S:**	Strongly developed

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, 1974) for details.

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 1	1° SE	Cereals	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Coral Rag
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31/96	22/10/96	SU19368985	PB/PW		31/96/1

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	20	C	10YR42	2%>2cm (S) 14%>2mm(S+D) 16% Total HR	None	None	N/A	Friable	Moderate	Many	Many fine & v. fine	Yes	Clear Smooth
2	68	C	10YR44	35%>2cm(S) 23%>2mm(S+D) 58% Total HR	None	None	Too Stony	Firm	Moderate	Many	Common Very Fine	Yes	Gradual Smooth
3	84	C	25Y53	35%>2cm(S) 14%>mm(S+D) 49% Total HR	Few Distinct Fine Ochreous	None	Too Stony	Firm	Moderate	Many	Few Very Fine	Yes	—

Profile Gleyed From: Not Gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3a

Available Water Wheat: 77 mm

Potatoes: 66 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: -26 mm

Potatoes: -28 mm

Droughtiness Grade: 3b (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Drought

Remarks: Horizon 3 compact.
Assumed 60% HR to 120cm for droughtiness calculation

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 2 (ASP213)	1° E	Stubble	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Sand and silt
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31/96	22/10/96	SU20728805	PRW/GMS		31/96/2

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	10YR54	None (Vis)	None	None	—	—	—	—	MF/VF		Abrupt Smooth
2	65+	C	2.5Y64	None (Vis)	CDFO 10YR58	C	SCPr	Extremely Firm	Poor	Poor	CVF dominantly ex ped		

Profile Gleyed From: 25cm

Depth to Slowly Permeable Horizon: 25cm

Wetness Class: IV

Wetness Grade: 3b

Available Water Wheat: 124 mm

Potatoes: 101 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: 21 mm

Potatoes: 7 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks:

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 3	2° NW	PGR	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Sand and silt
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31/96	22/10/96	SU20408790	GMS/PRW		31/96/3

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	30	HCL	10YR43	None (Vis)	None	None	—	—	—	—	CVF		Clear Smooth
2	66	HCL	7.5YR54	None (Vis)	None	Few	MCSAB	Friable	Mod	Good	CVF		Abrupt Smooth
3	90+	C	2.5Y62	None (vis)	MDFO 7.5YR68	None	MM/CPr	Firm	Poor	Poor	FVF ex ped		

Profile Gleyed From: 66

Depth to Slowly Permeable Horizon: 66

Wetness Class: II

Wetness Grade: 3a

Available Water Wheat: 140 mm

Potatoes: 117 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: 29 mm

Potatoes: 15 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Wetness

Remarks: PSD result SC,
50% sand, 18% silt, 32% clay, borderline 3b

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 4 (Asp 14)	4° NE	PGR	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Red Down Sand
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31.96	23.10.96	SU19389030	PB/GMS		31/96/4

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	22	SCL	7.5YR43	1%HR (Vis)	FDMO	None	—	—	—	—	MF,VF		Clear Smooth
2	53	C	7.5YR54	1%HR (Vis)	CDMO 7.5YR56	C	MM,FSAB	Friable	Good	Good	CF,VF		Gradual Smooth
3	73	C	10YR64, 54	1%HR (Vis)	CFMO 7.5YR56	C	WCAB	Friable	Mod	good	FVF		Gradual Smooth
4	98+	C Variable with sandier parts	10YR64	<1%HR (Vis)	CDCO 7.5YR56	C	WCAB	Friable	Mod	Low	FVF		

Profile Gleyed From: 53

Depth to Slowly Permeable Horizon: 73

Wetness Class: II

Wetness Grade: 2

Available Water Wheat: 153 mm

Potatoes: 128 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: 58 mm

Potatoes: 34 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 2

Main Limiting Factor(s): Wetness

Remarks:

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 5 (Asp29)	2° S	FLW	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Coral Rag
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31.96	23.10.96	SU20209010	PB/GMS		———

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	22	C	10YR42	10%>2cm 20%>2mm 30% Total HR (S+D)	None	None	—	—	—	—	MM,F		Clear Smooth
2	42	C	10YR41	10%>2cm 32%>2mm 42% Total HR (S+D)	CDFO 10YR56	None	MMSAB	Firm	Mod	Good	CF,VF		Gradual Smooth
3	73	C	2.5Y51	20%>2cm 36%>2mm 56% Total HR (S+D)	CDMO 10YR56	None	WCSAB	Firm	Poor	Poor	FVF		Clear Smooth
4	100+	C	2.5Y42	10%HR (Vis)	CDMO 10YR56	None	MMPr	Firm	Poor	Poor	FVF		

Profile Gleyed From: 22cm

Depth to Slowly Permeable Horizon: 73cm

Wetness Class: II

Wetness Grade: 3b

Available Water Wheat: 89 mm

Potatoes: 64 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: -14 mm

Potatoes: -30 mm

Droughtiness Grade: 3b/3a (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks: Stone is limestone but hard. Where predominantly clay in H3 then SPL but presence of stones aids permeability therefore overall SPL from 73cm

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 6 (Asp 49)	0°	Stubble	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Coral Rag
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31/96	24/10/96	SU19008978	PB/PRW		———

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	C	10YR42	6%>2cm(S) 27%<2mm(S+D) 33% Total HR	None	None	N/A	Friable	Moderate	Many	MF & VF	Yes	Abrupt Smooth
2	40+	C	2.5Y44	85% (Vis) Fractured Rock	Common Medium Ochreous 10YR56	None	Too Stony	Firm	Moderate	Poor	None Found	Yes	

Profile Gleyed From: 18

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: II

Wetness Grade: 3b

Available Water Wheat: 27 mm

Potatoes: 28 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: -76 mm

Potatoes: -66 mm

Droughtiness Grade: 4 (Calculated to 60 cm)

Final ALC Grade: 4

Main Limiting Factor(s): Depth

Remarks: 3rd Horizon probed to 60cm with ≙ 60% rock.
However, no roots observed passing through horizon 2.
Borderline to 3b on depth.
3b unit.

