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Proposed golf course at
Fritwell, Oxfordshire
Semi detailed survey
Agricultural Land Classification
ALC Map and Report
June 1994

AGRICULTURAL LAND CLASSIFICATION REPORT

PROPOSED GOLF COURSE AT FRITWELL, OXFORDSHIRE SEMI DETAILED SURVEY

1 Summary

- 1.1 ADAS was commissioned by MAFF's Land Use Planning Unit to provide information on land quality for a site at Fritwell Oxfordshire. The work forms part of MAFF's statutory input to the proposal for the development of a golf course on this land.
- 1.2 Approximately 53 hectares of land relating to land at Portway Farm Fritwell Oxfordshire was surveyed in June 1994. An Agricultural Land Classification (ALC) survey was carried out at a semi detailed level of approximately two borings every three hectares for the agricultural area. A total of 31 soil auger borings and three soil inspection pits were described in accordance with MAFF's revised guidelines and criteria for grading the quality of agricultural land (MAFF 1988). These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose a long term limitation on its use for agriculture.
- 1.3 The work was conducted by members of the Resource Planning Team in the Guildford Statutory Group of ADAS.
- 1.4 At the time of the survey the agricultural land use on the site was arable cropping, comprising wheat, barley and oilseed rape. Land mapped as non agricultural comprises part of Park Farm. The farm buildings at Portway Farm mainly consist of poultry houses. An area was not surveyed due to access difficulties caused by a mature winter sown oilseed rape crop.
- 1.5 The distribution of grades and subgrades is shown on the attached ALC map and the areas and extent are given in the table below. The map has been drawn at a scale of 1:10,000. It is accurate at this scale but any enlargement would be misleading.

Table 1 Distribution of Grades and Subgrades

Grade	Area (ha)	% of Site	% of Agricultural Land
2	5.9	11.1	12.3
3a	3.0	5.6	6.3
3b	<u>39.0</u>	<u>73.2</u>	<u>81.4</u>
Total agricultural area	<u>47.9</u>	<u>89.9</u>	<u>100%</u>
Not surveyed	3.9	7.3	
Non Agricultural	<0.1	<0.1	
Agricultural Buildings	<u>1.5</u>	<u>2.8</u>	
Total area of site	<u>53.3</u>	<u>100%</u>	

- 1.6 Appendix I gives a general description of the grades, subgrades and land use categories identified in the survey. The main classes are described in terms of the type of limitation that can occur, the typical cropping range and the expected level and consistency of yield.

1 7 The land surveyed has been classified as very good quality Grade 2 to moderate quality Subgrade 3b. The grading of the site is primarily influenced by soil droughtiness and to a lesser extent soil wetness limitations. Most of the site comprises shallow soils resting on hard brashy limestone. Profile available water is thus severely restricted and the land is assigned to Subgrade 3b. Occasionally this land is also affected by a topsoil stone limitation. Where soils are deeper over limestone Grades 2 and 3a are appropriate whilst some land affected by soil wetness is also included in the Grade 2 and 3a mapping units.

2 Climate

2 1 Climatic criteria are considered first when classifying land as climate may be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

2 2 Estimates of climatic variables relevant to the assessment of agricultural land quality were obtained by interpolation from a 5km grid point dataset (Met Office 1989) for representative locations in the survey area.

Table 2 Climatic Interpolations

Grid Reference	SP510296	SP508290
Altitude (m)	135	130
Accumulated Temperature (degree days Jan June)	1349	1355
Average Annual Rainfall (mm)	699	698
Field Capacity (days)	152	152
Moisture Deficit Wheat (mm)	96	97
Moisture Deficit Potatoes (mm)	85	86

2 3 The details given in the table above show that there is no overall climatic limitation affecting the site. In addition, no local climatic factors such as exposure or frost risk affect land quality at this locality.

2 4 Climatic factors do however interact with soil properties to influence soil wetness and droughtiness limitations. At this locality the climate is relatively dry in regional terms. Moisture deficits are however comparatively low due to site elevation and the likelihood of soil droughtiness restrictions will thereby be reduced.

