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CHERWELL DISTRICT LOCAL PLAN REVIEW
Land at Milestone Farm Banbury Oxfordshire
Semi Detailed Survey

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
LAND AT MILESTONE FARM BANBURY OXFORDSHIRE

SEMI DETAILED SURVEY

INTRODUCTION

- 1 This report presents the findings of a semi detailed Agricultural Land Classification (ALC) survey of 64.4 hectares of land to the south west of Banbury in Oxfordshire. 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). It was carried out in connection with MAFF's statutory input to the Cherwell District Local Plan. This survey supersedes any previous ALC information for this land. This survey lies adjacent to and over land previously classified in 1996 (FRCA Refs 01/036 & 037/96). Information from these studies has been incorporated into this survey.
- 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 agricultural land within the area of survey was in a variety of uses including winter cereals, soft fruit on a pick your own enterprise and permanent grass, much of which is currently utilised for grazing horses with in addition an area of amenity grassland to the south east of the site including the summit of Crouch Hill. Areas marked as Other Land include housing with associated gardens, farm buildings, tracks and roadways, a farm reservoir and woodland/unmanaged scrub.

SUMMARY

- 5 The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:15,000. 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.
- 7 The fieldwork was conducted at an average density of 1 boring per 1.2 hectares of agricultural land. In total 47 borings and 4 soil pits were described during this survey.
- 8 The agricultural land on this site has been classified in the range Grade 2 (very good quality) to Grade 4 (poor quality) with substantial areas mapped as Subgrade 3b (moderate quality) land and a small proportion as Subgrade 3a (good quality). The principal limitations to land quality include soil wetness, soil droughtiness, topsoil workability and gradient.

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

Table 1 Area of grades and other land

Grade/Other land	Area (hectares)	/ surveyed area	/ site area
2	8.8	15.2	13.7
3a	1.8	3.1	2.8
3b	46.0	79.6	71.4
4	1.2	2.1	1.9
Other land	6.6		10.2
Total surveyed area	57.8	100	89.8
Total site area	64.4		100

- 9 The majority of the site is mapped as Subgrade 3b and is limited by soil wetness. Soils across this area comprise a heavy clay loam or clay topsoil overlying similar subsoils. The majority of the subsoils significantly impede drainage. This factor in combination with a heavy topsoil texture and the prevailing local climatic parameters lead to Subgrade 3b being the most appropriate classification. Soil wetness reduces the versatility of the land in terms of access by machinery (e.g. for cultivations or harvesting) and grazing by livestock if damage to the soil is to be avoided. Soil wetness will also adversely affect seed germination and root growth and will therefore reduce the level and consistency of yields.
- 10 Some of the Subgrade 3b and all of the land mapped as Grade 4 is limited by gradient. The slopes in these areas were of sufficient gradient to restrict the safe and efficient use of farm machinery to the extent that the applied classification is appropriate.
- 11 The area mapped as Grade 2 is limited by either soil droughtiness, soil wetness or topsoil workability. The soils are variable across this area but most commonly comprise a heavy clay loam topsoil overlying stoneless to moderately stony heavy clay loam or clay subsoils. These either become impenetrable due to the presence of limestone/marlstone at moderate depths or pass to sandy loam and sand lower subsoils or pass to a poorly drained clay. In the prevailing local climate the sandy and stony soils do not contain sufficient moisture throughout the growing season so that crops are not likely to achieve maximum potential. As such crop quality and yields are likely to be adversely affected, especially in drier years. Some of the profiles examined contain sufficient moisture but because of either heavy topsoils or poorly drained clays at moderate depths they are limited by topsoil workability and soil wetness respectively. These limitations on land quality have the effect of restricting access to the land for grazing and/or cultivations during wetter periods is restricted if soil damage is to be avoided. Also excessive wetness in the soil can affect crop establishment and growth.
- 12 The area mapped as Subgrade 3a towards the south west of the site is principally restricted by soil droughtiness. The soils in this area comprise heavy clay loam topsoils which overlie similar and clay subsoils. The topsoils were slightly stony and the subsoils moderately to very stony. These significant stone contents restrict the amount of water available to plants to the extent that in the local climate Subgrade 3a is appropriate on the basis of soil droughtiness, the effects of which are described in paragraph 11 above.

