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Broadwater Farm, Weybridge, Surrey

Agricultural Land Classification
June 1996

Resource Planning Team
Guildford Statutory Group
ADAS Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

BROADWATER FARM, WEYBRIDGE, SURREY

Introduction

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 78 3 hectares of land on the northern side of Weybridge Surrey The survey was carried out in June 1996

2 The survey was commissioned by the Ministry of Agriculture Fisheries and Food (MAFF) from its Land Use Planning Unit in Reading in connection with an application to the Planning Authority under the Town and Country Planning Act 1990 for an 18 hole golf course All of the site was previously surveyed in May 1983 (ADAS Ref 4001/60/83) However the results of the current survey supersede this previous ALC survey

3 The work was conducted by members of the Resource Planning Team in the Guildford Statutory Group of ADAS 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 whole of the site was permanent pasture and cutting grass The areas of other land comprise farm tracks and buildings small areas of woodland and areas of open water Three small areas of newly planted trees to the north-east of Broadwater Farm were not mapped at this scale

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 overleaf

7 The fieldwork was conducted at an average density of one boring per hectare A total of 69 borings and four soil profile pits were described

8 The area of Subgrade 3b moderate quality agricultural land is limited by soil wetness and droughtiness limitations The land around Greenland Farm and Broadwater Farm has medium sandy loam topsoils over loamy medium sand and medium sand subsoils The combination of these well drained sandy soils and the prevailing climate results in land which cannot meet the potential crop moisture requirements throughout the year

Table 1 Area of grades and other land

Grade/Other land	Area (hectares)	% Total site area	% Surveyed Area
3b	33 2	42 4	52 4
4	30 2	38 6	47 6
Other land	14 9	19 0	-
Total surveyed area	63 4	81 0	100 0
Total site area	78 3	100 0	

9 The Subgrade 3b land to the north east of Broadwater Farm comprises much heavier soils which have impeded drainage The profiles typically consist of heavy clay loam topsoils overlying slowly permeable clay subsoils which cause waterlogging above them during the wetter part of the year thus inhibiting seed germination and growth

10 The Grade 4 poor quality agricultural land has a severe limitation to its agricultural use from flooding as well as soil wetness The fields are flooded most years for up to three weeks in the winter as part of a long term management operation for the nearby River Thames and Desborough Channel The profiles within this area typically consist of shallow clay topsoils over slowly permeable clay subsoils which will impede soil drainage and not allow flood waters to subside very rapidly There is a small area where medium sandy loam topsoils and river gravel deposits lie over the slowly permeable clay subsoils

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 overleaf in Table 2 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met Office 1989)

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

Table 2 Climatic and altitude data

Factor	Units	Values	Values	Values
Grid reference	N/A	TQ 092 660	TQ 078 656	TQ 085 656
Altitude	m, AOD	10	12	12
Accumulated Temperature	day°C	1506	1504	1504
Average Annual Rainfall	mm	609	624	615
Field Capacity Days	days	127	129	128
Moisture Deficit Wheat	mm	122	121	121
Moisture Deficit Potatoes	mm	119	117	118

15 The combination of rainfall and temperature at this site mean that there is no overall climatic limitation However climatic factors do interact with soil properties to influence soil wetness and droughtiness limitations The crop-adjusted soil moisture deficits at this locality are above the average for the south east of England This increases the likelihood of soil droughtiness limitations No local climatic factors such as exposure or frost risk are believed to adversely affect the land quality on the site This site is climatically Grade 1

Site

16 The site occupies terraces of the River Thames valley and is level apart from an embankment running along Engine River and a couple of hollows in the fields between Greenland Farm and Broadwater Farm Winter flooding occurs on the lower lying land to the north of Engine River and water collects in the hollows of the fields adjacent to the two farmsteads

Geology and Soils

17 The published geological information (BGS 1981) shows that the site has two types of geology To the north of Engine River the land is underlain by alluvium with the rest of the site being underlain by river terrace gravels

18 The published soils information (SSEW 1983) shows that there are two main soil types which follow the geology of the site To the north of Engine River the soils are from the Thames Association and are described as being stoneless mainly calcareous clayey soils affected by groundwater Risk of flooding (SSEW 1983) The rest of the site consists of soils from the Waterstock Association These are described as deep permeable mainly fine loamy soils variably affected by groundwater Some deep well drained fine and coarse loamy soils are also found (SSEW 1983)

