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CHERWELL DISTRICT LOCAL PLAN
Land At Dymock s Farm
Bicester Oxfordshire

Agricultural Land Classification
ALC Map and Report

December 1998

Resource Planning Team
Eastern Region
FRCA Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

CHERWELL DISTRICT LOCAL PLAN REVIEW
LAND AT DYMOCK S FARM
BICESTER
OXFORDSHIRE

INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of approximately 90 hectares of land in two blocks to the north east of Bicester Oxfordshire One block of land occurs around Dymock s Farm whilst the other lies directly to the east of Elm s Quarry The survey was carried out during December 1998

2 The survey was undertaken by the Farming and Rural Conservation Agency (FRCA)[1] on behalf of the Ministry of Agriculture Fisheries and Food (MAFF) The survey was carried out in connection with MAFF s statutory input to the Cherwell District Local Plan Review This survey supersedes any previous ALC information for this land

3 The work was conducted by members of the Resource Planning Team in the Eastern Region of FRCA 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 land was in winter cereals and grassland production (ley permanent and rough) The areas mapped as Other land include farm buildings tracks and woodland

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 below

Table 1 Area of grades and other land

Grade/Other Land	Area (hectares)	% surveyed area	% site area
3	15 6	18	17 9
3b	69 5	81 7	80 0
Other Land	1 8	N/A	2 1
Total surveyed area	85 1	100	97 9
Total site area	87 0		100

7 The fieldwork was conducted at an average density of 1 borings per hectare of agricultural land A total of 90 borings and 7 soil pits were described

[1] FRCA is an executive agency of MAFF and the Welsh Office

8 The majority of the agricultural land has been classified as Subgrade 3b (moderate quality) with Subgrade 3a (good quality agricultural land) making up the remainder The key limitation is soil droughtiness with soil wetness/workability being more restricting on occasions

9 Most of the land is classified on the basis of a soil droughtiness limitation caused by the presence of very high volumes of hard limestone in the subsoil The difference in grade mainly reflecting the depth at which high volumes of brashy limestone is encountered shallow in the case of the Subgrade 3b and deeper in the case of Subgrade 3a Such high subsoil stone volumes severely restrict water available for plant growth as well as reduce the potential rooting depth for crops

10 Isolated areas of the site (dominantly along the north east edges of both blocks of land) are affected by soil wetness/workability to varying degrees These areas tend to suffer from groundwater problems and usually occur on slightly lower lying land next to streams ditches seepage areas and ponds The soils vary considerably but tend to comprise mainly clayey (but sometimes sandy and/or gravelly) profiles which are derived from either alluvial deposits or Oxford Clay Soil wetness will restrict seed germination and growth as well as limit the timing of cultivations Wet soils such as these are also susceptible to structural damage through trafficking by agricultural machinery and grazing livestock

FACTORS INFLUENCING ALC GRADE

Climate

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

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

1 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

Table 2 Climatic and altitude data

Factor	Units	Values		
Grid reference	N/A	SP 606 247	SP 307 259	SP 502 257
Altitude	m AOD	75	80	90
Accumulated Temperature	day C (Jan June)	1417	1412	1400
Average Annual Rainfall	mm	683	686	688
Field Capacity Days	days	146	147	147
Moisture Deficit Wheat	mm	103	103	101
Moisture Deficit Potatoes	mm	95	94	92
Overall climatic grade	N/A	Grade 1	Grade 1	Grade 1

14 The combination of rainfall and temperature at this site mean that the area is relatively dry and warm Other local climatic factors such as exposure and frost risk are not believed to have a significant effect on the site The site is climatically Grade 1

Site

15 The agricultural land at this site lies at an altitude of 75 90m AOD and is flat or gently undulating Nowhere do flooding restrictions or micro relief adversely affect land quality

Geology and soils

16 The most detailed published geological information (BGS 1863) shows the majority of the site to lie over solid limestone (Cornbrash) deposits

17 The most recently published soils information for the site (SSEW 1983) shows the entire area to be mapped as the Aberford Association This is described as Shallow locally brashy well drained calcareous fine loamy soils over limestone Some deeper calcareous fine loamy soils over colluvium (SSEW 1983)

AGRICULTURAL LAND CLASSIFICATION

18 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

19 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 II

Subgrade 3a

20 Three discrete areas of Subgrade 3a (good quality) agricultural land occur across the site which total 15 6 hectares Here the soils are relatively deep and well drained over limestone deposits and are limited mainly by soil droughtiness Very occasional borings are restricted to Subgrade 3a on the basis of a soil wetness/workability limitation which occurs in combination with soil droughtiness