3 Relief

3 1 The site lies at an altitude of approximately 126-135 m AOD. The highest land is found towards the north west of the site falling gently in all directions. Nowhere on the site do gradient or microrelief affect agricultural land quality.

4 Geology and Soil

4 1 British Geological Survey (1968) Sheet 218 Chipping Norton shows the entire site to be underlain by Great Oolitic Limestone of the Jurassic period.

4 2 Soil Survey of England and Wales (1983) Sheet 6 Soils of South East England maps the soils on the site as the Aberford association. These soils are described as shallow locally brashy well drained calcareous fine loamy soils over limestone. Some deeper calcareous soils in colluvium (SSEW 1983)

4 3 Detailed field examination of the soils on the site confirmed the presence of shallow soils over brashy limestone across much of the site with a small area towards the north of the site comprising deeper soils over limestone or clay

5 Agricultural Land Classification

5 1 Table 1 provides the details of the area measurements for each grade and the distribution of each grade is shown on the attached ALC map

5 2 The location of the soil observation points and profile pits are given on the attached auger boring location map

Grade 2

5 3 A small area of Grade 2 has been mapped towards the north of the site. This land has minor soil wetness and/or droughtiness restrictions

Profiles typically comprise calcareous medium clay loam or medium silty clay loam topsoils which may contain 2-3% hard limestone fragments by volume. These overlie subsoils which generally become heavier with depth, passing to heavy clay loam and clay. Where profiles are impenetrable over brashy limestone at depths greater than 75 cm, the land is affected by slight soil droughtiness. Effective rooting is restricted by the limestone causing profile available water to be reduced. Crops may suffer slight drought stress and yield potential will be adversely affected as a result.

Alternatively at some locations the clay subsoils may impede drainage where they are slowly permeable causing slight soil wetness and subsoils to be gleyed or slightly gleyed. The utilisation of this land may be affected in terms of minor limitations on crop growth and development and slight restrictions on cultivations and/or grazing.

Occasional profiles within the Grade 2 mapping unit were of better quality being deep and well drained but they are of insufficient quantity or distribution to map separately.

Subgrade 3a

5 4 Good quality agricultural land has been mapped in a small unit north of Portway Farm. It comprises soils similar to those described in para 5 3 above which are affected by soil wetness or soil droughtiness restrictions.

Where soil wetness is the overriding limitation very slightly stony calcareous heavy clay loam topsoils overlie similar upper subsoils and pass to clay below about 45 cm which is slowly permeable below 70 cm and impedes drainage. Wetness Class II is appropriate.

which given the prevailing climatic regime and in combination with a heavy topsoil texture leads to Subgrade 3a being appropriate

Land is limited by soil droughtiness where similar profiles rest over brashy limestone at moderate depths ie about 55 cm. The subsoil horizons above 55 cm, (where the profile usually becomes impenetrable to soil auger) contain about 5-30% total hard limestone fragments by volume. The stone contents and relatively shallow soil depths over limestone together with restricted rooting reduce profile available water such that crops may suffer drought stress. Yield potential may be adversely affected as a result.

Subgrade 3b

- 5.5 Much of the land assigned to this grade is limited by soil droughtiness due to stony soil profiles resting on brashy limestone at shallow depths. Profiles typically comprise calcareous or non calcareous medium clay loam or occasionally heavy clay loam topsoils. These may contain between 2 and 20% total limestone fragments by volume (of which 1-16% are > 2cm diameter). Profiles either become impenetrable (to soil auger) immediately below the topsoil at depths in the range 25-32 cm, or pass to an upper subsoil of medium or heavy clay loam, (containing 10-50% total limestone brash) before becoming impenetrable to roots between 40 and 57 cm. Pit 3 is typical of these soils. Due to the shallow stony nature of these soils profile available water is significantly restricted such that crops are likely to experience drought stress and yield potential may be affected. Subgrade 3b is appropriate given the severity of this limitation.

Where topsoil stone contents exceed 15% total of hard limestone brash, the land is limited to this subgrade by the restrictions such stone contents impose on cultivations, crop establishment and quality and wear and tear to farm machinery.

