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**WYCOMBE DISTRICT LOCAL PLAN  
Site 6, Marlow, Buckinghamshire**

**Agricultural Land Classification  
ALC Map & Report**

**December 1997**

**Resource Planning Team  
Eastern Region  
FRCA Reading**

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# AGRICULTURAL LAND CLASSIFICATION REPORT

## WYCOMBE DISTRICT LOCAL PLAN SITE 6, MARLOW

### INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey on approximately 18 hectares of land between Bovingdon Green and Forty Green, to the north-west of Marlow, in the Wycombe District of Buckinghamshire. The survey was carried out during December 1997.
2. The survey was undertaken by the Farming and Rural Conservation Agency (FRCA)<sup>1</sup>, on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with the Wycombe District Local Plan. 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 all of the agricultural land on this site was under permanent grassland, being grazed by horses or cattle. The areas shown as 'Other Land' comprise farm buildings and trackways, residential buildings, a copse and an equestrian arena.

### SUMMARY

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

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
3a	3.8	24.5	21.4
3b	11.7	75.5	65.7
Other land	2.3	-	12.9
Total surveyed area	15.5	100.0	87.1
Total site area	17.8	-	100.0

<sup>1</sup> FRCA is an executive agency of MAFF and the Welsh Office.

7. The fieldwork was conducted at an average density of 1 boring per hectare. In total, 18 borings and two soil inspection pits were described.

8. The majority of the agricultural land on this site has been classified as Subgrade 3b (moderate quality) with a smaller area of Subgrade 3a (good quality land) on the slightly higher ground, at the centre of the site. The key limitations are topsoil stoniness and soil droughtiness.

9. The soils in this survey area are derived from glacial gravels and, as such, comprise variably flinty, fine to coarse grained sandy and loamy soils. On the Subgrade 3b land, the soils overlie gravel deposits at moderate depths. This particular combination of stony soils over gravel greatly restricts the amount of water that is available for crops. As such, this land experiences a significant droughtiness limitation which will reduce the level and consistency of yields. In many places, the amount of stone in the topsoil is itself sufficient to limit the land to Subgrade 3b, given the wear and tear that will be caused to agricultural equipment and the effect on the establishment and subsequent quality of root crops.

10. On the Subgrade 3a land, the soil resource extends to depth but is very sandy in the lower subsoils. These characteristics also produce a soil droughtiness limitation, though less severe than on the Subgrade 3b land. The impact of topsoil stoniness is also less severe, though this is still an important limitation in grading this land.

## FACTORS INFLUENCING ALC GRADE

### CLIMATE

11. Climate affects the grading of the 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 below 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	
		SU 838 870	SU 836 868
Grid reference	N/A	SU 838 870	SU 836 868
Altitude	m, AOD	80	85
Accumulated Temperature	day°C	1423	1417
Average Annual Rainfall	mm	716	719
Field Capacity Days	days	152	152
Moisture Deficit, Wheat	mm	103	102
Moisture Deficit, Potatoes	mm	94	94
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 (AT0, 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. However, climatic factors can interact with soil properties to influence soil wetness and droughtiness.

16. Local climatic factors such as frost risk and exposure can also affect land quality. At this site the land is shown to be rather frost prone (Met Office, 1970) though, given the altitude and aspect of the site, this is unlikely. Other over-riding site and soil factors mean that frost risk and exposure are not considered to have an adverse effect on the agricultural land at this locality. This site is climatically Grade 1.

#### **Site**

17. This site lies on the Chilterns, at an altitude of 80-85m AOD. It is generally flat but does slope gently away to the north and east of the site. Nowhere on this site do gradient or flooding adversely affect land quality.

#### **Geology and soils**

18. The published geological information for the site (BGS, 1948) shows all of the site to be underlain by Upper Chalk with a superficial drift deposit of glacial gravels.

19. The most recently published soil information for the site (SSEW, 1983) has not distinguished this land from the urban conurbation of Marlow. However, the nearest mapped soils associations are the Sonning 1 association, to the north west, and the Frilsham association, to the south west. The former soils are described as 'well drained flinty coarse loamy and sandy soils, mainly over gravel. Some coarse loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging' (SSEW, 1983). The latter soils are described as 'Well drained mainly fine loamy soils over chalk, some calcareous. Shallow calcareous fine loamy and fine silty soils in places' (SSEW, 1983).