21 Typically profiles within the Subgrade 3a unit comprise calcareous and non calcareous medium clay loam topsoils which are stoneless or very slightly stony (containing up to 3% total hard limestone fragments) The upper subsoils are similar in character to the topsoils but they comprise slightly heavier textures (heavy clay loam) Lower subsoils (when they occur) consist of clay and contain up to 20% hard rock and/or 30% soft limestone All the soils profiles within this unit are impenetrable to the soil auger at depths between 44cm and 75cm due to high volumes of limestone

22 Where soil droughtiness is limiting the soils are permeable and well drained (Wetness Class I) Soil pits 1P 6I and 7P (Appendix II) are representative of the soils within this unit The combination of soil texture and high volumes of hard rock in the lower subsoil restricts the water available to crops such that there is a risk of drought stress to the plants in some years As a result the level and consistency of crop growth and yields may be reduced On occasion soil wetness is limiting in combination to soil droughtiness Here profiles show evidence of

restricted drainage (in the form of gleying) at depths between 25cm and 35cm due to fluctuating groundwater or slowly permeable layers placing them in Wetness Class II or III In this climatic regime and given the topsoil texture of medium clay loam or heavy clay loam the occurrence of such waterlogging in the profile results in a minor soil wetness limitation Crop germination and growth may therefore be adversely affected and cultivations may also be restricted Land of Subgrade 3a quality could be expected to produce moderate yields of a wide range of crops and moderate to high yields of a narrow range of crops principally cereals and grass

23 Very occasional borings of better quality occur within the Subgrade 3a mapping unit but were too sporadic to be mapped separately at this scale

Subgrade 3b

24 The majority of the site (totalling 69 5 hectares) has been classified as Subgrade 3b (moderate quality agricultural land) mainly on the basis of a significant soil droughtiness problem (with occasional areas of land being affected by soil wetness)

25 Much of the survey area comprises soils which are shallow and stony over limestone deposits Here soil profiles comprise calcareous and non calcareous medium clay loam (with occasional heavy clay loam or clay) topsoils which are very slightly or slightly stony (containing up to 12% total hard limestone 7% > 2cm 4% > 6cm) Where penetrable these overlie similarly or slightly heavier textured upper subsoils which are calcareous and contain up to 60% total limestone The soil profiles are impenetrable to the auger at depths between 22cm and 45cm They are permeable and well drained (Wetness Class I) Soil pits 2P 3P 4P and 5P (Appendix II) are representative of the soils within this unit Such high stone volumes severely restrict profile available water for plant growth as well as reduce the potential rooting depth for crops (due to the large flaggy limestone blocks) to the extent that Subgrade 3b is appropriate

26 On flat lower lying localised areas of the site (adjacent to streams drainage ditches seepage areas and ponds) soil wetness is limiting The profiles are variable in nature in terms of drainage and soil texture Topsoils range from medium clay loam to silty clay and contain up to 5% total hard rock Subsoils also vary in texture and contain up to 30% hard rock The subsoils are often saturated at shallow to moderate depths and as a result are gleyed (at depths between 25cm and 40cm) Occasional profiles become slowly permeable at depth where plastic clay impedes drainage The majority of these profiles become impenetrable to the auger at depths between 45 and 80cm Given the high ground water levels of the land at the time of survey together with lack of falls and freeboard for drains a Wetness Class IV was considered to be most appropriate The occurrence of some hydrophilic vegetation (sedges) is indicative of periods of waterlogging Crop germination and growth may be significantly affected in areas such as these where drainage is impeded The timing of cultivations may also be restricted as trafficking by agricultural machinery or grazing by livestock may lead to structural damage

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APPENDIX I

DLSCRIPTION OF THE GRADES AND SUBGRADES

Gi ıde 1 Excellent Qu ılity Agricultur ıl Land

Land with no or very minor limitations to agricultural use A very wide rang e of agricultural and horticultural crops can be grown and commonly includes top fruit soft fruit salad crops and winter harvested veg etables Yields are high and less variable than on land of lower quality

Gi ıde 2 Very Good Quality Agi icultural 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

Subgr ıde 3 ı Good Quality Agricultural I and

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

Subgi ıde 3b Moder ıte 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 that can be grazed or harvested over most of the year

Gi ıde 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 gr ıde also includes very droughty arable land

Gi ıde 5 Ver y Poor Quality Agricultural Land

Land with severe limitations that restricts use to permanent pasture or rough grazing except for occ asional pioneer for ıge crops

APPENDIX II

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	**WHAT**	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	**OTH**	Other
DCW	Deciduous woodland	**BOG**	Bog or marsh	**SAS**	Set Aside
HTH	Heathland	**HRT**	Horticultural crops	**PLO**	Ploughed

