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**BALSCOTE, WROXTON AND HORNTON  
AREAS, BANBURY- MINERALS SITES  
GRUNDON 7/8**

**Agricultural Land Classification  
ALC Map and Report**

**May 1999**

**Resource Planning Team  
Eastern Region  
FRCA Reading**

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## **AGRICULTURAL LAND CLASSIFICATION REPORT**

### **BALSCOTE, WROXTON AND HORNTON AREAS, BANBURY - MINERALS SITES, GRUNDON 7/8**

#### **INTRODUCTION**

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of approximately 68 ha of land south of Stratford Road, to the west of Wroxton, near Banbury, Oxfordshire. The survey was carried out during May 1999.
2. The work was undertaken by the Farming and Rural Conservation Agency (FRCA)<sup>1</sup> on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF). The work was carried out in order to determine the land quality and site physical characteristics of land affected by ironstone workings (with existing planning permission) as part of the Statutory Review of Mineral Planning Permission. 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 the land use on the site was cereals, spring-sown oil seed rape, set-aside and permanent grass. The area mapped as 'agricultural land not surveyed' was in winter-sown oil seed rape and access could not be gained due to the advanced stage of crop growth. The area mapped as other land was a metalled road.

#### **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.
7. The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. In total, 53 borings and 2 soil pits were described.

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

**Table 1: Area of grades and other land**

Grade/Other land	Area (hectares)	% surveyed area	% site area
3a	26.1	47.1	38.2
3b	28.6	51.5	41.9
5	0.8	1.4	1.2
Agricultural land not surveyed	10.5	N/A	15.4
Other land	2.3	N/A	3.3
Total surveyed area	55.5	100.0	81.3
Total site area	68.3	-	100.0

8. The site has been classified as Subgrade 3a (good quality agricultural land) and Subgrade 3b (moderate quality agricultural land), with soil droughtiness and soil wetness being the principal limitations, respectively. However, small areas are limited by gradient to Subgrade 3b unit in the south-west of the site, and to Grade 5 on grassed former quarry faces on the upper reaches of Padsdon Bottom.
9. Most of the southern part of the site has been classified as Subgrade 3a (good quality) with soil droughtiness as the main limitation. Typical soil profiles comprise well drained, very slightly stony, heavy clay loam topsoils over slightly stony heavy clay loam or clay upper subsoils. However, many of the profiles in this unit were impenetrable to the auger at depths of 30-65 cm. Evidence from soil inspection pit 2P indicated that the lower subsoils contained significant volumes of stones. In the local climate, these reduce the amount of available water available for crop uptake at certain times during the growing season. This reduction in available water reserves imposes a soil droughtiness limitation, which will reduce the level and consistency of crop yields.
10. The northern part of the site has been classified as Subgrade 3b (moderate quality), on the basis of soil wetness. Typical soil profiles in this unit consist of very slightly stony heavy clay loam topsoils overlying clay upper and lower subsoils, which are sometimes slightly or moderately stony. The profiles in this unit typically showed signs of soil wetness. Evidence from soil inspection pit 1P indicated that the clay subsoil was slowly permeable, which would inhibit the movement of water through the soil profile. In the local climate, the soils are poorly or imperfectly drained and therefore lead to a wetness problem. This limitation restricts the amount of time available for cultivations, trafficking or grazing, if damage to the soil is to be avoided. Furthermore, it will restrict the range of crops that can be grown on the land and will reduce the level and consistency of yields.
11. As described in paragraph 8 some small areas of the site are limited by gradient. Steep slopes will adversely affect the safe and efficient use of agricultural machinery.

## FACTORS INFLUENCING ALC GRADE

### Climate

12. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.
13. 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).
14. 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.

