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Aylesbury Vale Local Plan
Site C, Haddenham

Agricultural Land Classification
ALC Map and Report
February 1996

Resource Planning Team
Guildford Statutory Group
ADAS Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

AYLESBURY VALE LOCAL PLAN
SITE C, HADDENHAM

Introduction

1. This summary report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 22 ha of land on the south-east side of Haddenham in the Aylesbury Vale District of Buckinghamshire. The site is bordered by minor roads to the east and south, with residential development to the north and west. The survey was carried out in February 1996.

2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) from its Land Use Planning Unit in Reading in connection with the Aylesbury Vale Local Plan. The results of this survey supersede any previous ALC information for this land.

3. The work was conducted by members of the Resource Planning Team in the Guildford Statutory Group of ADAS. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). A description of the ALC grades and subgrades is given in Appendix I.

4. At the time of survey the agricultural land across the west of the site was in cereal stubble. To the north, land had been sown with winter cereals and the remaining fields to the south were in permanent grazing.

Summary

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:10,000. It is accurate at this scale but any enlargement would be misleading.

6. The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% agricultural area	% total site area
3a	8.2	36.9	36.6
3b	14.0	63.1	62.5
Other land	0.2		0.9
Total agricultural area	22.2	100.0	
Total site area	22.4		100.0

7. The fieldwork was conducted at an average density of one auger boring per hectare. A total of 22 borings and 3 soil inspection pits were described.

8. Two areas of Subgrade 3a, good quality agricultural land have been identified, where moderately deep soils overlie poorly drained clay above weathered limestone. Soils in these areas typically have calcareous clay loam or clay topsoils over a heavy clay loam or clay subsoil containing very slight to moderate amounts of hard and soft weathered limestone. The underlying shattered Jurassic limestone was generally encountered below 60-85 cm depth. The major limitations associated with these areas are therefore soil wetness and/or droughtiness. Soil wetness arises due to impeded soil drainage as a result of the slowly permeable clay horizon. In addition, moisture balance calculations indicate that in this low rainfall area such soils will also be moderately droughty, restricting the land to this subgrade.

9. The larger, more central part of the site consists of moderate quality agricultural land, Subgrade 3b. Relatively shallow calcareous soils overlie hard Jurassic limestone strata at depths of approximately 30-60cm. Soils representative of this grade typically consist of calcareous heavy clay loam topsoils overlying similar or slightly heavier subsoils with only 2% hard rock in the surface horizons increasing to 20-50% soft weathered limestone in the horizons juxtaposing the limestone parent material. Soil droughtiness is the main limiting factor due to restricted rooting into the limestone parent material and also the high stone content in these profiles which has the effect of reducing the available water for plants.

Factors Influencing ALC Grade

Climate

10. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

11. The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met. Office, 1989).

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	SP 745 083
Altitude	m, AOD	75
Accumulated Temperature	day°C (Jan-June)	1422
Average Annual Rainfall	mm	624
Field Capacity Days	days	132
Moisture Deficit, Wheat	mm	109
Moisture Deficit, Potatoes	mm	102

12. The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

13. The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR), as a measure of overall wetness, and accumulated temperature (ATO, January to June), as a measure of the relative warmth of a locality.

14. The combination of rainfall and temperature at this site means that there is no overall climatic limitation at this locality. However, climatic factors will interact with soil factors to influence land classification. The climate is relatively warm and dry at this site, in a regional and national context, thereby increasing the likelihood of soil droughtiness problems. Local climatic factors such as frost risk and exposure are not believed to affect this site.

Site

15. The site is very gently undulating, lying at an altitude of 71-78 m AOD, falling towards the south-east. Nowhere on the site do gradient, microrelief or flooding affect land quality.

Geology and Soils

16. The most detailed published geological information for the site (GSGB, 1863) shows it to be underlain by Portland Stone, a Jurassic limestone.

17. The most detailed published soils information for the site (SSEW, 1983) shows the site to comprise soils of the Moreton association. These are described as 'well drained calcareous clayey and fine loamy soils over limestone, in places shallow and brashy. Some deeper slowly permeable calcareous clayey soils' (SSEW, 1983). The north-eastern part of the site may comprise soils of the Evesham 2 association which are described as 'slowly permeable calcareous clayey soils. Some slowly permeable seasonally waterlogged non-calcareous clayey and fine loamy or fine silty over clayey soils' (SSEW, 1983).