FACTORS INFLUENCING ALC GRADE

Climate

- 13 Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics
- 14 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)
- 15 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
- 16 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 44 05	SP 457 308	SP 433 400
Altitude	m AOD	125	140	155
Accumulated Temperature	day C (Jan June)	1558	1340	1323
Average Annual Rainfall	mm	707	701	707
Field Capacity Days	days	158	158	159
Moisture Deficit Wheat	mm	101	77	97
Moisture Deficit Potatoes	mm	90	88	86
Overall climatic grade	N/A	Grade 1	Grade 1	Grade 1

- 17 The combination of rainfall and temperature at this site mean that there is no overall climatic limitation. Local climatic factors such as exposure and frost risk are not believed to affect land quality at this location. The site is climatically Grade 1. However climatic factors do interact with soil properties to influence soil wetness and soil droughtiness

Site

- 18 The site lies at altitudes in the approximate range of 125-169m AOD. The highest land occurs in the south of the site at Crouch Hill. The land falls away in all directions from this prominent local feature towards the lowest lying land along the Broughton Road which bisects the site. The land then rises again towards the north of the site becoming almost flat towards Withycombe Farm at around 155m AOD. Some gradients within the site are sufficient to adversely affect land quality to the extent that Subgrade 3b and Grade 4 has been mapped in the vicinity of Crouch Hill and to the north of Milestone Farm on the basis of gradient. Other site factors such as microrelief and flooding are not present on the site and therefore do not adversely affect agricultural land quality

Geology and soils

- 19 The most detailed published geological information for the site (BGS 1982) shows the north of the site near Withycombe Farm to be underlain by Jurassic Marlstone Rock Beds. Moving south the land is shown as being underlain by a series of deposits including Chipping Norton limestone, Northampton Sands and the sandy Lower Estuarine Series, before much of the remainder of the site to the south of Milestone Farm is mapped as the Jurassic Upper Lias Clays. An outcrop of the Marlstone Rock Bed is shown in the south west of the site close to Crouch Hill Farm.
- 20 According to the most recent published information available for this area (SSEW 1983) the area of survey is underlain by two soil associations namely Banbury and Denchworth. The Denchworth association is mapped across the majority of the site especially where the clayey Upper Lias geology is shown. The soils are described as comprising slowly permeable seasonally waterlogged clayey soils with similar fine loamy over clayey soils. Some fine loamy over clayey soils with only slight seasonal waterlogging and some slowly permeable calcareous clayey soils. Landslips and associated irregular terrain locally (SSEW 1983). The Banbury association is mapped across the remainder of the site to the north and south west. The soils in these areas are described as well drained brashy fine and coarse loamy ferruginous soils over ironstone. Some deep fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging (SSEW 1983). Soils similar to both the above descriptions were found over the majority of the site with the addition that some of the land mapped as being underlain by Banbury soils contained limestone as well as ironstone.

AGRICULTURAL LAND CLASSIFICATION

- 21 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 on page 1.
- 22 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.

Grade 2

- 23 Land of very good quality has been mapped towards the north of the site on land adjacent to the previous 1996 survey (3301/036/96). The land in this area is principally limited by a combination of soil droughtiness, wetness and topsoil workability. The soil pit 1P (see Appendix II) is representative of the majority of soils in this area although considerable variation was observed.
- 24 Soils generally comprise a medium silty clay loam or more commonly a heavy clay loam topsoil which in most cases passes to similar heavy silty clay loam and clay subsoils. Towards the south of the unit heavy clay loam upper subsoils pass to medium sandy loam and medium sand lower subsoils. The majority of the soils were stoneless or very slightly stony containing up to 5% limestone and/or ironstone fragments by volume. Occasional observations were impenetrable due to an increase in stone content at a moderate depth. This has the effect of restricting the volume of water available for crop growth creating a slight soil droughtiness limitation. This effect is also seen where the lower subsoils are of a sandy nature. Soil droughtiness adversely affects crop yields and the variability of yields is also likely to be affected by prevailing weather conditions during the growing season.

- 25 Many of the soils in the Grade 2 unit are affected by a combination of very slight soil wetness and/or topsoil workability. The profiles exhibited signs of wetness by being gleyed or slightly gleyed at moderate depths. Where the clays were gleyed pit 1P shows that they were slowly permeable. Slowly permeable horizons cause drainage to be impeded and this may lead to gleying in the upper horizons. The moderate depth of the gleyed and slowly permeable horizons in the profile lead in the prevailing local climate to Wetness Classes I and II being applied. Soil wetness may adversely affect crop growth and development. At this level it can also slightly limit the flexibility of the land by reducing the number of days when the soil is in a suitable condition for cultivation trafficking by machinery or grazing by livestock. Nevertheless such land is suitable for a wide range of agricultural and horticultural uses.
- 26 With the heavy topsoils present across most of this area these soils are classified as Grade 2 because cultivations and grazing opportunities are likely to be slightly restricted without damage to the soil structure created by compaction and/or poaching of the surface especially during wetter periods or the winter months. Occasional observations in the Grade 2 unit are of both slightly better and slightly worse quality but their scattered location within the unit preclude separate mapping.