Occasional profiles within the 3b mapping unit are included on the basis of a soil wetness limitation. Heavy clay loam topsoils which are gleyed overlie heavy clay loam and clay in the subsoil, the clay horizons being poorly structured and slowly permeable and occurring from about 50 cm depth. Wetness Class III is thereby assigned and given the heavy topsoil texture and prevailing climate the land is classified as Subgrade 3b.

ADAS Ref 3301/140/94
MAFF Ref EL33/876

Resource Planning Team
Guildford Statutory Group
ADAS Reading

SOURCES OF REFERENCE

British Geological Survey (1968) Sheet No 218 Chipping Norton

MAFF (1988) Agricultural Land Classification of England and Wales Revised guidelines and criteria for grading the quality of agricultural land

Meteorological Office (1989) Climatological Data for Agricultural Land Classification

Soil Survey of England and Wales (1983) Sheet 6 Soils of South East England and accompanying legend

APPENDIX I

DESCRIPTION OF THE GRADES AND SUBGRADES

Grade 1 Excellent Quality Agricultural Land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 Very Good Quality Agricultural Land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural or horticultural crops can usually be grown but on some land of this grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1 land.

Grade 3 Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When more demanding crops are grown, yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a Good Quality Agricultural Land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b Moderate Quality Agricultural Land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or lower yields of a wider range of crops or high yields of grass 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 (eg cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 Very Poor Quality Agricultural Land

Land with severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

Urban

Built up or hard uses with relatively little potential for a return to agriculture including housing industry commerce education transport religious buildings cemeteries Also hard surfaced sports facilities permanent caravan sites and vacant land all types of derelict land including mineral workings which are only likely to be reclaimed using derelict land grants

Non agricultural

Soft uses where most of the land could be returned relatively easily to agriculture including private parkland public open spaces sports fields allotments and soft surfaced areas on airports Also active mineral workings and refuse tips where restoration conditions to soft after uses may apply

Woodland

Includes commercial and non commercial woodland A distinction may be made as necessary between farm and non farm woodland

Agricultural Buildings

Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses Temporary structures (eg polythene tunnels erected for lambing) may be ignored

Open Water

Includes lakes ponds and rivers as map scale permits

Land Not Surveyed

Agricultural land which has not been surveyed

Where the land use includes more than one of the above eg buildings in large grounds and where map scale permits the cover types may be shown separately Otherwise the most extensive cover type will be shown

APPENDIX II

FIELD ASSESSMENT OF SOIL WETNESS CLASS

SOIL WETNESS CLASSIFICATION

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

Definition of Soil Wetness Classes

Wetness Class	Duration of Waterlogging ¹
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years ²
II	The soil profile is wet within 70 cm depth for 31-90 days in most years or if there is no slowly permeable layer within 80 cm depth it is wet within 70 cm for more than 90 days but only wet within 40 cm depth for 30 days in most years
III	The soil profile is wet within 70 cm depth for 91-180 days in most years or if there is no slowly permeable layer present within 80 cm depth it is wet within 70 cm for more than 180 days but only wet within 40 cm depth for between 31-90 days in most years
IV	The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years or if there is no slowly permeable layer present within 80 cm depth it is wet within 40 cm depth for 91-210 days in most years
V	The soil profile is wet within 40 cm depth for 211-335 days in most years
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years

Soils can be allocated to a wetness class on the basis of quantitative data recorded over a period of many years or by the interpretation of soil profile characteristics, site and climatic factors. Adequate quantitative data will rarely be available for ALC surveys and therefore the interpretative method of field assessment is used to identify soil wetness class in the field. The method adopted here is common to ADAS and the SSLRC.

¹The number of days specified is not necessarily a continuous period

²In most years is defined as more than 10 out of 20 years

APPENDIX III
SOIL PIT AND SOIL BORING DESCRIPTIONS

Contents

Soil Abbreviations Explanatory Note

Soil Pit Descriptions

Database Printout Boring Level Information

Database Printout Horizon Level Information

SOIL PROFILE DESCRIPTIONS EXPLANATORY NOTE

Soil pit and auger boring information collected during ALC fieldwork is held on a computer database This uses notations and abbreviations as set out below