18. Soils were found to be broadly consistent with those described by the Soil Survey upon field examination.

Agricultural Land Classification

19. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1, page 1.

20. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix III.

Subgrade 3a.

21. Good quality land has been mapped in two mapping units. The northern-most unit of 3a is affected by soil wetness and/or droughtiness restrictions, whilst that to the south of the site is influenced by soil droughtiness alone. Soil profiles typically comprise calcareous clay, or occasionally medium or heavy clay loam topsoils which contain about 2% hard limestone fragments. These overlie similarly textured calcareous upper subsoils containing 2-10% limestone fragments. A number of profiles to the north of the site exhibited evidence of impeded drainage in the form of mottling and gleying at variable depths. In addition a number

of profiles were impenetrable (to the soil auger) at depths between 60 and 85 cm. Soil pit 1 (see Appendix III) provided evidence that the gleying in the soils was due to the poor structure and slow permeability of the lower subsoil horizons, whilst their impenetrability was caused by the presence of 30% limestone, also seen in soil pit 2. Where drainage is impeded by slowly permeable clay horizons in the subsoil, Wetness Class II or III (see Appendix II) is appropriate, which when combined with the heavy topsoil textures, results in a classification of Subgrade 3a on the basis of soil wetness/workability. Where soils are better drained, subsoils were generally found to be shallower and/or more stony over the limestone such that profile available water is restricted and a soil droughtiness limitation exists.

22. Soil wetness and workability limitations will adversely affect seed germination and root development, along with the flexibility of the land by reducing the number of days when the soil is in a suitable condition for cultivations, trafficking by machinery or grazing by livestock.

23. Soil droughtiness causes plants to suffer drought stress, thereby affecting the versatility of the land since the range of crops which can tolerate such conditions will be restricted. It will also affect the yield potential of crops which are grown.

Subgrade 3b.

24. The central part of the site has been mapped as moderate quality land on the basis of soil droughtiness. Soils comprise calcareous heavy clay loam, or occasionally clay, topsoils containing 2-5% hard limestone fragments. These overlie similarly textured subsoils which are typically impenetrable (to the soil auger) between 30 and 70 cm depth over limestone. Subsoils become progressively more stony with depth having between 10 and 50% limestone before passing to pure soft limestone. Soil pit 3 is representative of this soil type and it shows that plant roots are unable to penetrate the limestone bedrock beyond about 65 cm. The combination of stony soils, restricted plant rooting and the prevailing climate results in moisture balance calculations which suggest that profile available water is severely restricted. The soil droughtiness limitation which therefore exists is consistent with Subgrade 3b.

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SOURCES OF REFERENCE

Geological Survey of Great Britain (1863) *Sheet 45 SE, Old Series, Solid.* GSGB: London.

Ministry of Agriculture, Fisheries and Food (1988) *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.* MAFF: London.

Met. Office (1989) *Climatological Data for Agricultural Land Classification.* Met. Office: Bracknell.

Soil Survey of England and Wales (1983) *Sheet 6, Soils of South East England.*. SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in South East England* SSEW: Harpenden

APPENDIX I

DESCRIPTIONS OF THE 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 includes 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 or horticultural crops can usually be grown but on some land of this 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 land.

Grade 3: Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When 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 the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist 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 severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

APPENDIX II

SOIL WETNESS CLASSIFICATION

Definitions of Soil Wetness Classes

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

Wetness Class	Duration of waterlogging[1]
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years.[2]
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 only wet within 40 cm depth for 30 days in most years.
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 present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years.
IV	The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years **or**, if there is no slowly permeable layer present within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.
V	The soil profile is wet within 40 cm depth for 211-335 days in most years.
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years.

Assessment of Wetness Class

Soils have been allocated to wetness classes by the interpretation of soil profile characteristics and climatic factors using the methodology described in *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988).

[1] The number of days is not necessarily a continuous period.
[2] 'In most years' is defined as more than 10 out of 20 years.

APPENDIX III

SOIL DATA

Contents:

SOIL PROFILE DESCRIPTIONS: EXPLANATORY NOTE

Soil pit and auger boring information collected during ALC fieldwork is held on a computer database. This uses notations and abbreviations as set out below.

Boring Header Information

1. **GRID REF**: national 100 km grid square and 8 figure grid reference.

2. **USE**: Land use at the time of survey. The following abbreviations are used.

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

3. **GRDNT**: Gradient as estimated or measured by a hand-held optical clinometer.

