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Milton Keynes Local Plan
Potential Development Area 4
(South of Wavendon)
Agricultural Land Classification
Semi-Detailed Survey
ALC Map and Report

July 1997

Resource Planning Team
Eastern Region
FRCA Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

MILTON KEYNES LOCAL PLAN, POTENTIAL DEVELOPMENT AREA 4 (SOUTH OF WAVENDON)

SEMI-DETAILED SURVEY

INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 82.8 hectares of land north of the railway line to the south of Wavendon, south east of Milton Keynes in Buckinghamshire. The survey was carried out in July 1997.

2. The survey was undertaken by the Farming and Rural Conservation Agency (FRCA) on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with its statutory input to the Milton Keynes Local Plan. The results of this survey supersede any previous ALC information for this land. A survey was carried out on adjacent land to the south, also in 1997 (FRCA Ref: 0304/092/97).

3. The work was conducted by members of the Resource Planning Team in the Eastern Region of the 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, land to the west of the site was in permanent grass being grazed by cows and horses. To the east and south of the site, the land was in wheat. Areas of the site mapped as 'Other Land' comprise a track and buildings associated with stables and a builders yard. The area mapped as 'Agricultural land, not surveyed' shown to the north east of the site is where access was denied for this survey.

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 approximately 1 boring every 2 hectares of agricultural land. A total of 45 borings and 3 soil pits were described.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
2	5.5	7.3	6.6
3a	58.3	77.5	70.4
3b	11.4	15.2	13.8
Agricultural land not surveyed	6.1	N/A	7.4
Other land	1.5	N/A	1.8
Total surveyed area	75.2	100	90.8
Total site area	82.8	-	100

8. The agricultural land on this site has been assigned to a range of grades from Grade 2, very good quality, to Subgrade 3b, moderate quality, with the majority being Subgrade 3a (good quality). The soils are derived from an underlying geology which includes solid deposits of Oxford Clay and glacial drift deposits of head, glacial sand and gravel and Boulder Clay overlying Oxford Clay.

9. The land on the site has been classified principally on the basis of soil wetness and workability restrictions. Land assigned to Grade 2 has only minor limitations. Soils are derived from chalky Boulder Clay and as such are imperfectly drained due to the presence of clayey subsoil horizons at depth. These soils may also be slightly droughty due to the interaction between the prevailing climate, which is relatively dry, and soil properties.

10. The remaining agricultural land has been classified as Subgrades 3a and 3b on the basis of soil wetness / workability. Clayey subsoil horizons, which impede soil drainage, occur at moderate and shallow depth in the profile. The relative depth determines the severity of the soil wetness problem. The interaction between soil drainage status and the nature of the topsoil (ie texture and calcareousness) determines the ALC grade. Most of the land is classified as Subgrade 3a on this basis. However, where a heavier, non-calcareous, topsoil occurs, there is a further restriction on land quality as the soils remain wet for a longer period each year to the extent that Subgrade 3b is appropriate. Soil wetness has the effect of reducing the versatility of the land in terms of access by machinery (eg for cultivations or harvesting) and for grazing if damage to the soil is to be avoided. It also has the effect of reducing the level and consistency of yields.

FACTORS INFLUENCING ALC GRADE

Climate

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

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

Table 2: Climatic and altitude data

Factor	Units	Values	
Grid reference	N/A	SP 912 363	SP 915 366
Altitude	m, AOD	75	80
Accumulated Temperature	day°C (Jan-June)	1405	1399
Average Annual Rainfall	mm	624	622
Field Capacity Days	days	129	129
Moisture Deficit, Wheat	mm	109	108
Moisture Deficit, Potatoes	mm	101	101
Overall climatic grade	N/A	Grade 1	Grade 1

13. 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.

14. 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.

15. The combination of rainfall and temperature at this site mean that there is no overall climatic limitation. Other local climatic factors such as exposure and frost risk are also believed not to affect the site. The site is climatically Grade 1.

Site

16. The site lies at an altitude between approximately 75 and 90m AOD. The highest land is located towards the north east of the site, the lowest to the south west. The slopes within the site are slight and not of sufficient gradient to adversely affect land quality. Other site factors such as microrelief and flooding are also not significant.

Geology and soils

17. The published geological information for the site (BGS, 1971) shows the majority of the site to be underlain by head drift deposits overlying Oxford Clay, with the Oxford Clay mapped where the drift is thin or absent. On the higher land towards the north of the site, these give way to Boulder Clay and glacial sand and gravel, again overlying the Oxford Clay.