Subgrade 3a

- 27 Good quality land has been mapped in a single unit towards the south west of the area surveyed. The soils here are typified by soil pit 4P (see Appendix II). All the profiles observed were well drained (Wetness Class I). The soils typically comprise heavy clay loam or clay topsoils passing to similarly textured subsoil horizons which were impenetrable to the soil auger between 45 and 67cm. Topsoil stone contents were typically very slight in the range 0-8% hard stone fragments by volume with a maximum of 2% >2cm diameter. In the upper subsoil a maximum of 20% hard stone was recorded although 5-10% is more typical. The pit (4P) shows that at this location the upper subsoil stone content was much greater than had previously been estimated with 51% hard marlstone recorded. This passed at the approximate depth of impenetrability to the soil auger to a very stony clay lower subsoil (65% stone by volume). In the local climate these soil properties lead to Subgrade 3a being appropriate as the moisture available to plants is restricted by the volume of stones present in the profile as a whole. The result is that crop yields are adversely affected and the consistency of these yields is less predictable especially if conditions during the growing season are dry.

Subgrade 3b

- 28 The majority of the agricultural land within this survey area has been classified as being of moderate quality. Land quality is principally restricted by soil wetness. Soil pits 2 and 3 (see Appendix II) as well as pit 1 from the previous survey (FRCA Ref 2201/057/96) are typical of the soil types present in this area.
- 29 The principal soil type comprises a heavy clay loam or clay topsoil passing to clay subsoils. All the subsoils showed signs of soil wetness i.e. they were gleyed or occasionally slightly gleyed. The pit observations indicate that the subsoils are poorly structured and slowly permeable. In the local climate the depth to these drainage impeding horizons causes these profiles to be placed in Wetness Class IV. Given the local climate and the observed topsoil textures a Subgrade 3b classification is therefore appropriate. The consequences of soil wetness are described above (paragraph 25). However in this area the effects are likely to be more severe than on the Grade 2 land in the north of the site.

- 30 The second soil type in this area is also limited to Subgrade 3b by soil wetness. It is principally located towards the south west of the site. The soils in this area are characterised by soil pit 2 and comprise a heavy clay loam topsoil overlying two different clay subsoils. The topsoil and upper subsoil are very slightly or slightly stony, containing up to 15% relatively soft ironstone by volume. These pass at moderate depths to a stoneless, poorly structured, slowly permeable clay similar to that elsewhere in the Subgrade 3b unit. The moderate depth of the slowly permeable horizon leads to Wetness Class III being applied. Given the local climate and the poor workability of heavy clay loam topsoils, Subgrade 3b is again the appropriate classification here.
- 31 Subgrade 3b has also been mapped on the basis of gradient in two parts of the site. To the immediate north of Milestone Farm and around Crouch Hill slopes were measured in the range 7-11. These are sufficient to adversely affect agricultural land quality as some precision farm machinery cannot be safely operated in this area. Therefore Subgrade 3b has been applied because other factors, such as the soil conditions, are not more limiting, although they are equally limiting over much of this area.

Grade 4

- 32 To the north east of Milestone Farm and towards the summit of Crouch Hill poor quality land has been identified. The principal limitation here is gradient. Slopes were measured to be in excess of 11. This is sufficient to restrict the safe and efficient use of most precision farm machinery. Grade 4 is therefore the most appropriate classification for this land.

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SOURCES OF REFERENCE

British Geological Survey (1982) *Sheet No 201 Banbury Solid and Drift Edition 1 50 000 Scale*
BGS 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 1 250 000 Scale*
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 DATA

Contents

Sample location map

Soil abbreviations explanatory note

Soil boring descriptions (boring and horizon levels)

SOIL PROFILE DESCRIPTIONS EXPLANATORY NOTE

Soil pits and auger boring information collected during ALC fieldwork held in the pit database. These statistics and abbreviations as set out below.

Boring Hole Information

- 1 GRID REF national 100 km grid square and 8 figure grid reference
- 2 USE Land use with time for very thin filling between tins and

ARA	Arable	WHT	Wheat	BAR	Barley
CER	Cereal	OAT	Oats	MZE	Maze
OSR	Oilseed rape	BEN	Field beans	BRA	Broad beans
POT	Potatoes	SBT	Sugar beet	FCD	Fodder crop
LIN	Linseed	HRT	Sift and top fruit	FLW	Fillow
PGR	Permanent pasture	LEY	Ley grass	RCR	Rough grazing
SCR	Scrub	CFW	Clover woodland	OTH	Other
DCW	Deciduous woodland	BOG	Bog marsh	SAS	Set Asid
HHT	Heathland	HRT	Horticultural crop	PLO	Ploughed