3 GRDNT Gradient as estimated or measured by a hand held optical clinometer

4 CLAY/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	**ST**	Topsoil Stoniness
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
EX	Exposure				

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	FSST	soft fine grained sandstone
/R	soft argillaceous or silty rocks	CH	chalk
MSST	soft medium grained sandstone	GS	gravel with porous (soft) stones
SI	soft weathered igneous/metamorphic rock	GH	gravel with non porous (hard) stones

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	MD	moderately developed
	ST	strongly developed		
Ped size	F	fine	M	medium
	C	coarse		
Ped shape	S	single grain	M	massive
	GR	granular	AB	angular blocky
	SAB	sub angular blocky	PR	prismatic
	PL	platy		

9 CONSIST Soil consistence is described using the following notation

L loose	FM firm	EH extremely hard
VF very friable	VM very firm	
FR friable	EM extremely firm	

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

SAMPLE NO	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	WETNESS CLASS	GRADE	-WHEAT AP	MB	POTS- AP	MB	M REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	SP58912610	CER					1	1	103	1	114	21	3A				DR	3A	I75 SEE 1P
2	SP59002610	CER			60		1	1	143	41	117	24	1					1	SEE 1P
3	SP58902600	CER					1	1	88	14	92	1	3A				DR	3A	I55 LST SEE 1P
4	SP59002600	CER					1	1	91	11	94	1	3A				DR	3A	I55 LST SEE 1P
5	SP59102600	CER					1	1	50	52	50	-43	4				DR	3B	I30 LST SEE 1P
6	SP59202600	CER					1	1	55	-47	55	38	4B				DR	3B	I32 LST SEE 2P
7	SP58902590	CER					1	1	118	16	117	24	2				DR	2	I90 Q GR 1
8	SP59002590	CER					1	1	53	-49	53	-40	4				DR	3B	I32 LST SEE 2P
9	SP59102590	CER					1	1	57	-45	57	36	3B				DR	3B	I30 LST SEE 2P
10	SP59202590	CER					1	1	50	52	50	-43	4				DR	3B	I30 LST SEE 2P
11	SP59302590	CER					1	1	53	-49	53	40	3B				DR	3B	I30 LST SEE 2P
12	SP59392590	RGR					2	2	51	51	51	42	4				DR	3B	I30 SEE 2P
13	SP58802580	CER					1	1	75	27	75	18	3B				DR	3A	I44 LST SEE 1P
14	SP58902580	CER					1	1	81	21	84	9	3B				DR	3A	I55 LST SEE 1P
15	SP59002580	CER					1	1	50	52	50	-43	4				DR	3B	I30 LST SEE 2P
16	SP59102580	CER					1	1	49	53	49	44	4				DR	3B	I30 LST SEE 4P
17	SP59202580	CER					1	1	94	-8	102	9	3A				DR	3A	I72 LST
18	SP59302580	CER					1	1	49	53	49	-44	4				DR	3B	I30 LST SEE 2P
19	SP59402580	CER					1	1	49	53	49	44	4				DR	3B	I30 LST SEE 2P
20	SP59502580	RGR			47		2	2	92	10	96	3	3A				DR	3A	I60 LST W/T 60
21	SP58802570	CER					1	1	94	-8	98	5	3A				DR	3A	I62 LST SEE 1P
22	SP58902570	CER					1	1	49	53	49	-44	4				DR	3B	I30 LST SEE 2P
23	SP59002570	CER					1	1	67	35	67	26	3B				DR	3B	I40 LST SEE 4P
24	SP59102570	CER					1	1	52	50	52	41	3B				DR	3B	I30 LST SEE 4P
25	SP59202570	LEY					1	1	67	35	67	26	3B				DR	3B	I40 LST SEE 4P
26	SP59302570	CER					1	1	49	53	49	44	4				DR	3B	I30 LST SEE 3P
27	SP59402570	PGR					1	1	45	57	45	48	4				DR	3B	I25 LST SEE 3P
29	SP59602570	RGR	NE	1	19		2	2	81	21	81	12	3B				DR	3B	I50 LST W/T 50
30	SP58722560	CER					1	1	86	16	88	5	3A				DR	3A	I52 LST SEE 1P
31	SP58802560	CER					1	1	102	0	113	20	3A				DR	3A	I70 LST SEE 1P
32	SP58902560	CER					1	1	56	46	56	37	3B				DR	3B	I33 LST SEE 4P
33	SP59002560	CER					1	1	64	38	64	29	3B				DR	3B	I38 LST SEE 4P
34	SP59102560	LEY					1	1	33	69	33	60	4				DR	3B	I20 LST SEE 3P
35	SP59202560	LEY					1	1	50	52	50	-43	4				DR	3B	I30 LST SEE 3P
36	SP59302560	PGR					1	1	38	64	38	55	4				DR	3B	I36 LST SEE 3P
37	SP59402560	PGR					1	1	41	61	41	52	4				DR	3B	I25 LST SEE 3P
38	SP59502560	PGR					1	1	33	69	33	60	4				DR	3B	I20 LST SEE 3P
39	SP59602560	PGR					1	1	61	-41	61	32	3B				DR	3B	I37 LST SEE 3P
40	SP60202560	PGR					1	1	64	38	64	29	3B				DR	3B	I35 LST SEE 5P
41	SP58702550	CER					1	1	47	55	47	-46	4				DR	3B	I29 LST SEE 2P
42	SP58802550	GER					1	1	52	50	52	41	3B				DR	3B	I32 LST SEE 2P
43	SP58902550	CER					1	1	45	57	45	-48	4				DR	3B	I30 LST SEE 2P