Table 2: Climatic and altitude data

Factor	Units	Values	
Grid reference	N/A	SP 408 414	SP 406 412
Altitude	m, AOD	155	150
Accumulated Temperature	day°C (Jan-June)	1324	1330
Average Annual Rainfall	mm	723	723
Field Capacity Days	days	162	162
Moisture Deficit, Wheat	mm	96	97
Moisture Deficit, Potatoes	mm	84	84
Overall climatic grade	N/A	Grade 1	Grade 1

15. 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.
16. 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 not believed to be significant at the site. The site is climatically Grade 1.

### Site

17. The site lies at altitudes in the range 145–157m AOD with the land falling gently from the north to the south. A small incised valley with steep sides is located in the southern half of the site. Gradients of 19° (Grade 5) were recorded using an optical clinometer which represent the faces of the disused quarry working. Nowhere on the site do microrelief or flooding affect land quality.

### Geology and soils

18. The published geological information (BGS, 1982) shows most of the as the Marlstone Rock Bed. This consists of reddish-brown fossiliferous sandy ferruginous limestones, associated with oolites, calcareous mudstones, and brown calcareous sandstones (BGS, 1982). Along

the northern edge of the site, Upper Lias silty clays are mapped with a lobe extending southwards in the eastern half of the site.

19. The most detailed published soils information for this area (SSEW, 1983) shows the entire site to be mapped as soils of the Banbury association. These soils are described as 'well drained brashy fine and coarse loamy ferruginous soils over ironstone. Some deep fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging'.

## **AGRICULTURAL LAND CLASSIFICATION**

20. 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, page 1.
21. 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**

22. Good quality agricultural land suffers from a soil droughtiness limitation and is coincident with the underlying Marlstone Rock Beds. These soils are well drained (Wetness Class I) with medium or heavy clay loam topsoils which may contain up to 12% hard rock by volume. These typically similarly textured upper subsoil which may contain up to 20% hard rock. From 30 to 60cm, these upper subsoils were impenetrable to the soil auger. Soil Pit 2 (see Appendix II) was dug to investigate these impenetrable borings and confirmed an increase in stone content (55-65% hard rock) with depth. From 70cm, solid 'flaggy' rock was encountered with rooting observed to 80cm. Moisture balance calculations which take account of these soil characteristics in the local climate, indicate a slight soil droughtiness limitation which will adversely affect the level and consistency of crop yields, particularly in drier years. Within this mapping unit there are deeper soils which represent better quality land, however these could not be mapped separately.

### **Subgrade 3b**

23. Land of moderate quality is associated with the Upper Lias clays. It would appear that the clays are more extensive than mapped on the geology map (BGS, 1982). These soils suffer from a significant soil wetness limitation with heavy topsoils. Typically these soils comprise heavy clay loam topsoils with up to 2% hard rock by volume. These pass to stoneless clays which are slowly permeable, or pass through a heavy clay loam upper subsoil to the clay beneath. Soil Pit 1 is typical of these soils and confirmed the slowly permeable nature of the clay, which acts to impede the movement of water down the soil profile. These poor drainage characteristics are sufficient to place these soils into Wetness Class IV, or III where the less permeable clays are found deeper down the profile. This combination of soil properties, in the local climate (162 FC Days), results in the land being appropriately classified as Subgrade 3b. Excessive soil wetness adversely affects seed germination and survival, partly by a reduction in soil temperature and partly because of anaerobism. It also inhibits the development of a good root system, all of which can affect the range of crops that can be grown and the level of yield. Soil wetness also influences the sensitivity of the soil to structural damage and is, therefore, a major factor in determining the number of days when

the soil is in a suitable condition for cultivation, trafficking by machinery or grazing by livestock.

### Grade 5

24. Grade 5 land is mapped on steep narrow faces of what is believed to a former quarry working on the upper reaches of Padsdon Bottom. These are grassed over and grazed. Gradients of 18-19 degrees were measured which will severely restrict the safe and efficient use of most agricultural machinery and consequently, irrespective of soil type, the nature of mechanised operations which can be carried out is very limited.