- 3 GRDNT Gradient as estimated measured by hand held plummet
- 4 GLEY/SPL Depth in centimetres (cm) to gleying and/or slowly permeable layers
- 5 AP (WHEAT/POTS) Crop density (kg/ha) of wheat/potatoes
- 6 MB (WHEAT/POTS) Moisture balance (Crop density AP crop density MD)
- 7 DRT Best grade according to soil dryness
- 8 If any of the following factors are considered significant Yll be ticked in the audit form

MREL	Mercury contamination	FLOOD	Flood risk	EROSN	Siltation risk
EXP	Exposure	FROST	Frost	DIST	Disturbance
CHEM	Chemical				

- 9 LIMIT The minimum limit on the land quality. The following abbreviations

OC	Overall Climate	AL	Aspect	ST	Topsoil Stress
FR	Frost Risk	GR	Gradient	MR	Mercury
FL	Flood Risk	TX	Topsoil Texture	DP	Soil Depth
CH	Chemical	WE	Wetness	WK	Workability
DR	Drought	FR	Frost Risk	WD	Soil Wetness/Drought Stress
EA	Exposure				

Soil Pits and Auger Boring

- 1 TEXTURE The texture classes are defined by the following abbreviations

S	Sand	LS	Loamy Sand	SI	Silty 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	OI	Organic Loam
P	Pit	SP	Sandy Pit	IP	Loamy Pit
PL	Pit Loam	PS	Pit Sand	MZ	Marl Light Silt

For the sand, loamy sand, sandy loam and sandy silt loam classes the percentage of fine sand is defined as follows:

F	Fine (more than 66% of the sand is less than 0.2 mm)
M	Medium (less than 66% of the sand is less than 0.2 mm and less than 33% is larger than 0.2 mm)
C	Coarse (more than 33% of the sand is larger than 0.2 mm)

The clay loam and silty clay loam classes will be subdivided according to the following: M (medium) (27-33% clay) H (heavy) (33-35% clay)

- 2 MOTTLE COLOR Mottling Munsell color

3 MOTTLE ABUN M ttle b dan xp ss d as pe tag fdl tr rf d ribed
 F f w <2/ C comm 2 20/ M many 20-40/ VM ry 40

4 MOTTLE CONT M ttle co trast

F f int undistinct m tles dent nly lose inspect o
 D distinct m tles ar read ly seen
 P p nument m tiling consp cu us and fth tstand gf t es fth h ri

5 PED COL Ped f ce col ing M nsell tat n.

6 GLEY If th l h rnz gl yed Y will ppear tl l nn If lghtly gleyed, an S will ppear

7 STONE LITH St Lith l gy fth f ll wing is sed

HR	ll hard ocks and st es	FSST	ft f gra ed sandst
ZR	soft, argillaceo lty rocks	CH	h lk
MSST	soft, med m grained sandst	CS	gra l w th po (ft) st
SI	soft weathered gn s/metam rphu ock	CH	gra l w th po (hard) t

St ne co tents (>2cm, >6cm and t tal) ar gi en un percent ges (by l)

8 STRUCT th degree fd l pment, iz and sh pe f l peds ar described g th f ll wing tat

Degree of de l pment	WK	weakly d l ped	MD	moder t ly d l ped
	ST	stro gly d l ped		
Ped size	F	fin	M	d n
	C	ars		
Ped hape	S	ngl gr i	M	ass
	GR	gran lar	AB	gular blocky
	SAB	sub-angular bl ky	PR	p mat
	PL	pl ty		

9 CONSIST S l ons sten described ing th f ll ing t t

L loo	FM	f m	LH	t ly l d
VF ery frn ble	VM	ry f		
FR frnabl	EM	t ly f		

10 SUBSTR S bso lstruct ral co dt eco ded f th p rpose f l l t gp fl dr ght ess G good M mod t P poo

11 POR S lporos ty If so l horz has less than 0.5/ b opo >0.5 Y ll ppear tl l in

12 IMP If th p fl mpe tr bl t oot g Y will pp tl l t dl pp pri t l rnz

13 SPL Sl wly perm bl l y If th l h rnz l wly pe bl \ ll ppe tl l un

14 CALC If th so l h rnz l careo Y will ppear in tl l

15 Other tat ons

APW	l bl w ter	pac ty (un m)	dj st df l t
APP	l bl w ter	p ty (un mm)	dj st df p t t
MBW	m st b lan	wh t	
MBP	m ist re b lan	potatoes	