SAMPLE NO	GRID REF	USE	ASPECT GRDNT	GLEY	SPL	WETNESS- CLASS	GRADE	-WHEAT AP	MB	POTS AP	MB	M REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
85	SP60702480	RGR		25		2	3A	90	12	98	5	3A				WD	3A	SEE 7P
86	SP60802480	SAS		25	25	4	3B	98	-4	102	9	3A				WE	3B	+WK
87	SP60602470	RGR				1	2	51	51	51	42	4				DR	3B	I30 SEE 5P
88	SP60702470	RGR		30		2	3A	67	35	67	26	3B				DR	3B	I40 SEE 5P
89	SP60802470	RGR		28		2	3A	69	33	69	24	3B				WE	3B	I45 HIGH W/T
90	SP60702460	RGR				1	2	44	58	44	-49	4				DR	4	I25 SEE 5P
1P	SP58902600	CER				1	1	96	6	101	8	3A				DR	3A	W/T 70 PIT 75
2P	SP59102590	CER				1	1	62	-40	66	27	3B				DR	3B	W/T 65 PIT 70
3P	SP59402560	PGR				1	1	53	-49	53	-40	3B				DR	3B	ROOTS 48
4P	SP59002570	CER				1	1	62	-40	63	30	3B				DR	3B	ROOTS 65
5P	SP60502520	SAS				1	2	70	32	71	22	3B				DR	3B	ROOTS 60
6P	SP60502540	SAS		28		2	2	106	4	109	15	3A				DR	3A	W/T 70
7P	SP60702480	RGR				1	1	87	15	90	3	3A				DR	3A	ROOTS 60