20. Detailed field examination revealed soils of a similar nature to those described above as the Sonning 1 soil association.

#### **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.

### **Subgrade 3a**

23. Good quality agricultural land is mapped across the centre of the site on the highest land. The land is limited by soil droughtiness and/or topsoil stoniness. The soil profiles comprise medium sandy silty loam and medium sandy loam topsoils and upper subsoils. These usually overlie either lighter textured medium sandy loam lower subsoils or slightly heavier textured medium clay loam and sandy clay loam subsoils. The topsoils and upper subsoils contain 10-20% total flint (including 7-14% >2cm in diameter) but the subsoils are generally less stony, containing 2-5% flints. Soil inspection Pit 2 shows that these profiles are generally deep and well drained with moderate subsoil structural conditions. However, in this local climatic regime the combination of soil textures, structures and stone content acts to reduce the amount of available moisture for crops. This can cause drought stress during the drier months and leads to reduced crop growth and yields. In general, this land has therefore been classified as Subgrade 3a due to a slight soil droughtiness limitation.

24. In places, topsoil stoniness is an equal or over-riding limitation. This is because large stones can impede cultivation, harvesting and crop growth, and increase the cost of cropping in terms of machinery wear and tear and yield reduction. Here 11-14% flints, larger than 2cm in diameter, have been measured. This restricts the land to Subgrade 3a.

### **Subgrade 3b**

25. The majority of this site has been classified as Subgrade 3b (moderate quality) land. Soil droughtiness and topsoil stoniness are once again the principal limitations. The topsoils comprise fine to medium grained sandy silt loams and sandy loams with 15-25% total flint (11-20% of which is >2cm in diameter). These overlie similar textured upper subsoils, with 10-47% flint. At approximately 40-70cm depth, most profiles become impenetrable to the soil auger. Soil inspection Pit 1 shows that this is due to the subsoils becoming progressively lighter textured and more stony. In general, very stony (48% flints) loamy medium sands overlie gravel at moderate depths. Drought stress on this land will therefore be more severe than on the Subgrade 3a land. Similarly, the effects of the increased topsoil stone content will be more far-reaching. This land cannot, therefore, be classified higher than Subgrade 3b.

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## SOURCES OF REFERENCE

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Met. Office (1970) *Unpublished Climatological Data*.  
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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*  
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## 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 pit descriptions**

**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:

<b>ARA:</b> Arable	<b>WHT:</b> Wheat	<b>BAR:</b> Barley
<b>CER:</b> Cereals	<b>OAT:</b> Oats	<b>MZE:</b> Maize
<b>OSR:</b> Oilseed rape	<b>BEN:</b> Field beans	<b>BRA:</b> Brassicae
<b>POT:</b> Potatoes	<b>SBT:</b> Sugar beet	<b>FCD:</b> Fodder crops
<b>LIN:</b> Linseed	<b>FRT:</b> Soft and top fruit	<b>FLW:</b> Fallow
<b>PGR:</b> Permanent pasture	<b>LEY:</b> Ley grass	<b>RGR:</b> Rough grazing
<b>SCR:</b> Scrub	<b>CFW:</b> Coniferous woodland	<b>OTH:</b> Other
<b>DCW:</b> Deciduous woodland	<b>BOG:</b> Bog or marsh	<b>SAS:</b> Set-Aside
<b>HTH:</b> Heathland	<b>HRT:</b> Horticultural crops	<b>PLO:</b> 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:

<b>MREL:</b> Microrelief limitation	<b>FLOOD:</b> Flood risk	<b>EROSN:</b> Soil erosion risk
<b>EXP:</b> Exposure limitation	<b>FROST:</b> Frost prone	<b>DIST:</b> Disturbed land
<b>CHEM:</b> Chemical limitation		

9. **LIMIT:** The main limitation to land quality. The following abbreviations are used:

<b>OC:</b> Overall Climate	<b>AE:</b> Aspect	<b>ST:</b> Topsoil Stoniness
<b>FR:</b> Frost Risk	<b>GR:</b> Gradient	<b>MR:</b> Microrelief
<b>FL:</b> Flood Risk	<b>TX:</b> Topsoil Texture	<b>DP:</b> Soil Depth
<b>CH:</b> Chemical	<b>WE:</b> Wetness	<b>WK:</b> Workability
<b>DR:</b> Drought	<b>ER:</b> Erosion Risk	<b>WD:</b> Soil Wetness/Droughtiness
<b>EX:</b> Exposure		