4. **GLEY/SPL**: Depth in centimetres (cm) to gleying and/or slowly permeable layers.

5. **AP (WHEAT/POTS)**: Crop-adjusted available water capacity.

6. **MB (WHEAT/POTS)**: Moisture Balance. (Crop adjusted AP - crop adjusted MD)

7. **DRT**: Best grade according to soil droughtiness.

8. 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				

9. **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				

Soil Pits and Auger Borings

1. **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)

2. **MOTTLE COL**: Mottle colour using Munsell notation.

3. **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% +

4. **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

5. **PED. COL**: Ped face colour using Munsell notation.

6. **GLEY:** If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

7. **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 sandston	**GS**:	gravel with porous (soft) stones
SI:	soft weathered igneous/metamorphic rock		

Stone contents (>2cm, >6cm and total) are given in percentages (by volume).

8. **STRUCT**: the degree of development, size and shape of soil peds are described using the following notation:

degree of development	**WK**: weakly developed **ST**: strongly developed	**MD**: moderately developed
ped size	**F**: fine **C**: coarse	**M**: medium **VC**: very coarse
ped shape	**S** : single grain **GR**: granular **SAB**: sub-angular blocky **PL**: platy	**M**: massive **AB**: angular blocky **PR**: prismatic

9. **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

10. **SUBS STR**: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G**: good **M**: moderate **P**: poor

11. **POR**: Soil porosity. If a soil horizon has less than 0.5% biopores >0.5 mm, a 'Y' will appear in this column.

12. **IMP**: If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

13. **SPL**: Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

14. **CALC**: If the soil horizon is calcareous, a 'Y' will appear in this column.

15. Other notations
    APW: available water capacity (in mm) adjusted for wheat
    APP: available water capacity (in mm) adjusted for potatoes
    MBW: moisture balance, wheat
    MBP: moisture balance, potatoes

SOIL PIT DESCRIPTION

Site Name : AYLESBURY LP-HADDENHAM C Pit Number : 1P

Grid Reference: SP74600850 Average Annual Rainfall : 624 mm
Accumulated Temperature : 1422 degree days
Field Capacity Level : 132 days
Land Use : Cereals
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 30	HCL	10YR43 00	0	2	HR					Y
30- 48	C	25Y 62 00	0	10	HR	C	MDCSAB	FM	M	Y
48-120	C	25Y 62 00	0	30	HR	C	WKCSAB	FM	P	Y

Wetness Grade : 3A Wetness Class : III
Gleying :030 cm
SPL :048 cm

Drought Grade : 2 APW : 122mm MBW : 13 mm
APP : 104mm MBP : 2 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Wetness

SOIL PIT DESCRIPTION

Site Name : AYLESBURY LP-HADDENHAM C Pit Number : 2P

Grid Reference: SP74600820
Average Annual Rainfall : 624 mm
Accumulated Temperature : 1422 degree days
Field Capacity Level : 132 days
Land Use : Permanent Grass
Slope and Aspect : 01 degrees S

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 28	MCL	10YR42 00	0	5	HR					Y
28- 60	C	10YR53 54	0	5	HR		WKCSAB	FR	M	Y
60- 90	C	25 Y72 00	0	30	SLST	M			P	Y

Wetness Grade : 2
Wetness Class : II
Gleying :060 cm
SPL :060 cm

Drought Grade : 3A
APW : 107mm MBW : -2 mm
APP : 108mm MBP : 5 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Droughtiness

SOIL PIT DESCRIPTION

Site Name : AYLESBURY LP-HADDENHAM C Pit Number : 3P

Grid Reference: SP74600830 Average Annual Rainfall : 624 mm
Accumulated Temperature : 1422 degree days
Field Capacity Level : 132 days
Land Use : Permanent Grass
Slope and Aspect : 01 degrees S

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 28	HCL	10YR42 00	0	5	HR					Y
28- 43	C	10YR44 54	0	30	SLST		WKCSAB	FR	M	Y
43- 65	SLST	25 Y74 00	0	0					M	Y