SAMPLE NO	GRID REF	USE	ASPECT		WETNESS GRDNT	GLEY	SPL	CLASS	WHEAT GRADE	AP	MB	POTS AP	MB	M REL DRT	EROSN FLOOD	FROST EXP	CHEM DIST	ALC LIMIT		COMMENTS
44	SP59002550	CER						1	1	67	35	67	26	3B				DR	3B	I40 LST SEE 4P
45	SP59102550	LEY						1	1	40	-62	40	53	4				DR	3B	I25 LST SEE 3P
46	SP59202550	LEY						1	1	53	-49	53	-40	3B				DR	3B	I30 LST SEE 3P
47	SP59302550	PGR						1	1	72	30	72	21	3B				DR	3B	I42 LST SEE 4P
48	SP59402550	PGR						1	1	49	53	49	-44	4				DR	3B	I30 LST SEE 3P
49	SP59502550	PGR						1	1	49	53	49	-44	4				DR	3B	I30 LST SEE 3P
50	SP59602550	PGR	E	1				1	1	123	21	117	24	2				DR	2	W/T 90
51	SP60202550	PGR						1	1	31	71	31	62	4				DR	3B	I20 LST SEE 5P
52	SP60302550	PGR						1	1	92	10	121	28	3A				DR	3A	I70
53	SP60402550	PGR			35	70		2	2	132	30	110	17	2				WE	3B	G/W +WK
54	SP58702540	CER						1	1	46	56	46	47	4				DR	3B	I28 LST SEE 3P
55	SP58802542	CER						1	1	50	52	50	-43	4				DR	3B	I30 LST SEE 3P
55A	SP58952543	CER						1	1	50	52	50	-43	4				DR	3B	I30 LST SEE 3P
56	SP59002542	CER						1	1	68	34	68	25	3B				DR	3B	I40 LST SEE 4P
57	SP59602540	PGR						1	1	123	21	115	22	2				DR	2	I90
58	SP60302540	SAS						1	1	49	53	49	44	4				DR	3B	I30 SEE 5P
59	SP60402540	SAS			55			1	1	103	1	110	17	3A				DR	3A	I75
60	SP60502540	SAS			35			2	2	103	1	111	18	3A				WD	2	I65 SEE 6P
61	SP60302530	RGR						1	1	49	53	49	44	4				DR	3B	I30 SEE 5P
62	SP60402530	SAS						1	1	50	52	50	43	4				DR	3B	I30 SEE 5P
63	SP60502530	SAS						1	1	70	32	70	23	3B				DR	3B	I40 SEE 5P
64	SP60402520	SAS						1	1	82	20	82	11	3B				DR	3B	I50 BORDER 3A
65	SP60502520	SAS						1	2	76	26	76	17	3B				DR	3B	I45 SEE 5P
66	SP60602520	SAS						1	1	79	23	79	14	3B				DR	3B	I48 SEE 5P
67	SP60402510	RGR						1	2	45	57	45	48	4				DR	3B	I28 SEE 5P
68	SP60502510	SAS						1	2	75	27	75	18	3B				DR	3B	SEE 5P
69	SP60602510	SAS						1	2	64	38	64	29	3B				DR	3B	I40 SEE 5P
70	SP60702510	SAS						1	1	66	36	66	27	3B				DR	3B	I40 SEE 5P
71	SP60402500	RGR						1	2	53	49	53	40	3B				DR	3B	I30 SEE 5P
72	SP60502500	SAS						1	2	72	30	72	21	3B				DR	3B	I42 SEE 5P
73	SP60602500	SAS						1	2	59	-43	59	34	3B				DR	3B	I35 SEE 5P
74	SP60702500	SAS			41	41		3	3A	89	13	98	5	3A				WD	3A	SEE 7P
75	SP60802500	SAS			28	55		3	2	103	1	109	16	3A				DR	3A	I78 Q DIST
76	SP60902500	RGR						1	2	85	17	90	3	3A				WE	3B	I60 G/W +WK
77	SP60402490	RGR						1	2	57	-45	57	36	3B				DR	3B	I35 SEE 5P
78	SP60502490	RGR						1	2	49	53	49	44	3B				DR	3B	I30 SEE 5P
79	SP60602490	RGR						1	2	69	33	69	24	3B				DR	3B	I40 SEE 5P
80	SP60702490	SAS						1	1	92	10	97	4	3A				DR	3A	I60 SEE 7P
81	SP60802490	SAS			25			2	2	77	25	77	16	3B				DR	3B	SEE 5P
82	SP60902490	RGR			35	65		3	2	128	26	101	8	2				WE	3B	G/W +WK
83	SP60502480	RGR						1	2	38	64	38	55	4				DR	3B	I22 SEE 5P
84	SP60602480	RGR						1	2	103	1	115	22	3A				DR	3A	I75 SEE 7P

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	MCL	10YR43						0	0	HR	2							
	30 45	HCL	10YR43 44						0	0		0		M					
	45-75	C	10YR53 44	10YR56 58	F	F			0	0	HR	8		M				Y	IMP LIMESTONE
2	0 30	MCL	10YR43						0	0	HR	2							
	30 60	HCL	10YR54 56						0	0		0		M					DENSE
	60 120	C	10YR53	10YR56	C	F		Y	0	0		0		M					W/T AT 65
3	0 30	MCL	10YR43						0	0	HR	3							
	30-40	HCL	10YR44						0	0		0		M					
	40 55	C	10YR44						0	0		0		M					IMP LIMESTONE
4	0 35	MCL	10YR43						0	0	HR	2						Y	
	35-55	HCL	10YR44						0	0		0		M					IMP LIMESTONE
5	0 30	MCL	10YR43						4	2	HR	8							IMP LIMESTONE
6	0 32	MCL	10YR43						0	0	HR	4							IMP LIMESTONE
7	0 30	MCL	10YR43						0	0	HR	1							
	30 55	HCL	10YR44						0	0		0		M					
	55-90	C	75YR44 46						0	0		0		M					IMP LIMESTONE
8	0 32	MCL	10YR43						4	2	HR	8						Y	IMP LIMESTONE
9	0 35	MCL	10YR42 43						4	2	HR	10							IMP LIMESTONE
10	0 30	MCL	10YR43						3	0	HR	8							IMP LIMESTONE
11	0-32	MCL	10YR44						3	0	HR	8							IMP LIMESTONE
12	0 30	MCL	10YR42	10YR46	C	D		Y	0	0	HR	5							IMP LIMESTONE
13	0 28	MCL	10YR43						0	0	HR	2							
	28-44	HCL	10YR44						0	0		0		M					IMP LIMESTONE
14	0 30	MCL	10YR43						2	0	HR	5							
	30 56	MCL	10YR44						0	0	SLST	30		M				Y	IMP LIMESTONE
15	0 30	MCL	10YR43						4	2	HR	8						Y	IMP LIMESTONE
16	0 30	MCL	10YR43						8	4	HR	10						Y	IMP LIMESTONE
17	0 30	MCL	10YR43						3	0	HR	8						Y	
	30-45	HCL	10YR44						0	0	HR	5		M				Y	
	45-72	MCL	25Y 64						0	0	HR	30		M				Y	IMP LIMESTONE
18	0 30	MCL	10YR43						5	0	HR	10							IMP LIMESTONE