### SOIL RESOURCES

25. This section describes the soil resources identified on the site. It should be emphasised that this is not intended as a prescription for soil stripping, but merely as an illustration of the soil resources available for restoration on the site. Due to the natural variability of soils, the depths of topsoil and subsoil given should be treated with caution. Soils were sampled to a maximum depth of 120cm, where possible, during survey work. In some cases soil resources will extend below this depth. Textures described relate predominantly to hand texturing, incorporating the results of laboratory analysis (particle size distribution), where taken.

#### Soil Units : considerations for restoration

26. Three soil units have been identified across the site, the extent and distribution of which are illustrated on the accompanying soil resources map.

#### Soil Unit 1

27. This unit generally comprises poorly drained heavy textured soils having a very slightly stony heavy clay loam (occasionally medium clay loam) topsoil to a mean average depth of 32cm (range 25-40cm). This passes to a very slightly stony clay (occasionally heavy clay loam) upper subsoil with a mean thickness of 37cm (range 55-90cm). Lower subsoil information is derived from Pit 1 and comprises alternating very stony clay bands, with a thickness of 28cm, over a stoneless clay layer to 100cm, passing to a stony clay horizon to 120cm.

#### Representative soil profile for Soil Unit I

Horizon	Average Depth (cm)	Description
Topsoil	0-32	non-calcareous; heavy clay loam; brown (7.5YR4/4); very slightly stony (0-5% hard rock); moderately developed coarse sub-angular blocky; firm.
Subsoil 1	32-69	non-calcareous; clay (occasionally heavy clay loam); light olive brown (2.5Y 5/3) with common distinct ochreous mottles 10YR 6/8 (gleyed); very slightly stony (0-5% hard rock); moderately developed coarse angular blocky; firm.
Subsoil 2	69-120	non-calcareous; clay; light olive brown (2.5Y 5/3) with common distinct ochreous mottles 10YR 6/8 (gleyed); very stony (50% hard

		rock); firm. Over a stoneless clay then stony clay horizon.
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### Soil Unit 2

28. This unit generally comprises well drained medium loamy and clayey soils with stony subsoils resting on shattered marlstone within auger depth. They have a very slightly to slightly stony heavy clay loam or medium clay loam topsoil to a mean average depth of 31cm (range 25-40cm). This passes to a similarly stony and textured (occasionally clay) upper subsoil to a mean thickness of 18cm (range 35-60cm). Lower subsoil information is derived from Pit 2 and comprises a very stony (range 55-65% hard rock) heavy clay loam to a thickness of 30cm, resting on shattered Marlstone.

#### Representative soil profile for Soil Unit 2

Topsoil	0-31	non-calcareous; heavy or medium clay loam; brown (75YR4/4); very to slightly stony (0-5% hard rock); moderately developed coarse sub-angular blocky; friable.
Subsoil 1	31-49	non-calcareous; heavy or medium clay loam (occasionally clay); brown (75YR5/4); moderately stony (3-20% hard rock; moderately developed.
Subsoil 2	49-79	non-calcareous; heavy clay loam; brown (75YR5/4); very stony (55-65% hard rock); too stony to assess ped development and consistence.
Subsoil	79-120	shattered Marlstone.

### Soil Unit 3

29. This unit appears to be a restored part of an older mineral working. This unit generally comprises a stoneless heavy clay loam (occasionally medium silty clay loam) topsoil to a mean average depth of 17cm (range 10-40cm). This passes to a very slightly stony (range 0-5% FSST) heavy clay loam (occasionally heavy silty clay loam) upper subsoil to a mean thickness of 53cm (range 57-90cm). These rest on shattered Marlstone.

#### Representative soil profile for Soil Unit 3

Topsoil	0-17	non-calcareous; heavy clay loam (occasionally medium silty clay loam); brown (10YR4/3); stoneless.
Subsoil	17-70	non-calcareous; heavy clay loam (occasionally heavy silty clay loam), dark yellowish brown (10YR4/6); very slightly stony (0-5% FSST).
Subsoil	70-120	impeded, shattered Marlstone.