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 page 2

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 III

Subgrade 3b

21 Land mapped as Subgrade 3b moderate quality is subject to either moderate soil wetness or droughtiness limitations The former occur to the north east of Broadwater Farm Topsoils typically comprise non-calcareous heavy clay loams passing to slowly permeable clay subsoils These profiles which are represented by Pit 4 are imperfectly drained as indicated by gleying below the topsoil This drainage impedance is partially offset by the dry local climate such that Wetness Class III is appropriate (see Appendix II) The interaction between the heavy topsoils and drainage characteristics with the local climate means that this land is classified as Subgrade 3b This land is subject to significant restrictions on the timing and type of cropping, stocking and cultivating which can successfully take place Within this mapping unit there are a few profiles with medium clay loam topsoils or permeable subsoils The profiles with medium clay loam topsoils were also assessed as Wetness Class III but because of their slightly lighter topsoil texture they were classified as Subgrade 3a The profiles with permeable subsoils are also classified as better agricultural land However at the level of detail of the survey this better quality land cannot be delineated separately

22 The land adjacent to Greenland Farm and Broadwater Farm suffers from a moderate droughtiness limitation These profiles have much lighter soil textures than the remainder of the site with medium sandy loam topsoils overlying loamy medium sand and medium sand subsoils The profiles were shown in Pit 1 to be stoneless (less than 1%) throughout The interaction between these soil characteristics and the relatively dry climate results in the amount of soil available water being inadequate to meet crop requirements in most years The resultant soil droughtiness limitation means that this land will suffer from lower and less consistent crop yields Fluctuating groundwater levels mean that some of the profiles particularly those in the hollows mentioned in paragraph 16 have gleyed subsoils but they are assessed as Wetness Class I because of the coarse textures of the subsoil

Grade 4

23 Grade 4 poor quality land has been mapped in a single mapping unit to the north of Engine River The overall limitation to the agricultural use of this land is winter flooding The fields are flooded for up to three weeks most winters as part of a long term management operation for the nearby River Thames and the Desborough Channel The soils of this area are mainly clay topsoils over slowly permeable clay subsoils as shown in Pit 2 A small area has medium sandy loam topsoils and localised gravel deposits lying over the clay subsoil which was seen in Pit 3 The clayey soils mean that the after-effects of the inundation will be more serious than better draining soils as they will remain saturated for longer This severely limits the type and timing of grazing and cultivation operations which can take place

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SOURCES OF REFERENCE

British Geological Survey (1981) *Sheet No 269 Windsor*
BGS London

Ministry of Agriculture Fisheries and Food (1988) *Agricultural Land Classification of England and Wales Revised guidelines and criteria for grading the quality of agricultural land*
MAFF London

Met Office (1989) *Climatological Data for Agricultural Land Classification*
Met Office Bracknell

Soil Survey of England and Wales (1983) *Sheet 6 Soils of South east England 1 250 000*
SSEW Harpenden.

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

APPENDIX I

DESCRIPTIONS OF THE GRADES AND SUBGRADES

Grade 1 Excellent Quality Agricultural Land

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

Grade 2 Very Good Quality Agricultural Land

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

Grade 3 Good to Moderate Quality Land

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

Subgrade 3a Good Quality Agricultural Land

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

Subgrade 3b Moderate Quality Agricultural Land

Land capable of producing moderate yields of a narrow range of crops principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year

Grade 4 Poor Quality Agricultural Land

Land with severe limitations which significantly restrict the range of crops and/or the level of yields It is mainly suited to grass with occasional arable crops (e g cereals and forage crops) the yields of which are variable In moist climates yields of grass may be moderate to high but there may be difficulties in utilisation The grade also includes very droughty arable land

Grade 5 Very Poor Quality Agricultural Land

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

APPENDIX II

SOIL WETNESS CLASSIFICATION

Definitions of Soil Wetness Classes

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

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

Assessment of Wetness Class

Soils have been allocated to wetness classes by the interpretation of soil profile characteristics and climatic factors using the methodology described in *Agricultural Land Classification of England and Wales Revised guidelines and criteria for grading the quality of agricultural land* (MAFF 1988)