SAMPLE NO	GRID REF	ASPECT		-WETNESS			-WHEAT		POTS		M REL		EROSN	FROST	CHEM	ALC	COMMENTS
		USE	GRDNT	GLEY	SPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP	DIST	LIMIT	
1	SP43304020	PGR	W	2			1	1	160	61	124	36	1			1	
2	SP43304010	CER	W	1			1	2	100	1	112	24	3A		DR	3A	IMP 75
3	SP43404010	CER	W	1			1	2	134	35	112	24	1		WK	2	
4	SP43504010	CER	E	1	65	65	2	3A	133	34	113	25	1		WE	3A	1P LOCATION
6	SP43304000	CER	W	1			1	2	151	52	113	25	1		WK	2	
7	SP43404000	CER			35	35	4	3B	86	13	92	4	3A		WE	3B	
8	SP43504000	CER	N	3	65		1	2	122	23	104	16	2		DR	2	
9	SP43604000	RGR			39	22	4	3B	83	16	89	1	3A		WE	3B	SL GLY 22CM
10	SP43704000	RGR	N	2	24	24	4	3B	84	15	90	2	3A		WE	3B	
11	SP43503990	PGR	S	2	40		1	1	124	25	115	27	2		DR	2	
12	SP43603990	PGR	S	2	19	30	4	3B	132	33	110	22	1		WE	3A	
13	SP43683994	PGR	2	S	18	45	4	3B	106	7	108	20	2		WE	3B	IMP80 LSTONE
16	SP43603980	PGR	N	6	26	26	4	3B	83	16	89	1	3A		WE	3B	
17	SP43703980	PLO	N	4	20	20	4	3B	80	19	86	2	3A		WE	3B	
18	SP43803980	PLO	S	5			1	1	72	27	72	16	3B		DR	3A	IMP 45 HR
20	SP43603970	PGR	N	1	20	20	4	3B	87	12	99	11	3A		WE	3B	
21	SP43703970	PLO			20	20	4	3B	87	12	99	11	3A		WE	3B	
22	SP43803970	PLO			20	20	4	3B	77	22	80	8	3B		WE	3B	
25	SP43503960	PGR			38	38	4	3B	85	14	90	2	3A		WE	3B	
26	SP43603960	PGR			45	45	3	3B	94	5	103	15	3A		WE	3B	
27	SP43703960	CER	S	1	25	40	4	3B	99	0	103	15	3A		WE	3B	
30	SP44003960	PGR	N	2	0	32	4	3B	87	12	93	5	3A		WE	3B	
31	SP43403950	HRT			52	52	3	3B	121	22	112	24	2		WE	3B	
32	SP43503950	STB					1	2	154	55	119	31	1		WK	2	
33	SP43603950	PLO			35	35	4	3B	90	9	96	8	3A		WE	3B	
38	SP44103950	PGR	NE	5	22	22	4	3B	83	16	89	1	3A		WE	3B	
39	SP43403940	HRT	N	5	30	42	4	3B	92	7	99	11	3A		WE	3B	2P LOCATION
40	SP43503940	FRT	N	5	42	42	3	3B	91	8	98	10	3A		WE	3B	
41	SP43603940	FRT	N	4	60	60	2	3B	105	6	112	24	2		WE	3B	CLAY TOPSOIL
42	SP43713946	CER	N	2	32	32	4	3B	100	1	105	17	3A		WE	3B	QSPL32 WC3 3B
43	SP43823940	CER	N	7	25	25	4	3B	99	0	104	16	3A		WE	3B	3B GRADIENT
45	SP43973941	CER	N	5	27	27	4	3B	79	20	79	9	3A		WE	3B	
47	SP44203939	OTH	E	5	14	14	4	3B	71	28	71	17	3B		WE	3B	
48	SP43403930	FRT	N	2			1	2	76	23	76	12	3B		DR	3B	IMP45 4P LOC
49	SP43503930	FRT	N	4			1	2	97	2	107	19	3A		DR	3A	IMP 67 HR
50	SP43603930	FRT	N	2			1	3A	83	16	87	1	3A		WD	3A	IMP 55 HR
51	SP43703930	FRT			42	42	3	3B	87	12	94	6	3A		WE	3B	
52	SP43623926	PGR	NW	4	22	40	4	3B	102	3	107	19	3A		WE	3B	3P LOCATION
58	SP43403920	PLO			33	33	4	3B	81	18	83	5	3A		WE	3B	
59	SP43503920	HRT			27	27	4	3B	76	23	76	12	3B		WE	3B	
60	SP43603920	FRT			55	55	3	3B	102	3	110	22	3A		WE	3B	
62	SP43803920	CER	NW	4	30	30	4	3B	101	2	106	18	3A		WE	3B	C PLASTIC 30+