18. The most detailed published soils information for the site (SSEW, 1983 and 1984) shows it to comprise soils of the Hanslope and Oxpasture associations. Hanslope soils are mapped towards the north east of the site approximately conforming to the Boulder Clay and glacial sand and gravel geology. They are described as, 'Slowly permeable calcareous clayey soils. Some slowly permeable, non-calcareous clayey soils. Slight risk of water erosion,' (SSEW, 1983). Oxpasture soils are mapped approximately where the head drift deposits and Oxford Clay are shown. They are described as, 'Fine loamy over clayey and clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Some slowly permeable seasonally waterlogged clayey soils.' (SSEW, 1983). Soils of these broad descriptions were found throughout the site.

AGRICULTURAL LAND CLASSIFICATION

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

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

Grade 2

21. Land of very good quality has been mapped towards the north of the site. Soil wetness and soil droughtiness are equally limiting in this area. The soils are characterised by the soil pit, 1P (see Appendix II).

22. The soils in this area comprises a very slightly stony medium clay loam, or calcareous heavy clay loam. This passes to a slightly stony, commonly calcareous, heavy clay loam or clay upper subsoil, which, occasionally showed some evidence of seasonal waterlogging. The lower subsoil comprises a very slightly stony, commonly calcareous, gleyed and slowly permeable clay. Given the local climate, such imperfectly drained soils equate to Wetness Class II and are thereby classified as Grade 2. Soil wetness restricts the versatility of the land by limiting the opportunities for cultivation or grazing without damaging the soil, as well as restricting plant growth and the level and consistency of yields. The combination of soil characteristics in the relatively dry local climate also leads these areas to be slightly droughty to the extent that Grade 2 is appropriate. Soil droughtiness may affect plant growth and yield potential, as the supply of available water may be deficient, especially in drier years.

Subgrade 3a

23. Land of good quality has been mapped in a single unit across the majority of the site. The principal limitation to land quality here is soil wetness. Soils are characterised by the soil pits, 2P and 3P (see Appendix II).

24. The soils in this area are of two overall types. The more common soils are characterised by the soil pit, 2P (see Appendix II). These comprise a stoneless to very slightly stony, calcareous, heavy clay loam or clay, occasionally non-calcareous, medium clay loam topsoil. This directly overlies a calcareous, poorly structured, gleyed and slowly permeable clay subsoil becoming slightly chalky and highly calcareous with depth. Occasionally a narrow calcareous clay upper subsoil horizon was observed, which was neither gleyed or slowly permeable. Given the local climate and these imperfectly drained soils, seasonal waterlogging is the dominant factor in determining the land quality in this area. This soil type equates with Wetness Classes II or III, which, when combined with the calcareous nature of the heavy topsoils leads to Subgrade 3a being appropriate on the basis of a soil wetness limitation.

25. The second slightly less common soil type is characterised by the soil pit, 3P (see Appendix II). These comprise a non-calcareous, very slightly stony medium clay loam topsoil, which was occasionally gleyed. This passes to an upper subsoil of moderately structured, non-calcareous, slightly stony heavy or sandy clay loam. This horizon was either gleyed or showed other evidence of seasonal waterlogging. The lower subsoil horizons comprise a combination of non-calcareous and calcareous, poorly structured, very slightly stony and chalky, gleyed and slowly permeable clays. The depth to the slowly permeable horizons, which impede drainage, is the dominant factor in determining the land quality. These soils are appropriately placed in Wetness Class III and, given the non-calcareous nature of the medium textured topsoils, Subgrade 3a is appropriate.

26. Occasional observations of both a slightly better and slightly worse quality have been included in this map unit as they were of too scattered a distribution to be mapped separately at this scale of survey.

Subgrade 3b

27. Land of moderate quality has been mapped in two separate units, both located towards the south west of the site. The principal limitation in these areas is soil wetness, with topsoil workability as an additional factor.

28. The soils in these parts of the site are of a single overall type. They comprise a stoneless to very slightly stony, non-calcareous, heavy clay loam topsoil, which was occasionally gleyed. This passes to a similarly stony, gleyed, poorly structured and slowly permeable clay subsoil, which occasionally became calcareous at depth. Given the relatively dry local climate, these soils are appropriately placed in Wetness Class III and Subgrade 3b, when the non-calcareous heavy textured topsoils are taken into account. The limitations caused by soil wetness are detailed above in para. 22. In these map units they are of a severe nature, principally because the topsoil is heavier and non-calcareous and therefore includes an additional workability component. These factors significantly restrict access to the land for cultivation and/or grazing. They also further reduce the flexibility of land use and the level and consistency of yields.