[1] The number of days is not necessarily a continuous period
[2] In most years is defined as more than 10 out of 20 years

APPENDIX III

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	
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 **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	**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 **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	**SLST**	soft oolitic or dolomitic 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 BROADWATER FM WEYBRIDGE Pit Number 1P

Grid Reference TQ08006550 Average Annual Rainfall 609 mm
Accumulated Temperature 1506 degree days
Field Capacity Level 127 days
Land Use Permanent Grass
Slope and Aspect degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 27	MSL	10YR31 00	0	0						
27- 66	LMS	10YR43 00	0	0		C	WCSAB	FR	G	
66-120	MS	10YR54 56	0	0		C	WCSAB	VF	M	

Wetness Grade 1 Wetness Class I
Gleying cm
SPL cm

Drought Grade 3B APW 101mm MBW -21 mm
APP 86 mm MBP -33 mm

FINAL ALC GRADE 3B
MAIN LIMITATION Droughtiness

SOIL PIT DESCRIPTION

Site Name BROADWATER FM WEYBRIDGE Pit Number 2P

Grid Reference TQ08206570

Average Annual Rainfall	609 mm
Accumulated Temperature	1506 degree days
Field Capacity Level	127 days
Land Use	Permanent Grass
Slope and Aspect	degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 13	C	10YR32 00	0	0		F				
13- 38	C	10YR52 00	0	0		C	MCPR	VM	P	
38-120	C	25 Y62 00	0	0		M	MCPR	VM	P	

Wetness Grade 3B

Wetness Class	III
Gleying	13 cm
SPL	13 cm

Drought Grade 3A

APW	119mm	MBW	-3 mm
APP	96 mm	MBP	-23 mm

FINAL ALC GRADE 4

MAIN LIMITATION

SOIL PIT DESCRIPTION

Site Name BROADWATER FM WEYBRIDGE Pit Number 2P

Grid Reference TQ08206570

Average Annual Rainfall	609 mm
Accumulated Temperature	1506 degree days
Field Capacity Level	127 days
Land Use	Permanent Grass
Slope and Aspect	degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 13	C	10YR32 00	0	0		F				
13- 38	C	10YR52 00	0	0		C	MCPR	VM	P	
38-120	C	25 Y62 00	0	0		M	MCPR	VM	P	

Wetness Grade 3B

Wetness Class	III
Gleying	13 cm
SPL	13 cm

Drought Grade 3A

APW	119mm	MBW	-3 mm
APP	96 mm	MBP	-23 mm

FINAL ALC GRADE 4

MAIN LIMITATION

SOIL PIT DESCRIPTION

Site Name BROADWATER FM WEYBRIDGE Pit Number 3P

Grid Reference TQ08506590

Average Annual Rainfall 609 mm
Accumulated Temperature 1506 degree days
Field Capacity Level 127 days
Land Use *Permanent Grass*
Slope and Aspect degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 24	MSL	10YR32 00	8	52	HR					
24- 40	SCL	10YR53 63	0	40	HR	C	WACSAB	VM	P	
40-120	C	10YR51 00	0	10	HR	M	MCPR	FM	P	

Wetness Grade 2

Wetness Class III
Gleying 24 cm
SPL 24 cm

Drought Grade 3B

APW 90 mm MBW -32 mm
APP 69 mm MBP -50 mm

FINAL ALC GRADE 4
MAIN LIMITATION

SOIL PIT DESCRIPTION

Site Name BROADWATER FM WEYBRIDGE Pit Number 4P

Grid Reference TQ09006590

Average Annual Rainfall	609 mm
Accumulated Temperature	1506 degree days
Field Capacity Level	127 days
Land Use	Permanent Grass
Slope and Aspect	degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 26	HCL	10YR43 00	0	0		F				
26- 55	C	25Y 63 00	0	0		M	WCPR	FM	P	
55-120	C	10YR73 00	0	0		M	MCPR	FM	P	