Boring Header Information

1 **GRID REF** national 100 km grid square and 8 figure grid reference

2 **USE** Land use at the time of survey The following abbreviations are used

ARA Arable	WHT Wheat	BAR Barley
CER Cereals	OAT Oats	MZE Maize
OSR Oilseed rape	BEN Field Beans	BRA Brassicae
POT Potatoes	SBT Sugar Beet	FCD Fodder Crops
LIN Linseed	FRT Soft and Top Fruit	FLW Fallow
PGR Permanent Pasture	LEY Ley Grass	RGR Rough Grazing
SCR Scrub	CFW Coniferous Woodland	DCW Deciduous Wood
HTH Heathland	BOG Bog or Marsh	FLW Fallow
PLO Ploughed	SAS Set aside	OTH Other
HRT Horticultural Crops		

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

4 **GLEYS/SPL** Depth in centimetres (cm) to gleying and/or slowly permeable layers

5 **AP (WHEAT/POTS)** Crop adjusted available water capacity

6 **MB (WHEAT/POTS)** Moisture Balance (Crop adjusted AP crop adjusted MD)

7 **DRT** Best grade according to soil droughtiness

8 If any of the following factors are considered significant Y will be entered in the relevant column

MREL Microrelief limitation	FLOOD Flood risk	EROSN Soil erosion risk
EXP Exposure limitation	FROST Frost prone	DIST Disturbed land
CHEM Chemical limitation		

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

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

Soil Pits and Auger Borings

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

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

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

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

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

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

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

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

4 **MOTTLE CONT** Mottle contrast

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

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

6 **GLEYS** If the soil horizon is gleyed a **Y** will appear in this column. If slightly gleyed an **S** will appear

7 **STONE LITH** Stone Lithology One of the following is used

HR	all hard rocks and stones	SLST	soft oolitic or dolimitic limestone
CH	chalk	FSST	soft fine grained sandstone
ZR	soft argillaceous or silty rocks	GH	gravel with non porous (hard) stones
MSST	soft medium grained sandstone	GS	gravel with porous (soft) stones
SI	soft weathered igneous/metamorphic rock		

Stone contents (>2cm >6cm and total) are given in percentages (by volume)

8 **STRUCT** the degree of development size and shape of soil peds are described using the following notation

degree of development **WK** weakly developed **MD** moderately developed
 ST strongly developed

ped size **F** fine **M** medium
 C coarse **VC** very 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 **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

SOIL PIT DESCRIPTION

Site Name FRITWELL GOLF COURSE P t N mber 1P

Grid Reference SP50902930 Average Annual Rainfall 699 mm
 Accumulated Temperature 1349 degree days
 Field Capacity Level 152 days
 Land Use Oilseed Rape
 Slope and Aspect degrees

HORIZON	TEXTURE	COLOUR	STONES	2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0	22	MCL	10YR43 00	1	5	HR					
22	41	MCL	25Y 74 64	0	3	HR	F	WKCSAB	FR	M	
41	74	HCL	25Y 53 62	0	3	HR	M	MDCSAB	FR	M	

Wetness Grade 1 Wetness Class I
 Gleying 41 cm
 SPL No SPL

Drought Grade 2 APW 105mm MBW 8 mm
 APP 112mm MBP 26 mm

FINAL ALC GRADE 2
 MAIN LIMITATION Drought e

SOIL PIT DESCRIPTION

Site Name FRITWELL GOLF COURSE Pit Number 2P
 Grid Reference SP50802910 Average Annual Rainfall 699 mm
 Accumulated Temperature 1349 degree days
 Field Capacity Level 152 days
 Land Use Wheat
 Slope and Aspect degrees

HORIZON	TEXTURE	COLOUR	STONES	2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0 21	MCL	10YR44 00	11		20	HR					
21 32	MCL	10YR46 72	0		80	HR				P	

Wetness Grade 1 Wetness Class I
 Gleying cm
 SPL No SPL

Drought Grade 4 APW 34 mm MBW 63 mm
 APP 34 mm MBP 52 mm

FINAL ALC GRADE 4
 MAIN LIMITATION Droughtiness

SOIL PIT DESCRIPTION

Site Name FRITWELL GOLF COURSE P t N mber 3P

Grid Reference SP50802950 A e age A al Ra f ll 699 mm
 Acc m lated Tempe at re 1349 degree days
 Field Capac ty Le el 152 days
 Land Use Ba l y
 Slope and Aspect degrees