Colin Pritchard  
Resource Planning Team  
Eastern Region  
FRCA Reading

## **SOURCES OF REFERENCE**

British Geological Survey (1982) *Sheet No.201, Banbury*.  
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*.  
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Soil Survey of England and Wales (1983) *Sheet 6, Soils of South East England*.  
SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in South East England*  
SSEW: Harpenden



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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 pit and 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:

- 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:

<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:

<b>L:</b> loose	<b>FM:</b> firm	<b>EH:</b> extremely hard
<b>VF:</b> very friable	<b>VM:</b> very firm	
<b>FR:</b> friable	<b>EM:</b> 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	FROST	CHEM	ALC	COMMENTS			
			GRDNT	GLEY	SPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP		DIST	LIMIT	
1	SP40204190	SAS		30	30	4	3B	89	-7	98	14	3A		WE	3B	IMP65/1P		
2	SP40304190	OSR		40	40	4	3B	132	36	109	25	1		WE	3B	H2 SPL		
3	SP40404190	OSR		35	35	4	3B	95	-1	107	23	3A		WE	3B	IMP70/1P		
4	SP40204180	SAS		45	45	3	3B	129	33	104	20	1		WE	3B	H4 SPL		
5	SP40304180	OSR		35	35	4	3B	95	-1	107	23	3A		WE	3B	IMP70/1P		
6	SP40404180	OSR		35	35	4	3B	92	-4	101	17	3A		WE	3B	IMP65/1P		
7	SP40504180	OSR		35	35	4	3B	62	-34	62	-22	3B		WE	3B	IMP65/1P		
8	SP40604180	CER		35	35	4	3B	95	-1	107	23	3A		WE	3B	IMP70/1P		
9	SP40204170	SAS		30	30	4	3B	91	-5	98	14	3A		WE	3B	IMP75/1P		
10	SP40304170	OSR		35	35	4	3B	109	13	107	23	2		WE	3B	IMP90/1P		
11	SP40404170	OSR		55	55	3	3B	112	16	113	29	2		WE	3B	IMP85/1P		
12	SP40504170	OSR		35	55	4	3B	136	40	113	29	1		WE	3B	H3 SPL		
13	SP40604170	CER		35	35	4	3B	85	-11	88	4	3A		WE	3B	IMP55/1P		
14	SP40704170	WHT		37	37	4	3B	88	-8	92	8	3A		WE	3B	IMP58/1P		
15	SP40804170	CER		70	70	2	3A	123	27	118	34	2		WE	3A	IMP100/1P		
16	SP40204160	OSR		45	75	2	2	133	37	112	28	1		WE	2	H4 SPL/2P		
17	SP40304160	OSR		25	25	4	3B	105	9	103	19	2		WE	3B	IMP90/1P		
18	SP40404160	OSR		30	30	4	3B	93	-3	105	21	3A		WE	3B	IMP70/1P		
19	SP40504160	OSR		50	90	1	1	147	51	118	34	1			1	H4 SPL		
20	SP40604160	CER	S	4		1	2	44	-52	44	-40	4		DR	3B	IMP25/1P		
21	SP40704160	WHT				1	1	56	-40	56	-28	3B		WD	3A	IMP35/1P		
22	SP40804160	CER		50	50	3	3B	106	10	111	27	2		WE	3B	IMP80/1P		
23	SP40904160	CER		32	32	4	3B	94	-2	106	22	3A		WE	3B	IMP70/1P		
24	SP40104150	BAR				1	1	142	46	116	32	1			1			
27	SP40404150	CER		50	50	3	3B	99	3	107	23	3A		WE	3B	IMP75/1P		
28	SP40504150	CER		55	55	3	3B	102	6	108	24	2		WE	3B	IMP80/1P		
29	SP40604150	CER				1	1	52	-44	52	-32	3B		DR	3A	IMP35/2P		
29A	SP40654149	PGR				1	1	131	35	125	41	1	Y		1	DISTURBED		
30	SP40704150	WHT		37	37	4	3B	82	-14	85	1	3A		WE	3B	IMP55/1P		
31	SP40804150	CER		28	28	4	3B	93	-3	105	21	3A		WE	3B	IMP70/1P		
32	SP40904150	CER		37	37	4	3B	97	1	106	22	3A		WE	3B	IMP75/1P		
36	SP40404140	CER				1	1	90	-6	95	11	3A		DR	2	IMP60/2P		
37	SP40504140	CER				1	1	85	-11	88	4	3A		DR	2	IMP55/2P		
38	SP40604140	CER				1	1	58	-38	58	-26	3B		DR	3A	IMP35/2P		
38A	SP40674141	PGR	S	1		1	2	89	-7	93	9	3A	Y		Y	DR	3A	DISTURBED
39	SP40704140	CER				1	2	52	-44	52	-32	3B		DR	3A	AT 2P		
40	SP40804140	CER		25	25	4	3B	70	-26	70	-14	3B		WE	3B	IMP45/1P		
41	SP40904140	CER		35	35	4	3B	89	-7	98	14	3A		WE	3B	IMP70/1P		
42	SP41004140	CER				1	1	66	-30	66	-18	3B		DR	3A	IMP40/2P		
46	SP40404130	CER				1	1	64	-32	64	-20	3B		DR	3A	IMP40/2P		
47	SP40504130	CER				1	1	49	-47	49	-35	3B		DR	3A	IMP30/2P		
48	SP40604130	CER				1	1	48	-48	48	-36	3B		DR	3A	IMP30/2P		