SAMPLE NO	GRID REF	ASPECT USE	-WETNESS		-WHEAT		POTS		M REL		EROSN	FROST		CHEM	ALC	COMMENTS
			GRDNT	GLEYSPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP	DIST	LIMIT	
64	SP44003920	CER S	9	50 50	3	3B	101	2 113	25	3A				WE	3B	3B GRADIENT
66	SP44203920	CER S	2	25 25	4	3B	99	0 104	16	3A				WE	3B	
68	SP43703910	CER SW	3	28 28	4	3B	100	1 105	17	3A				WE	3B	
70	SP43903910	CER S	1	27 27	4	3B	93	-6 105	17	3A				WE	3B	
71	SP44063909	CER S	4	22 22	4	3B	97	2 102	14	3A				WE	3B	
1P	SP43504010	CER E	1	63 63	2	3A	106	7 114	26	2				WE	3A	PIT 80 @ ASP 4
2P	SP43403940	HOR N	5	27 51	3	3B	93	6 105	17	3A				WE	3B	PIT 70 @ ASP3
3P	SP43703930	PGR N	3	25 25	4	3B	85	14 91	3	3A				WE	3B	PIT 60 @ ASP5
4P	SP43403930	PGR N	1		1	2	76	23 83	5	3B				DR	3B	PIT 70 @ ASP48

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES			PED		STONES			STRUCT/	SUBS			CALC	
				COL	ABUN	CONT	COL	GLE	2	6	LITH	TOT	CONSIST	STR	POR		IMP
1	0 28	MZCL	10YR46						0	0	HR	2					
	28 50	HZCL	75YR44	75YR56	C	F		S	0	0		0			M		SL GLEYED
	50 75	HZCL	75YR44	75YR58	C	D	FEW MN	S	0	0		0			M		SL GLEYED
	75-120	HZCL	75YR44 54	75YR58	C	D	COM MN	S	0	0		0			M		SL GLEYED
2	0 25	HCL	10YR43				FEW MN		0	0	HR	5					
	25-35	HCL	75YR43				FEW MN		0	0	HR	5			M		
	35-75	C	75YR54	10YR68	C	D	FEW MN	S	0	0	HR	5			M		SL GLEYED
3	0 25	HCL	10YR43						0	0	HR	5					
	25-120	C	75YR56				COM MN		0	0	HR	5			M		
4	0 28	HCL	10YR43						0	0	HR	3					1P LOCATION
	28-65	C	75YR44				FEW MN		0	0	HR	3			M		
	65-100	C	10YR53	10YR68	M	D	COM MN	Y	0	0		0			P		Y
	100 120	C	25Y 34	10YR68	M	D	COM MN	Y	0	0		0			P		Y
																	PLASTIC
6	0 25	HCL	10YR43						2	0	HR	10					
	25-65	HCL	10YR46 56						0	0		0			M		
	65-120	HCL	10YR56				COM MN		0	0		0			M		
7	0 20	HCL	10YR44						0	0	SLST	2					
	20 35	C	10YR43		F	F			0	0		0			M		
	35-45	C	10YR42	10YR56	C	D		Y	0	0		0			P		Y
	45 60	C	25Y 62	10YR58	M	D		Y	0	0		0			P		Y
8	0 25	HCL	10YR43						0	0	HR	5					
	25 35	HCL	10YR44				COM MN		0	0		0			M		
	35-65	MSL	10YR54						0	0	MSST	8			M		
	65-120	MS	25Y 72	10YR68	C	D		Y	0	0	MSST	3			M		
9	0 22	HCL	10YR42						0	0		0					
	22 39	C	10YR43	75YR46	C	F		S	0	0		0			P		Y
	39 60	C	25Y 62	10YR56	C	D	COM MN	Y	0	0		0			P		Y
10	0 24	MCL	10YR42						0	0		0					
	24 60	C	25Y 64	10YR68	C	D		Y	0	0		0			P		Y
11	0 30	MCL	10YR43						0	0		0					
	30 40	HCL	10YR44	10YR56	C	D		S	0	0		0			M		SL GLEYED
	40 75	MSL	25Y 63	10YR56	C	D		Y	0	0		0			M		
	75 97	MS	25Y 72						0	0		0			M		
12	0 19	HCL	10YR42						0	0		0					SEE 1P
	19 30	C	25Y 74	10YR68	C	D		Y	0	0	HR	20			M		
	30 45	C	25Y 64	10YR68	M	D		Y	0	0	HR	5			P		Y Y
	45 120	C	25Y 64	10YR68	C	D		Y	0	0	HR	5			P		Y Y