Wetness Grade 3B

Wetness Class	III
Gleying	26 cm
SPL	26 cm

Drought Grade 3A

APW	127mm	MBW	5 mm
APP	104mm	MBP	-15 mm

FINAL ALC GRADE 3B
MAIN LIMITATION Wetness

SAMPLE NO	GRID REF	USE	ASPECT		--WETNESS--		-WHEAT-		-POTS-		M REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
			GRDNT	GLEY	SPL	CLASS	GRADE	AP	MB	AP	MB							
1	TQ09006610	PGR				1	1	87	-35	90	-29	3B				DR	3B	IMP 55
1P	TQ08006550	PGR				1	1	101	-21	86	-33	3B				DR	3B	
2	TQ09106610	PGR		25	45	3	3B	133	11	110	-9	2				WE	3B	
2P	TQ08206570	PGR		13	13	3	3B	119	-3	96	-23	3A	Y			FL	4	
3	TQ09206610	PGR		30	45	3	3B	131	9	108	-11	3A				WE	3B	
3P	TQ08506590	PGR		24	24	3	2	90	-32	69	-50	3B	Y			FL	4	
4P	TQ09006590	PGR		26	26	3	3B	127	5	104	-15	3A				WE	3B	
5	TQ08606600	PGR						14	-108	14	-105	4	Y			FL	4	IMP 15
6	TQ08706600	PGR						14	-108	14	-105	4	Y			FL	4	IMP 15
7	TQ08806600	PGR				1	2	54	-68	54	65	4				DR	3B	IMP 30
8	TQ08906600	PGR				1	2	54	-68	54	-65	4				DR	3B	IMP 30
9	TQ09006600	PGR		25	50	3	3B	106	-16	111	-8	3A				WE	3B	AGD 80
10	TQ09106600	PGR		35	35	3	3B	97	-25	109	-10	3B				WE	3B	AGD 70
11	TQ09206600	PGR		30	30	3	3B	94	-28	106	-13	3B				WE	3B	AGD 70
12	TQ08006590	PGR		20	20	3	3B	87	-35	99	-20	3B	Y			FL	4	AGD 70
13	TQ08106590	PGR		0	20	3	3B	87	-35	99	-20	3B	Y			FL	4	AGD 70
14	TQ08206590	PGR		20	20	3	3B	101	-21	99	-20	3B	Y			FL	4	AGD 90
15	TQ08306590	PGR		20	20	2	3B	67	-55	67	-52	4	Y			FL	4	IMP 45
16	TQ08406590	PGR				1	1	14	-108	14	-105	4	Y			FL	4	IMP 15
17	TQ08506590	PGR				1	1	14	-108	14	-105	4	Y			FL	4	IMP 15
18	TQ08606590	PGR				1	1	14	-108	14	-105	4	Y			FL	4	IMP 15
19	TQ08706590	PGR		0	20	3	3B	87	-35	99	-20	3B	Y			FL	4	AGD 70
20	TQ08806590	PGR				1	1	152	30	112	-7	2				DR	2	3B MAP UNIT
21	TQ08906590	PGR		30	30	3	3A	124	2	106	-13	3A				WE	3B	IMP 90
22	TQ09006590	PGR		30	30	3	3A	129	7	106	-13	3A				WE	3A	3B MAP UNIT
23	TQ09106590	PGR		30	30	3	3B	130	8	106	-13	3A				WE	3B	
25	TQ07906580	PGR		30	30	3	3B	126	4	103	-16	3A	Y			FL	4	
26	TQ08006580	PGR		25	25	3	3B	82	-40	88	-31	3B	Y			FL	4	AGD 60
27	TQ08106580	PGR		18	18	3	3B	86	-36	98	-21	3B	Y			FL	4	AGD 70
28	TQ08206580	PGR		20	20	3	3B	87	-35	99	-20	3B	Y			FL	4	AGD 70
29	TQ08306580	PGR		25	25	3	3B	89	-33	101	-18	3B	Y			FL	4	AGD 70
30	TQ08406580	PGR		20	20	3	3B	87	-35	99	-20	3B	Y			FL	4	AGD 70
31	TQ08506580	PGR		0	18	3	3B	86	-36	98	-21	3B	Y			FL	4	AGD 70
32	TQ08606580	PGR		0	15	3	3B	85	-37	97	-22	3B	Y			FL	4	AGD 70
33	TQ08706580	PGR		20	20	3	3B	87	-35	99	-20	3B	Y			FL	4	AGD 70
34	TQ08806580	PGR		30	30	3	3B	94	-28	106	-13	3B				WE	3B	AGD 70
35	TQ08906580	PGR		35	35	3	3B	97	-25	109	-10	3B				WE	3B	AGD 70
36	TQ09006580	PGR		30	30	3	3A	94	-28	106	-13	3B				WE	3A	AGD70-3B UNIT
38	TQ07906570	PGR		25	25	3	3B	125	3	101	-18	3A	Y			FL	4	
39	TQ08006570	PGR		20	20	3	3B	80	-42	86	-33	3B	Y			FL	4	AGD 60
40	TQ08106570	PGR		20	20	3	3B	87	-35	99	-20	3B	Y			FL	4	AGD 70
41	TQ08206570	PGR		20	20	3	3B	80	-42	86	-33	3B	Y			FL	4	AGD 60