SAMPLE NO.	GRID REF	ASPECT USE	--WETNESS--		-WHEAT-		-POTS-		M.REL		EROSN	FROST	CHEM	ALC	COMMENTS	
			GRDNT	GLEY	SPL	CLASS	GRADE	AP	MB	AP	MB	DRT	FLOOD	EXP		DIST
49	SP40704130	PGR				1	2	104	8	110	26	2	Y	WD	2	DISTURBED
50	SP40804130	WHT				1	2	93	-3	101	17	3A		DR	2	IMP65/2P
51	SP40904130	CER				1	1	66	-30	66	-18	3B		DR	3A	IMP40/2P
52	SP41004130	CER				1	2	69	-27	69	-15	3B		DR	3A	IMP40/2P
55	SP40404120	CER				1	1	63	-33	63	-21	3B		DR	3A	IMP40/2P
56	SP40504120	CER				1	1	58	-38	58	-26	3B		DR	3A	IMP35/2P
58	SP40804120	CER				1	1	58	-38	58	-26	3B		DR	3A	IMP35/2P
59	SP40904120	CER				1	1	89	-7	96	12	3A		DR	2	IMP60/2P
60	SP41004120	CER				1	1	75	-21	75	-9	3B		DR	3A	IMP45/2P
61	SP41104120	CER				1	1	74	-22	74	-10	3B		DR	3A	IMP45/2P
63	SP40324110	CER				1	1	112	16	114	30	2		DR	2	IMP80/2P
64	SP40404110	CER				1	1	108	12	110	26	2		DR	2	IMP80/2P
65	SP40504110	CER				1	1	150	54	113	29	1			1	
66	SP41004110	CER				1	1	51	-45	51	-33	3B		DR	3A	IMP30/2P
67	SP41104110	CER				1	1	64	-32	64	-20	3B		DR	3A	IMP40/2P
68	SP40154162	BAR				1	1	143	47	119	35	1			1	
70	SP40244198	SAS		45	45	3	3B	130	34	106	22	1		WE	3B	H3 SPL
71	SP40074138	CER	S	3		1	1	74	-22	74	-10	3B		DR	3B	IMP45/2P
1P	SP40404140	OSR		30	30	4	3B	105	9	100	16	2		WE	3B	PIT100 AUG105I
2P	SP40724140	CER				1	1	77	-19	82	-2	3A		DR	3A	IMP70



SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED COL.	----STONES-----			STRUCT/ CONSIST	SUBS					
				COL	ABUN	CONT		GLE	>2	>6		LITH	TOT	STR	POR	IMP	SPL
1	0-30	HCL	75YR44						0	0	HR	2					
	30-65	C	25Y 64	10YR66		C D		Y	0	0		0		P			Y
2	0-40	HCL	75YR44						0	0	HR	2					
	40-55	C	75YR43	10YR68		C D		Y	0	0	HR	2		P			Y
	55-90	C	05Y 52	10YR68		M D		Y	0	0		0		P			Y
	90-120	C	25Y 63	10YR68		M D		Y	0	0		0		P			Y
3	0-35	HCL	75YR44						0	0	HR	2					
	35-70	C	25Y 63	10YR68		M D		Y	0	0		0		P			Y
4	0-30	HCL	75YR44						0	0	HR	2					
	30-45	HCL	75YR44						0	0		0		M			
	45-90	HCL	75YR53	10YR66		C D		Y	0	0	HR	10		P			Y
	90-120	C	25Y 64	10YR66		M D		Y	0	0		0		P			Y
5	0-35	HCL	75YR44						0	0	HR	2					
	35-70	C	25Y 5363	10YR68		C D		Y	0	0		0		P			Y
6	0-35	HCL	75YR44						0	0	HR	2					
	35-65	C	25Y 5363	10YR68		C D		Y	0	0		0		P			Y
7	0-35	HCL	75Y 44						0	0	HR	2					
	35-55	C	10YR53	10YR68		C D		Y	0	0	HR	5		P			Y
	55-65	C	10YR63	10YR68		C D		Y	0	0	HR	8		P			Y
8	0-35	HCL	75YR44						0	0	HR	2					
	35-70	C	25Y 64	10YR66		M D		Y	0	0		0		P			Y
9	0-30	HCL	75YR44						0	0	HR	2					
	30-65	HCL	75YR53	10YR66		C D		Y	0	0	HR	10		M			
	65-75	C	25Y 64	10YR66		M D		Y	0	0		0		P			Y
10	0-35	HCL	75YR44						0	0	HR	2					
	35-60	C	25Y 6353	10YR68		C D		Y	0	0	HR	2		P			Y
	60-90	C	05Y 52	10YR68		M D		Y	0	0		0		P			Y
11	0-35	HCL	75YR44						0	0	HR	2					
	35-55	HCL	75YR46						0	0		0		M			
	55-85	C	25Y 64	10YR66		C D		Y	0	0		0		P			Y
12	0-35	HCL	75YR44						0	0	HR	2					
	35-55	HCL	75YR53	75YR46		C D		Y	0	0		0		M			
	55-75	C	75YR53	75YR46		C D		Y	0	0		0		P			Y
	75-120	C	25Y 64	10YR66		C D		Y	0	0		0		P			Y
13	0-35	HCL	75YR44						0	0	HR	2					
	35-55	C	25Y 64	10YR66		M D		Y	0	0		0		P			Y

