RPT006

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Norchard

Agricultural Land Classification

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Resource Planning Team
Bristol
FRCA Western Region

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NORCHARD

AGRICULTURAL LAND CLASSIFICATION SURVEY

CONTENTS

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INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 287 7 ha of land at Norchard Field survey was based on 267 auger borings and 11 soil profile pits and was completed in August 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 sections Apart from the published regional ALC map (MAFF 1977) which shows the site at a reconnaissance scale as Grade 3 in the eastern half of the site Grade 1 in the south west corner and the north east area around Crossway Green with the remainder of the site as Grade 2 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 An area to the west at Mount Pleasant Crossway Green was surveyed in 1993 This survey showed similar soils to the current survey sandy loam topsoils over sandy loam and loamy sands and the area was mapped as a Grade 1

5 At the time of survey land cover in the west of the site was primarily horticultural with some arable cropping and the east of the site was a mix of grassland and arable cropping A small area in the north west of the site was not surveyed because ownership could not be established

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 Norchard

Grade	Area (ha)	% Surveyed Area (263 6 ha)
1	80 2	30 4
2	65 9	25 0
3a	79 9	30 3
3b	34 8	13 2
Agricultural land not surveyed	2 8	1 1
Other land	24 1	
Total site area	287 7	

7 The majority of the survey area has been mapped as best and most versatile land with over half the site being Grade 1 and 2 The soils in the western half of the survey area are well drained sandy soils some of which experience a minor droughtiness limitation Soils developed over Keuper Marl in the east experience moderate wetness limitations and are predominately mapped to Subgrade 3a with small areas of 3b in the south east The distribution of soils closely follows the underlying geology of Keuper sandstone in the west

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

Table 2 Climatic Interpolations Norchard

Grid Reference		S0 840869	S0 857 680	S0 844 679
Altitude (m)		85	40	63
Accumulated Temperature (day °C)		1404	1455	1429
Average Annual Rainfall (mm)		676	637	661
Overall Climatic Grade		1	1	1
Field Capacity Days		146	139	143
Moisture deficit (mm)	Wheat	103	111	106
	Potatoes	92	103	97

RELIEF

11 Altitude ranges from 40 metres in the south east around Little Acton Farm to 85 metres in the west at Crossway Green The land slopes gently away from this high point towards the east with small valleys dissecting this slope None of the slopes are limiting to agricultural quality

GEOLOGY AND SOILS

12 The underlying geology of the site is shown on the published geology map (BGS 1976) as a Lower Keuper Sandstone to the west of the site and to the east Keuper Marl that is red marl with grey bands and sandy skerries Drift alluvium is present within both of these solid geology types along the valleys leading to Valley Farm and north of Acton Hall The soils found during the recent survey were clearly related to the underlying geology with a distinct east west split between sandier soils in the west and more clayey soils in the east

13 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as the Bromsgrove Association on the western part of the site and on the eastern side the soils are from the Whimple 3 Association

14 Bromsgrove Association soils are described as well drained reddish coarse loamy soils mainly over soft sandstone but deep in places There are also associated fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging The Whimple 3 Association is described as reddish fine loamy or fine silty over clayey soils with slowly permeable subsoils and slight seasonal waterlogging Some similar clayey soils are found on brows slowly permeable seasonally waterlogged fine loamy and fine silty over clayey soils are found on lower slopes

15 The mapped soil associations closely follow the mapped geology and as indicated above the soils found during the recent survey also follow this split The soils to the west were well drained light textured and to the east slowly permeable subsoils were found in the heavier textures

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 1

17 Nearly one third of the site has been mapped as Grade 1 excellent quality agricultural land This is split into two blocks in the western part of the site here medium sandy loams overlie medium sandy loam and loamy medium sand subsoils which are well drained and are Wetness Class I (See Appendix II) There are very few stones within these profiles and there is sufficient available water within the soil for there to be no droughtiness limitation Three soil profile pits were dug in the Grade 1 soils to assess the subsoil structural condition Structures tend to be weak with friable and very friable consistence Roots generally extend deep into the profile