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES COL	ABUN	CONT	PED COL	GLEY	STONES 2	6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
19	0 30	MCL	10YR44						3	0	HR	10							IMP LIMESTONE
20	0 25	MCL	10YR42 43						0	0		0							
	25-47	HCL	10YR43 53	10YR56	F	D			0	0		0		M					
	47 60	MCL	25Y 53	10YR56 58	C	D		Y	0	0	HR	20		M					+5% SLST IMP
21	0 29	MCL	10YR43						0	0		0							
	29 45	HCL	10YR44						0	0		0		M					
	45-50	C	10YR44						0	0	SLST	5		M			Y		
	50-62	MCL	25Y 53 74						0	0	HR	20		M			Y		+20% SLST IMP
22	0 30	MCL	10YR34						4	2	HR	10							IMP LIMESTONE
23	0 37	MCL							0	0	HR	3							
	37-40	MCL	25Y 74						0	0	HR	40		M			Y		IMP LIMESTONE
24	0 30	MCL	10YR43						2	0	HR	4					Y		IMP LIMESTONE
25	0 28	MCL	10YR44						0	0	HR	5					Y		
	28 40	MCL	75YR44						0	0	HR	2		M			Y		IMP LIMESTONE
26	0 30	MCL	10YR44						5	0	HR	10							IMP LIMESTONE
27	0 25	MCL	10YR44						0	0		0							IMP LIMESTONE
29	0 19	MCL	10YR42 32	10YR46	C	D		Y	0	0		0							SURFACE PONDING
	19-42	HCL	25Y 53	10YR58	M	D		Y	0	0		0		M					
	42 50	HCL	25Y 53	10YR58	M	D		Y	0	0	HR	20		M					LIMESTONE/GRAVEL
30	0 29	MCL	10YR43						0	0	HR	2							
	29 47	HCL	10YR44						0	0		0		M					
	47 52	C	10YR44						0	0		0		M					IMP LIMESTONE
31	0 30	MCL	10YR43						2	0	HR	3							
	30-45	HCL	10YR44						0	0		0		M			Y		
	45-55	HCL	10YR43						0	0	HR	5		M			Y		
	55-70	MCL	25Y 76						0	0	HR	5		M			Y		IMP LIMESTONE
32	0 30	MCL	10YR43						3	0	HR	6							
	30 33	HCL	10YR44						0	0		0		M					IMP LIMESTONE
33	0 28	MCL	10YR43						3	0	HR	6							
	28-38	HCL	10YR44						0	0		0		M					IMP LIMESTONE
34	0 20	MCL	10YR43						5	0	HR	10					Y		IMP LIMESTONE
35	0 30	MCL	75YR44						3	0	HR	8					Y		IMP LIMESTONE

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES COL	ABUN	CONT	PED COL	GLEY	STONES 2	6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
36	0 22	MCL	10YR44						0	0	HR	5							IMP LIMESTONE
37	0 25	MCL	10YR44						0	0	HR	10							IMP LIMESTONE
38	0 20	MCL	10YR44						0	0	HR	10							IMP LIMESTONE
39	0 15	MCL	10YR42						0	0	HR	5							
	15-37	MCL	10YR56						0	0		0		M					IMP LIMESTONE
40	0 30	MZCL	10YR43						0	0	HR	2						Y	
	30 35	MZCL	10YR44						0	0	HR	5		M				Y	
41	0 29	MCL	10YR43						6	4	HR	10							IMP LIMESTONE
42	0 28	MCL	10YR43						4	2	HR	8							
	28 32	HCL	10YR44						0	0	HR	10		M				Y	+5% SLST IMP
43	0 28	MCL	10YR43						7	3	HR	12							IMP LIMESTONE
44	0-40	MCL	10YR43						0	0	HR	8							IMP LIMESTONE
45	0 25	MCL	10YR44						5	0	HR	12						Y	IMP LIMESTONE
46	0 30	MCL	75YR44						0	0	HR	2						Y	IMP LIMESTONE
47	0 42	MCL	10YR44						0	0	HR	5							IMP LIMESTONE
48	0 30	MCL	10YR44						0	0	HR	10							IMP LIMESTONE
49	0 30	MCL	10YR44						0	0	HR	10							IMP LIMESTONE
50	0 15	MCL	10YR42						0	0		0							
	15-55	MCL	10YR44						0	0		0		M					
	55-68	MZCL	10YR56						0	0		0		M					
	68 90	MZCL	10YR54	10YR58	C	D		S	0	0		0		M					W/T AT 90 CM
51	0 20	MZCL	10YR43						16	8	HR	20						Y	IMP LIMESTONE
52	0 65	MCL	10YR43						0	0	HR	3						Y	
	65-70	HCL	10YR44						0	0	HR	5		M				Y	IMP LIMESTONE
53	0 35	MZCL	10YR43						0	0	HR	2						Y	
	35-55	HZCL	25Y 53	10YR58	C	D		Y	0	0	HR	5		M				Y	
	55-70	SCL	25Y7172	10YR58	C	D		Y	0	0	HR	5		M				Y	
	70 120	C	05Y 6171	10YR58	C				0	0	SLST	15		P		Y		Y	
54	0 28	MCL	10YR43						6	4	HR	10							IMP LIMESTONE

