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HORNTON 1

**Agricultural Land Classification and
Statement of Physical Characteristics**

May 1999

**Resource Planning Team
Eastern Region
FRCA Reading**

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AGRICULTURAL LAND CLASSIFICATION & STATEMENT OF SITE PHYSICAL CHARACTERISTICS

HORNTON 1

INTRODUCTION

- 1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 79.1 ha of land at Hornton near Banbury Oxfordshire. The survey was carried out during May 1999.
- 2 The survey was undertaken by the Farming and Rural Conservation Agency (FRCA)¹ 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 agricultural land on the site was under wheat, barley and grass grazed by sheep. The areas mapped as 'Other land' include extensive farm buildings, woodland, a bridle road and a large area of active mineral workings with associated haul road. There are two separate areas of land which are indicated as restored land (red boundary) or land in oil seed rape (cross hatching) which proved inaccessible at the time (May 1999).

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 60 borings and 5 soil pits are described.
- 8 The agricultural land on the site has been classified as Grade 2 (very good quality), Subgrade 3a (good quality) and Subgrade 3b (moderate quality) with soil droughtiness and overall climate the principal limitations, with gradient to a lesser extent.
- 9 Most of the site is affected by a soil droughtiness limitation with well drained fine loamy soils having stony subsoils and a progressively diminishing soil resource where ironstone deposits are closer to the surface. The severity of the limitation depends upon the relationship between the soil properties and climatic factors. Moisture balance calculations indicate Grade 2 for the

¹ FRCA is an executive agency of MAFF and the Welsh Office.

deeper fine loamy soils over the ironstone and for the progressively shallower soil resource Subgrades 3a and 3b is appropriate. The effect of a shortfall of available moisture to plant roots may cause the level and consistency of yields to be depressed particularly in drier years. In addition, climate has an overriding influence on land quality on the site restricting the survey area to Grade 2 irrespective of the more favourable soil conditions. This may both effect the range of potential agricultural uses and the cost and level of production.

- 10 Some Subgrade 3b land in the extreme south is also restricted by steep gradients which affect mechanised farm operations and the safe and efficient use of machinery on sloping land.

Table 1 Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	/ site area
2	19.8	43.5	25.0
3a	11.7	25.7	14.8
3b	14.0	30.8	17.7
Agricultural land not surveyed	3.9	N/A	4.9
Restored land	8.6	N/A	10.9
Other land	21.1	N/A	26.7
Total surveyed area	45.5	100	57.5
Total site area	79.1		100

FACTORS INFLUENCING ALC GRADE

Climate

- 11 Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.
- 12 The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met Office 1989).
- 13 The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.
- 14 The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR) as a measure of overall wetness and accumulated temperature (ATO January to June) as a measure of the relative warmth of a locality.
- 15 The combination of rainfall and temperature at this site mean that there is a minor overall climate limitation with accumulated temperature (ATO) recorded as being low in a regional context. The site is climatically Grade 2 which means that land cannot be classified higher than Grade 2 due to the relatively cool climate. However other local climatic factors such as exposure and frost risk are not believed to be significant at the site.

Table 2 Climatic and altitude data

Factor	Units	Values	
		SP 389 444	SP 382 441
Grid reference	N/A	185	180
Altitude	m AOD	1288	1294
Accumulated Temperature	day C (Jan June)	722	719
Average Annual Rainfall	mm	164	163
Field Capacity Days	days	91	92
Moisture Deficit Wheat	mm	76	78
Moisture Deficit Potatoes	mm		
Overall climatic grade	N/A	Grade 2	Grade 2

Site

- 16 The site lies in the altitude range 170–190 m AOD with the highest land found along the north eastern boundary and the lowest lying land located along the southern boundary. The irregular southern boundary outlines the extent of the Marlstone Rock Bed which falls quickly away with gradients measured in the range 8°–11° resulting in a gradient limitation restricting land quality to Subgrade 3b. Nowhere on the site do microrelief or flooding affect land quality.