SAMPLE NO	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	DRT	M REL FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
42	TQ08306570	PGR		25	25	3	3B		82	-40	88	-31	3B	Y			FL	4	AGD 60
43	TQ08406570	PGR		25	25	3	3B		89	-33	101	-18	3B	Y			FL	4	AGD 70
44	TQ08506570	PGR		0	22	3	3B		88	-34	100	-19	3B	Y			FL	4	AGD 70
45	TQ08606570	PGR		0	25	3	3B		89	-33	101	-18	3B	Y			FL	4	AGD 70
46	TQ08706570	PGR		20	50	3	2		112	-10	89	-30	3A	Y			FL	3B	
47	TQ08806570	PGR		30	30	3	3A		94	-28	106	-13	3B				WE	3A	AGD70-3B UNIT
48	TQ08906570	PGR		35	35	3	3B		97	-25	109	-10	3B				WE	3B	AGD 70
50	TQ07806560	PGR		30		1	1		127	5	96	-23	3A				DR	3A	3B MAP UNIT
51	TQ07906560	PGR		60		1	1		153	31	112	-7	2				DR	2	3B MAP UNIT
52	TQ08006560	PGR				1	1		51	-71	51	-68	4				DR	3B	IMP 30
54	TQ08206560	PGR		0	20	3	3B		87	-35	99	-20	3B	Y			FL	4	AGD 70
55	TQ08306560	PGR		0	20	3	3B		87	-35	99	-20	3B	Y			FL	4	AGD 70
56	TQ08406560	PGR		0	20	3	3B		87	-35	99	-20	3B	Y			FL	4	AGD 70
57	TQ08506560	PGR		0	20	3	3B		87	-35	99	-20	3B	Y			FL	4	AGD 70
58	TQ08606560	PGR		25		1	1		99	-23	84	-35	3B				DR	3B	
59	TQ08706560	PGR		20		1	1		97	-25	82	-37	3B	Y			FL	4	
60	TQ08806560	PGR		25		1	1		117	-5	86	-33	3B				DR	3B	
61	TQ07806550	PGR				1	1		105	-17	89	-30	3A				DR	3A	3B MAP UNIT
63	TQ08006550	PGR				1	1		101	-21	85	-34	3B				DR	3B	
64	TQ08106550	PGR				1	1		101	-21	85	-34	3B				DR	3B	
65	TQ08206550	PGR				1	1		103	-19	87	-32	3B				DR	3B	
66	TQ08306550	PGR		60	60	2	1		109	-13	96	-23	3A				DR	3A	AGD100-3B UNIT
67	TQ08406550	PGR				1	1		105	-17	89	-30	3A				DR	3A	3B MAP UNIT
68	TQ08506550	PGR		30		1	1		90	-32	73	-46	3B	Y			DR	3B	
69	TQ08606550	PGR				1	1		101	-21	85	-34	3B				DR	3B	
71	TQ07806540	PGR				1	1		101	-21	85	-34	3B				DR	3B	
74	TQ08106540	PGR		50		1	1		98	-24	81	-38	3B				DR	3B	
75	TQ08206540	PGR				1	1		121	-1	89	-30	3A				DR	3A	3B MAP UNIT
76	TQ08306540	PGR		30		1	1		101	-21	85	-34	3B	Y			DR	3B	
77	TQ08406540	PGR				1	1		100	-22	83	-36	3B				DR	3B	
78	TQ08506542	PGR				1	1		121	-1	89	-30	3A				DR	3A	3B MAP UNIT