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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.

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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

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:

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

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

4. **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	**ST**:	Topsoil Stoniness
FR:	Frost Risk	**GR**:	Gradient	**MR**:	Microrelief
FL:	Flood Risk	**TX**:	Topsoil Texture	**DP**:	Soil Depth
CH:	Chemical	**WE**:	Wetness	**WK**:	Workability
DR:	Drought	**ER**:	Erosion Risk	**WD**:	Soil Wetness/Droughtiness
EX:	Exposure				

Soil Pits and Auger Borings

1. **TEXTURE**: soil texture classes are denoted by the following abbreviations:

S:	Sand	**LS**:	Loamy Sand	**SL**:	Sandy Loam
SZL:	Sandy Silt Loam	**CL**:	Clay Loam	**ZCL**:	Silty Clay Loam
ZL:	Silt Loam	**SCL**:	Sandy Clay Loam	**C**:	Clay
SC:	Sandy Clay	**ZC**:	Silty Clay	**OL**:	Organic Loam
P:	Peat	**SP**:	Sandy Peat	**LP**:	Loamy Peat
PL:	Peaty Loam	**PS**:	Peaty Sand	**MZ**:	Marine Light Silts

For the sand, loamy sand, sandy loam and sandy silt loam classes, the predominant size of sand fraction will be indicated by the use of the following prefixes:

F: Fine (more than 66% of the sand less than 0.2mm)
M: Medium (less than 66% fine sand and less than 33% coarse sand)
C: Coarse (more than 33% of the sand larger than 0.6mm)

The clay loam and silty clay loam classes will be sub-divided according to the clay content:
M: Medium (<27% clay) **H**: Heavy (27-35% clay)

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

3. **MOTTLE ABUN**: Mottle abundance, expressed as a percentage of the matrix or surface described:

F: few <2% **C**: common 2-20% **M**: many 20-40% **VM**: very many 40% +

4. **MOTTLE CONT**: Mottle contrast:

F: faint - indistinct mottles, evident only on close inspection
D: distinct - mottles are readily seen
P: prominent - mottling is conspicuous and one of the outstanding features of the horizon

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

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

7. **STONE LITH**: Stone Lithology - one of the following is used:

HR:	all hard rocks and stones	**FSST**:	soft, fine grained sandstone
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

SOIL PIT DESCRIPTION

Site Name : MILTON KEYNES LP AREA 4 Pit Number : 1P

Grid Reference: SP91403680
Average Annual Rainfall : 624 mm
Accumulated Temperature : 1405 degree days
Field Capacity Level : 129 days
Land Use : Wheat
Slope and Aspect : 2 degrees SE

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 24	HCL	10YR41 42	0	2	HR					Y
24- 50	C	10YR52 00	0	5	HR		MDCSAB	FM	M	Y
50- 80	C	25Y 52 53	0	4	HR	C	MDCPR	FM	P	Y

Wetness Grade : 2
Wetness Class : II
Gleying : 50 cm
SPL : 50 cm

Drought Grade : 2
APW : 132mm MBW : 23 mm
APP : 111mm MBP : 10 mm

FINAL ALC GRADE : 2
MAIN LIMITATION : Soil Wetness/Droughtiness

SOIL PIT DESCRIPTION

Site Name : MILTON KEYNES LP AREA 4 Pit Number : 2P

Grid Reference: SP91583659
Average Annual Rainfall : 624 mm
Accumulated Temperature : 1405 degree days
Field Capacity Level : 129 days
Land Use : Wheat
Slope and Aspect : 1 degrees S

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 26	HCL	10YR42 00	1	3	HR					Y
26- 43	C	10YR53 52	0	3	CH	C	STCAB	FM	P	Y
43- 60	C	25Y 52 53	0	10	CH	M	MDCAB	FM	P	Y

Wetness Grade : 3A
Wetness Class : III
Gleying : 26 cm
SPL : 26 cm

Drought Grade :
APW : mm MBW : 0 mm
APP : mm MBP : 0 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Wetness