Grade 2

18 A quarter of the site has been mapped as Grade 2 very good quality agricultural land There are several blocks of Grade 2 land around the site These soils are similar to the Grade 1 soils described above except that there are either more stones or lighter textures in the subsoils which restrict the available water and impose a slight droughtiness limitation Many of the borings in the north western block were impenetrable to the auger and a soil profile pit dug here showed stony subsoils To the south of Stony Lane the presence of loamy medium sand lower subsoils which were very red in colour typically 2 5YR or 10R restricted the available water imposing a minor droughtiness limitation Within this block of Grade 2 there are occasional Grade 1 profiles Also within the southern blocks of Grade 2 there are occasional wetter profiles which have a minor wetness limitation but with medium sandy loam topsoils fall into Grade 2 In the north east of the site there are some wet Grade 2 profiles which were assessed as Wetness Class II and with slightly heavier medium clay loam topsoils fall into Grade 2

Subgrade 3a

19 Much of the eastern part of the site has been mapped as Subgrade 3a good quality agricultural land These soils developed on the Keuper Marl have a moderate wetness limitation These profiles typically have medium clay loam topsoils over heavier subsoils which become clayey at depth The soils are reddish but some do display mottling and the lower subsoils are slowly permeable Three soils profile pits were dug in the soils which showed the soils to be Wetness Class III which in combination with medium clay loam topsoils restrict the land to Subgrade 3a Within this mapping unit there are occasional better drained soils but also some more poorly drained soils In the north of the Subgrade 3a block some borings were found to be impenetrable as were some around Valley Farm The soil profile pit showed that the stone content of these soils did not impose a significant droughtiness limitation The soils profile pits did confirm the presence of slowly permeable

lower subsoils which had low porosity and typically moderately developed coarse prismatic structures

Subgrade 3b

20 Two smaller areas of Subgrade 3b moderate quality agricultural land have been mapped in the south east of the survey area Here the red soils have slowly permeable layers higher in the profile than described above and were assessed as Wetness Class IV Again gleying was present in some profiles and the presence of the slowly permeable layers in the subsoil was confirmed in soils profile pits Topsoils were typically medium clay loams

Other Land

21 The small area in the north west of the site was not surveyed because ownership could not be established Other land not surveyed included small areas of woodland residential and farming buildings

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October 1998

REFERENCES

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SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 3 Soils of Midland and Western 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 (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
Norchard	Pit 1	1 E	Ley	Av Rainfall 661 mm ATO 1429 day C	Lower Keuper Sandstone
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 143 Climatic Grade 1 Exposure Grade 1	PSD SAMPLES TAKEN
77/98	12 8 98	SO 844 693	SH/GN		

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	MSL	7 5YR3/3	9%HR (+ d)	None	None	VCPL			Good	MF + VF		Clear Smooth
2	40	MSL	5YR3/3	9% HR (+ d)	None	None	STVCPL	FM	Poor	Good	CF + VF		Clear Smooth
3	73	MSL	25YR3/4	13% HR (s + d)	FDFO 75YR5/6 40 43 cm	None	MDCSAB very compacted 40 42 cm	VF	Mod	Good	FVF		Clear Smooth
4	80	CSL	5YR4/4	18%HR (+d)	None	None	MDCSAB	FR VF	Mod	Good	FVF		Clear Smooth
5	120	HCL	2 5YR4/4	2% HR (s)	2 5YR4/1	Few in silty bands	MDCPL	FR	Poor	Good	FVF		

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From No spl

Wetness Class I

Wetness Grade 1

Available Water Wheat 126 mm

Potatoes 96 mm

Moisture Deficit Wheat 106 mm

Potatoes 97mm

Moisture Balance Wheat 20 mm

Potatoes 1 mm

Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 2

Main Limiting Factor(s) Droughtiness

Remarks H2 compacted layer better managment would improve sturctural conditiond to mod
MB +22 +3

