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MILTON KEYNES EXPANSION STUDY
AREA 6 - BRICKFIELDS

Agricultural Land Classification
Semi-Detailed Survey
ALC Map and Report

April 1998

Resource Planning Team
Eastern Region
FRCA Reading

RPT Job Number: 0301/020/98
FRCA Reference: EL 03/01621

AGRICULTURAL LAND CLASSIFICATION REPORT

MILTON KEYNES EXPANSION STUDY
AREA 6 - BRICKFIELDS
SEMI-DETAILED SURVEY

INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey on 84.5 hectares of land at Brickfields to the east of Newton Longville, Buckinghamshire. The survey was carried out during April 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), in connection with the Milton Keynes Expansion Study. The survey area includes a section of land to the far southeast which was surveyed previously in 1992 (FRCA Ref.: 0304/058/92). The current survey uses the data collected in 1992 in conjunction with the data collected on this occasion in order to derive the agricultural land classification for this area. In addition to this, land immediately northeast of the site was surveyed in 1993 (FRCA Ref.: (0301/041/93). This 1993 survey has been amended slightly to account for additional information collected during this 1998 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 most of the agricultural land on this site was either under winter cereal production with smaller areas under permanent grassland or oilseed rape production. The areas shown as 'Other land' comprise woodland and urban dwellings.

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 the Table 1 overleaf.

7. The fieldwork was conducted at an average density of 1 boring every 1.5 hectares of agricultural land. In total, 57 borings and 4 soil pits were described.

8. The agricultural land on this site has been assigned predominantly to Subgrade 3b, (moderate quality) with smaller areas of Subgrade 3a (good quality) land occurring in places. The clayey soils are derived mainly from drift deposits of glacial Boulder Clay and the

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

underlying Oxford Clay. There is a complicated pattern of drift material giving rise to mainly poorly drained soils with smaller pockets of better drained land.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
3a	30.9	36.9	36.5
3b	52.8	63.1	62.5
Other Land	0.8	-	1.0
Total Surveyed Area	83.7	100	99.0
Total Site area	84.5	-	100

9. The majority of the land on this site has been classified as Subgrade 3b on the basis of soil wetness/workability restrictions. Typical profiles comprise calcareous and non-calcareous clay loam topsoils (with occasional clay topsoils) over clayey subsoils which impede soil drainage. The combination of soil drainage status and the heavy topsoils, causes significant soil wetness/workability problems, such that the flexibility of cropping and the opportunities for cultivation or grazing by livestock are reduced. Land of Subgrade 3a quality occurs in more localised parts of the site, generally equating to the slightly higher land where soils are less clayey and/or better structured and thereby better drained. The soils wetness restrictions are thereby less severe.

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

Factors	Units	Values		
Grid reference	N/A	SP 858 317	SP 861 311	SP 860 315
Altitude	m.AOD	90	95	100
Accumulated Temperature	day°C	1392	1386	1380
Average Annual Rainfall	mm	656	659	658
Field Capacity Days	days	139	140	140
Moisture Deficit, Wheat	mm	105	105	104
Moisture Deficit, Potatoes	mm	97	96	95
Overall Climatic Grade	N/A	Grade 1	Grade 1	Grade 1

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. Other local climatic factors such as exposure and frost risk are also not believed to affect the site; it is climatically Grade 1.

Site

15. The site lies between approximately 95m and 110m AOD. The land is either flat or gently sloping. Nowhere on the site does gradient adversely affect agricultural land quality. Other site factors such as microrelief and flooding are not limiting.

Geology and soils

16. The published geological information for the site (BGS, 1971) show the majority of the area to be underlain by glacial boulder clay as a drift deposit overlying solid Oxford Clay. Towards the north-west edge of the site, an area of alluvial drift and Oxford Clay has been mapped. In the south-east side of the site the geology is shown to be more variable comprising alluvial drift, head, and glacial sand and gravel drift deposits as well as more discrete units of Oxford Clay.

17. The most detailed published soils information for the site (SSEW, 1983 and 1984) shows the whole area to comprise soils from the Hanslope Association. These are described as, 'Slowly permeable calcareous clayey soils. Some slowly permeable non-calcareous clayey soils. Slight risk of water erosion.' (SSEW, 1983). Upon detailed field examination, soils broadly consistent with the description of the Hanslope association were found across the site.