SOIL PIT DESCRIPTION

Site Name : MILTON KEYNES LP AREA 4 Pit Number : 3P

Grid Reference: SP91903630 Average Annual Rainfall : 624 mm
Accumulated Temperature : 1405 degree days
Field Capacity Level : 129 days
Land Use : Wheat
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 28	MCL	10YR42 00	0	2	HR	F				
28- 43	HCL	10YR42 53	0	2	HR	C	MDCSAB	FR	M	
43- 53	SCL	10YR53 00	0	15	HR	C	MDCSAB	FR	M	
53- 60	C	25Y 52 53	0	20	HR	M	WKCAB	FM	P	
60- 90	C	25Y 51 61	0	5	CH	M	MDCAB	FM	P	Y

Wetness Grade : 3A
Wetness Class : III
Gleying : 28 cm
SPL : 53 cm

Drought Grade : 3A
APW : 110mm MBW : 1 mm
APP : 106mm MBP : 5 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Wetness

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	--WETNESS-- GLEY	SPL	CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	DRT	M.REL FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	SP91403700	WHT	SE	2	55	55	2	2	100	-9	112	11	3A				WD	2	IMP 70
1P	SP91403680	WHT	SE	2	50	50	2	2	132	23	111	10	2				WD	2	PIT 80 AUG 120
2	SP90903690	PGR	S	1			1	1	77	-32	077	-24	3B				DR	3B	IMP 45
2P	SP91583659	WHT	S	1	26	26	3	3A		0		0					WE	3A	PIT 60
3	SP91103689	PGR	S	1	0	50	3	3A		0		0					WE	3A	RIDGE&FURROW
3P	SP91903630	WHT			28	53	3	3A	110	1	106	5	3A				WE	3A	PIT 75 AUG 90
4	SP91303690	WHT	SE	2	28	28	3	3A		0		0					WE	3A	
5	SP91443689	WHT	SE	2	30	30	3	3A		0		0					WE	3A	
6	SP91733686	WHT	SE	1	26	26	3	3B		0		0					WE	3B	+ WORKABILITY
7	SP91003680	PGR	S	1	70		1	1	153	44	116	15	1					1	SL GLEY 45
8	SP91203680	PGR			38	38	3	3A		0		0					WE	3A	
9	SP91303680	WHT	SE	1	32		2	2		0		0					WE	2	IMP 85
10	SP91403680	WHT	SE	2	55	55	2	2	132	23	111	10	2				WD	2	SEE 1P
11	SP91603680	WHT	W	1	30	30	3	3A		0		0					WE	3A	CALC TOPSOIL
12	SP91803680	WHT	SE	1	25	25	3	3A	95	-14	100	-1	3A				WE	3A	CALC TOPSOIL
13	SP91103670	PGR	S	1	0	42	3	3A		0		0					WE	3A	IMP 100
14	SP91283671	PGR			60	60	2	3A		0		0					WE	3A	
15	SP91403670	WHT	SE	2	25	25	3	3B		0		0					WE	3B	+ WORKABILITY
16	SP91503670	WHT	SE	1			1	2	149	40	114	13	1				WK	2	SL GLEYED 42
17	SP91703670	WHT	S	3	30	30	3	3A		0		0					WE	3A	
18	SP91903670	WHT	SE	2	48	48	2	3A		0		0					WE	3A	
19	SP91003660	PGR	SE	1	0	25	3	3A		0		0					WE	3A	CALC TOPSOIL
20	SP91203660	PGR			27	37	3	3A		0		0					WE	3A	
21	SP91403660	PGR	SE	1	48	48	2	3A		0		0					WE	3A	
22	SP91583659	WHT	SE	1	28	28	3	3A		0		0					WE	3A	SEE 2P CALCTOP
23	SP91803660	WHT	W	1	45	45	2	3A		0		0					WE	3A	
24	SP91093651	PGR			37	37	3	3A		0		0					WE	3A	IMP 60
25	SP91303650	WHT	SE	1	30		2	3A	90	-19	98	-3	3A				WE	3A	IMP 60
26	SP91503650	WHT	SE	1	28	40	3	3A	86	-23	90	-11	3B				WE	3A	IMP 58
27	SP91703650	WHT	SE	1	42	42	3	3B		0		0					WE	3B	+ WORKABILITY
28	SP91903650	WHT	S	3	55	55	2	2	119	10	110	9	2				WD	2	
29	SP91203640	PGR			30	30	3	3B		0		0					WE	3B	+ WORKABILITY
30	SP91403640	PGR			0	27	3	3B		0		0					WE	3B	+ WORKABILITY
31	SP91603643	WHT			38	38	3	3B		0		0					WE	3B	+ WORKABILITY
32	SP91803640	WHT	S	1	30	30	3	3A	101	-8	112	11	3A				WE	3A	IMP 75
33	SP92003640	WHT			30	30	3	3A		0		0					WE	3A	
34	SP91103630	PGR			15	25	3	3A		0		0					WE	3A	BORDER 3B
35	SP91303630	PGR			28	35	3	3A		0		0					WE	3A	
36	SP91503630	WHT			25	25	3	3A		0		0					WE	3A	
37	SP91703630	WHT			28		2	3A	109	0	116	15	3A				WE	3A	IMP 75
38	SP91903630	WHT			25	55	3	3A		0		0					WE	3A	SEE 3P
39	SP92113632	WHT			35	35	3	3B	137	28	106	5	2				WE	3B	+ WORKABILITY