Wetness Grade : 2 Wetness Class : I
Gleying : cm
SPL : cm

Drought Grade : 3B APW : 074mm MBW : -35 mm
APP : 077mm MBP : -27 mm

FINAL ALC GRADE : 3B
MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	M.REL DRT	FLOOD	EXP	DIST	EROSN LIMIT	FROST	CHEM	ALC	COMMENTS
1	SP74700860	CER	S	01	080	080	1	2	136	27	113	11	2						WD	2	
1P	SP74600850	CER			030	048	3	3A	122	13	104	2	2						WE	3A	
2	SP74500850	CER	W	01	030	055	2	3A	105	-4	107	5	3A						WE	3A	SEE 1P
2P	SP74600820	PGR	S	01	060	060	2	2	107	-2	108	5	3A						DR	3A	
3	SP74600850	CER			030		2	2	092	-17	100	-2	3A						DR	3A	IMP 60
3P	SP74600830	PGR	S	01			1	2	074	-35	077	-27	3B						DR	3B	ROOTS TO 65
4	SP74700850	CER					1	2	089	-20	097	-5	3A						DR	3A	IMP 60, SEE 1P
5	SP74400840	CER					1	2	074	-35	074	-28	3B						DR	3B	IMP 45, SEE 3P
6	SP74500840	CER					1	2	058	-51	058	-44	4						DR	3B	IMP 35, SEE 3P
7	SP74600840	CER	W	01			1	2	072	-37	075	-27	3B						DR	3B	IMP 55, SEE 3P
8	SP74700840	PGR					1	2	055	-54	055	-47	4						DR	3B	IMP 32, SEE 3P
9	SP74800840	PGR					1	2	079	-30	079	-23	3B						DR	3B	IMP 47, SEE 3P
10	SP74300830	STB					1	2	049	-60	049	-53	4						DR	3B	IMP 30, SEE 3P
11	SP74400830	STB	S	01			1	2	082	-27	082	-20	3B						DR	3B	IMP 50, SEE 3P
12	SP74500830	PGR	S	01			1	2	115	6	113	11	2						WD	2	IMP 92
13	SP74600830	PGR					1	2	052	-57	052	-50	4						DR	3B	IMP 30, SEE 3P
14	SP74700830	PGR					1	2	073	-36	073	-29	3B						DR	3B	IMP 45, SEE 3P
15	SP74800830	PGR					1	2	091	-18	098	-4	3A						DR	3A	IMP 72
16	SP74300820	STB					1	2	078	-31	078	-24	3B						DR	3B	IMP 50, SEE 3P
17	SP74400820	CER	W	01			1	2	067	-42	067	-35	3B						DR	3B	IMP 40, SEE 3P
18	SP74500820	PGR					1	2	067	-42	067	-35	3B						DR	3B	IMP 40, SEE 3P
19	SP74600820	PGR					1	1	093	-16	105	3	3A						DR	3A	IMP 65, SEE 2P
20	SP74700820	PGR					1	1	096	-13	106	4	3A						DR	3A	IMP 65
21	SP74400810	CER	S	01			1	2	060	-49	060	-42	3B						DR	3B	IMP 35, SEE 3P
22	SP74500810	STB					1	2	074	-35	079	-23	3B						DR	3B	IMP 60, SEE 3P