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES COL	ABUN	CONT	PED COL	GLEY	STONES- 2	6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
55	0-30	MCL	10YR43						4	2	HR	8							IMP LIMESTONE
55A	0-30	MCL	10YR43						4	2	HR	8							IMP LIMESTONE
56	0-40	MCL	10YR43						0	0	HR	6							IMP LIMESTONE
57	0 15	MCL	10YR42						0	0		0							
	15-50	MCL	75YR46						0	0		0		M					
	50 90	HCL	75YR44						0	0		0		M					IMP LIMESTONE
58	0-30	MCL	10YR43						6	4	HR	10						Y	IMP LIMESTONE
59	0 35	MCL	10YR43						5	8	HR	10						Y	
	35-55	HCL	10YR4454						0	0	HR	5		M				Y	
	55-75	HCL	10YR53	10YR58	C	D		Y	0	0	HR	5		M				Y	IMP LIMESTONE
60	0 35	MZCL	10YR43						0	0	SLST	5						Y	
	35-65	HCL	10YR53	10YR58	C	D		Y	0	0	SSLT	5		M				Y	IMP LIMESTONE
61	0 30	MCL	10YR43						6	3	HR	10						Y	IMP LIMESTONE
62	0 30	MCL	10YR43						4	2	HR	8						Y	IMP LIMESTONE
63	0 35	MCL	10YR43						0	0		0						Y	
64	0 30	MCL	10YR43						0	0	HR	5						Y	
	30 50	C	10YR44						0	0	HR	5		M				Y	IMP LIMESTONE
65	0-35	HCL	10YR43						0	0	HR	4						Y	
	35-45	C	10YR44						0	0	HR	4		M				Y	IMP LIMESTONE
66	0 30	MCL	10YR43						0	0	HR	4						Y	
	30 48	C	10YR44						0	0	HR	5		M				Y	IMP LIMESTONE
67	0 28	C	10YR43						0	0	HR	5						Y	IMP LIMESTONE
68	0 32	HCL	10YR43						0	0	HR	4						Y	
	32 50	C	10YR44						0	0	HR	4		M				Y	IMP LIMESTONE
69	0 30	C	10YR43						0	0	HR	4							
	30-40	C	10YR44						0	0	HR	4		M					IMP LIMESTONE
70	0 28	MCL	10YR43						0	0	HR	5						Y	
	28-40	C	10YR44						0	0	HR	5		M				Y	IMP LIMESTONE
71	0 30	HCL	10YR4344						0	0	HR	2							IMP LIMESTONE
72	0-32	HCL	10YR43						0	0	HR	2							
	32 42	C	10YR44						0	0	HR	5		M					IMP LIMESTONE