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
40	SP91203620	PGR			0	40	3	3A		0		0					WE		3A	
41	SP91403620	WHT			38	38	3	3B		0		0					WE		3B	+ WORKABILITY
42	SP91603620	WHT			35	35	3	3A		0		0					WE		3A	
43	SP91303610	PGR	N	1	37	48	3	3A		0		0					WE		3A	
44	SP91453610	WHT			30	30	3	3B		0		0					WE		3B	+ WORKABILITY
45	SP91203600	WHT			30	30	3	3B		0		0					WE		3B	+ WORKABILITY

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
1	0-35	mcl	10YR42 00						0	0	HR	2							
	35-55	hcl	10YR54 00						0	0	HR	2		M				Y	
	55-70	c	25Y 53 00	10YR58 00	M		00MN00 00	Y	0	0	SLST	5		P			Y	Y	IMP FLINT 70
1P	0-24	hcl	10YR41 42						0	0	HR	2						Y	
	24-50	c	10YR52 00				10YR53 00		0	0	HR	5	MDCSAB	FM M				Y	
	50-80	c	25Y 52 53	10YR58 00	C		25Y 53 00	Y	0	0	HR	4	MDCPR	FM P	Y		Y	Y	+4% CALC FRAGS
2	0-28	mcl	10YR41 42						0	0		0							
	28-45	mcl	10YR42 00						0	0	SLST	5		M				Y	IMP FLINT/SLST 45
2P	0-26	hcl	10YR42 00						1	0	HR	3						Y	+1% CALC FRAGS
	26-43	c	10YR53 52	10YR56 00	C		10YR53 00	Y	0	0	CH	3	STCAB	FM P	Y		Y	Y	
	43-60	c	25Y 52 53	10YR58 00	M		25Y 51 00	Y	0	0	CH	10	MDCAB	FM P	Y		Y	Y	
3	0-30	mcl	10YR42 00	10YR58 00	C		00MN00 00	Y	0	0		0							
	30-50	hcl	25Y 52 00	10YR58 00	M		00MN00 00	Y	0	0	HR	2		M					SLIGHTLY SANDY
	50-60	c	25Y 51 53	10YR56 58	M		00MN00 00	Y	0	0	HR	3		P			Y		
	60-80	c	10YR51 53	10YR58 00	M		00MN00 00	Y	0	0	HR	5		P			Y	Y	
3P	0-28	mcl	10YR42 00	10YR46 00	F		00MN00 00		0	0	HR	2							
	28-43	hcl	10YR42 53	10YR56 00	C		10YR53 00	Y	0	0	HR	2	MDCSAB	FR M					TENDS WKCSAB
	43-53	scl	10YR53 00	10YR58 00	C		00MN00 00	Y	0	0	HR	15	MDCSAB	FR M					TENDS WKCSAB
	53-60	c	25Y 52 53	10YR58 00	M			Y	0	0	HR	20	WKCAB	FM P	Y		Y		
	60-90	c	25Y 51 61	10YR58 00	M		25Y 52 53	Y	0	0	CH	5	MDCAB	FM P	Y		Y	Y	+3% FLINTS
4	0-28	hzcl	25Y 41 42						0	0	HR	4						Y	
	28-70	zc	25Y 52 53	10YR52 53	M			Y	0	0	HR	4		P			Y	Y	HR = LIMESTONE
5	0-30	hcl	10YR42 00						0	0	HR	4						Y	
	30-70	c	25Y 52 53	10YR56 58	M			Y	0	0	HR	5		P			Y	Y	+3% CALC FRAGS
6	0-26	c	25Y 42 00	10YR46 00	F				0	0	HR	1							
	26-45	c	25Y 52 53	10YR56 00	M			Y	0	0	HR	1		P			Y	Y	
	45-70	c	25Y 61 63	10YR56 00	M			Y	0	0	CH	10		P			Y	Y	
7	0-32	mcl	10YR42 00						0	0	HR	2							SLIGHTLY SANDY
	32-45	hcl	10YR53 54						0	0	HR	2		M					SLIGHTLY SANDY
	45-70	hcl	10YR54 00	10YR58 00	C		00MN00 00	S	0	0	HR	2		M					SLGLEYED + SLSANDY
	70-120	mzcl	25Y 63 64	10YR66 00	C			Y	0	0	HR	2		M				Y	MARLY
8	0-22	mcl	10YR42 00				00FE00 00		0	0	HR	2							SLIGHTLY SANDY
	22-38	hcl	10YR54 00	10YR56 00	F		00MN00 00		0	0	HR	2		M					SLIGHTLY SANDY
	38-80	c	10YR51 53	10YR56 58	M		00MN00 00	Y	0	0	HR	4		P			Y	Y	
9	0-32	hcl	10YR42 00						0	0	HR	2						Y	
	32-65	mzcl	25Y 63 64	10YR58 00	C			Y	0	0		0		M				Y	
	65-85	hzcl	25Y 63 64	10YR58 00	C			Y	0	0		0		M				Y	IMP STONES 85