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.

20. The agricultural land on this site has been assigned predominantly to Subgrade 3b, (moderate quality) with more restricted areas of Subgrade 3a (good quality) land occurring in the north-west and south-east of the site. The heavy soils are derived mainly from glacial Boulder Clay and the underlying Oxford Clay.

Subgrade 3a

21. The soil profiles within the Subgrade 3a unit are affected by soil wetness and workability limitations. They typically have impeded drainage which gives rise to gleying below depths of 22cm. Topsoils generally comprise both calcareous and non-calcareous medium and heavy clay loams which are generally stoneless or very slightly stony (up to 5% total flints). These rest over similar or slightly heavier upper subsoils which are sometimes gleyed but not slowly permeable. At depth, slowly permeable calcareous clay was found to contain up to 25% chalk and soft limestone fragments in addition to up to 5% flint stone. These soil profiles have been allocated to wetness class II or III (see Pits 1, 2 and 4, Appendix II) and given the topsoil characteristics, are usually placed in Subgrade 3a due to wetness and workability limitations. These may restrict the utilisation of the land by reducing the number of days when cultivations and/or grazing may occur without causing structural damage to the soil, consequently flexibility of use is reduced.

Subgrade 3b

22. The remainder of the site has been mapped as Subgrade 3b. This land is also limited by soil wetness and workability restrictions. The soils within this unit comprise calcareous and non-calcareous heavy clay loam or clay topsoils which are stoneless to slightly stony (containing up to 5% total flint fragments). The profiles sometimes have shallow upper subsoil horizons which have similar characteristics to the topsoils and tend to be gleyed, calcareous and contain up to 15% soft limestone and flints. On the whole however, the topsoils generally lie directly over dense calcareous clay subsoils (typically within 55cm of the surface). The soil inspection pit 3 reveals this denser clay to be poorly structured and slowly permeable. As a result, soil drainage will be impeded to the extent that wetness class III or more commonly wetness class IV is appropriate, which when combined with local climatic conditions and topsoil characteristics, gives rise to a land classification of Subgrade 3b on the basis of soil wetness and workability limitations. These limitations (which are more severe than for land graded as Subgrade 3a), will restrict the timing of cultivations as trafficking by agricultural machinery or grazing by livestock may lead to structural damage. Flexibility of cropping or stocking, together with the yield potential of crops, may be reduced.

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SOURCES OF REFERENCE

British Geological Survey (1971) *Sheet No. SP83. Milton Keynes. Solid and Drift Edition. 1:25 000 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) *Soils of South East England. 1:250 000 Scale.* SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils of South East England. Bulletin No. 15.* SSEW: Harpenden.