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES COL	ABUN	CONT	PED COL	GLEY	STONES 2	6	LITH	STRUCT/ TOT	CONSIST	SUBS STR	POR	IMP	SPL	CALC	
73	0-30	HCL	10YR43						0	0	HR	5						Y	
	30-35	C	10YR44						0	0	HR	5		M				Y	IMP LIMESTONE
74	0-27	HCL	10YR43						0	0	HR	4						Y	
	27-41	C	10YR44						0	0		0		M				Y	
	41 58	C	10YR53	10YR56	C	D		Y	0	0	HR	10		P		Y		Y	
	58-65	C	10YR5354						0	0	HR	10		M				Y	IMP LIMESTONE
75	0 28	MZCL	10YR43						0	0	HR	2						Y	
	28-55	MCL	10YR41	75YR58	M	D		Y	0	0	HR	10		M				Y	
	55-78	C	05Y61	75YR58	M	D		Y	0	0	HR	10		P		Y		Y	IMP LIMESTONE
76	0 27	HCL	10YR4243						0	0	HR	3							
	27-40	HCL	10YR44						0	0	HR	10		M				Y	IMP LIMESTONE
	40 60	HCL	10YR54	10YR56	F	D			0	0	HR	20		M				Y	IMP LST 60CM
77	0 30	HCL	10YR43						0	0	HR	5						Y	
	30 35	C	10YR44						0	0	HR	5		M				Y	IMP LIMESTONE
78	0 30	HCL	10YR43						0	0	HR	5						Y	IMP LIMESTONE
79	0 30	HCL	10YR43						0	0	HR	2							
	30-40	C	10YR44						0	0	HR	2		M					IMP LIMESTONE
80	0 30	MCL	10YR43						0	0		0							
	30 37	HCL	10YR4446						0	0	HR	2		M				Y	
	37 60	HCL	10YR4446						0	0	SLST	10		M				Y	IMP LIMESTONE
81	0 25	MCL	10YR42						0	0		0							
	25-45	C	10YR5653	10YR58	C	F		Y	0	0		0		M					IMP LIMESTONE
82	0 35	MCL	10YR4252						0	0		0						Y	
	35-65	SCL	25Y62	10YR68	M	D		Y	0	0	HR	30		M				Y	
	65-120	ZC	05Y52						0	0		0		P		Y			IMP LIMESTONE
83	0 22	HCL	10YR43						0	0	HR	5							IMP LIMESTONE
84	0 30	HCL	10YR43						0	0	HR	3							
	30 55	C	10YR44						0	0	HR	3		M					
	55-75	C	10YR4446	10YR58	F	D			0	0	HR	2		M					IMP LIMESTONE
85	0 25	HCL	10YR43						0	0	HR	2							
	25-40	C	10YR53	10YR58	C	D		Y	0	0	HR	3		M					
	40 60	C	10YR5354	10YR58	C	D		S	0	0	HR	5		M				Y	IMP LIMESTONE
86	0 25	HCL	10YR42						0	0		0						Y	
	25-80	C	10YR61	10YR56	M	D		Y	0	0	HR	2		P		Y			IMP LIMESTONE

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	ABUN	CONT	PED COL	GLEY	STONES 2	6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
87	0 30	HCL	10YR43						0	0	HR	5						Y	IMP LIMESTONE
88	0-30	HCL	10YR43						0	0		0							
	30 40	C	25Y 51	10YR58	M	D		Y	0	0		0			P				IMP LIMESTONE
89	0 28	ZC	10YR42						0	0	SLST	2							
	28-40	C	10YR5351	10YR58	M	D		Y	0	0	HR	2			P		Y		
	40 45	C	10YR53	10YR5658	C	D		Y	0	0	SLST	5			M			Y	IMP LIMESTONE
90	0-25	HCL	10YR43						0	0	HR	2						Y	IMP LIMESTONE
1P	0-30	MCL	10YR43						0	0	HR	3							
	30 55	HCL	10YR44						0	0		0	MDCSAB	FR	M				POROUS
	55-65	C	10YR44						0	0	HR	55			M			Y	
	65-70	HR	10YR54						0	0		0			P			Y	W/T AT 70 CM
2P	0 23	MCL	10YR42						2	0	HR	5						Y	
	23-65	MCL	10YR43						0	0	HR	65			M			Y	ROOTS 65 PIT 90
3P	0 23	MCL	10YR43						14	6	HR	16						Y	
	23-48	HCL	75YR43						0	0	HR	60			M			Y	ROOTS 48 PIT 60
4P	0 29	MCL	10YR44						2	0	HR	5							
	29 45	HCL	75YR54						0	0	HR	60			M			Y	
	45-65	HR							0	0		0			P			Y	PIT TO 70 CM
5P	0 22	HCL	10YR4243						0	0	HR	5						Y	
	22 40	C	10YR4446						0	0	HR	30	MDCSAB	FR	M			Y	
	40 50	C	10YR4446						0	0	HR	44		FR	M			Y	
	50 60	HR	10YR64						0	0		0			P			Y	PIT TO 65 CM
6P	0 28	MZCL	10YR42						0	0	HR	2						Y	
	28-48	HCL	25Y 5351	10YR4656	C	D		Y	0	0	HR	2	MDCPR	FR	M			Y	POROUS W/T 70 CM
	48-78	MCL	05Y 61	10YR58	M	D		Y	0	0	HR	31	WKCSAB	FR	M			Y	POROUS PIT 85
7P	0 25	MCL	10YR43						0	0		0							
	25-42	C	10YR4344	10YR58	C	F		S	0	0		0	MDCSAB	FR	M				
	42 60	SCL	10YR46						0	0	HR	35			M			Y	