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC	
10	0-30	hcl	10YR42 00	00MN00	00	F			0	0	HR	2						Y	SEE 1P
	30-55	c	10YR53 54	00MN00	00	F			0	0	HR	2		M				Y	
	55-120	c	10YR51 53	10YR56	58 M		00MN00	00 Y	0	0	HR	5		P			Y	Y	MARLY 90+
11	0-30	c	25Y 53 00						0	0	CH	1						Y	
	30-70	c	25Y 61 54	10YR58	00 C			Y	0	0	CH	10		P			Y	Y	
12	0-25	c	25Y 42 43	10YR46	00 F				0	0	HR	1						Y	
	25-50	c	25Y 62 54	10YR56	00 C			Y	0	0	CH	2		P			Y	Y	
	50-80	c	25Y 61 63	10YR56	00 M			Y	0	0	CH	10		P			Y	Y	
13	0-20	mcl	10YR42 53	10YR56	00 C			Y	0	0	HR	2							SLIGHTLY SANDY
	20-42	hcl	10YR52 53	10YR56	00 C		00MN00	00 Y	0	0	HR	2		M					SLIGHTLY SANDY
	42-80	c	25Y 52 00	10YR56	58 C		00MN00	00 Y	0	0	HR	2		P			Y		SLIGHTLY SANDY
	80-100	scl	25Y 52 62	10YR56	00 M		00MN00	00 Y	0	0	HR	10		M				Y	IMP FLINTS 100
14	0-30	hcl	10YR41 42	10YR46	00 C		00MN00	00	0	0	HR	2							SL SANDY ROOT MOTS
	30-50	c	10YR53 54	10YR56	00 F				0	0		0		M					
	50-60	c	10YR54 00	10YR56	00 C			S	0	0		0		M					SLIGHTLY GLEYED
	60-120	c	10YR51 53	10YR58	00 M		00MN00	00 Y	0	0	HR	2		P			Y		
15	0-25	hcl	25Y 41 42						0	0	HR	2							
	25-65	c	25Y 52 53	10YR56	58 M		00MN00	00 Y	0	0	HR	2		P			Y	Y	
16	0-28	hcl	10YR42 00						0	0		0							
	28-42	c	10YR54 00	00MN00	00 F				0	0		0		M					
	42-60	c	10YR44 00	10YR58	00 C			S	0	0	HR	10		M					SLIGHTLY GLEYED
	60-120	hcl	10YR44 00	10YR58	00 C			S	0	0	HR	5		M					SLGLEYED + SLSANDY
17	0-30	hcl	25Y 42 00	10YR56	00 F				0	0	HR	2						Y	
	30-80	c	05Y 51 53	10YR58	00 M			Y	0	0	CH	10		P			Y	Y	
18	0-27	c	25Y 43 00						0	0	HR	1						Y	
	27-48	c	25Y 54 00						0	0	HR	1		M				Y	
	48-70	c	25Y 61 63	10YR56	00 M			Y	0	0	CH	10		P			Y	Y	
19	0-25	hcl	25Y 42 00	10YR56	00 C			Y	0	0	HR	2						Y	
	25-70	c	25Y 53 00	10YR58	00 C			Y	0	0	HR	2		P			Y	Y	
20	0-27	mcl	10YR42 00						0	0		0							BORDER HCL
	27-37	hcl	10YR53 00	75YR46	00 C			Y	0	0		0		M					SLIGHTLY SANDY
	37-70	c	25Y 63 00	10YR58	00 C			Y	0	0	HR	2		P			Y		
21	0-20	hcl	10YR42 00						0	0		0							
	20-48	c	25Y 54 00	00MN00	00 F				0	0		0		M				Y	
	48-80	c	25Y 63 00	75YR56	00 C			Y	0	0		0		P			Y	Y	
22	0-28	hcl	10YR42 00						0	0		0						Y	SEE 2P
	28-70	c	25Y 53 00	10YR58	00 C			Y	0	0		0		P			Y	Y	