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 2 (Asp 109)	1 West	CER	Av Rainfall 661 mm ATO 1429 day C	Keuper Marl
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 143 Climatic Grade 1 Exposure Grade 1	PSD SAMPLES TAKEN
77/98	13 8 98	SO 855 688	SH/GN		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	32	MCL	7 5YR3/2	1% HR ( )	None	None				Good	FF + VF		Abrupt Smooth
2	43	HCL	5YR4/3	None	None	None	MDCSAB (Changing to MDCPR from 38 pcm)	FR	M	Good	FVF		Abrupt Smooth
3	60	C	2.5YR3/3 (5YR4/2-4/3)	N e	5GY7/1 (Tea Green Marl bands)	Few	MDCPR	VM	P	Poor	FVF		Clear Smooth
4	80	C	2.5YR3/3 3/2 (5YR4/2)	N	5GY7/1 (Tea Green Marl bands)	None	STCAB	VM (dry) FM	P	Poor	FVF		Gradual Smooth
5	100	C	2.5YR4/3	N	None	None	Massive (Mudstone weathering, small angular blocks. Not soil structure)	FM	P		FVF		

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From 43

Wetness Class III

Wetness Grade 3a

Available Water Wheat 119 mm

110 mm

Potatoes 106 mm

Moisture Deficit Wheat 97 mm

Potatoes

Moisture Balance Wheat 13 mm

13 mm

Potatoes (Calculated to 100 cm)

Droughtiness Grade 2

Final ALC Grade 3a

Main Limiting Factor(s) We

Remarks H3 H4 roots running down pedfaces

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 3 (Asp 87)	3 NE	HRT	Av Rainfall 661 mm ATO 1429 day C FC Days 143 Climatic Grade 1 Exposure Grade 1	Lower Keuper sandstone
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
77/98	20 8 98	SO 8475 6890	GS/SH		

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	42	MSL	7 5YR3/3	N	None	None					MVF		Sharp Smooth
2	95	MSL	5YR4/4	1% HR (s)	None	None	WKCAB (w th tendency to longer prism shape in some areas)	FR	Good	Good	CVF		Gradual Smooth
3	120	LMS	25YR4/6	No e	None	None	WKCPL breaking readily to WKCAB	VF	Mod	Low	FVF		

Profile Gleyed From not gleyed

Slowly Permeable Horizon From No spl

Wetness Class I

Wetness Grade 1

Available Water Wheat 153 mm

Potatoes 119 mm

Moisture Deficit Wheat 106 mm

Potatoes 97 mm

Moisture Balance Wheat +49 mm

Potatoes 22 mm

Droughtiness Grade 1 (Calculated to 120 cm)

Final ALC Grade 1

Main Limiting Factor(s)

Remarks Some compaction at 30 40 cm H1
H2 mottled nature with 75YR5/6 and 2 5YR 4/6 3/6 patches (due to Sandstone)
H2 H3 gradual boundary colour change 5YR 4/4 5YR46

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 4 (Asp 82 98)	1 N	SBT	Av Rainfall 661 mm ATO 1429 day C FC Days 143 Climatic Grade 1 Exposure Grade 1	Lower Keuper Sandstone
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
77/98	20 8 98	SO 8430 6885	SH/GS		

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	MSL	5YR42	1% HR (d)	None	None					MF VF		Clear Smooth
2	58 (55-64)	MSL	5YR43	1% HR (l p bbles)	None	None	WKCAB	VF	Good	Good	CVF		Abrupt Wavy
3	100	CSL	2 5YR43	Sm ll le of small pebbles 1% HR	None	Few (patchy)	WKCPl	VF	Mod	Low	FVF		Clear Smooth
4	120	Sandstone MSST											

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From No spl

Wetness Class I

Wetness Grade 1

Available Water Wheat 144 mm

Potatoes 117 mm

Moisture Deficit Wheat 106 mm

Potatoes 97 mm

Moisture Balance Wheat 38 mm

Potatoes 20 mm

Droughtiness Grade 1 (Calculated to 120 cm)

Final ALC Grade 1

Main Limiting Factor(s) None

Remarks H3 has very small stonesthese may be sand size hence coarse rather than medium Also reasonable clay content H4 sandstone can be chipped away

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 5	1 S	CER	Av Rainfall 661 mm ATO 1429 day C	Keuper Marl
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 143 Climatic Grade 1 Exposure Grade 1	PSD SAMPLES TAKEN
77/98	20 8 98	SO 857 683	SH/GS		

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	MCL	75YR2.5/3	< 1%HR (s e)	None	None					MVF		Abrupt Smooth
2	48	MCL	75YR4/3	4% >2 cm 5% 2 cm 9% HR (+d)	CFD 7 5YR 5/6	None	MDCSAB	FR	Mod	Good	CVF		Clear Smooth
3	70	C	25YR3/4 (5YR4/2-5/2)	N	CFD 5YR5/6 25Y 5/2	Common	MDCAB CPR	FM	Poor	Poor	CVF between peds		