Geology and soils

- 17 The most detailed published geological information (BGS 1982) shows the whole site 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).
- 18 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. Soils fitting the first half of this general description were observed across the site.

AGRICULTURAL LAND CLASSIFICATION

- 19 The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1 page 1.
- 20 The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II.
- 21 Also shown on the attached ALC map is 8.6ha of land which has been restored back to agriculture. Anecdotal evidence suggests that this area indicated by the red boundary has been restored in the last three years prior to the date of this survey. The area has not been formally graded because physical conditions on restored land may take several years to stabilise therefore the land is not normally graded until the end of the statutory aftercare period or otherwise not until 5 years after soil replacement (MAFF 1988). However a

number of exploratory auger borings and two pits highlight the variability of the soil resource in this unit

Grade 2

- 22 Very good quality agricultural land suffers from a minor climate limitation which restricts land quality to grade 2 regardless of more favourable soil or site characteristics. In general climate has a significant and in places overriding influence on land quality by affecting both the range of potential agricultural uses and the cost and level of production. However on this site limitations are relatively minor. There are two soil variants in the grade 2 mapping unit. There are a number of deep well drained auger borings located around Hornton Grounds in the west. These soils are typically non calcareous medium clay loam topsoils which contain up to 10% total hard rock by volume. These overlie similar or heavy clay loam upper subsoils which contain up to 25% total ironstone. These pass to similarly stony and textured lower subsoils down to 120 cm. Moisture balance calculations which take account of the interaction of these soil properties with the prevailing climatic indicate these soils are Grade 1. However overall climate indicates that the site cannot be classified any higher than Grade 2 (see Table 2)
- 23 Some grade 2 land also suffers from a minor soil droughtiness limitation. Soils in this unit are well drained (Wetness Class I) with medium clay loam topsoils with total hard rock in the range 2–12% (1% > 2 cm in size). These overlie similarly textured upper subsoils containing around 40% total hard rock (ironstone). From 52–90cm these soils were impenetrable to the soil auger due an increase in the volume of ironstone or where solid ironstone is encountered. Pit 4 (see Appendix II) represents the shallowest variant of the mapping unit and confirmed the increase with depth of the ironstone and the fractured nature of the underlying ironstone which allowed rooting to develop further down the profile. These soil properties in the prevailing climate result in a shortfall in the profile available water and moisture balance calculations indicate Grade 2 is appropriate

Subgrade 3a

- 24 Good quality agricultural land suffers from a greater soil droughtiness limitation and represents a shallower/stonier variant of the Grade 2 soils as previously described. Pit 1 (see Appendix II) is representative of these well drained (Wetness Class I) soils. These soils are typical of the land in the east of the site which comprise a medium clay loam topsoil with 12% total hard rock (ironstone) by volume (1% > 2 cm in size). These overlie a similarly textured or heavy clay loam upper subsoil with 20% hard rock. These pass to a similarly textured lower subsoil with 30% hard rock. In Pit 1 from 76 cm solid flaggy ironstone is encountered which restricted rooting. Moisture balance calculations 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

- 25 Land of moderate quality is found in a number of areas. Soil droughtiness is the principal limitation to land quality with gradient to a lesser extent. Most of this mapping unit is affected by a significant soil droughtiness limitation due to impenetrable stony profiles. Pit 2 (see

Appendix II) is representative of these soils which are typically non calcareous and well drained (Wetness Class I) The soils comprise medium clay loam topsoils with up to 18% ironstone (7% >2cm) These pass to similarly textured subsoils which become increasingly stony with depth In pit 2 subsoil ironstone content increased from 57% to 68% From 62cm flaggy solid ironstone was observed in the pit with rooting extending only down to 70cm Moisture balance calculations indicate a significant soil droughtiness limitation which could adversely affect the level and consistency of crop yields particularly in drier years Gradient also restricts land quality to Subgrade 3b typically in the range 8°–11 This affects land in the south where the irregular site boundary marks the outcrop of the ironstone A gradient limitation will affect the safe and efficient use of agricultural machinery