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED	----STONES-----			STRUCT/	SUBS					
				COL	ABUN	CONT	COL.	GLEY	>2	>6	LITH	TOT	CONSIST	STR	POR	IMP	SPL
14	0-29	HCL	10YR43					0	0	0							
	29-37	HCL	10YR44					0	0	0		M					
	37-58	C	25Y 53	10YR56	M	F		Y	0	0	0		P		Y	Y	
15	0-30	HCL	75YR44					0	0	0							
	30-50	C	75YR44					0	0	0		M					
	50-70	C	75YR4	10YR68	C	D		S	0	0	0		M				
	70-100	C	25Y 53	10YR68	C	D		Y	0	0	0		P		Y		
16	0-35	MCL	75YR44					1	0	HR	5						
	35-45	MCL	75YR44					0	0	0		M					
	45-75	HCL	75YR53	75YR46	C	D		Y	0	0	HR	10		M			
	75-120	ZC	75YR53	75YR46	C	D		Y	0	0	HR	15		P		Y	
17	0-25	MCL	75YR44					0	0	HR	2						
	25-55	C	25Y 64	10YR66	C	D		Y	0	0	0		P		Y		
	55-75	C	75YR44	10YR66	C	D		Y	0	0	0		P		Y		
	75-90	C	25Y 64	10YR66	C	D		Y	0	0	0		P		Y		
18	0-30	MCL	75YR44					0	0	HR	2						
	30-70	C	25Y 64	10YR66	C	D		Y	0	0	0		P		Y		
19	0-35	MCL	75YR44					0	0	HR	2						
	35-50	MCL	75YR46					0	0	0		M					
	50-90	HCL	75YR53	75YR46	C	D		Y	0	0	0		M				
	90-120	C	10YR64	10YR66	C	D		Y	0	0	0		P		Y		
20	0-25	HCL	75YR44					0	0	HR	2						
21	0-30	HCL	10YR43					10	5	HR	10						
	30-35	HCL	10YR44	10YR56	M	D		S	0	0	HR	15		M		Y	
22	0-30	HCL	75YR44					0	0	HR	2						
	30-50	C	75YR44					0	0	0		M					
	50-80	C	10YR53	10YR68	C	D		Y	0	0	0		P		Y		
23	0-32	HCL	75YR44					0	0	HR	2						
	32-70	C	25Y 53	10YR68	C	D		Y	0	0	0		P		Y		
24	0-35	HCL	75YR44					0	0	0							
	35-100	C	75YR44					0	0	HR	5		M				
	100-120	HCL	75YR44					0	0	HR	10		M				
27	0-35	HCL	75YR44					0	0	HR	5						
	35-50	C	75YR54					0	0	HR	5		M				
	50-75	C	25Y 64	10YR56	C	D		Y	0	0	HR	10		P		Y	Y
28	0-30	HCL	75YR44					0	0	HR	5						
	30-55	C	75YR44					0	0	HR	5		M				
	55-80	C	25Y 64	10YR56	C	D		Y	0	0	HR	5		P		Y	Y

SAMPLE	DEPTH	TEXTURE	COLOUR	-----MOTTLES-----			PED COL.	-----STONES-----			STRUCT/ CONSIST	SUBS			CALC
				COL	ABUN	CONT		GLEY	>2	>6		LITH	TOT	STR	
29	0-35	HCL	75YR44					11	3	HR	18				
29A	0-30	MZCL	10YR43					0	0		0				
	30-90	HZCL	10YR46					0	0		0		M		
30	0-30	HCL	10YR43					1	0	HR	1				
	30-37	HCL	10YR44	10YR58	C	D		S	0	0	0		M		
	37-55	C	25Y 53	10YR58	M	D		Y	0	0	HR	15		P	Y Y
31	0-28	HCL	75YR44					0	0		0				
	28-70	C	25Y 53	10YR68	C	D		Y	0	0	0		P		Y
32	0-37	C	75YR44					0	0		0				
	37-75	C	25Y 64	10YR68	C	D		Y	0	0	0		P		Y
36	0-30	MCL	75YR44					0	0	HR	5				
	30-60	MCL	75YR54					0	0	HR	10		M		
37	0-30	MCL	75YR44					0	0	HR	5				
	30-55	MCL	75YR54					0	0	HR	10		M		
38	0-30	MCL	75YR44					0	0	HR	5				
	30-35	MCL	75YR54					0	0	HR	20		M		
38A	0-10	HCL	10YR43					0	0		0				
	10-57	HCL	10YR46					0	0		0		M		
39	0-30	HCL	75YR44					1	0	HR	3				
40	0-25	HCL	75YR44					0	0	HR	2				
	25-45	C	25Y 63	10YR66	M	D		Y	0	0	0		P		Y
41	0-35	HCL	75YR44					0	0	HR	2				
	35-70	HCL	25Y 53	10YR66	C	D		Y	0	0	HR	15		P	Y
42	0-30	HCL	75YR44					0	0	HR	5				
	30-40	C	75YR54					0	0	HR	10		M		
46	0-30	MCL	75YR44					1	0	HR	5				
	30-40	MCL	75YR54					0	0	HR	20		M		
47	0-30	MCL	75YR44					2	0	HR	10				
48	0-30	MCL	75YR44					5	0	HR	12				
49	0-10	HCL	10YR43					0	0		0				
	10-75	HCL	10YR44					0	0	FSST	5		M		