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL	PED GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	STR	POR	IMP	SPL	CALC
1	0-30	hcl	10YR43 00						0	0	HR	5						
	30-55	hcl	10YR54 00	00MN00	00	C			0	0	HR	5		M				
1P	0-27	msl	10YR31 00						0	0		0						
	27-66	lms	10YR43 00	10YR58	00	C			0	0		0	WCSAB	FR	G			
	66-120	ms	10YR54 56	75YR58	00	C			0	0		0	WCSAB	VF	M			
2	0-25	hcl	10YR42 00						0	0		0						
	25-45	hcl	10YR63 00	10YR58	00	C	00MN00	00 Y	0	0		0		M				
	45-120	c	10YR51 00	10YR58	00	M		Y	0	0		0		P	Y		Y	
2P	0-13	c	10YR32 00	10YR56	00	F			0	0		0						
	13-38	c	10YR52 00	75YR56	00	C		Y	0	0		0	MCPR	VM	P	Y		Y
	38-120	c	25 Y62 00	05YR46	00	M		Y	0	0		0	MCPR	VM	P	Y		Y
3	0-30	hcl	10YR43 00						0	0	HR	5						
	30 45	hcl	10YR53 00	10YR58	00	C	00MN00	00 Y	0	0		0		M				
	45-120	c	10YR51 00	10YR58	00	M		Y	0	0		0		P	Y		Y	
3P	0 24	msl	10YR32 00						8	0	HR	52						
	24 40	scl	10YR53 63	10YR68	72	C	00MN00	00 Y	0	0	HR	40	WACSAB	VM	P	Y		Y
	40-120	c	10YR51 00	10YR58	00	M		Y	0	0	HR	10	MCPR	FM	P	Y		Y
4P	0 26	hcl	10YR43 00	10YR66	00	F			0	0		0						
	26-55	c	25Y 63 00	75YR58	00	M	00MN00	00 Y	0	0		0	WCPR	FM	P	Y		Y
	55-120	c	10YR73 00	10YR58	72	M		Y	0	0		0	MCPR	FM	P	Y		Y
5	0 15	msl	10YR32 00						0	0	HR	50						
6	0 15	msl	10YR32 00						0	0	HR	50						
7	0 30	hcl	10YR42 00						0	0		0						
8	0-30	hcl	10YR42 00						0	0		0						
9	0-25	hcl	10YR43 00						0	0		0						
	25-50	hcl	10YR53 00	10YR68	00	C	00MN00	00 Y	0	0		0		M				
	50-80	c	10YR51 00	10YR58	00	M		Y	0	0		0		P	Y		Y	
10	0-35	hcl	10YR32 00	75YR58	00	C			0	0		0						
	35 70	c	10YR52 00	10YR56	00	M		Y	0	0		0		P	Y		Y	
11	0-30	hcl	10YR54 00	75YR58	00	C			0	0		0						
	30-70	c	10YR52 00	10YR58	00	M		Y	0	0		0		P	Y		Y	
12	0-20	c	10YR32 00	10YR58	00	C			0	0		0						
	20-70	c	10YR52 00	10YR58	64	M		Y	0	0		0		P	Y		Y	