SOIL RESOURCES

- 26 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

- 27 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

- 28 This unit covers an area of 14.1 hectares and comprises a moderately stony medium clay loam (occasionally heavy clay loam) topsoil to an average mean depth of 30cm (range 28–40cm) Subsoils comprise a very stony similarly textured (occasionally heavy clay loam) horizon with a mean thickness of 30cm (see Pit 2) resting on shattered ironstone rock to a depth of 120cm

Representative soil profile for Soil Unit I

Horizon	Average Mean Depth (cm)	Description
Topsoil	0–30	non-calcareous medium clay loam brown (7.5YR4/4) moderately stony (20% hardrock) moderately developed coarse angular blocky friable
Subsoil	30–60	non-calcareous medium clay loam strong brown (7.5YR4/6.5/6) very stony (65% hardrock) too stony to access ped development moderate structure
Subsoil	60–120	shattered ironstone

Soil Unit 2

- 29 This unit covers an area of 10.7 hectares and comprises a slightly stony medium clay loam (occasionally heavy clay loam) topsoil to a depth of 30cm (range 28–36cm) Subsoils

comprise a moderately to very stony similarly textured (occasionally heavy clay loam) horizon with a mean thickness of 30cm (range 40–65cm) resting on overburden to a depth of 120cm. There are profiles in this unit which are less stony and with a deeper soil resource than soil unit 1.

Representative soil profile for Soil Unit 2

Horizon	Average Mean Depth (cm)	Description
Topsoil	0–30	non-calcareous medium clay loam brown (7.5YR4/4) slightly stony (10% hardrock) moderately developed coarse angular blocky friable moderate structure
Subsoil	30–60	non-calcareous medium clay loam strong brown (7.5YR4/6 5/6) moderately to very stony (40% hardrock) too stony to assess ped development moderate structure
Subsoil	60–120	shattered ironstone

Soil Unit 3

30 This unit covers an area of 20.9 hectares and comprises a slightly stony medium clay loam topsoil to a depth of 30cm (range 25–40). Subsoils comprise a moderately to very stony similarly textured (occasionally heavy clay loam) horizon with a mean thickness of 70cm (range 54–120cm) given the variability only one subsoil has been recognised though there are some shallower profiles as well as those which are less stony with a soil resource to 120cm.

Representative soil profile for Soil Unit 3

Horizon	Average Mean Depth (cm)	Description
Topsoil	0–30	non-calcareous medium clay loam brown (7.5YR4/4) slightly stony (10% hardrock) moderately developed coarse sub angular blocky friable moderate structure
Subsoil	30–100	non-calcareous medium clay loam brown/strong brown (7.5YR4/4–4/6) moderately to very stony (<45% hardrock) moderately developed coarse sub angular blocky very friable good structure
Subsoil	100–120	shattered ironstone

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SOURCES OF REFERENCE

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BGS: London.

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

Soil Survey of England and Wales (1983) *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

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)

SAMPLE NO	GRID REF	ASPECT USE	-WETNESS-		-WHEAT		POTS-		M REL		EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
			GRDNT	GLEYSPL	CLASS	GRADE	AP	MB	AP	MB					
1	SP38704500	WHT			4	3B	63	28	63	13	3B		WE	3B	RESTORED
2	SP38604490	WHT			4	3B	62	29	62	14	3B		WE	3B	RESTORED
3	SP38704490	WHT			4	3B	71	20	71	5	3A		WE	3B	RESTORED
6	SP38604480	WHT			4	3B	77	14	80	4	3A		WE	3B	RESTORED
7	SP38704480	WHT			4	3B	70	21	70	-6	3B		WE	3B	RESTORED
10	SP39004480	WHT	N	1	1	1	75	16	75	1	3A		DR	3A	IMP45 SEE1P
11	SP39104480	WHT	NE	1	1	2	148	57	114	38	1		WE	2	GRADE 2 OC
12	SP38604470	BAR			4	3B	81	10	86	10	3A		WE	3B	RESTORED
15	SP38904470	WHT	SE	1	1	1	112	21	114	38	2		DR	2	GRADE 2 OC
16	SP39004470	WHT			1	2	61	30	61	15	3B		DR	3B	IMP35 SEE2P
17	SP39104470	WHT			1	2	70	21	70	6	3B		DR	3B	IMP42 SEE2P
18	SP39204470	WHT	N	1	1	1	55	36	55	21	3B		DR	3B	IMP32 SEE2P
19	SP39304470	CER	N	2	1	1	46	-45	46	30	3B		DR	3B	IMP30 SEE2P
20	SP39404470	CER	N	2	1	1	49	-42	49	27	3B		DR	3B	IMP30 SEE2P
21	SP38304460	BAR	N	1	1	1	69	22	69	7	3B		DR	3A	IMP47 SEE4P
22	SP38404460	BAR	E	1	4	3B	64	27	64	12	3B		WE	3B	RESTORED
23	SP38504460	BAR	E	2	4	3B	127	36	98	22	1		WE	3B	RESTORED
28	SP39004460	SAS	NE	2	4	3B	79	12	80	4	3A		WE	3B	RESTORED
29	SP39104460	WHT	S	1	1	1	82	9	98	22	3A		DR	3A	IMP60 SEE1P
30	SP39204460	WHT			1	1	98	7	106	30	2		DR	2	IMP65 SEE1P
31	SP39304460	CER	N	1	1	1	71	20	71	5	3A		DR	3A	IMP50 SEE1P
32	SP39404460				1	1	49	-42	49	27	3B		DR	3B	IMP30 SEE2P
33	SP39504460	CER	N	2	1	1	80	11	80	4	3A		DR	3A	IMP50 SEE1P
34	SP38204450	WHT			1	1	83	-8	87	11	3A		DR	3A	IMP58 SEE1P
35	SP38304450	WHT			1	1	116	25	97	21	2		DR	2	
36	SP38404450	BAR			1	1	98	7	110	34	2		DR	2	IMP70 SEE4P
37	SP38504450	LEY	SF	1	1	1	105	14	103	27	2		DR	2	IMP85 SEE4P
38	SP38604450	PGR			1	1	76	15	76	0	3A		DR	3A	IMP48 SEE4P
43	SP39104450	BAR	SW	8	1	1	139	48	106	30	1		GR	3B	
44	SP39204450	BAR			1	1	77	14	77	1	3A		DR	3A	IMP48 SEE1P
45	SP39304450	CER			1	1	74	17	74	2	3A		DR	3A	IMP48 SEE1P
46	SP39404450	CER			1	1	78	13	79	3	3A		DR	3A	IMP52 SEE1P
47	SP39504450	CER			1	1	66	25	66	10	3B		DR	3B	IMP40 SEE1P
48	SP39604450	CER	N	2	1	1	50	-41	50	26	3B		DR	3B	IMP30 SEE2P
49	SP38204440	WHT	SW	4	1	1	129	38	98	22	1		OC	2	
50	SP38304440	WHT	SE	2	1	1	131	40	102	26	1		OC	2	
52	SP38504440	OTH			1	1	129	38	100	24	1		OC	2	
53	SP38604440	LEY	S	2	1	1	134	43	103	27	1		OC	2	
54	SP38704439	LEY	SW	2	1	1	143	52	111	35	1		OC	2	
58	SP39104440	BAR	SW	3	1	1	117	26	110	34	2		DR	2	IMP90 SEE4P
59	SP39204440	BAR			1	1	57	34	57	19	3B		DR	3B	IMP32
60	SP38204430	WHT	SW	5	1	1	92	1	101	25	3A		DR	3A	IMP70 SEE4P

SAMPLE NO	GRID REF	ASPECT USE	GRDNT	-WETNESS		WHEAT		POTS-		M REL		EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
				GLEYSPL	CLASS	GRADE	AP	MB	AP	MB	DRT					
61	SP38304430	PGR S	2		1	1	41	50	41	35	38			DR	3B	IMP25
62	SP38404430	PGR SW	2		1	1	78	13	79	3	3A			DR	3A	IMP52 SEE4P
63	SP38504430	LEY S	2		1	1	141	50	111	35	1			OC	2	
64	SP38604430	PGR S	1		1	1	82	9	86	10	3A			DR	2	IMP57 SEE4P
65	SP38904430	BAR SW	2		1	1	86	5	88	12	3A			DR	2	IMP54 SEE4P
66	SP39004430	BAR W	3		1	1	141	50	105	29	1			OC	2	
67	SP38204420	PGR SW	5		1	1	33	58	33	-43	4			DR	4	IMP20
68	SP38404420	PGR SW	3		1	1	115	24	104	28	2			DR	2	IMP95 SEE4P
69	SP38504420	LEY SE	1		1	1	81	10	83	7	3A			DR	2	IMP55 SEE4P
70	SP38604420	PGR S	2		1	1	82	9	85	9	3A			DR	2	IMP55 SEE4P
71	SP38704420	PGR E	4	40	1	1	91	0	95	19	3A			DR	3A	IMP58 SEE4P
72	SP38904420	BAR SW	1		1	1	56	35	56	20	38			DR	3B	IMP32
73	SP39004420	BAR S	2		1	1	143	52	107	31	1			OC	2	
74	SP38204410	PGR SW	3		1	1	57	34	57	19	38			DR	3B	IMP35
78	SP38904410	BAR SW	2	85	1	1	144	53	108	32	1			OC	2	
79	SP39004410	BAR SE	5		1	1	90	1	93	17	3A			DR	2	IMP55 SEE4P
80	SP38904400	BAR SW	11		1	1	41	50	41	35	38			GR	3B	IMP25
81	SP39004400	BAR NE	9		1	1	93	2	104	28	3A			GR	3B	IMP70
1P	SP39404470	WHT			1	1	92	1	96	20	3A			DR	3A	ROOTS 76CM
2P	SP39304450	CER N	2		1	1	68	23	71	5	38			DR	3B	ROOTS 70CM
3P	SP38704500	BAR			4	38	83	-8	71	5	3A			WE	3B	COMPACTED SPL
4P	SP38604420	LEY E	2		1	1	96	5	97	21	2			CD	2	ROOTS 120CM
5P	SP38404460	BAR			20	4	38	66	34	72	19	38		WE	3B	COMPACTED SPL

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES-		PED		GLEYS	STONES		STRUCT/ CONSIST	SUBS			CALC	
				COL	ABUN	CONT	COL		2	6		LITH	TOT	STR		POR
1	0-26	MCL	75YR46						5	0	HR	10				
	26-43	MCL	10YR5456						0	0	HR	25		M		Y
2	0-32	MCL	75YR46						5	0	HR	10				
	32-40	MCL	75YR46						0	0	HR	25		M		
3	0-30	MCL	75YR46						5	0	HR	10				
	30-48	MCL	10YR5456						0	0	HR	25		M		Y
6	0-25	MCL	75YR46						5	0	HR	10				
	25-55	HZCL	75YR46						0	0	HR	25		M		
7	0-27	MCL	75YR44						4	0	HR	10				
	27-47	HZCL	10YR46						0	0	HR	25		M		Y
10	0-28	MCL	75YR44						0	0	HR	2				
	28-45	HCL	75YR56						0	0	HR	8		M		
11	0-30	HCL	75YR44						0	0	HR	4				
	30-60	HCL	75YR44						0	0	HR	4			M	
	60-80	MCL	75YR44						0	0	HR	4			M	
	80-120	MCL	75YR44						0	0	HR	10			M	
12	0-30	MCL	75YR46						4	0	HR	10				
	30-48	MCL	75YR46						0	0	HR	25			M	
	48-60	SCL	10YR4456						0	0	HR	20			M	
15	0-25	MCL	75YR44						0	0	HR	2				
	25-80	HCL	75YR44						0	0	HR	4			M	
	80-120	HCL	75YR44						0	0	HR	5			M	
16	0-35	HCL	75YR44						0	0	HR	3				
17	0-30	HCL	75YR44						0	0	HR	4				
	30-42	HCL	75YR56						0	0	HR	5			M	
18	0-28	MCL	75YR44						0	0	HR	3				
	28-32	HCL	75YR56						0	0	HR	3			M	
19	0-30	MCL	75YR44						0	0	HR	15				
20	0-30	MCL	75YR44						0	0	HR	10				
21	0-28	MCL	75YR46						4	0	HR	10				
	28-47	MCL	10YR4656						0	0	HR	25			M	
22	0-31	MCL	75YR46						3	0	HR	10				
	31-42	MCL	10YR5456						0	0	HR	25			M	

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES-			PED		STONES			STRUCT/		SUBS			
				COL	ABUN	CONT	COL	GLEYS	2	6	LITH	TOT	CONSIST	STR	POR	IMP	SPL
23	0-31	MCL	75YR46						5	0	HR	10					
	31-120	MCL	10YR5456						0	0	HR	25		M			Y
28	0-29	MCL	75YR46						1	0	HR	5					
	29-51	MCL	75YR5444						0	0	HR	15		M			
29	0-60	MCL	75YR44						0	0	HR	10					
30	0-30	MCL	75YR44						0	0	HR	2					
	30-50	HCL	75YR44						0	0	HR	3		M			
	50-65	HCL	75YR56						0	0	HR	8		M			
31	0-28	MCL	75YR44						0	0	HR	10					
	28-50	HCL	75YR46						0	0	HR	15		M			
32	0-30	MCL	75YR44						0	0	HR	10					
33	0-30	MCL	75YR44						0	0	HR	5					
	30-50	MCL	75YR46						0	0	HR	10		M			
34	0-39	MCL	75YR46						3	0	HR	10					
	39-58	MCL	10YR4656						0	0	HR	25		M			
35	0-39	MCL	75YR46						3	0	HR	10					
	39-58	MCL	10YR4656						0	0	HR	25		M			
	58-120	MCL	10YR46						0	0	HR	50		M			
36	0-29	MCL	75YR4446						1	0	HR	4					
	29-60	C	10YR5444						0	0	HR	5		M			
	60-70	MCL	75YR44						0	0	HR	25		M			
37	0-30	MCL	75YR44						0	0	HR	5					
	30-75	HCL	75YR46						0	0	HR	20		M			
	75-85	SCL	10YR4656						0	0	HR	25		M			
38	0-36	MCL	75YR44						1	0	HR	5					
	36-48	MCL	75YR46						0	0	HR	25		M			
43	0-32	MCL	10YR44						1	0	HR	5					
	32-47	MCL	75YR46						0	0	HR	20		M			
	47-120	MCL	75YR4656						0	0	HR	15		M			
44	0-36	MCL							0	0	HR	7					
	36-48	MCL	75YR5444						0	0	HR	15		M			
45	0-30	MCL	75YR44						0	0	HR	10					
	30-48	HCL	75YR46						0	0	HR	15		M			