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	PED GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC	
23	0-28	hcl	25Y 42 00	10YR56 00	F				0	0	HR	2							
	28-45	hcl	25Y 43 00	10YR56 00	F				0	0	HR	2		M					
	45-80	c	25Y 51 53	10YR58 00	M			Y	0	0	CH	5		P		Y	Y		
24	0-29	mcl	10YR43 00						0	0		0							
	29-37	hcl	10YR53 00	10YR58 00	F				0	0		0		M					
	37-60	c	10YR53 00	75YR46 00	C			Y	0	0	HR	2		P		Y			IMP 60 GRAVELLY
25	0-30	hcl	10YR43 00						0	0		0							
	30-60	c	10YR53 00	75YR58 00	M		00MN00 00	Y	0	0	HR	10		M					IMP 60 GRAVELLY
26	0-28	mcl	10YR42 00						0	0		0							SLIGHTLY SANDY
	28-40	hcl	10YR52 00	75YR56 00	C			Y	0	0	HR	5		M					SLIGHTLY SANDY
	40-58	c	10YR53 00	75YR58 00	C		00MN00 00	Y	0	0	HR	10		P		Y			IMP 58 GRAVELLY
27	0-32	hcl	25Y 42 00						0	0	HR	1							
	32-42	c	25Y 53 00	10YR46 00	F		00FE00 00		0	0	HR	1		M					
	42-72	c	25Y 63 53	10YR58 00	M		00FE00 00	Y	0	0	HR	5		P		Y			SLIGHTLY SANDY
	72-100	c	05Y 62 63	10YR58 00	M			Y	0	0	CH	5		P		Y	Y		
28	0-28	hcl	25Y 43 00						0	0	HR	2						Y	
	28-55	c	25Y 54 00	10YR58 00	F		00MN00 00		0	0	HR	2		M				Y	
	55-75	c	25Y 52 53	10YR58 00	C		00MN00 00	Y	0	0	HR	5		P		Y			
	75-100	c	25Y 51 52	10YR58 00	M		00MN00 00	Y	0	0		0		P		Y			
29	0-30	hcl	10YR43 00						0	0		0							
	30-55	c	25Y 53 00	10YR58 00	C			Y	0	0		0		P		Y			
	55-80	c	25Y 53 00	10YR58 00	M			Y	0	0		0		P		Y	Y		
30	0-27	hcl	10YR41 00	75YR46 00	C			Y	0	0		0							
	27-50	c	10YR53 00	75YR58 00	C		00MN00 00	Y	0	0		0		P		Y			
	50-70	c	25Y 51 00	75YR46 00	M			Y	0	0		0		P		Y			IMP 70 GRAVELLY
31	0-28	hcl	10YR42 00						0	0	HR	2						Y	LIMED
	28-38	c	25Y 54 00	10YR58 00	F				0	0		0		M					
	38-60	c	25Y 53 00	10YR58 00	C			Y	0	0		0		P		Y			
	60-80	c	25Y 51 00	75YR46 00	M			Y	0	0		0		P		Y			
32	0-30	mcl	10YR42 00						0	0	HR	2							
	30-55	c	25Y 53 00	10YR56 00	C		00MN00 00	Y	0	0	HR	5		P		Y			V SLIGHTLY SANDY
	55-75	c	25Y 51 52	10YR56 00	C		00FE00 00	Y	0	0	HR	15		P		Y			IMP GRAVELLY 75
33	0-30	mcl	10YR42 00						0	0	HR	2							
	30-50	c	10YR52 00	10YR56 58	M		00MN00 00	Y	0	0	HR	10		P		Y			SLIGHTLY SANDY
	50-100	c	25Y 41 51	10YR58 00	M		00MN00 00	Y	0	0	HR	2		P		Y			
34	0-15	mcl	10YR42 00						0	0		0							
	15-25	hcl	10YR52 51	10YR58 00	C			Y	0	0		0		M					
	25-70	c	25Y 52 00	75YR56 00	M		00MN00 00	Y	0	0		0		P		Y			