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES-			PED		STONES			STRUCT/	SUBS			CALC		
				COL	ABUN	CONT	COL	GLE	2	6	LITH	TOT	CONSIST	STR	POR		IMP	SPL
13	0-18	HCL	10YR42						0	0	0							
	18-45	C	25Y 64	10YR68	C	D			Y	0	0	0		P				
	45-80	HCL	25Y 32							0	0	0		M			IMP 80 CM	
16	0-26	MCL	10YR42							0	0	HR	2					
	26-60	C	25Y 53	10YR58	C	D			Y	0	0	HR	2		P	Y	Y	PLASTIC
17	0-20	MCL	10YR42							0	0	HR	2					
	20-60	C	25Y 53	10YR56	C	D	COM MN		Y	0	0	HR	2		P		Y	PLASTIC
18	0-15	MCL	10YR42							0	0		0					
	15-45	C	10YR54							0	0	SLST	5		M		Y	IMP 45 LSTONE
20	0-20	HCL	10YR42	10YR58	C	D			Y	0	0	HR	2					
	20-70	C	25Y 53	10YR58	M	D	FEW MN		Y	0	0	HR	2		P		Y	PLASTIC
21	0-20	HCL	10YR42	10YR56	M	D	COM MN		Y	0	0	HR	2					
	20-70	C	25Y 53	10YR56	M	D	COM MN		Y	0	0	HR	2		P		Y	
22	0-20	C	25Y 63							0	0		0					
	20-55	C	25Y 53	10YR56	C	D	COM MN		Y	0	0		0		P		Y	
25	0-28	C	10YR53							0	0		0					
	28-38	C	25Y 53							0	0		0		M			
	38-58	C	25Y 63	10YR56	C	D	COM MN		Y	0	0		0		P		Y	
26	0-28	HCL	10YR43							0	0	HR	1					
	28-45	C	10YR53							0	0		0		M			
	45-65	C	10YR53	10YR56	C	D	COM MN		Y	0	0		0		P		Y	
27	0-25	HCL	10YR42							0	0	HR	2					
	25-40	C	10YR44	10YR58	C	D			Y	0	0	MSST	5		M			
	40-80	C	10YR44	10YR58	C	D	FEW MN		Y	0	0	MSST	10		P		Y	
30	0-32	HCL	10YR53	10YR46	C	D			Y	0	0		0					
	32-60	C	25Y 63	10YR58	M	D			Y	0	0	HR	2		P		Y	PLASTIC
31	0-35	HCL	10YR43							0	0	HR	2					
	35-52	HCL	10YR44				FEW MN			0	0		0		M			
	52-100	C	25Y 53	10YR56	C	D	COM MN		Y	0	0		0		P		Y	
32	0-35	HCL	10YR43							0	0		0					
	35-65	HCL	10YR44							0	0		0		M			
	65-120	HCL	10YR54							0	0	HR	5		M			
33	0-35	HCL	10YR43	10YR56	F	F				0	0		0					
	35-60	C	10YR52	10YR58	C	D	COM MN		Y	0	0		0		P		Y	

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES			PED		STONES			STRUCT/		SUBS			
				COL	ABUN	CONT	COL	GLE	2	6	LITH	TOT	CONSIST	STR	POR	IMP	SPL
38	0 22	HCL	10YR51	10YR46	M	D		Y	0	0	0						
	22 60	C	25Y 61	10YR68	M	D		Y	0	0	0		P		Y	PLASTIC	
39	0-30	HCL	10YR53						0	0	0					2P LOCATION	
	30-42	C	10YR53	10YR56	C	D		Y	0	0	0		M				
	42 62	C	25Y 53	10YR56	C	D		Y	0	0	0		P		Y		
40	0 25	HCL	10YR42						0	0	0						
	25-42	HCL	10YR53						0	0	0		M				
	42-62	C	25Y 63	10YR56	C	D		Y	0	0	0		P		Y		
41	0 25	C	10YR42						0	0	0						
	25 60	C	10YR53				FEW MN		0	0	0		M				
	60 80	C	10YR53	10YR56	C	D	FEW MN	Y	0	0	0		P		Y		
42	0 32	HCL	10YR43						0	0	HR	2					
	32 52	C	10YR53	10YR58	C	D	COM MN	Y	0	0	MSST	5		P		Y	
	52-80	C	25Y 53 62	10YR58	M	D	COM MN	Y	0	0	0		P		Y		
43	0 25	HCL	10YR53						0	0	0						
	25-40	C	25Y 52	10YR58	M	D	FEW MN	Y	0	0	0		P		Y		
	40 80	C	25Y 61	10YR68	M	D		Y	0	0	0		P		Y		
45	0 27	HCL	10YR42	10YR68	F	F			0	0	0						
	27 50	C	25Y 61	10YR58	M	D		Y	0	0	0		P		Y		
47	0 14	C	10YR51	10YR56	M	D		Y	0	0	0						
	14 50	C	25Y 51	10YR58	M	D		Y	0	0	0		P		Y		
48	0 35	HCL	10YR54						0	0	0					4P LOCATION	
	35-45	HCL	10YR54						0	0	HR	20		M		IMP 45	
49	0 27	HCL	10YR54						0	0	0						
	27 67	HCL	75YR54						0	0	HR	10		M		IMP67 SEE 4P	
50	0 30	C	10YR53						1	0	HR	4					
	30 40	C	10YR53						0	0	HR	5		M			
	40 55	C	10YR53						0	0	HR	5		M		IMP 55	
51	0 30	C	10YR53						1	0	HR	4					
	30 42	C	10YR53						0	0	HR	2		M			
	42 62	C	25Y 63	10YR56	C	D	COM MN	Y	0	0	HR	1		P		IMP 62	
52	0 22	HCL	10YR53	10YR46	F	D			0	0	0					3P LOCATION	
	22 40	C	25Y 53 52	10YR58	C	D	FEW MN	Y	0	0	0		M				
	40 80	C	25Y 62	10YR58	M	D	FEW MN	Y	0	0	0		P		Y		
58	0 33	HCL	10YR54						0	0	HR	5					
	33 53	C	25Y 64	10YR58	C	D	COM MN	Y	0	0	0		P		Y	IMP53 PLASTIC	