HORIZON	TEXTURE	COLOUR	STONES	2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0 22	MCL	10YR43 00	3		7	HR					
22 34	MCL	10YR44 00	0		30	HR				M	
34 50	MCL	10YR66 00	0		38	HR		MDCSAB	FR	M	
50 57	MCL	10YR66 00	0		50	HR				P	

Wetness Grade 1 Wetness Class I
 Gley ng cm
 SPL No SPL

Dro ght G ade 3B APW 70 mm MBW 27 mm
 APP 72 mm MBP 14 mm

FINAL ALC GRADE 3B
 MAIN LIMITATION Dro ghtiness

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						DRT
1	SP51402990	BAR			1	1	57	40	57	29	3B			TS	3B	IMP 40 LIMEST
1P	SP50902930	OSR		41	1	1	105	8	112	26	2			DR	2	PIT 74 DR 74
2	SP51302980	BAR			1	2	41	56	41	45	4			DR	3B	3B TO 120 3P
2P	SP50802910	WHT			1	1	34	63	34	52	4			DR	4	PIT 32 DR 32
3	SP51102970	BAR E	01	50 90	1	2	131	34	117	31	1			WK	2	SL GLEY 27
3P	SP50802950	BAR			1	1	70	27	72	14	3B			DR	3B	PIT 57 DR 57
4	SP51202970	BAR		60 60	2	2	109	12	112	26	2			WD	2	SL GLEY 45
5	SP51302970	BAR N	01	70 70	2	3A	136	39	117	31	1			WE	3A	SL GLEY 60
6	SP51402970	BAR		0 50	3	3B	114	17	109	23	2			WE	3B	IMP 90 LIMEST
7	SP51102960	BAR E	01	45 45	3	3A	102	5	111	25	2			WE	3A	
8	SP51302960	BAR E	01		1	1	160	63	117	31	1				1	SL GLEY 45
9	SP50802950	BAR W	01		1	2	78	19	78	8	3A			DR	3B	SEE 3P
10	SP51002950	BAR E	01		1	2	63	34	63	23	3B			DR	3B	IMP 40 SEE 3P
11	SP51102950	BAR NE	01		1	1	107	10	117	31	2			DR	2	SL GLEY 60
12	SP51202950	BAR			1	1	129	32	119	33	1				1	
13	SP51302950	BAR S	01		1	2	85	12	88	2	3A			DR	3A	IMP 55 LIMEST
14	SP51102940	WHT E	01		1	1	69	28	69	17	3B			DR	3B	IMP 45 LIMEST
15	SP50802930	WHT S	01		1	1	48	49	48	38	3B			DR	3B	3A TOP STONES
16	SP51002930	OSR S	01		1	1	41	56	41	45	4			DR	3B	SEE 3P
17	SP51202930	OSR E	01		1	1	71	26	71	15	3B			DR	3B	IMP 45 LIMEST
18	SP50602910	WHT			1	1	53	44	53	33	3B			DR	3B	IMP 32 LIMEST
19	SP50702910	WHT			1	1	45	52	45	41	4			DR	3B	IMP 30 SEE 3P
20	SP50802910	WHT			1	1	37	60	37	49	4			DR	3B	IMP 30 SEE 3P
21	SP50902910	OSR			1	1	45	52	45	41	4			DR	3B	SEE 3P
22	SP51002910	OSR		50	1	1	87	10	95	9	3A			DR	3A	IMP 68
23	SP51102910	OSR			1	1	70	27	70	16	3B			DR	3B	SEE 3P
24	SP51202911	OSR			1	1	47	50	47	39	3B			DR	3B	IMP 30 LIMEST
25	SP50602900	WHT			1	1	40	57	40	46	4			DR	3B	SEE 3P
26	SP50702900	WHT			1	1	45	52	45	41	4			DR	3B	IMP 30 SEE 3P
27	SP50802900	WHT S	01		1	1	42	55	42	44	4			DR	3B	SEE 3P
28	SP50902900	OSR S	01		1	1	49	48	49	37	3B			DR	3B	SEE 3P
29	SP51002900	OSR			1	1	62	35	62	24	3B			DR	3B	SEE 3P
30	SP50602890	WHT			1	1	65	32	65	21	3B			DR	3B	SEE 3P
31	SP50702890	WHT SE	01		1	1	41	56	41	45	4			DR	3B	SEE 3P