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	PED GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC	
35	0-28	mcl	10YR43 00						0	0		0							SLIGHTLY SANDY
	28-35	hcl	25Y 53 00	10YR58 00	C			Y	0	0	HR	2		M					
	35-55	c	25Y 52 00	75YR56 00	M			Y	0	0	HR	5		P		Y			STONY 50-55
	55-80	c	05GY61 00	75YR56 00	M			Y	0	0		0		P		Y			
36	0-25	mcl	10YR42 00						0	0	HR	2							
	25-60	c	25Y 52 62	10YR58 00	M		00MN00 00	Y	0	0	HR	2		P		Y			SLIGHTLY SANDY
37	0-28	hcl	10YR42 00						0	0		0						Y	
	28-75	hcl	25Y 53 61	75YR58 00	C			Y	0	0	HR	2		M					IMP FLINT 75
38	0-25	mcl	10YR42 00						0	0	HR	2							SEE 3P
	25-55	hcl	10YR53 52	10YR56 00	C		00MN00 00	Y	0	0	HR	15		M					SLIGHTLY SANDY
	55-65	c	25Y 51 61	10YR58 00	M		00MN00 00	Y	0	0	HR	5		P		Y			
	65-90	c	05Y 61 00	75YR68 00	M			Y	0	0	CH	5		P		Y	Y		
39	0-28	hcl	10YR42 00						0	0	HR	2							
	28-35	c	10YR43 00	10YR56 00	F				0	0	HR	2		M					BORDER HCL
	35-65	c	25Y 51 52	10YR58 00	M			Y	0	0	HR	2		P		Y			SMALL STONES
	65-80	scl	25Y 61 00	10YR58 00	M		00MN00 00	Y	0	0	MSST	5		M					MOIST
	80-120	scl	10YR53 63	10YR58 68	M		00MN00 00	Y	0	0	HR	20		M					MOIST
40	0-28	mcl	10YR42 00	75YR46 00	C			Y	0	0		0							BORDER HCL
	28-40	hcl	25Y 52 00	10YR56 00	C			Y	0	0	HR	2		M					SLIGHTLY SANDY
	40-70	c	25Y 63 00	10YR58 00	C			Y	0	0		0		P		Y			
41	0-30	hcl	10YR42 00						0	0	HR	2							
	30-38	hcl	10YR43 00	75YR46 00	F				0	0	HR	2		M					SLIGHTLY SANDY
	38-70	c	25Y 52 00	75YR58 00	M			Y	0	0	HR	2		P		Y			
42	0-35	hcl	10YR42 00						0	0		0						Y	
	35-70	c	25Y 53 00	10YR58 00	C			Y	0	0		0		P		Y	Y		
43	0-25	mcl	10YR42 00						0	0	HR	2							
	25-37	hcl	10YR43 44						0	0	HR	2		M					SLIGHTLY SANDY
	37-48	c	25Y 53 00	10YR58 00	C			Y	0	0	HR	2		M					
	48-75	c	25Y 52 00	75YR56 00	M		00MN00 00	Y	0	0	HR	2		P		Y			
	75-80	c	25Y 52 00	75YR56 00	M		00MN00 00	Y	0	0	HR	2		P		Y	Y		
44	0-30	hcl	10YR42 00						0	0		0							
	30-45	c	25Y 53 00	75YR56 00	C			Y	0	0	HR	2		P		Y			SLIGHTLY SANDY
	45-70	c	25Y 51 00	75YR58 00	M			Y	0	0		0		P		Y	Y		
45	0-30	hcl	10YR42 00						0	0		0							
	30-45	c	25Y 52 61	75YR58 00	M			Y	0	0		0		P		Y			
	45-70	c	25Y 52 61	75YR58 00	M			Y	0	0		0		P		Y	Y		