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
1	0-30	c	10YR43 00						0	0	HR	2						Y	
	30-80	c	10YR44 00						0	0	HR	2		M				Y	
	80-120	c	10YR52 00	10YR58 00	C		00FE00 00	Y	0	0	HR	2		M			Y	Y	Poss Fe pan 100+
1P	0-30	hcl	10YR43 00						0	0	HR	2						Y	
	30-48	c	25Y 62 00	10YR58 00	C		00FE00 00	Y	0	0	HR	10	MDCSAB FM	M				Y	
	48-120	c	25Y 62 00	10YR58 00	C		00FE00 00	Y	0	0	HR	30	WKCSAB FM	P			Y	Y	
2	0-30	c	10YR43 00						0	0	HR	2						Y	
	30-55	c	10YR56 00	75YR58 00	C		00MN00 00	S	0	0	HR	2		M				Y	
	55-70	c	25 Y63 00	10YR58 00	C			Y	0	0	SLST	10		P			Y	Y	
	70-85	c	25 Y30 00						0	0	SLST	5		P			Y	Y	Imp-limestone
2P	0-28	mcl	10YR42 00						0	0	HR	5						Y	
	28-60	c	10YR53 54						0	0	HR	5	WKCSAB FR	M				Y	Water at 55
	60-90	c	25 Y72 00	10YR68 00	M			Y	0	0	SLST	30		P			Y	Y	Weathered limestone
3	0-30	hcl	10YR43 00						0	0	HR	2						Y	
	30-60	c	10YR52 00	10YR58 00	C		00FE00 00	Y	0	0	HR	2		M				Y	Imp-limestone
3P	0-28	hcl	10YR42 00						0	0	HR	5						Y	
	28-43	c	10YR44 54						0	0	SLST	30	WKCSAB FR	M				Y	
	43-65	slst	25 Y74 00						0	0		0		M				Y	Weathered limestone
4	0-30	c	10YR43 00						0	0	HR	2						Y	
	30-60	c	10YR54 00						0	0	HR	2		M				Y	Imp-limestone
5	0-30	hcl	10YR43 00						0	0	HR	3						Y	
	30-40	c	10YR54 00						0	0	SLST	5		M				Y	
	40-45	c	10YR56 00						0	0	SLST	30		M				Y	Imp-limestone
6	0-30	hcl	10YR43 00						3	0	HR	5						Y	
	30-35	c	10YR56 00						0	0	SLST	30		M				Y	Imp-limestone
7	0-30	c	10YR43 00						2	0	HR	3						Y	
	30-55	c	10YR54 00						0	0	SLST	50		M				Y	Imp-limestone
8	0-30	hcl	10YR42 00						0	0	HR	2						Y	
	30-32	c	10YR53 00						0	0	SLST	50		M				Y	Imp-limestone
9	0-30	hcl	10YR42 00						0	0	HR	2						Y	
	30-40	c	10YR53 00						0	0	HR	2		M				Y	
	40-47	c	10YR53 00						0	0	SLST	15		M				Y	Imp-limestone
10	0-25	hcl	10YR42 00						0	0	HR	2						Y	
	25-30	hcl	10YR53 00						0	0	SLST	50		M				Y	Imp-limestone
11	0-28	hcl	10YR43 00						0	0	HR	3						Y	
	28-35	c	10YR53 00						0	0	HR	5		M				Y	
	35-50	c	10YR53 00						0	0	SLST	10		M				Y	Imp-limestone

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC	
12	0-25	hcl	10YR43 00						0	0	HR	2						Y	
	25-42	c	10YR53 00						0	0	HR	5		M				Y	
	42-92	c	10YR53 00						0	0	SLST	5		M				Y	Imp-limestone
13	0-25	hcl	10YR42 00						0	0	HR	2						Y	
	25-30	c	10YR53 00						0	0	HR	2		M				Y	Imp-limestone
14	0-28	hcl	10YR42 00						0	0	HR	2						Y	
	28-35	c	10YR53 00						0	0	HR	5		M				Y	
	35-45	c	10YR53 00						0	0	SLST	25		M				Y	Imp-limestone
15	0-30	hcl	10YR42 00						0	0	HR	2						Y	
	30-72	hcl	10YR53 00						0	0	SLST	40		M				Y	Imp-limestone
16	0-28	hcl	10YR42 00						0	0	HR	2						Y	
	28-40	c	10YR54 00						0	0	SLST	5		M				Y	
	40-50	c	10YR54 00						0	0	SLST	50		M				Y	Imp-limestone
17	0-30	hcl	10YR42 00						0	0	HR	2						Y	
	30-35	hcl	10YR53 00						0	0	SLST	5		M				Y	
	35-40	hcl	10YR53 00						0	0	SLST	25		M				Y	Imp-limestone
18	0-25	hcl	10YR42 00						0	0	HR	2						Y	
	25-40	c	10YR54 00						0	0	SLST	5		M				Y	Imp-limestone
19	0-20	mcl	10YR42 00						0	0	HR	2						Y	
	20-40	hcl	10YR53 00						0	0	HR	2		M				Y	
	40-65	c	10YR64 00						0	0	HR	5		M				Y	Imp-limestone
20	0-30	mcl	10YR42 00						0	0	HR	2						Y	
	30-50	hcl	10YR53 00	75YR46 00	F				0	0	HR	5		M				Y	
	50-55	c	10YR53 00	75YR46 00	F				0	0	HR	10		M				Y	
	55-65	mzcl	25Y 73 00						0	0	SLST	10		M				Y	Weathered 1st imp
21	0-30	hcl	10YR42 00						0	0	HR	3						Y	
	30-35	c	10YR53 00						0	0	HR	5		M				Y	Imp-limestone
22	0-25	hcl	10YR42 00						0	0	HR	3						Y	
	25-60	c	10YR53 00						0	0	SLST	50		M				Y	Imp-limestone