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC
13	0-20	c	10YR42 00	10YR66 00	C			Y	0	0		0						
	20-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
14	0-20	c	10YR32 00	10YR66 00	C				0	0		0						
	20-90	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
15	0-20	c	10YR32 00	10YR66 00	F				0	0		0						
	20-45	c	10YR52 42	10YR58 00	M			Y	0	0		0		P	Y		Y	
16	0-15	msl	10YR43 00						0	0	HR	50						
17	0-15	msl	10YR43 00						0	0	HR	50						
18	0 15	msl	10YR32 00						0	0	HR	50						
19	0-20	c	10YR42 00	10YR66 00	C			Y	0	0		0						
	20-70	c	10YR51 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
20	0-30	hcl	10YR42 00						0	0	HR	5						
	30-55	hcl	10YR54 00	10YR58 00	F		00MN00 00		0	0	HR	5		M				
	55-120	scl	10YR56 00						0	0		0		M				
21	0-30	hcl	10YR43 00						0	0		0						
	30-80	c	10YR53 64	10YR56 00	C			Y	0	0		0		P	Y		Y	
	80-120	lms	10YR63 00	75YR58 00	M			Y	0	0	HR	20		G				
22	0-30	mcl	10YR43 00	10YR66 00	F				0	0		0						
	30-60	c	25Y 53 00	75YR58 00	M			Y	0	0		0		P	Y		Y	
	60-120	c	10YR63 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
23	0-30	hcl	10YR43 00	10YR56 00	F				0	0		0						
	30-70	c	10YR63 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
	70-120	lms	10YR64 00	10YR58 00	M			Y	0	0		0		G				
25	0-30	c	10YR32 00	10YR58 00	C				0	0		0						
	30-60	c	25Y 52 00	10YR66 00	C			Y	0	0		0		P	Y		Y	
	60 120	c	25Y 62 00	75YR58 00	M			Y	0	0		0		P	Y		Y	
26	0-25	c	10YR33 00	10YR56 00	C				0	0		0						
	25-60	c	25Y 52 00	10YR58 00	C			Y	0	0		0		P	Y		Y	
27	0-18	c	10YR32 00	75YR66 00	C				0	0		0						
	18-70	c	10YR52 00	10YR58 00	C			Y	0	0		0		P	Y		Y	
28	0-20	c	10YR32 00	10YR66 00	C				0	0		0						
	20-70	c	10YR62 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
29	0-25	c	10YR32 00	10YR66 00	F				0	0		0						
	25-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL	GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC
30	0-20	c	10YR32 00	10YR66 00	C				0	0		0						
	20-70	c	10YR51 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
31	0-18	c	10YR42 00	75YR58 00	C			Y	0	0		0						
	18-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
32	0-15	c	10YR42 00	10YR66 00	C			Y	0	0		0						
	15-70	c	10YR61 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
33	0-20	c	10YR32 00	10YR66 00	C				0	0		0						
	20-70	c	10YR61 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
34	0-30	hcl	10YR32 00	75YR58 00	C				0	0		0						
	30-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
35	0-35	hcl	10YR43 00	75YR58 00	C				0	0		0						
	35-70	c	10YR62 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
36	0 30	mcl	10YR32 00	75YR56 00	C				0	0		0						
	30-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
38	0-25	c	10YR33 00	10YR58 00	C				0	0		0						
	25-50	c	25Y 52 00	10YR58 00	C			Y	0	0		0		P	Y		Y	
	50-70	c	25Y 62 00	75YR58 00	M			Y	0	0		0		P	Y		Y	
	70-120	lms	10YR62 00	10YR68 00	C			Y	0	0		0		G				
39	0-20	c	10YR33 00	10YR56 00	C				0	0		0						
	20 60	c	25Y 52 00	10YR58 64	M			Y	0	0		0		P	Y		Y	
40	0 20	c	10YR32 00	10YR66 00	C				0	0		0						
	20 70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
41	0 20	c	10YR32 00	10YR66 00	C				0	0		0						
	20 60	c	25Y 52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
42	0 25	c	10YR32 00	75YR58 00	C				0	0		0						
	25 60	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
43	0-25	c	10YR32 00	10YR66 00	F				0	0		0						
	25-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
44	0-22	c	10YR42 00	75YR58 00	C			Y	0	0		0						
	22-70	c	10YR52 00	10YR58 66	M			Y	0	0		0		P	Y		Y	
45	0-25	c	10YR42 00	10YR66 00	C			Y	0	0		0						
	25-70	c	10YR41 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
46	0 20	msl	10YR43 00						0	0		0						
	20 50	lms	10YR63 00	10YR56 00	C			Y	0	0		0		G				
	50 120	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL	GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC
47	0-30	mcl	10YR43 00	10YR56 00	C				0	0		0						
	30-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
48	0-35	hcl	10YR43 00	75YR58 00	C				0	0		0						
	35-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
50	0 30	msl	10YR33 00	10YR66 00	C				0	0		0						
	30-50	msl	10YR42 00	10YR58 00	C			Y	0	0	HR	15		M				
	50-120	lms	10YR42 00	75YR58 00	M			Y	0	0		0		G				
51	0-35	msl	10YR31 00						0	0		0						
	35-60	msl	10YR54 00						0	0		0		M				
	60 120	scl	10YR53 43	10YR56 00	C			Y	0	0		0		M				
52	0-30	msl	10YR31 00						0	0		0						
54	0-20	c	10YR42 00	10YR66 00	C			Y	0	0		0						
	20-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
55	0-20	c	10YR42 00	10YR66 00	C			Y	0	0		0						
	20-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
56	0-20	c	10YR42 00	10YR66 00	C			Y	0	0		0						
	20-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
57	0-20	c	10YR42 00	75YR58 00	C			Y	0	0		0						
	20-70	c	10YR52 00	10YR58 00	M			Y	0	0		0		P	Y		Y	
58	0 25	msl	10YR42 00						0	0		0						
	25-65	lms	10YR63 53	10YR58 00	C			Y	0	0		0		G				
	65-120	ms	10YR73 00					Y	0	0		0		M				
59	0-20	msl	10YR32 00	75YR58 00	C				0	0		0						
	20-70	lms	10YR63 00	10YR56 68	M			Y	0	0		0		G				
	70-120	ms	10YR62 00	75YR58 00	M			Y	0	0		0		M				
60	0-25	msl	10YR54 00	75YR58 00	C				0	0		0						
	25-120	lms	10YR62 64	10YR58 00	M		00MN00 00	Y	0	0		0		G				
61	0-30	msl	10YR31 00						0	0		0						
	30-70	lms	10YR43 00						0	0		0		G				
	70-120	ms	10YR54 00						0	0		0		M				
63	0-30	msl	10YR31 00						0	0		0						
	30-60	lms	10YR43 00						0	0		0		G				
	60-120	ms	10YR44 00						0	0		0		M				
64	0-30	msl	10YR31 00						0	0		0						
	30 60	lms	10YR43 00	10YR56 00	C				0	0		0		G				
	60-120	ms	10YR43 53	00MN00 00	C				0	0		0		M				

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
65	0-30	msl	10YR32 00						0	0		0						
	30-65	lms	10YR54 00						0	0		0		G				
	65-120	ms	10YR73 00						0	0		0		M				
66	0-30	msl	10YR32 00						0	0		0						
	30-60	lms	10YR64 00						0	0		0		G				
	60-100	c	10YR52 73	10YR58 00	C		00MN00 00	Y	0	0		0		P	Y		Y	
67	0-30	msl	10YR32 00						0	0		0						
	30-70	lms	10YR64 00						0	0		0		G				
	70-120	ms	10YR73 00						0	0		0		M				
68	0-30	msl	10YR44 00	75YR58 00	C				0	0		0						
	30-120	ms	10YR63 54	75YR58 00	C			Y	0	0		0		M				
69	0 30	msl	10YR42 00						0	0		0						
	30 58	lms	10YR44 00						0	0		0		G				
	58 120	ms	10YR63 54	00MN00 00	C				0	0		0		M				
71	0 30	msl	10YR31 00						0	0		0						
	30-60	lms	10YR43 00						0	0		0		G				
	60 120	ms	10YR56 00						0	0		0		M				
74	0-30	msl	10YR31 00						0	0		0						
	30-50	lms	10YR43 00						0	0		0		G				
	50-120	ms	10YR54 53	75YR56 00	C		00MN00 00	Y	0	0		0		M				
75	0-30	msl	10YR43 00						0	0		0						
	30-120	lms	10YR64 00						0	0		0		G				
76	0-30	msl	10YR32 00	75YR58 00	C				0	0		0						
	30-60	lms	10YR64 00	10YR58 00	C			Y	0	0		0		G				
	60-120	ms	10YR73 00	10YR68 00	C			Y	0	0		0		M				
77	0-30	msl	10YR43 00						0	0		0						
	30-55	lms	10YR54 00						0	0		0		G				
	55-120	ms	10YR63 00						0	0		0		M				
78	0-30	msl	10YR43 00						0	0		0						
	30-120	lms	10YR64 44						0	0		0		G				