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED COL.	----STONES-----			STRUCT/ CONSIST	SUBS		
				COL	ABUN	CONT		GLEY	>2	>6		LITH	TOT	STR
50	0-30	HCL	75YR43					1	0	HR	2			
	30-65	HCL	75YR43					0	0	FSST	20		M	
51	0-30	HCL	75YR44					0	0	HR	5			
	30-40	HCL	75YR44					0	0	HR	10		M	
52	0-30	HCL	75YR44					0	0	HR	2			
	30-40	HCL	75YR54					0	0		0		M	
55	0-30	MCL	75YR44					2	0	HR	7			
	30-40	MCL	75YR54					0	0	HR	20		M	
56	0-35	HCL	75YR44					5	0	HR	8			
58	0-30	MCL	75YR44					0	0	HR	5			
	30-35	MCL	75YR44					0	0	HR	20		M	
59	0-35	HCL	75YR44					0	0	HR	5			
	35-60	C	75YR44					0	0	HR	10		M	
60	0-35	HCL	75YR44					0	0	HR	5			
	35-45	HCL	75YR44					0	0	HR	10		M	
61	0-30	HCL	75YR44					0	0	HR	4			
	30-45	HCL	10YR56					0	0	HR	10		M	
63	0-30	MCL	75YR44					2	0	HR	5			
	30-80	MCL	75YR54					0	0	HR	2		M	
64	0-35	HCL	75YR54					3	0	HR	6			
	35-80	HCL	75YR54					0	0	HR	10		M	
65	0-35	MCL	75YR54					0	0	HR	5			
	35-120	HCL	10YR56					0	0	HR	5		M	
66	0-30	MCL	75YR44					0	0	HR	5			
67	0-30	MCL	75YR44					0	0	HR	5			
	30-40	MCL	75YR54					0	0	HR	20		M	
68	0-40	HCL	75YR44					0	0		0			
	40-120	C	75YR44					0	0	HR	2		M	
70	0-30	HCL	75YR44					0	0	HR	2			
	30-45	HCL	75YR44	75YR46	F	D		0	0		0		M	
	45-80	C	75YR53	10YR66	C	D	Y	0	0	HR	10		P	Y
	80-120	C	25Y 64	10YR66	M	D	Y	0	0		0		P	Y

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- PED			----STONES-----			STRUCT/	SUBS	STR	POR	IMP	SPL	CALC
				COL	ABUN	CONT	COL.	GLEY >2	>6							
71	0-30	HCL	75YR44						0	0	HR	5				
	30-45	C	75YR44						0	0	HR	5		M		
1P	0-30	HCL	75YR44						0	0	HR	2	MDCSAB	FM		
	30-62	C	25Y 53	10YR68	C	D		Y	0	0		0	MDCAB	FM	P	Y
	62-90	C	25Y 53	10YR68	C	D		Y	0	0	HR	50		P		Y Y
	90-100	C	25Y 53	10YR68	C	D		Y	0	0		0		P		Y Y
2P	0-30	HCL	75YR44						2	0	HR	3	MDCSAB	FR		
	30-60	HCL	75YR54						0	0	HR	55		M		
	60-70	HCL	75YR54						0	0	HR	65		M		