## Soil Pits and Auger Borings

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

<b>S:</b> Sand	<b>LS:</b> Loamy Sand	<b>SL:</b> Sandy Loam
<b>SZL:</b> Sandy Silt Loam	<b>CL:</b> Clay Loam	<b>ZCL:</b> Silty Clay Loam
<b>ZL:</b> Silt Loam	<b>SCL:</b> Sandy Clay Loam	<b>C:</b> Clay
<b>SC:</b> Sandy Clay	<b>ZC:</b> Silty Clay	<b>OL:</b> Organic Loam
<b>P:</b> Peat	<b>SP:</b> Sandy Peat	<b>LP:</b> Loamy Peat
<b>PL:</b> Peaty Loam	<b>PS:</b> Peaty Sand	<b>MZ:</b> 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:

<b>F:</b> Fine (more than 66% of the sand less than 0.2mm)
<b>M:</b> Medium (less than 66% fine sand and less than 33% coarse sand)
<b>C:</b> 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:

<b>HR:</b> all hard rocks and stones	<b>FSST:</b> soft, fine grained sandstone
<b>ZR:</b> soft, argillaceous, or silty rocks	<b>CH:</b> chalk
<b>MSST:</b> soft, medium grained sandstone	<b>GS:</b> gravel with porous (soft) stones
<b>SI:</b> soft weathered igneous/metamorphic rock	<b>GH:</b> 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	<b>WK</b> : weakly developed	<b>MD</b> : moderately developed
	<b>ST</b> : strongly developed	
Ped size	<b>F</b> : fine	<b>M</b> : medium
	<b>C</b> : coarse	
Ped shape	<b>S</b> : single grain	<b>M</b> : massive
	<b>GR</b> : granular	<b>AB</b> : angular blocky
	<b>SAB</b> : sub-angular blocky	<b>PR</b> : prismatic
	<b>PL</b> : platy	

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 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
			GRDNT	GLEYSPL	CLASS	GRADE	AP	MB	AP	MB				
1	SU83608700	PGR			1	1	70	-33	70	-24	3B		DR 3B	I45 See 1P
2	SU83708700	PGR		70	1	1	83	-20	84	-10	3A		TS 3B	
3	SU83808700	PGR N	1		1	1	65	-38	65	-29	3B		TS 3B	I50 Q DR also
4	SU83508690	PGR			1	1	77	-26	80	-14	3B		TS 3B	
5	SU83608690	PGR			1	1	49	-54	49	-45	4		TS 3B	I40 Q DR also
6	SU83708690	PGR		45	1	1	81	-22	84	-10	3B		DR 3A	Less stony
7	SU83808690	PGR		45 45	3	2	114	11	105	11	2		TS 3B	
8	SU83908690	PGR SW	1		1	1	54	-49	54	-40	3B		TS 3B	I50 Q DR also
9	SU83408680	PGR			1	1	58	-45	58	-36	3B		DR 3B	I45 See 1P
10	SU83508680	PGR			1	1	61	-42	61	-33	3B		TS 3B	I45 Q DR also
11	SU83608680	PGR			1	1	109	6	93	-1	2		TS 3A	See 2P
12	SU83708680	PGR		45 52	3	2	113	10	105	11	2		WD 2	
13	SU83808680	PGR			1	1	65	-38	65	-29	3B		TS 3B	I45 Q DR also
14	SU83908680	PGR		45 70	2	1	109	6	104	10	2		TS 3A	
15	SU83458670	PGR			1	1	65	-38	65	-29	3B		TS 3B	I45 Q DR also
16	SU83608670	PGR			1	1	103	0	83	-11	3A		DR 3A	See 2P
17	SU83708670	PGR			1	1	62	-41	62	-32	3B		DR 3B	See 1P
18	SU83808670	PGR			1	1	66	-37	66	-28	3B		DR 3B	I45 See 1P
1P	SU83708670	PGR			1	1	65	-38	62	-32	3B		DR 3B	At AB 17
2P	SU83608680	PGR			1	1	99	-4	84	-10	3A		TS 3A	At AB 11