APPENDIX I

DESCRIPTION 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 that 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 (eg. 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 that restricts use to permanent pasture or rough grazing, except for occasional pioneer forage 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	**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 sandstone	**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 appropiate 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	SP85803180	CER	NW	1	32	32	4	3B	94	-11	106	10					WE	3B	SEE PIT 3
2	SP85703170	CER	SE	1	24	24	4	3B	89	-16	101	5					WE	3B	SEE PIT 3
3	SP85903170	CER	W	1		30	3	3B	99	-6	104	8					WE	3B	SL. GL. 30
4	SP86003170	CER	NW	2	30	30	4	3B	94	-11	106	10					WE	3B	SEE PIT 3
5	SP85603160	CER			28	28	4	3B	93	-12	101	5					WE	3B	SEE PIT 3
6	SP85803160	CER	W	1	28	28	4	3B	98	-7	103	7					WE	3B	SEE PIT 3
7	SP85903160	CER			30	50	3	3A	107	2	112	16					WE	3A	SEE PIT 1
8	SP86003160	CER	NW	2	35	35	4	3B	108	3	106	10					WE	3B	SEE PIT 3
9	SP86103160	CER	NE	1	28	45	3	3A	110	5	107	11					WE	3A	SEE PIT 1
10	SP86203160	CER	NE	1	55	30	3	3A	99	-6	103	7					WE	3A	SL. GL. 30
11	SP85503150	CER			35	35	4	3B	97	-8	109	13					WE	3B	SEE PIT 3
12	SP85703150	CER	W	1	50	28	3	3A	99	-6	104	8					WE	3A	SL. GL. 28
13	SP85803150	CER			28	62	3	3A	133	28	113	17					WE	3A	SEE 2P & 3P
14	SP85903150	CER	N	2	65	65	2	2	135	30	111	15					WE	2	SEE PIT 1
15	SP86003150	CER	NE	1	25	55	3	3B	111	6	109	13					WE	3B	SEE PIT 3
16	SP86103150	CER			55	30	3	3A	99	-6	103	7					WE	3A	SL. GL. 30
17	SP86203150	CER			30		2	2	141	36	118	22					WE	2	
18	SP86303150	CER			35	35	4	3B	96	-9	104	8					WE	3B	SEE PIT 3
19	SP86603140	CER	W	1	30	30	4	3B	101	-4	106	10					WE	3B	SEE PIT 3
20	SP86803140	CER	N	2	45	45	3	3A	114	9	105	9					WE	3A	SEE PIT 1
21	SP86903140	CER			30	45	3	3B	110	5	107	11					WE	3B	SEE PIT 3
22	SP86003140	CER			35	35	4	3B	107	2	105	9					WE	3B	SEE PIT 3
23	SP96103140	CER			30		2	3A	149	44	117	21					WE	3A	
24	SP96103140	CER			30	30	4	3B	91	-14	102	6					WE	3B	SEE PIT 3
25	SP85403130	CER			28		2	2	155	50	117	21					WE	2	OLD DRAIN
26	SP85503130	CER	SW	1	30	30	4	3B	101	-4	106	10					WE	3B	SEE PIT 3
27	SP85703130	CER	NW	3	30	42	3	3A	128	23	105	9					WE	3A	SEE PIT 1
28	SP85803130	CER			30	55	3	3B	111	6	109	13					WE	3B	SEE PIT 3
29	SP85903130	CER			27	35	4	3B	112	7	102	6					WE	3B	SEE PIT 3
30	SP86103130	CER			28	28	4	3B	96	-9	104	8					WE	3B	SEE PIT 3
31	SP85603120	CER	NW	3	22	65	3	3A	113	8	104	8					WE	3A	SEE PIT 1
32	SP85703120	CER			28	28	4	3B	97	-8	101	5					WE	3B	SEE PIT 3
33	SP85803120	CER	SE	1	26	35	4	3B	114	9	105	9					WE	3B	SEE PIT 3
34	SP86003120	CER			25	25	4	3B	89	-16	100	4					WE	3B	SEE PIT 3
35	SP86203120	CER	SE	1	30	30	4	3B	100	-5	105	9					WE	3B	SEE PIT 3
36	SP85703110	CER	SE	1	28	75	2	2	113	8	103	7					WE	2	SEE PIT 1
37	SP85903110	CER			35	35	4	3B	93	-12	104	8					WE	3B	SEE PIT 3
38	SP86103110	PGR	SE	1	25	25	4	3B	84	-21	90	-6					WE	3B	IMP 60 GRAVEL
39	SP86303110	CER	SE	1	28	28	4	3B	92	-13	104	8					WE	3B	SEE PIT 3
40	SP87103110	CER	SW	1	65	65	2	3A	122	17	116	20					WE	3A	SEE PIT 4
41	SP87203110	CER	SW	1	27	27	4	3B	89	-16	101	5					WE	3B	SEE PIT 3
42	SP86003110	PGR	SE	1	25	25	4	3B	87	-18	99	3					WE	3B	SEE PIT 3

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
43	SP86203100	PGR	SE	1	28	28	4	3B	99	-6	104	8					WE	3B	SEE PIT 3
44	SP86403100	CER	SE	1	30	45	3	3A	100	-5	105	9					WE	3A	SEE PIT 2
45	SP87003100	CER	SW	1	30	45	3	3B	112	7	110	14					WE	3B	SEE PIT 3
46	SP86103090	PGR	SE	1	28	28	4	3B	99	-6	104	8					WE	3B	SEE PIT 3
47	SP86303090	CER	SE	1	27	27	4	3B	93	-12	105	9					WE	3B	SEE PIT 3
48	SP86503090	PGR			46	46	3	3B	105	0	110	14					WE	3B	SEE PIT 3
49	SP86703090	CER	NW	1	42	42	3	3B	111	6	109	13					WE	3B	SEE PIT 3
50	SP86903090	CER	NW	1	32		2	3A	123	18	117	21					WE	3A	SEE PIT 4
51	SP86403080	OSR	.		29	29	4	3B	93	-12	105	9					WE	3B	SEE PIT 3
52	SP86603080	OSR			50	50	2	2	111	6	109	13					WE	2	BORDER TS TEXT
53	SP86803080	CER	NW	1			1	2	88	-17	95	-1	3A				DR	3A	
54	SP86903080	CER	NW	1	40	40	3	3A	103	-2	108	12					WE	3A	SEE PIT 4
55	SP86503070	OSR	NW	1	40	40	3	3A	103	-2	108	12					WE	3A	SEE PIT 4
56	SP86703070	OSR	NW	1	45	45	3	3B	104	-1	109	13					WE	3B	SEE PIT 3
57	SP86653060	OSR			29	29	4	3B	98	-7	103	7					WE	3B	SEE PIT 3
1P	SP85703130	CER	NW	2	27	45	3	3A	100	-5	104	8					WE	3A	
2P	SP86403100	CER	SE	1	32	63	3	3A	133	28	114	18					WE	3A	
3P	SP86403080	OSR			26	26	4	3B	95	-10	103	7					WE	3B	
4P	SP87103110	CER	N	1	74	74	2	3A	134	29	115	19					WE	3A	

				----MOTTLES-----			PED		----STONES----			STRUCT/	SUBS			
SAMPLE	DEPTH	TEXTURE	COLOUR	COL	ABUN	CONT	COL.	GLEY	>2	>6	LITH	TOT	CONSIST	STR	POR	IMP	SPL	CALC
1	0-32	HCL	25Y 43						0	0		0						Y
	32-70	C	25Y 53	25Y58	C			Y	0	0	HR	2			P		Y	Y
2	0-24	HCL	25Y 4243						0	0	HR	2						
	24-70	C	25Y 53	25Y 58	C			Y	0	0	HR	2			P		Y	Y
3	0-30	HCL	10YR42						0	0		0						
	30-80	C	25Y54	10YR58	C			S	0	0	HR	5			P		Y	
4	0-30	HCL	10YR42						0	0		0						Y
	30-70	C	25Y 5163	10YR58	M			Y	0	0		0			P		Y	Y
5	0-28	HCL	25Y 4243						0	0	HR	2						
	28-38	C	25Y 5153	25Y 58	C			Y	0	0	HR	2			P		Y	Y
	38-75	C	25Y 51	25Y 58	M			Y	0	0	CH	5			P		Y	Y
6	0-28	HCL	25Y42						0	0	HR	2						
	28-45	C	25Y5253	10YR58	C			Y	0	0	HR	2			P		Y	
	45-80	C	25Y52	10YR5861	M			Y	0	0	HR	2			P		Y	Y
7	0-30	HCL	10YR42						0	0		0						Y
	30-50	C	25Y 53	10YR56	C			Y	0	0		0			M			Y
	50-80	C	25Y 5153	10YR58	M			Y	0	0		0			P		Y	Y
8	0-35	HCL	10YR42						0	0	HR	3						Y
	35-70	C	25Y 5362	10YR58	C	D		Y	0	0	CH	5			P		Y	Y
	70-90	C	25Y 51	10YR58	C	D		Y	0	0	CH	25			P		Y	Y
9	0-28	HCL	25Y 42						0	0	HR	3						Y
	28-45	C	25Y 53	10YR58	C	D		Y	0	0	HR	3			M			Y
	45-90	C	25Y 6163	10YR5868	M	D		Y	0	0	CH	10			P		Y	Y
10	0-30	HCL	10YR42						0	0	HR	3						Y
	30-55	C	25Y 54	10YR56	C	F		S	0	0	HR	3			P		Y	Y
	55-80	C	25Y 6163	10YR58	M	D		Y	0	0	CH	15			P		Y	Y
11	0-35	HCL	25Y 4243	10YR46	F				0	0		0						
	35-70	C	25Y 63	25Y 5658	C			Y	0	0		0			P		Y	Y
12	0-28	HCL	25Y42						0	0	HR	1						Y
	28-50	C	25Y54	10YR58	C			S	0	0	HR	2			P		Y	Y
	50-80	C	25Y5361	10YR58	C			Y	0	0	HR	2			P		Y	Y
13	0-28	HCL	10YR42						0	0	HR	2						Y
	28-62	C	25Y 53	10YR56	C			Y	0	0	HR	2			M			Y
	62-120	C	25Y 5153	10YR58	M			Y	0	0	HR	2			P		Y	Y
14	0-30	HCL	10YR43						1	0	HR	3						Y
	30-50	C	10YR54						0	0	CH	5			M			Y
	50-65	HCL	10YR64						0	0	CH	25			M			Y
	65-120	C	25Y 6162	10YR58	M	D		Y	0	0	CH	15			P		Y	Y

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
15	0-25	HCL	25Y 43						0	0	HR	3							
	25-45	C	25Y 5354	10YR56	C	D		Y	0	0	CH	3		M				Y	
	45-55	C	25Y 53	10YR5658	C	D		Y	0	0	CH	5		M				Y	
	55-90	C	25Y 6163	10YR58	M	D		Y	0	0	CH	15		P			Y	Y	
16	0-30	HCL	10YR42						1	0	HR	3						Y	
	30-55	C	10YR4454	10YR56	C	D		S	0	0	HR	3		P			Y	Y	
	55-80	C	25Y 6263	10YR58	M	D		Y	0	0	CH	10		P			Y	Y	
17	0-30	MCL	25Y 43						0	0		0							
	30-70	HCL	25Y 53	10YR56	C			Y	0	0		0		M				Y	
	70-80	MSL	25Y 72	10YR56	M			Y	0	0		0		M				Y	
	80-120	LMS	25Y 72	10YR56	M			Y	0	0		0		M				Y	
18	0-35	HCL	25Y 42						0	0	HR	3						Y	
	35-75	C	25Y 5153	25Y 58	M			Y	0	0	HR	5		P			Y	Y	
19	0-30	HCL	10YR42						0	0		0						Y	
	30-80	C	25Y53	10YR58	C			Y	0	0		0		P			Y	Y	+2% HR
20	0-22	HCL	10YR43						1	0	HR	5						Y	
	22-45	C	10YR5354	10YR56	F	F			0	0	HR	3		M				Y	
	45-100	C	25Y 6163	10YR58	M	D		Y	0	0	CH	5		P			Y	Y	
21	0-30	HCL	10YR42						1	0	HR	3							
	30-45	C	25Y 5253	10YR56	C	D		Y	0	0	CH	3		M				Y	
	45-90	C	25Y 6163	10YR68	M	D		Y	0	0	CH	15		P			Y	Y	+3% HR
22	0-35	HCL	10YR42						0	0	HR	3						Y	
	35-65	C	25Y 6163	10YR58	M	D		Y	0	0	CH	10		P			Y	Y	
	65-90	C	25Y 61	10YR68	M	D		Y	0	0	CH	15		P			Y	Y	
23	0-30	HCL	25Y 43						0	0	HR	2							
	30-80	C	25Y 53	10YR56	C			Y	0	0		0		M				Y	
	80-120	HCL	25Y 53	10YR56	C			Y	0	0		0		M					WITH MS
24	0-30	HCL	25Y 42						0	0	HR	3						Y	
	30-70	C	25Y 5153	25Y 58	M			Y	0	0	CH	5		P			Y	Y	
25	0-28	MCL	10YR42	10YR56	F				0	0		0							
	28-60	HCL	25Y 5253	10YR58	M			Y	0	0	HR	2		M					
	60-120	HCL	25Y 53	10YR58	M			Y	0	0		0		M					
26	0-30	HCL	10YR42						0	0		0						Y	
	30-80	C	25Y53	10YR58	C			Y	0	0		0		P			Y	Y	
27	0-30	HCL	10YR42						1	0	HR	5						Y	
	30-42	C	10YR53	10YR56	C	F		Y	0	0		0		M				Y	
	42-80	C	25Y 52	10YR58	C	D		Y	0	0	CH	10		P			Y	Y	
	80-120	C	25Y 6162	10YR58	M	D		Y	0	0	CH	10		P			Y	Y	

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	
28	0-30	HCL	25Y 42						1	0	HR	3							
	30-55	C	25Y 5354	10YR56	C	F		Y	0	0	HR	3		M				Y	
	55-90	C	25Y 6163	10YR58	M	D		Y	0	0	CH	10		P			Y	Y	
29	0-27	HCL	10YR42						0	0	HR	5						Y	
	27-35	C	25Y 5354	10YR56	C	D		Y	0	0		0		M				Y	
	35-75	C	25Y 52	10YR58	C	D		Y	0	0	CH	10		P			Y	Y	
	75-100	C	25Y 61	75YR68	M	D		Y	0	0	CH	10		P			Y	Y	
30	0-28	HCL	25Y 42						0	0		0							
	28-50	C	25Y 53	25Y 56	C			Y	0	0		0		P			Y		
	50-75	C	25Y 5153	25Y 58	M			Y	0	0	CH	5		P			Y	Y	+5% HR
31	0-22	HCL	25Y 42						0	0	HR	2						Y	
	22-35	HCL	25Y 53	10YR56	C	F		Y	0	0	CH	2		M				Y	
	35-65	C	25Y 5253	10YR58	C	D		Y	0	0	CH	5		M				Y	
	65-100	C	25Y 6263	10YR58	C	D		Y	0	0	CH	15		P			Y	Y	
32	0-28	HCL	25Y 42						1	0	HR	3							
	28-80	C	25Y 6163	10YR5868	M	D		Y	0	0	CH	10		P			Y	Y	
33	0-26	HCL	10YR42						0	0	HR	3							
	26-35	C	25Y 5354	10YR58	C	D		Y	0	0	CH	5		M				Y	
	35-75	C	25Y 6263	10YR58	M	D		Y	0	0	CH	5		P			Y	Y	
	75-100	C	25Y 61	10YR68	M	D		Y	0	0	CH	10		P			Y	Y	
34	0-25	HCL	25Y 42						0	0	HR	2						Y	
	25-70	C	25Y 5153	25Y 58	M			Y	0	0	CH	4		P			Y	Y	
35	0-30	HCL	25Y42						0	0	HR	1							
	30-80	C	25Y5261	10YR58	C			Y	0	0	HR	2		P			Y	Y	
36	0-28	HCL	10YR42						1	0	HR	5						Y	
	28-36	C	10YR54	10YR66	C	F		Y	0	0	CH	5		M				Y	
	36-75	C	25Y 5354	10YR58	C	D		Y	0	0	CH	10		M				Y	
	75-100	C	25Y 61	10YR58	M	D		Y	0	0	CH	10		P			Y	Y	
37	0-35	HCL	25Y 42						0	0	CH	4						Y	
	35-70	C	25Y 5153	25Y 58	M			Y	0	0	CH	5		P			Y	Y	+3% HR
38	0-25	HCL	25Y42						0	0		0						Y	
	25-60	C	25Y6361	10YR58	C			Y	0	0	HR	2		P			Y	Y	IMP GRAVELLY
39	0-28	HCL	25Y42						0	0	HR	1						Y	
	28-70	C	25Y6361	10YR58	M			Y	0	0	HR	2		P			Y	Y	
40	0-30	HCL	10YR42						0	0	HR	1							
	30-65	C	10YR54						0	0		0		M				Y	
	65-100	C	25Y5361	10YR58	C			Y	0	0		0		P			Y	Y	

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	
41	0-27	C	10YR42						0	0	HR	1							
	27-70	C	25Y5261	10YR58	C			Y	0	0		0		P			Y	Y	
42	0-25	C	25Y42						0	0	HR	2						Y	
	25-70	C	25Y6361	10YR58	C			Y	0	0	HR	2		P			Y	Y	
43	0-28	HCL	25Y42						0	0		0							
	28-80	C	25Y5361	10YR58	C			Y	0	0	HR	2		P			Y	Y	
44	0-30	MCL	10YR43						0	0		0							
	30-45	C	25Y53	10YR58	C			Y	0	0		0		M					
	45-80	C	25Y5363	10YR58	C			Y	0	0	HR	2		P			Y		
45	0-30	HCL	10YR42						0	0	HR	1							
	30-45	C	10YR5354	10YR58	C	F		Y	0	0		0		M					
	45-90	C	10YR53	10YR5861	C			Y	0	0		0		P			Y	Y	
46	0-28	HCL	10YR42						0	0	HR	1						Y	
	28-80	C	25Y53	10YR58	C			Y	0	0	HR	2		P			Y	Y	
47	0-27	HCL	25Y42						0	0		0							
	27-70	C	25Y5363	10YR58	C			Y	0	0		0		P			Y		
48	0-30	HCL	10YR43						0	0		0							
	30-46	C	10YR54						0	0		0		M					
	46-80	C	25Y6261	10YR58	M			Y	0	0	HR	2		P			Y	Y	
49	0-30	HCL	10YR42						0	0	HR	2							
	30-42	C	25Y54						0	0		0		M					
	42-80	C	25Y5253	10YR58	M			Y	0	0		0		P			Y	Y	
	80-90	C	25Y5261	10YR58	M			Y	0	0		0		P			Y	Y	
50	0-32	HCL	10YR43						0	0	HR	1							
	32-65	C	25Y63	10YR58	C	F		Y	0	0		0		M					
	65-90	SC	75YR54	75YR58	C			S	0	0		0		M					
51	0-29	HCL	25Y52						0	0	HR	2							
	29-70	C	25Y6361	10YR58	M			Y	0	0		0		P			Y	Y	
52	0-30	MCL	10YR43						2	0	HR	3							
	30-50	HCL	25Y54						0	0	HR	2		M					
	50-90	C	25Y5361	10YR58	C			Y	0	0	HR	5		P			Y	Y	
53	0-28	HCL	10YR43						1	0	HR	3							
	28-40	C	10YR4454	75YR58	F				0	0	HR	3		M					
	40-60	C	10YR54	75YR58	F				0	0	HR	15		M					IMP GRAVELLY
54	0-28	HCL	10YR43						0	0	HR	2						Y	
	28-40	C	10YR54						0	0		0		M				Y	
	40-80	C	25Y53	10YR5861	C			Y	0	0		0		P			Y	Y	

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						0	0	HR	2							
	30-40	HCL	10YR54	10YR58	F				0	0		0		M					
	40-80	C	25Y5361	10YR58	C			Y	0	0		0		P			Y		CALC 55+
56	0-29	HCL	25Y42						0	0	HR	2							
	29-45	C	10YR54	10YR58	C			S	0	0		0		M					
	45-80	C	25Y5361	10YR58	C			Y	0	0		0		P			Y	Y	
57	0-29	HCL	25Y42						0	0	HR	2						Y	
	29-80	C	25Y5361	10YR58	C			Y	0	0	HR	3		P			Y	Y	
1P	0-27	HCL	10YR42						1	0	HR	4						Y	
	27-45	C	25Y 53	10YR56	C	F	25Y 5354	Y	0	0	HR	5	MDMSAB	FR	M			Y	
	45-80	C	25Y 6162	10YR58	C	D		Y	0	0	CH	15	WKCAB	FM	P	Y	Y	Y	+5% HR
2P	0-32	MCL	25Y4243						0	0	HR	2							
	32-63	C	25Y5253	10YR56	C	F		Y	0	0	HR	2	MDMAB	FR	M			Y	COMPOUND
	63-84	C	25Y6151	10YR5658	M			Y	0	0	HR	5	WKMAB	FM	P	Y	Y	Y	
	84-120	C	25Y61	10YR58	M			Y	0	0	HR	5	WKCAB	FM	P	Y	Y	Y	
3P	0-26	HCL	25Y 42						0	0	HR	2							
	26-75	C	25Y 5153	10YR58	M		25Y 52	Y	0	0		0	MDCAB	FM	P	Y	Y	Y	PLASTIC
4P	0-30	HCL	25Y 42						0	0	HR	3							
	30-74	C	25Y 54	10YR5658	F	D	25Y 53		0	0	HR	3	MDMSAB	FR	M			Y	COMPOUND
	74-120	C	25Y 6163	10YR58	M	D		Y	0	0	CH	8	WKVCAB	FM	P	Y	Y	Y	+3% HR