Profile Gleyed From 48 cm

Slowly Permeable Horizon From 48 cm

Wetness Class III

Wetness Grade 3a

Available Water	Wheat	97 mm
	Potatoes	109 mm
Moisture Deficit	Wheat	106 mm
	Potatoes	96 mm
Moisture Balance	Wheat	9 mm
	Potatoes	12 mm

Droughtiness Grade 1 (Calculated to 90 cm)

Final ALC Grade 3a

Main Limiting Factor(s) Wetness

Remarks Dug to 70 cm

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 6 (Asp 259)	0	Wheat	Av Rainfall 661 mm ATO 1429 day C	Keuper Marl
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 143 Climatic Grade 1 Exposure Grade 1	PSD SAMPLES TAKEN
77/98	21/8/98	SO 854679	PRW/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	33	MCL	7.5YR43	1% HR ( )	None	None					MVF		Abrupt Smooth
2	40	C	7 5YR44	<1% HR ( )	None	None	MDCSAB	Friable	Mod	Good	CVF		Abrupt Smooth
3	59	C	5Y51 with 5YR44 patches (7 5YR43)	1% HR ( )	None	None	MDCPr	Firm	Mod	Low	CVF		Abrupt Smooth
4	100	C	2 5YR34 (5YR43)	None (vis)	No e	None	MDCAB	Firm	Mod	Low	FVF		

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From 40 cm

Wetness Class III

Wetness Grade 3a

Available Water Wheat 126 mm

Potatoes 118 mm

Moisture Deficit Wheat 106 mm

Potatoes 97 mm

Moisture Balance Wheat 20 mm

Potatoes 21 mm

Droughtiness Grade 1 (Calculated to 100 cm)

Final ALC Grade 3a

Main Limiting Factor(s) Wetness

Remarks Base of H3 5 cm thick stone layer fractured

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 7 (Asp 190)	2 E	HRT	Av Rainfall 661mm ATO 1429 day C	Keuper Marl
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 143	PSD SAMPLES TAKEN
77/97	21 8 98	SO 852 683	PW/SH	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	30	MCL	7.5YR4/3	<1% HR	None	None					CF + VF		Abrupt Smooth
2	68	C	5YR 3/3 4/3 (5YR 5/2) with patches of 10Y 6/1 5/1 Tea Green Marl)	None	None	Few around the less weathered nodules	WKCSAB breaks down relatively easily to MSAB	FM	Mod	Poor	FVF		Abrupt Smooth
3	100	C	5YR 4/3 5YR 4/2	None	None	Few on ped faces of small angular blocky structures	Massive to WKMAB	FM	Poor	Poor	None seen		

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From 30

Wetness Class IV

Wetness Grade 3b

Available Water Wheat 122 mm
Potatoes 117 mm

Moisture Deficit Wheat 106 mm
Potatoes 97 mm

Moisture Balance Wheat 16 mm
Potatoes 20 mm

Droughtiness Grade 2 (Calculated to 100 cm)

Final ALC Grade 3b

Main Limiting Factor(s) We

Remarks

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE			PARENT MATERIAL
Norchard	Pit 8 (Asp 247)	1 E	Set aside	Av Rainfall	661 mm	Keuper Marl
				ATO	1429 day C	
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days	143	PSD SAMPLES TAKEN
77/98	26 8 98	SO 859 680	SH/KM	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	22 24	MCL	7 5YR 3/2 (7 5YR52)	3% HR ( )	CF MD 5YR 5/6	None				Good	MF + VF		Clear Wavy
2	73	C	5YR 4/3 (5YR 5/2)	N	CF MF 5YR 5/6	Few	WKDCPR + WKCAB	VM	Poor	Poor	CF + VF to 55 cm FF + VF		Clear Wavy
3	100	C	25YR 4/3 (10Y 5/1 patches + viening)	N b t g y m t ls o lly ry t ll	None	None	Massive with weak fine platy structue rock structure rather than soil structures	FM	Poor	Poor	FVF to 100		