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 7 (Asp 27/39)	2° S	Cereals	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Coral Rag
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31/96	24/10/96	SU19869002	PRW/PB		—

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	30	C	10YR42	1%>2cm 11%<2cm 12% HR (S+D)	None	None	N/A	V. Firm	Moderate	Many	Common Fine & V. Fine	Yes	Clear Wavy
2	55	C	2.5Y52	3%>2cm 42%<2cm 45% HR (S+D)	Few Faint Fine	None	Too Stony	V Firm	Moderate	Many?	Few Fine	Yes	Abrupt Smooth
3	70+	C	2.5Y52	85% HR Fractured Rock	—	—	—	—	—	—	Not Seen	Yes	—

Profile Gleyed From: Not Gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3a

Available Water Wheat: 73 mm

Potatoes: 73 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: -30 mm

Potatoes: -21 mm

Droughtiness Grade: 3b (Calculated to 100 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Drought

Remarks:

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 8 (Asp 106)	4° N	PGR	Av Rainfall: 689 mm ATO: 1408 day °C	Sand and silt
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	SOIL SAMPLE REFERENCES
31/96	25/10/96	SU20718925	PB/GMS		31/96/8

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	26	HCL	10YR54	1% HR (Vis)	FFFO 10YR58	Few	—	—	—	—	MF,VF		Gradual Smooth
2	49	C	10YR53	Neg	CDFO 10Y58	Few	MM/CPr	Very Firm	Poor	Poor	CVF		Gradual Smooth
3	75	C	25Y51	Neg	CDMO 10YR58	Few	MCPr	V Firm	Poor	Poor	FVF		

Profile Gleyed From: 26cm

Depth to Slowly Permeable Horizon: 26cm

Wetness Class: IV

Wetness Grade: 3b

Available Water Wheat: 127 mm

Potatoes: 104 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: 24 mm

Potatoes: 10 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks: 32% clay in topsoil

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 9 (Asp 135-136)	0°	Cereal	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Coral Rag
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31/96	25/10/96	SU20508892	PB/GMS		31/96/9

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	15	C	10YR31	1%>2cm 9%>2mm 10% Total HR (S+D)	None	None	—	—	***	Good	CF,VF		Abrupt Smooth
2	44	C	10YR41	1%>2cm 9%>2mm 10% Total HR (Vis)	None	None	MM/CSAB	Firm	Good/ Mod	Good	FVF,F		Gradual Smooth
3	58	C	2.5Y43	55% HR (Vis)	None	None	MM/CSAB	Firm	Good/ Mod	Good	FVF		Clear Smooth
4	85+	C	2.5Y63	15%>2cm 23%>2mm 38% Total HR (S+D)	CDFO 10YR58	None	Too Stony	to Assess			FVF		

Profile Gleyed From: 58cm

Depth to Slowly Permeable Horizon: None

Wetness Class: I

Wetness Grade: 3a

Available Water Wheat: 122 mm

Potatoes: 108 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: 19 mm

Potatoes: 14 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Workability

Remarks: Top part of H3 sieved 1%>2cm, 18%>2mm. H1 is plough layer. Rock is limestone.

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 10	0°	Winter Cereal	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Sand and silt
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31/96	12/96	SU21228960	GMS		———

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	23	C	10YR42	None	None	—	—	—	—	FVF	—	Abrupt Smooth
2	45	C	10YR53	None	CDFO 10YR56	None	MCSAB	Friable	Mod	Good	FVF		Clear
3	70+	C	2.5Y63	None	CDFO 10YR58	None	MCAB	Firm	Poor	Poor	FVF		

Profile Gleyed From: 23cm

Depth to Slowly Permeable Horizon: 45cm

Wetness Class: IV

Wetness Grade: 3b

Available Water Wheat: 132 mm

Potatoes: 109 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: 29 mm

Potatoes: 15 mm

Droughtiness Grade: 2 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks: Transition to H3 not as clear in auger borings, hence lower depth for start of H3 in borings

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
South Marston	Pit 11	0°	Fallow	Av Rainfall: 689 mm ATO: 1408 day °C FC Days: 152 Climatic Grade: 1 Exposure Grade: 1	Aluvium
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY		SOIL SAMPLE REFERENCES
31/96	4/12/96	SU21708760	GMS		———

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	15	C	10YR31	None	FFFO	None	—	—	—	—	FVF		Clear Smooth
2	70+	C	2.5Y52	None	CDFO 10YR56	None	MCAB	Friable	Mod	Poor	CVF		

Profile Gleyed From: 15cm

Depth to Slowly Permeable Horizon: 15cm

Wetness Class: IV

Wetness Grade: 3b

Available Water Wheat: 138 mm

Potatoes: 114 mm

Moisture Deficit Wheat: 103 mm

Potatoes: 94 mm

Moisture Balance Wheat: 35 mm

Potatoes: 20 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Wetness

Remarks: