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**MILTON KEYNES EXPANSION STUDY
Land at Tickford Fields Farm, Newport Pagnell,
Buckinghamshire**

**Agricultural Land Classification
ALC Map and Report**

January 1999

**Resource Planning Team
Eastern Region
FRCA Reading**

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AGRICULTURAL LAND CLASSIFICATION REPORT

MILTON KEYNES EXPANSION STUDY LAND AT TICKFORD FIELDS FARM, NEWPORT PAGNELL, BUCKINGHAMSHIRE

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 45.6 ha of land at Tickford Fields Farm near Newport Pagnell in Buckinghamshire. The survey was carried out during January 1999.
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 work was carried out in connection with MAFF's statutory input to The Milton Keynes Expansion Study. 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 agricultural land use comprised permanent grassland with two areas in winter cereals in the north and east of the survey area. The areas mapped as 'Other Land' include farm buildings, extended domestic gardens, trees, some of which have been planted recently and ponds.

SUMMARY

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:10,000. It is accurate at this scale but any enlargement would be misleading.
6. The area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
2	21.5	51.2	47.1
3a	9.6	22.8	21.1
3b	10.9	26.0	23.9
Other land	3.6	-	7.9
Total surveyed area	42.0	100	92.1
Total site area	45.6	-	100

7. The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. In total, 45 borings and 4 soil pits were described.

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

8. The agricultural land on the site has been classified in the range Grade 2 (very good quality) to Subgrade 3b (moderate quality) with a significant proportion being classified as Subgrade 3a (good quality). The principal limitations to land quality include soil droughtiness, soil wetness and microrelief.
9. The very good quality land mapped is limited by soil droughtiness. The soils in this area comprise medium clay loam topsoils overlying heavy clay loam and sandy clay loam subsoils which, occasionally, pass to clay at depth. Given the relatively dry local climate, these soil textures, in combination with the slight to moderate stoniness prevalent throughout this area, lead to a slight drought limitation sufficient to slightly limit land versatility to the level whereby Grade 2 is most appropriate. This means that although a wide variety of crops may be grown, there may be periods during the growing season when insufficient moisture may be available for crop utilisation and therefore maximum yields may not be achieved.
10. Soil wetness affects the rest of the site in varying degrees. Where good quality land is mapped towards the south of the site the soils comprise medium clay loam topsoils overlying heavy clay loam, sandy clay loam and clay subsoils. The clay and some of the sandy clay loam subsoils adversely affect land drainage. The moderate depths at which these were encountered in the local climate lead to Subgrade 3a being the most appropriate classification in this area. 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 thus reduce the quantity and consistency of crop yields.
11. Land of moderate quality has been mapped towards the south and centre of the site. Much of this land is principally restricted by a severe soil wetness limitation, the remainder is affected by microrelief. Soils in this area comprise heavy clay loam topsoils overlying similar and poor draining clay subsoils which severely restrict land drainage. The relatively dry local climate in combination with the topsoil texture indicates that Subgrade 3b is most appropriate. The effects of soil wetness described above are more severe in this area.
12. Some of the land in the south of the site is adversely affected by microrelief considered to be the result of springs and seepage occurring at the junction of two geological deposits. The uneven nature of this area prohibits the effective use of precision agricultural machinery. Therefore Subgrade 3b has been considered appropriate.

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 (AT0, January to June), as a measure of the relative warmth of a locality.

Table 2: Climatic and altitude data

Factor	Units	Values	
		SP 886 400	SP 889 437
Grid reference	N/A	55	60
Altitude	m, AOD	1425	1420
Accumulated Temperature	day°C (Jan-June)	609	610
Average Annual Rainfall	mm	122	122
Field Capacity Days	days	114	114
Moisture Deficit, Wheat	mm	108	107
Moisture Deficit, Potatoes	mm		
Overall climatic grade	N/A	Grade 1	Grade 1

17. The combination of rainfall and temperature at this site means 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. The relatively dry local climate contributes towards soil droughtiness being more prevalent than elsewhere in the region.

Site

18. The site lies at altitudes in the approximate range of 55m-60m AOD. The lowest lying land occurs in the north and north-west of the site. Slopes within the site are slight and as such gradient does not adversely affect land quality. Land quality on some of the land in the south of the site is adversely affected by microrelief present as a result of springs and seepage occurring at the junction of two geological deposits. The land adjacent to Chicheley Brook towards the northern boundary of the site was slightly affected by groundwater at the time of the survey; some the profiles examined were saturated from a minimum depth of 70cm. No information on flood events affecting this survey area is available and, given that no adverse effects of flooding were visible on the site, it has had no influence on the classification.

Geology and soils

19. The most detailed published geological information for the site (BGS, 1971) shows the surveyed area to be underlain by a solid and several drift deposits. Solid Oxford Clay is mapped to the west and south-east of the site. Drift deposits are shown underlying the remainder of the site. First terrace gravels are mapped along the course of Chicheley Brook to the north and north-east of the site. Head deposits adjoin this across the centre of the site bordering the Oxford Clay and further drift deposits which comprise Boulder Clay and glacial sand and gravel overlying Oxford Clay to the south of the site.

20. According to the most recent published soils information for this area (SSEW,1983) the majority of the site is underlain by soils of the Bishampton 2 association; these are described as 'Deep, fine loamy and fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging and similar slowly permeable seasonally waterlogged soils' (SSEW, 1983). To the south-east soils of the Hanslope association have been mapped; these are described as 'Slowly permeable calcareous clayey soils with some slowly permeable non-clayey soils' (SSEW, 1983). The soils observed during the survey are within the range of these descriptions.

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.
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. Very good quality agricultural land has been mapped in a single unit in the north of the site. The soils in this area are typified by soil pits 1P and 3P (see Appendix II). Two slightly different soil types were observed in this area during the survey, both of which are principally limited by soil droughtiness, although in a number of cases soil wetness was equally limiting.
24. The dominant soil type, typified by soil pit 3P, comprises non-calcareous medium clay loam topsoils overlying similar or heavy clay loam, sandy clay loam, occasionally medium sandy loam textured subsoils. Stone contents vary within the profile from 0-5% flints by volume in the topsoil up to approximately 40% flints by volume in the lower subsoil, although around 25% flints in the lower subsoil was more common. These increased stone contents result in some observations being impenetrable to the soil auger between 70 and 80cm. The combination of soil textures and stone contents in the relatively dry local climate leads to this area being slightly drought prone. The result is that during dry summer periods these soils may not contain sufficient moisture to maintain plant growth and as such crop yields may be variable. During the survey many of the observations became saturated in the range 60-90cm but, given the survey timing, shortly after an extremely wet period during which Chicheley Brook had not flooded, this limitation was not considered sufficient to downgrade this area. Many of the observations exhibited gleying at shallow depths and as such are placed in Wetness Class II resulting in Grade 2 also being appropriate given the local climate and the topsoil texture.
25. The second less extensive Grade 2 soil type, represented by soil pit 1P, is principally located on the margins of lower quality land towards the centre of the site. The soil type is similar overall, ie medium clay loam topsoils overlying heavy clay loam and sandy clay loam subsoils except that stone contents overall are much lower (0-15% flints by volume) and a plastic slowly permeable clay horizon was encountered from between 65 and 100cm. These soil texture and stone volume combinations result in Grade 2 being appropriate on the basis of soil droughtiness as well as soil wetness. The shallow and moderate depths to gleying and the

slowly permeable clay subsoil in the local climate lead to Wetness Class II and subsequently Grade 2 with the prevailing medium textured topsoil.

26. Given that this land is restricted to Grade 2 on the basis of soil wetness and soil droughtiness the land may be too wet to cultivate or graze in the wettest periods of winter and equally it may not contain sufficient reserves of water for complete plant growth in summer. However this land is still highly versatile and only the most demanding of crops are likely to fail.

Subgrade 3a

27. The south-eastern part of the site is classified as being of good quality. Soils in this area of the site are characterised by soil pit 4P (see Appendix II). The principal limitation affecting these soils is soil wetness.
28. Soils in this area are not dissimilar to those in the areas classified as Grade 2 comprising medium clay loam topsoils overlying heavy clay loam, sandy clay loam and clay subsoils which overall contain 0-15% flints by volume. The principal difference is that soil pit 4P indicates that as well as the clay, some sandy clay loam subsoils are slowly permeable. This factor aligned with the generally shallower depth to gleying in the local climate leads to Wetness Class III being applied and subsequently Subgrade 3a is appropriate when the medium textured subsoils are accounted for in the local climate.
29. Moderate soil wetness is likely to lead to some restriction on winter use of the land in terms of grazing or cultivating, it may also adversely affect crop growth and yield if conditions during the growing season are particularly wet.

Subgrade 3b

30. The south and south-west of the site is classified as being of moderate quality. Land quality is restricted by soil wetness and soil pit 2P typifies the dominant soil characteristics observed in this area. In addition to soil wetness, the extreme south of the site is affected by microrelief to the extent that versatility of this part of the site is severely limited and Subgrade 3b is the most appropriate classification.
31. Soils within the majority of the area classified as Subgrade 3b have heavy clay loam topsoils which overlie similar and clay subsoils. Gleying was observed in some topsoils and all the subsoils. From soil pit 2P, the clay subsoils which occur from between 23 and 35cm were adjudged to be slowly permeable even though a significant stone content (25% flints by volume) was present as porosity was low, the structure poor and water was obviously being held up in the upper horizons. These subsoils restrict drainage to the extent that in the local climate Wetness Class III is applied and subsequently Subgrade 3b is appropriate given the heavy topsoil textures present.
32. Excessive wetness in the soil is likely to adversely affect crop growth and development. It is also likely to 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.

33. In the south of the Subgrade 3b unit the land was affected by microrelief considered to be the result of seepage occurring where the permeable glacial sand and gravel deposits overlie impermeable Oxford Clay. This is evidenced on the ground by the presence of several perennial ponds overlying areas of seepage and more seasonally wet areas as well as very uneven ground. The sharp changes in slope over short distances precludes the use of precision agricultural machinery and as such the land is best suited to grass production. On this basis this area has been mapped within the land of moderate quality.

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SOURCES OF REFERENCE

British Geological Survey (1971) *Sheet No. SP 83 and parts of SP 73, 74, 84, 93 & 94, 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) *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 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
PCR:	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
IHT:	Heathland	HRT:	Horticultural crops	PLO:	Ploughed

3. **GRDNT:** Gradient as estimated or measured by a hand-held optical clinometer.
4. **GLEYSPL:** 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. **GLEYS:** 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
ZR:	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	ASPECT USE	--WETNESS--				-WHEAT-		-POTS-		M.REL		EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
			GRONT	GLEY	SPL	CLASS	GRADE	AP	MB	AP	MB	DRT					
8	SP88524382	PGR		50	60	2	2	134	20	111	4	2			WD	2	
9	SP88604400	SAS		28		2	2	136	22	112	5	2			WD	2	GWATER 80+
10	SP88704400	SAS				1	1	135	21	104	-3	2			DR	2	GWATER 70+
11	SP88804400	SAS				1	1	101	-13	103	-4	3A			DR	3A	IMP80 DR2-120
12	SP88524390	PGR				1	1	128	14	104	-3	2			DR	2	GWATER 60+
13	SP88604390	PGR				1	1	123	9	100	-7	2			DR	2	GWATER 70+
14	SP88704390	STU				1	1	144	30	114	7	2			DR	2	GWATER 70+
15	SP88804390	STU				1	1	99	-15	104	-3	3A			DR	3A	IMP75 DR2-120
16	SP88904390	STU		27		2	2	141	27	107	0	2			WD	2	
17	SP89004390	PGR				1	1	109	-5	112	5	3A			DR	3A	IMP80 DR2-120
18	SP88604380	PGR		23	23	3	3B	125	11	102	-5	2			WE	3B	
19	SP88704380	PBR	W	1	20	35	3	3B	126	12	104	-3	2		WE	3B	
20	SP88804380	SAS			65	100	1	1	146	32	116	9	2		DR	2	1P LOCATION
21	SP88904380	PGR			26		2	2	135	21	117	10	2		WD	2	
22	SP89004380	PGR			55		1	1	135	21	110	3	2		DR	2	GWATER 90+
23	SP89104380	PGR					1	2	130	16	101	-6	2		WD	2	HCL TOPSOIL
24	SP88584368	PGR			20	30	3	3B		0	0				WE	3B	C PLASTIC 45+
25	SP88664370	PGR			0	65	2	2	114	4	107	9	3A		WD	2	AUG 90
26	SP88804370	PGR	N	1	10	65	2	2	115	1	113	6	3A		WD	2	AUG 90
27	SP88904370	PGR	N	2	19	19	3	3B		0	0				WE	3B	
28	SP89004370	PGR	N	1	28	35	3	3B	128	14	105	-2	2		WE	3B	
29	SP89104370	CER	N	1	20		2	2	99	-15	109	2	3A		DR	3A	IMP70 DR2-120
30	SP89204370	CER					1	1	134	20	112	5	2		DR	2	GWATER 85+
31	SP89304370	CER			35		2	2	110	-4	108	1	3A		DR	3A	3P LOC IMP 85
32	SP89404370	CER	N	1	27		2	2	140	26	112	5	2		WD	2	
33	SP88644360	PGR			20	35	3	3B	123	9	101	-6	2		WE	3B	
34	SP88704360	PGR			0	25	3	3B		0	0				WE	3B	
35	SP88804360	PGR	S	2	0	45	3	3B		0	0				WE	3B	
36	SP88904360	PGR	SE	2	0	35	3	3B	136	22	114	7	2		WE	3B	2P LOCATION
37	SP89004360	CER			27	45	3	3A		0	0				WE	3A	
38	SP89104360	CER	NW	1	27	45	3	3A		0	0				WE	3A	IBOGRV SATBO
39	SP89204360	CER	N	2	65	65	2	3A	126	12	102	-5	2		WE	3A	
40	SP89304360	CER	N	4	35	95	2	2	141	27	115	8	2		WD	2	
41	SP89404360	CER	N	3	26	35	3	3A	129	15	106	-1	2		WE	3A	
42	SP88704350	PGR			45	45	2	3A	136	22	110	3	2		WE	3A	GWATER 90+
43	SP88804350	PGR	S	2	30	45	3	3B	128	14	101	-6	2		WE	3B	
44	SP88904350	PGR			25	45	3	3A	149	35	116	9	2		WE	3A	GWATER 80+
45	SP89004350	CER	NW	2	28	65	2	2	132	18	115	8	2		WD	2	
46	SP89104350	CER	NW	1	27	50	3	3A		0	0				WE	3A	
47	SP89204350	CER			24	52	3	3A	120	6	103	-4	2		WE	3A	4P LOCATION
48	SP89304350	CER			36	48	3	3A	133	19	110	3	2		WE	3A	
49	SP88804340	PGR			40	55	3	3B	136	22	108	1	2		WE	3B	GWATER 80+

SAMPLE NO.	GRID REF	ASPECT USE	--WETNESS--				-WHEAT-		-POTS-		M.REL		EROSN	FROST	CHEM	ALC	COMMENTS
			GRDNT	GLEYS	SPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP	DIST	LIMIT	
50	SP88904340	PGR W	2	40	40	3	3A	120	6	98	-9	2			WE	3A	NR MIC RELIEF
51	SP98104342	CER		55	55	2	2	131	17	105	-2	2			WD	2	PLASTIC C 75+
52	SP88984398	SAS				1	1	114	0	108	1	3A			DR	3A	IMP90 GRAVELLY
1P	SP88804380	SAS		70	100	1	1	143	29	114	7	2			DR	2	PIT105 AUG 120
2P	SP88904360	PGR SE	2	0	43	3	3B	124	10	99	-8	2			WE	3B	PIT 80 AUG 120
3P	SP89304370	CER N	1	55		1	1	125	11	104	-3	2			DR	2	PIT 80 AUG 120
4P	SP89204350	CER		36	52	3	3A	124	10	101	-6	2			WE	3A	P90A120 SEEP52

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED	----STONES----			STRUCT/ CONSIST	SUBS			CALC			
				COL	ABUN	CONT		COL.	GLE	>2		>6	LITH	TOT		STR	POR	IMP
8	0-20	MCL	10YR33							0	0	HR	2					SLIGHTLY SANDY
	20-50	HCL	10YR44							0	0	HR	2		M			SLIGHTLY SANDY
	50-60	HCL	10YR42 52	10YR58	C	D	FEW MN	Y		0	0	HR	2		M			
	60-120	C	25Y 42 52	10YR58	C	D			Y		0	0		0		P		Y
9	0-28	MCL	10YR42							0	0	HR	5					
	28-60	HCL	10YR43	10YR66	C	F	FEW MN	Y		0	0		0		M			
	60-110	SCL	10YR53	10YR68	C	F			Y		0	0	HR	15		M		IMP 110 FLINTS
10	0-35	MCL	10YR42							0	0	HR	5					
	35-55	SCL	10YR43							0	0	HR	10		M			
	55-120	SCL	10YR54							0	0	HR	25		M			GROUNDWATER 70
11	0-27	MCL	10YR42							0	0	HR	5					
	27-45	HCL	10YR43							0	0	HR	10		M			
	45-80	HCL	10YR54							0	0	HR	25		M			IMP 80 GRAVELLY
12	0-20	MCL	10YR33							0	0	HR	2					
	20-50	MCL	10YR44							0	0	HR	5		M			SLIGHTLY SANDY
	50-60	SCL	10YR54							0	0	HR	25		M			
	60-120	SCL	10YR54							0	0	HR	40		M			GROUNDWATER 60
13	0-27	MCL	10YR32							0	0	HR	2					
	27-55	SCL	10YR44 54							0	0	HR	15		M			
	55-70	SCL	10YR56							0	0	HR	30		M			
	70-120	SCL	10YR56							0	0	HR	40		M			GROUNDWATER 70
14	0-26	MCL	10YR42							0	0	HR	2					
	26-65	HCL	10YR54				FEW MN			0	0		0		M			SLIGHTLY SANDY
	65-120	SCL	10YR53							0	0	HR	20		M			GROUNDWATER 70
15	0-27	MCL	10YR42							0	0	HR	5					
	27-55	HCL	10YR43							0	0	HR	10		M			SLIGHTLY SANDY
	55-75	SCL	10YR54							0	0	HR	25		M			IMP 75 GWATER 75
16	0-27	MCL	10YR32							0	0	HR	5					
	27-55	SCL	10YR64	10YR58	C	D	FEW MN	Y		0	0	HR	10		M			
	55-80	SCL	10YR53	10YR58	C	D			Y		0	0		0		M		
	80-120	SCL	10YR52	10YR68	C	D			Y		0	0	HR	15		M		
17	0-28	MCL	10YR32 42							0	0	HR	3					
	28-45	MCL	10YR44							0	0	HR	5		M			
	45-60	HCL	10YR44 54							0	0	HR	5		M			
	60-80	HCL	10YR54				FEW MN			0	0	HR	15		M			IMP 80 GRAVELLY
18	0-23	HCL	10YR31							0	0	HR	2					SEE 2P
	23-55	C	05Y 61	10YR66	M	D			Y		0	0	CH	2		P		Y Y
	55-120	C	05Y 51	10YR58	M	D	COM MN		Y		0	0		0		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
19	0-20	HCL	10YR31						0	0	HR	2				SEE 2P
	20-35	HCL	10YR53	10YR56	C	D	FEW MN	Y	0	0	HR	3	M			
	35-60	C	10YR52 53	10YR58	M	D			Y	0	0	0	P		Y	
	60-85	C	10YR52 53	10YR58	M	D			Y	0	0	0	P		Y	
	85-120	C	05Y 62	10YR68	M	D			Y	0	0	HR	5	P	Y	PLASTIC
20	0-30	MCL	10YR32						0	0	HR	2				1P LOCATION
	30-50	HCL	10YR43	10YR68	F	F	FEW MN		0	0		0	M			
	50-65	HCL	10YR53	10YR58	F	F	FEW MN		0	0		0	M			
	65-100	SCL	10YR52	10YR58	C	D			Y	0	0	HR	10	M		
	100-120	C	5BG 62	10YR68	C	D			Y	0	0		0	P	Y	PLASTIC
21	0-26	MCL	10YR32						0	0		0				
	26-65	HCL	10YR42	10YR58	C	F	COM MN	Y	0	0		0	M			
	65-100	HCL	10YR42	75YR46	M	D			Y	0	0	HR	2	M		IMP 100 FLINTS
22	0-20	MCL	10YR42						0	0	HR	3				
	20-45	HCL	10YR43				FEW MN		0	0	HR	5	M			
	45-55	HCL	10YR54						0	0	HR	10	M			
	55-85	HCL	10YR64 54	10YR66	C	D			Y	0	0	HR	5	M		
	85-120	SCL	10YR63	10YR68	C	D			Y	0	0	HR	40	M		GROUNDWATER 90+
23	0-20	HCL	10YR32						0	0	HR	3				SEE 3P
	20-45	HCL	10YR44						0	0	HR	5	M			
	45-60	SCL	10YR44 54						0	0	HR	25	M		Y	GRITTY
	60-90	MSL	10YR54						0	0	HR	30	M		Y	
	90-120	MSL	10YR54 56						0	0	HR	40	M		Y	
24	0-20	HZCL	10YR32						0	0		0				SEE 2P
	20-30	C	10YR53	10YR56	C	F			Y	0	0	0	M			
	30-45	C	25Y 53	10YR56	C	D	FEW MN	Y	0	0		0	P		Y	
	45-90	C	05Y 61	10YR68	M	D			Y	0	0	CH	5	P	Y	Y
25	0-25	MCL	10YR41	75YR46	M	D			Y	0	0	0				
	25-65	HCL	10YR42	10YR58	M	D			Y	0	0	0	M			
	65-90	C	25Y 51	10YR58	M	D			Y	0	0	0	P		Y	
26	0-10	MCL	10YR32						0	0		0				
	10-35	MCL	10YR41	75YR46	M	D	FEW MN	Y	0	0		0	M			
	35-65	HCL	10YR41	75YR46	M	D	FEW MN	Y	0	0		0	M			
	65-90	C	25Y 61	10YR58	M	D	FEW MN	Y	0	0		0	P		Y	
27	0-19	HCL	10YR32						0	0		0				SEE 2P
	19-41	C	25Y 52	10YR58	M	D			Y	0	0	0	P		Y	
	41-80	C	05Y 63	10YR58	M	D			Y	0	0	0	P		Y	PLASTIC
28	0-28	HCL	10YR42						0	0	HR	3				SEE 2P
	28-35	HCL	10YR53	10YR56	C	F	FEW MN	Y	0	0	HR	3	M			
	35-55	C	10YR53	10YR56	M	D	FEW MN	Y	0	0		0	P		Y	
	55-120	C	05Y 62	10YR68	M	D			Y	0	0	CH	5	P	Y	Y

SAMPLE	DEPTH	TEXTURE	COLOUR	-----MOTTLES-----		PED		-----STONES-----			STRUCT/ CONSIST	SUBS			CALC	
				COL	ABUN	CONT	COL.	GLE	>2	>6		LITH	TOT	STR		POR
29	0-20	MCL	10YR42						0	0	HR	2				
	20-40	SCL	10YR42	10YR56	C	D	COM MN	Y	0	0		0		M		
	40-70	SCL	10YR42	10YR56	M	D		Y	0	0	HR	4		M		IMP 70 FLINTS
30	0-25	MCL	10YR32 42						1	0	HR	5				
	25-80	HCL	10YR44 54	10YR58	F	D	FEW MN		0	0	HR	5		M		SLIGHTLY SANDY
	80-120	SCL	10YR54						0	0	HR	40		M	Y	GROUNDWATER 90+
31	0-35	MCL	10YR32						0	0	HR	3				3P LOCATION
	35-55	HCL	10YR53	10YR66	C	F	FEW MN	Y	0	0	HR	5		M		
	55-85	SCL	10YR52	10YR58	M	D	COM MN	Y	0	0	HR	30		M	Y	IMP 85 GRAVELLY
32	0-27	MCL	10YR42						0	0	HR	2				
	27-65	SCL	10YR53	10YR66	C	F	FEW MN	Y	0	0		0		M		
	65-110	SCL	10YR52	10YR58	M	D	COM MN	Y	0	0	HR	5		M		
33	0-20	HCL	10YR32						0	0		0				
	20-35	HCL	10YR53	10YR56	C	F		Y	0	0	HR	2		M		
	35-60	C	10YR53	10YR56	C	D	FEW MN	Y	0	0	HR	2		P	Y	
	60-85	C	10YR53 63	10YR56	C	D		Y	0	0	HR	25		P	Y	SLIGHTLY SANDY
	85-120	C	05Y 61	10YR68	M	D		Y	0	0	CH	3		P	Y	Y
34	0-25	HCL	10YR42	75YR46	M	D		Y	0	0		0				SEE 2P
	25-60	C	25Y 51	10YR58	M	D		Y	0	0		0		P	Y	
35	0-25	HCL	10YR32	75YR46	M	D		Y	0	0		0				SEE 2P
	25-45	HCL	10YR42	10YR56	M	D		Y	0	0	HR	3		M		
	45-80	C	25Y 61	10YR58	M	D		Y	0	0		0		P	Y	
36	0-20	HCL	10YR41	10YR46	C	D		Y	0	0		0				2P LOCATION
	20-35	HCL	10YR51 52	10YR58	C	D		Y	0	0		0		M		
	35-55	C	25Y 61	10YR58	M	D		Y	0	0		0		M	Y	
	55-120	C	05Y 61	10YR58	M	D		Y	0	0		0		P	Y	PLASTIC
37	0-27	MCL	10YR32						0	0	HR	2				
	27-45	SCL	10YR42	10YR56	C	F	FEW MN	Y	0	0		0		M		
	45-100	SCL	10YR42	10YR56	M	D		Y	0	0		0		P	Y	IMP 100 SPL AS4P
38	0-27	MCL	10YR32						0	0	HR	3				
	27-45	SCL	10YR42	10YR58	C	F		Y	0	0		0		M		
	45-80	C	10YR51	10YR56	M	D		Y	0	0	HR	4		P	Y	
39	0-25	HCL	10YR42						1	0	HR	5				SLIGHTLY SANDY
	25-45	HCL	10YR44				FEW MN		0	0	HR	5		M		SLIGHTLY SANDY
	45-65	SCL	10YR44	10YR56	F	F	FEW MN		0	0	HR	25		M		
	65-95	C	10YR53	10YR58	M	D	FEW MN	Y	0	0	HR	15		P	Y	SPL SEE 4P
	95-120	C	05Y 62 64	10YR68	M	D	FEW MN	Y	0	0		0		P	Y	PLASTIC

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED		----STONES-----			STRUCT/ CONSIST	SUBS			CALC		
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH		TOT	STR	POR		IMP	SPL
40	0-35	MCL	10YR32							0	0	HR	2					
	35-70	HCL	10YR52	10YR58	C	D	FEW MN	Y	0	0	HR	5	M					SLIGHTLY SANDY
	70-95	SCL	10YR52	10YR58	C	D		Y	0	0	HR	20	M					
	95-120	C	5BG 62	10YR68	C	D		Y	0	0		0	P		Y			PLASTIC
41	0-26	MCL	10YR32							0	0	HR	2					
	26-35	HCL	10YR52	10YR58	M	D		Y	0	0		0	M					
	35-65	C	5BG 62	10YR58	C	D		Y	0	0		0	P		Y			PLASTIC
	65-120	C	5BG 62	10YR58	M	D	COM MN	Y	0	0		0	P		Y			PLASTIC
42	0-30	HCL	10YR43							0	0		0					
	30-45	HCL	10YR44	54						0	0		0	M				
	45-60	C	10YR53	10YR56	C	D	COM MN	Y	0	0		0	P		Y			
	60-90	C	10YR53	10YR56	C	D	FEW MN	Y	0	0	HR	5	P		Y			
	90-120	SCL	10YR63	10YR66	C	D		Y	0	0	HR	20	M					GROUNDWATER 90+
43	0-10	MZCL	10YR32							0	0	HR	2					ORGANIC?
	10-30	HCL	10YR42							0	0	HR	2	M				
	30-45	HCL	10YR42	10YR56	C	F	FEW MN	Y	0	0	HR	20	M					
	45-90	C	10YR53	10YR58	M	D	FEW MN	Y	0	0	HR	2	P		Y			SLIGHTLY SANDY
	90-120	SCL	10YR63	10YR68	C	D	FEW MN	Y	0	0	HR	20	M					GROUNDWATER 90+
44	0-25	MCL	10YR42							0	0	HR	2					
	25-45	MCL	10YR53	10YR56	C	F	FEW MN	Y	0	0	HR	2	M					
	45-75	HCL	10YR63	10YR68	C	D	FEW MN	Y	0	0		0	P		Y			SL. SANDY SPL 4P
	75-120	SCL	10YR63	10YR68	M	D		Y	0	0	HR	10	P		Y			SPL SEE 4P
45	0-28	MCL	10YR32							0	0	HR	3					
	28-65	HCL	10YR42	10YR42	C	F		Y	0	0		0	M					
	65-100	SCL	10YR42	10YR58	M	D		Y	0	0	HR	6	P		Y			IMP 100 SPL AS4P
46	0-27	MCL	10YR32							0	0	HR	3					
	27-50	SCL	10YR42	75YR56	C	D		Y	0	0	HR	2	M					
	50-80	SCL	10YR42	75YR56	M	D		Y	0	0	HR	10	P		Y			SPL SEE 4P
	80-100	C	25Y 63	10YR58	M	D		Y	0	0	HR	6	P		Y	Y		
47	0-24	MCL	10YR32							1	0	HR	5					4P LOCATION
	24-35	HCL	10YR53	10YR58	C	D	FEW MN	Y	0	0	HR	3	M					SLIGHTLY SANDY
	35-85	C	10YR52	10YR58	M	D	COM MN	Y	0	0	HR	3	M					SL. SANDY SPL 52
	85-120	C	25Y 63						0	0	HR	25	P		Y	Y		
48	0-36	MCL	10YR32							0	0	HR	2					
	36-48	HCL	10YR52	10YR58	C	D	COM MN	Y	0	0	HR	5	M					
	48-120	C	5GB 62	10YR65	C	D		Y	0	0		0	P		Y			PLASTIC
49	0-20	HCL	10YR32							0	0		0					
	20-40	HCL	10YR44							0	0		0	M				
	40-55	HCL	10YR53	10YR56	C	F	FEW MN	Y	0	0	HR	5	M					
	55-80	SCL	10YR53	10YR56	C	D	FEW MN	Y	0	0	HR	15	P		Y			SPL SEE 4P
	80-120	SCL	10YR53	10YR66	C	D		Y	0	0	HR	25	M			Y		GROUNDWATER 80+

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED	----STONES----			STRUCT/	SUBS			SPL	CALC		
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH	TOT	CONSIST	STR			POR	IMP
50	0-25	MCL	10YR42						0	0	HR	5						
	25-40	HCL	10YR44						0	0	HR	5		M				
	40-80	HCL	10YR53	10YR58	C	D	COM MN	Y	0	0	HR	10		P		Y	SPL SEE 4P	
	80-120	SCL	10YR63	10YR58	M	D	COM MN	Y	0	0	HR	25		P		Y	Y	
51	0-28	MCL	10YR32						0	0	HR	5					SLIGHTLY SANDY	
	28-55	SCL	10YR53	10YR56	F	F			0	0	HR	3		M				
	55-75	SCL	10YR52	10YR58	M	D	COM MN	Y	0	0	HR	10		P		Y	SPL SEE 4P	
	75-120	C	05BG61	10YR68	M	D		Y	0	0		0		P		Y		
52	0-27	MCL	10YR42						0	0	HR	5						
	27-55	HCL	10YR43	10YR56	C	F		S	0	0	HR	10		M			SLIGHTLY GLEYED	
	55-90	HCL	10YR43	10YR58	C	D		S	0	0	HR	15		M			IMP 90 SL.GLEYED	
1P	0-30	MCL	10YR32						0	0	HR	2					PIT @ ASP 20	
	30-70	HCL	10YR52	10YR58	F	F	FEW MN		0	0	HR	5	MDCAB	FR	M	N		
	70-100	SCL	10YR53	10YR58	M	D	FEW MN	Y	0	0	HR	15	MDCAB	FR	M	N		
	100-120	C	5BG 62	10YR58	C	D		Y	0	0		0		FM	P	Y	Y	PIT 105 AUG 120
2P	0-23	HCL	10YR32	10YR46	C	D		Y	0	0		0					PIT @ ASP36/PSD	
	23-43	HCL	25Y 61	10YR58	M	D		Y	0	0	HR	5	MDCP	FR	M	Y	Y	
	43-75	C	25Y 51	10YR58	M	D		Y	0	0	HR	25	MDCP	FM	P	Y	Y	PLASTIC
	75-120	C	5GY 61	10YR58	M	D		Y	0	0		0		FM	P	Y	Y	PIT 80 AUG 120
3P	0-24	MCL	10YR42						0	0	HR	5					PIT @ ASP 31	
	24-55	HCL	10YR52						0	0	HR	5	MDCAB	FR	M			
	55-70	SCL	10YR53	10YR58	M	D		Y	0	0	HR	20	MDCSAB	FR	M			
	70-80	SCL	10YR53	10YR58	M	D		Y	0	0	HR	30		FR	M		Y	
	80-120	SCL	10YR54						0	0	HR	40		FR	M		Y	PIT 80 AUG 120
4P	0-22	MCL	10YR32 42						1	0	HR	5					PIT @ ASP 47	
	22-36	HCL	10YR42	10YR58	F	D			0	0	HR	10	MDCAB	FR	M	N		
	36-52	SCL	10YR52	10YR58	C	D	FEW MN	Y	0	0	HR	10	MDCAB	FR	M	N		
	52-85	SCL	10YR52	10YR58	M	D	COM MN	Y	0	0	HR	10	WKCB	FR	P	Y	Y	PSD SEEP 52
	85-120	C	25Y 62	10YR58	M	D		Y	0	0	HR	15		FM	P		Y	PIT 90 AUG 120