Profile Gleyed From	24	Available Water	Wheat	113 mm	Final ALC Grade 3b
Slowly Permeable Horizon From	24		Potatoes	102 mm	Main Limiting Factor(s) We
Wetness Class	IV	Moisture Deficit	Wheat	106 mm	
Wetness Grade	3b		Potatoes	97 mm	
		Moisture Balance	Wheat	7 mm	Remarks H2 + 3 Roots pass along ped faces
			Potatoes	5 mm	
		Droughtiness Grade 2		(Calculated to 100 cm)	

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 9 (Asp 166)	4 E	Cereal stubble	Av Rainfall 661 mm ATO 1429 day C	Lower Keuper Sandstone
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 143 Climatic Grade 1 Exposure Grade 1	PSD SAMPLES TAKEN
77/98	26/8/98	SO 845 684	GMS/SH		

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	38	MSL	2 5YR43	gl g bl	None	None					CVF		Sharp Smooth
2	90	LMS	2 5YR44	N	None	None	WKCAB	Friable	Good	Low	FVF		Gradual Smooth
3	120	LMS	2 5YR44	N e	None	None	WKCPL	Friable	Mod	Low	None seen		

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From No spl

Wetness Class I

Wetness Grade 1

Available Water	Wheat	119 mm
	Potatoes	95 mm
Moisture Deficit	Wheat	106 mm
	Potatoes	97 mm
Moisture Balance	Wheat	+13 mm
	Potatoes	2 mm

Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 2

Main Limiting Factor(s) droughtiness

Remarks

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 10 (Asp 234)	level N/S	SBT	A Rainfall 661 mm ATO 1429 day C	Lower Keuper Sandstone
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY	FC Days 143 Climatic Grade 1 Exposure Grade 1	PSD SAMPLES TAKEN
77/98	26 8 98	S0 846 680	SH/KM		

Horizon No	Lowest Av Depth (cm)	Texture	Matr x (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 D st nctness and form
1	37	MSL	5 YR 4/3	None	None	None					CF + VF to 10 cm F 30 cm		Sharp Smooth
2	65	LFS	5YR 4/4	None	None	None	MD M+F AB tending to platy when dry + compacted	FR	Good	Poor	FVF running along surf to horizon		Abrupt Smooth
3	90	FSL	2 5YR 4/3	None	None	Common on surfaces and within platy structures	MDCPL Sandstone structure then soil developmental structure	FM	Mod	Poor	None seen		Smooth Gradual
4	90+	Sandstone which can be crushed to LFS	25YR 4/6	None	None	Common throughout	M	VM when crushed in direction of peds	Mod	Poor	None Seen		

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From No spl

Wetness Class 1

Wetness Grade 1

Available Water	Wheat	147 mm
	Potatoes	114 mm
Moisture Deficit	Wheat	106 mm
	Potatoes	97 mm
Moisture Balance	Wheat	41 mm
	Potatoes	17 mm

Droughtiness Grade 1 (Calculated to 100 cm)

Final ALC Grade 1

Main Limiting Factor(s)

Remarks

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Norchard	Pit 11(Asp 169)	3 E	Horticulutural	Av Rainfall 661 mm ATO 1429 day C FC Days 143 Climatic Grade 1 Exposure Grade 1	Lower Keuper Sandstone
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
77/98	26/8/98	SO 848 684	GMN/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	33	MSL	05YR33	N	None	None					CF VF		Abrupt Smooth
2	55	MSL	2 5YR43	No e	None	Few	MDCAB	VF	Mod	Low	FVF		Clear Smooth
3	80	LMS (MSL)	10R44	No e	None	Common	MDVCPL	FR	Mod	Low	None seen		Clear Smooth
4	120	Lenses of LMS and MSL	10R44	N	None	Few	MDCPL	FR	Mod	Low	V Few		

Profile Gleyed From Not gleyed

Slowly Permeable Horizon From No spl

Wetness Class I

Wetness Grade 1

Available Water	Wheat	118 mm
	Potatoes	100 mm
Moisture Deficit	Wheat	106 mm
	Potatoes	97 mm
Moisture Balance	Wheat	12 mm
	Potatoes	3mm

Droughtiness Grade 2 (Calculated to 120 cm)

Final ALC Grade 2

Main Limiting Factor(s) Droughtiness

Remarks