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED		----STONES-----			STRUCT/ CONSIST	SUBS		SPL	CALC
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH		TOT	STR		
1	0-25	FSZL	10YR42						11	3	HR	15				
	25-45	MCL	10YR54						0	0	HR	30		M		Imp Gravelly
2	0-20	MSZL	10YR42						16	3	HR	20				
	20-40	MSZL	10YR43						0	0	HR	25		M		
	40-50	MSL	10YR54						0	0	HR	20		M		
	50-70	LMS	10YR54						0	0	HR	20		M		
	70-75	SCL	10YR54	05YR58		C	D		Y	0	0	HR	20		M	
3	0-20	MSZL	10YR43						16	3	HR	20				
	20-50	MSL	10YR54						0	0	HR	25		M		Imp Gravelly
4	0-25	MSZL	10YR32						16	5	HR	20				
	25-50	MSZL	10YR53						0	0	HR	30		M		
	50-70	LCS	10YR54						0	0	HR	35		M		Imp Gravelly
5	0-20	MSZL	10YR32						20	6	HR	25				
	20-40	MSL	10YR43						0	0	HR	35		M		Imp Gravelly
6	0-30	MSZL	10YR33						14	2	HR	20				
	30-40	MSZL	10YR44						0	0	HR	10		M		
	40-45	SCL	10YR56	10YR56		F			0	0	HR	5		M		
	45-55	MCL	10YR53	10YR56		C	D		Y	0	0	HR	5		M	
7	0-25	MSZL	10YR42						20	6	HR	30				
	25-45	FSZL	10YR54						0	0	HR	10		M		
	45-100	C	75YR56	05YR58		M	D		Y	0	0	0		P		Y
8	0-25	FSL	10YR53						16	3	HR	21				
	25-50	LMS	10YR44						0	0	HR	25		M		Imp Gravelly
9	0-20	MSZL	10YR43						13	3	HR	20				
	20-45	MSL	75YR44						0	0	HR	30		M		Imp Gravelly
10	0-25	MSZL	10YR43						19	6	HR	25				
	25-45	MSZL	10YR54						0	0	HR	30		M		Imp Gravelly
11	0-30	MSZL	10YR33						11	6	HR	15				
	30-55	MSL	10YR44						0	0	HR	5		M		
	55-120	MS	10YR56						0	0	0	0		M		
12	0-30	MSZL	10YR33						9	0	HR	14				
	30-45	SCL	10YR44						0	0	HR	2		M		
	45-52	HCL	10YR53	10YR56		C	D		Y	0	0	HR	5		M	
	52-100	C	10YR53	75YR56		M	D		Y	0	0	HR	5		P	
13	0-25	MSZL	10YR33						17	4	HR	22				
	25-45	MSZL	10YR43						0	0	HR	20		M		Imp Gravelly

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----		PED COL.	----STONES----			STRUCT/ CONSIST	SUBS			SPL	CALC	
				COL	ABUN		CONT	GLE	>2		>6	LITH	TOT			STR
14	0-25	FSL	10YR33						13	4	HR	18				
	25-45	MCL	10YR43						0	0	HR	15			M	
	45-60	SCL	10YR53	75YR56	M	D		Y	0	0	HR	5			M	
	60-70	FSL	10YR5352	75YR56	M	D		Y	0	0		0			M	
	70-90	C	10YR5363	75YR56	M	D		Y	0	0		0			P	Y
15	0-25	MSZL	10YR43						16	3	HR	20				
	25-45	MSZL	10YR53						0	0	HR	25			M	Imp Gravelly
16	0-25	MSZL	10YR33						7	0	HR	12				
	25-50	MSL	10YR43						0	0	HR	10			M	
	50-65	LMS	10YR46						0	0	HR	2			M	
	65-120	MS	75YR58						0	0		0			M	
17	0-25	MSZL	10YR33						14	3	HR	19				
	25-45	MSL	10YR44						0	0	HR	25			M	Imp Gravelly
18	0-25	MSZL	10YR33						12	4	HR	17				
	25-45	MSZL	10YR43						0	0	HR	25			M	Imp Gravelly
1P	0-24	MSZL	10YR33						12	3	HR	20				
	24-46	MSL	10YR43						0	0	HR	47	MDMAB	FR	M	
	46-55	LMS	10YR53						0	0	HR	48		VF	M	
	55-120	GH	10YR56						0	0		0			P	
2P	0-24	MSL	10YR33						11	6	HR	15				
	24-60	MSL	10YR43						0	0	HR	20	MDCAB	FR	M	
	60-120	MS	10YR56						0	0	HR	5	WKCAB	VF	M	