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES		PED		STONES		STRUCT/	SUBS	IMP	SPL	CALC
				COL	ABUN	CONT	COL	GLE	2					
1	0 25	mzc1	10YR43 00						16	0	HR	20		
	25 40	mzc1	10YR44 00						0	0	HR	30	M	IMP 40 LIMESTONE
1P	0 22	mc1	10YR43 00						1	0	HR	5		
	22 41	mc1	25Y 74 64	10YR58 00	F				0	0	HR	3	WKCSAB FR M	
	41 74	hc1	25Y 53 62	10YR68 00	M		00MN00 00	Y	0	0	HR	3	MDCSAB FR M	IMP 74 LIMESTONE
2	0 25	hc1	10YR54 00						6	0	HR	10		Y IMP 25 LIMESTONE
	21 32	mc1	10YR46 72						11	0	HR	20		
3	0 27	hc1	10YR43 00						0	0		0		
	27 50	c	10YR44 00	10YR66 00	C			S	0	0		0	M	
	50 90	c	10YR53 00	75YR58 00	C			Y	0	0		0	M	
	90 110	c	10YR62 00	75YR58 00	M			Y	0	0		0	P	Y
3P	0 22	mc1	10YR43 00						3	0	HR	7		
	22 34	mc1	10YR44 00						0	0	HR	30	M	
	34 50	mc1	10YR66 00						0	0	HR	38	MDCSAB FR M	
	50 57	mc1	10YR66 00						0	0	HR	50	P	IMP 57 LIMESTONE
4	0 25	mzc1	10YR44 00						0	0	HR	3		
	25 45	h 1	10YR54 00	10YR58 00	F				0	0	HR	5	M	
	45 60	c	10YR54 00	10YR58 00	C			S	0	0	HR	5	M	
	60 85	c	10YR62 64	10YR58 00	C			Y	0	0	HR	5	P	Y
5	0 28	hc1	10YR43 00						0	0	HR	1		
	28 45	hc1	10YR44 00						0	0		0	M	
	45 60	c	10YR44 00						0	0		0	M	
	60 70	c	10YR44 00	75YR68 00	C			S	0	0		0	M	
	70 120	c	25 Y62 00	75YR58 00	C			Y	0	0		0	P	Y
6	0 25	hc1	10YR42 00	10YR58 00	C			Y	0	0	HR	2		
	25 50	hc1	10YR54 00	10YR58 00	C			S	0	0	HR	2	M	
	50 80	c	10YR53 00	10YR58 72	C			Y	0	0	HR	2	P	Y
	80 90	hc1	25Y 53 56	25Y 66 00	C			S	0	0	HR	5	M	Y IMP 90 LIMESTONE
7	0 30	mc1	10YR43 00						0	0		0		
	30 45	hc1	10YR44 00		F		00MN00 00		0	0		0	M	
	45 58	c	10YR53 00	75YR58 00	C			Y	0	0		0	P	Y
	58 75	c	25 Y62 00	75YR68 00	M			Y	0	0		0	P	Y
8	0 28	mc1	10YR43 00						0	0		0		
	28 45	hc1	10YR44 00						0	0		0	M	
	45 55	hc1	10YR44 00	10YR58 00	C			S	0	0	HR	2	M	
	55 75	c	10YR44 00	10YR58 00	C			S	0	0		0	M	
	75 90	hc1	10YR44 00	10YR66 00	C			S	0	0		0	M	
	90 120	fs1	10YR66 00	10YR58 00	F			S	0	0		0	M	

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES		PED		STONES			STRUCT/ CONSIST	SUBS		SPL	CALC
				COL	ABUN	CONT	COL	GLE	2	6		LITH	TOT		
9	0 32	hc1	10YR54 00					0	0	HR	5				Y
	32 40	hc1	10YR63 00					0	0	HR	20	M			Y
	40 50	hc1	10YR66 76					0	0	HR	25	M		IMP 50	LIMESTONE
10	0 28	hc1	10YR44 00					0	0	HR	2				Y
	28 40	hc1	10YR54 00					0	0	HR	30	M		IMP 40	LIMESTONE
11	0 27	mc1	10YR43 00					0	0		0				
	27 60	hc1	10YR44 54					0	0		0	M			
	60 75	c	10YR54 00 75YR58 00 C					S	0	0	0	M		IMP 75	LIMESTONE
12	0 30	mzc1	10YR43 00					0	0	HR	2				
	30 60	hc1	10YR54 00					0	0	HR	2	M			
	60 100	c	10YR54 00 00MN00 00 F					0	0	HR	2	M			
13	0 27	hc1	10YR43 00					0	0	HR	2				Y
	27 40	hc1	10YR54 00					0	0	HR	5	M			Y
	40 50	c	10YR56 66					0	0	HR	10	M			Y
	50 55	c	10YR66 00					0	0	HR	30	M		IMP 55	LIMESTONE
14	0 28	mc1	10YR42 00					0	0	HR	5				Y
	28 35	hc1	10YR44 54					0	0	HR	20	M			Y
	35 45	hc1	10YR66 00					0	0	HR	30	M		IMP 45	LIMESTONE
15	0 32	mc1	10YR43 00					12	0	HR	17				Y
16	0 25	mc1	10YR43 00					4	0	HR	10				Y
17	0 20	mc1	10YR44 00					0	0	HR	2				Y
	20 30	hc1	10YR54 00					0	0	HR	10	M			Y
	30 42	c	10YR54 66					0	0	HR	10	M			Y
	42 45	c	10YR66 00					0	0	HR	30	M		IMP 45	LIMESTONE
18	0 27	mc1	10YR44 00					1	0	HR	5				
	27 32	mc1	10YR46 72					0	0	HR	20	M		IMP 32	LIMESTONE
19	0 27	mc1	10YR43 00					4	0	HR	15				
	27 30	mc1	10YR46 00					0	0	HR	30	M		IMP 30	LIMESTONE
20	0 23	mc1	10YR44 00					8	0	HR	18				Y
	23 30	mc1	10YR72 00					0	0	HR	80	P		IMP 30	LIMESTONE
21	0 28	mc1	10YR43 00					10	0	HR	12				IMP 28
22	0 30	mc1	10YR43 00					3	0	HR	12				Y
	30 50	mc1	10YR46 00					0	0	HR	20	M			Y
	50 68	mc1	10YR53 00 10YR68 66 C					Y	0	0	HR	30	M		IMP 68

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES		PED		GLEYS	STONES		STRUCT/ CONSIST	SUBS			SPL	CALC
				COL	ABUN	CONT	COL		2	6		LITH	TOT	STR		
23	0 32	mc1	10YR43 00						3	0	HR	5				
	32 42	hc1	10YR54 00						0	0	HR	8	M		IMP 42	LIMESTONE
24	0 25	mc1	10YR43 00						2	0	HR	10				
	25-30	hc1	10YR46 00						0	0	HR	30	M		IMP 30	LIMESTONE
25	0 25	mc1	10YR43 00						6	0	HR	15				
	25 26	mc1	10YR44 00						0	0	HR	30	M		IMP 26	LIMESTONE
26	0 27	mc1	10YR43 00						7	0	HR	15				
	27 30	mc1	10YR44 00						0	0	HR	30	M		IMP 30	LIMESTONE
27	0 27	mc1	10YR43 00						3	0	HR	15		Y	IMP 27	LIMESTONE
28	0 32	mc1	10YR43 00						0	0	HR	15		Y	IMP 32	LIMESTONE
29	0 25	mc1	10YR43 00						8	0	HR	12				
	25 40	mc1	10YR44 00						0	0	HR	10	M		IMP 40	LIMESTONE
30	0 28	mc1	10YR44 00						5	0	HR	15				
	28 50	mc1	10YR46 00						0	0	HR	40	M		IMP 50	LIMESTONE
31	0 25	mc1	10YR43 00						2	0	HR	10		Y	IMP 25	LIMESTONE