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES			PED		STONES			STRUCT/ CONSIST	SUBS			CALC	
				COL	ABUN	CONT	COL	GLEYS	2	6	LITH		TOT	STR	POR		IMP
59	0-27	HCL	10YR54						0	0	HR	5					
	27-50	C	25Y 64	10YR58	M	D			Y	0	0	0		P		Y	IMP 50
60	0-30	HCL	10YR54							0	0	0					
	30-55	HCL	10YR54							0	0	HR	10		M		
	55-75	C	25Y 63	10YR56	M	D			Y	0	0	0		P		Y	
62	0-30	HCL	10YR53							0	0	0					
	30-80	C	25Y 61	10YR68	M	D			Y	0	0	0		P		Y	PLASTIC
64	0-35	HCL	10YR42							0	0	0					
	35-50	C	10YR44	10YR68	C	D			S	0	0	0			M		SL GLEYED
	50-70	C	25Y 61	10YR58	M	D			Y	0	0	0		P		Y	
66	0-25	HCL	10YR53							0	0	0					
	25-40	C	25Y 52	10YR68	M	D			Y	0	0	0		P		Y	
	40-80	C	25Y 61	10YR68	M	D			Y	0	0	0		P		Y	
68	0-28	HCL	10YR53							0	0	0					
	28-45	C	25Y 53	10YR58	M	D	FEW MN		Y	0	0	0		P		Y	PLASTIC
	45-80	C	25Y 61	10YR68	M	D			Y	0	0	0		P		Y	PLASTIC
70	0-27	HCL	10YR42							0	0	0					
	27-50	C	10YR61	10YR58	C	D	FEW MN		Y	0	0	0		P		Y	
	50-70	C	25Y 61	10YR68	M	D			Y	0	0	0		P		Y	
71	0-22	HCL	10YR53							0	0	0					
	22-80	C	25Y 61	10YR68	M	D			Y	0	0	0		P		Y	PLASTIC
1P	0-23	HCL	10YR43							0	0	HR	2				PIT @ ASP 4
	23-63	C	10YR54	10YR58	F	F	10YR53			0	0	0	MDCSAB	FR	M	Y	
	63-80	C	25Y 62	10YR68	M	D	COM MN		Y	0	0	0	WACAB	FM	P	Y	Y
2P	0-27	HCL	10YR43							0	0	MSST	5				PIT @ ASP 39
	27-51	C	10YR52	10YR68	F	D	COM MN			0	0	MSST	15	WDCAB	FM	M	Y
	51-70	C	25Y 52	10YR58	M	D			Y	0	0	0	WAVCAB	FM	P	Y	Y
3P	0-25	HCL	10YR43 53							0	0	0					PIT @ ASP 52
	25-44	C	25Y 52	10YR58	C	D	25Y 53		Y	0	0	0	MDCPR	FM	P	Y	Y
	44-60	C	25Y 61 62	10YR68	C	D			Y	0	0	0	WKCAB	FM	P	Y	Y
4P	0-27	HCL	75YR54							2	0	HR	8				PIT @ ASP 48
	27-55	C	10YR56							0	0	HR	51		FR	M	SIEVED STONES
	55-70	C	10YR56							0	0	HR	65		FR	M	PIT IMP 70 CM