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES		PED		STONES-		STRUCT/		SUBS		SPL	CALC
				COL	ABUN	CONT	COL	GLE	2	6	LITH	TOT	CONSIST		
46	0 30	MCL	75YR44					0	0	HR	10				
	30 52	HCL	75YR46					0	0	HR	15		M		
47	0 30	MCL	75YR44					0	0	HR	5				
	30 40	MCL	75YR46					0	0	HR	10		M		
48	0 25	MCL	75YR4344					0	0	HR	5				
	25-30	MCL	75YR4446					0	0	HR	10		M		
49	0 30	MCL	75YR4446					3	0	HR	10				
	30 75	HCL	75YR46					0	0	HR	25		M		
	75-120	MCL	75YR4656					0	0	HR	20		M		
50	0-40	MCL	75YR4446					3	0	HR	10				
	40 70	HCL	75YR46					0	0	HR	25		M		
	70 120	MCL	75YR46					0	0	HR	25		M		
52	0 31	MCL	75YR44					3	0	HR	10				
	31 50	MCL	75YR4446					0	0	HR	20		M		
	50 120	MCL	10YR5456					0	0	HR	25		M		
53	0-29	MCL	75YR44					0	0	HR	5				
	29-85	HCL	75YR4446					0	0	HR	20		M		
	85-120	HCL	75YR46					0	0	HR	20		M		
54	0 27	MCL	75YR44					0	0	HR	2				
	27 90	HCL	75YR46					0	0	HR	8		M		
	90 120	MCL	75YR56					0	0	HR	20		M		
58	0 38	MCL	75YR44					0	0	HR	4				
	38 75	MCL	75YR46					0	0	HR	15		M		
	75-90	HCL	75YR46					0	0	HR	10		M		
59	0 32	MCL	75YR44					0	0	HR	7				
	32 34	MCL	75YR4454					0	0	HR	15		M		
60	0 38	MCL	75YR44					3	0	HR	10				
	38-70	MCL	10YR5646					0	0	HR	25		M		
61	0 25	MCL	75YR4344					0	0	HR	10				
62	0 20	MCL	75YR44					0	0	HR	2				
	20 52	MCL	75YR46					0	0	HR	15		M		
63	0 35	MCL	75YR44					0	0	HR	1				
	35-80	HCL	75YR46					0	0	HR	15		M		
	80 120	MCL	75YR56					0	0	HR	20		M		

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES-		PED		STONES-		STRUCT/		SUBS		
				COL	ABUN	CONT	COL	GLE	2	6	LITH	TOT	CONSIST	STR
64	0-25	MCL	75YR4344					0	0	HR	8			
	25-57	MCL	75YR4644					0	0	HR	15		M	
65	0-40	MCL	10YR44					0	0	HR	5			
	40-54	MCL	10YR4454					0	0	HR	15		M	
66	0-30	MCL	75YR44					0	0	HR	4			
	30-45	MCL	75YR56					0	0	HR	15		M	
	45-70	MCL	10YR4456					0	0	HR	20		M	
	70-120	MCL	10YR4456					0	0	HR	10		M	
67	0-20	MCL	75YR4344					0	0	HR	15			
68	0-25	MCL	75YR44					0	0	HR	2			
	25-50	MCL	75YR56					0	0	HR	20		M	
	50-95	MCL	75YR46					0	0	HR	15		M	
69	0-25	MCL	75YR44					0	0	HR	2			
	25-55	MCL	75YR44					0	0	HR	20		M	
70	0-25	MCL	75YR4344					0	0	HR	8			
	25-55	MCL	75YR4446	75YR56		F	D	0	0	HR	10		M	
71	0-27	MCL	75YR4344					0	0	HR	3			
	27-40	HCL	75YR4446	75YR5658		F	F	0	0	HR	5		M	
	40-58	HCL	10YR52	10YR4656		C	D	Y	0	0	HR	2		M
72	0-27	MCL	75YR46					0	0	HR	5			
	27-34	MCL	75YR46					0	0	HR	15		M	
73	0-25	MCL	75YR44					0	0	HR	4			
	25-50	MCL	75YR56					0	0	HR	15		M	
	50-75	MCL	10YR4456					0	0	HR	10		M	
	75-120	MCL	10YR56					0	0	HR	5		M	
74	0-35	MCL	75YR4344					0	0	HR	10			
78	0-25	MCL	75YR44					0	0	HR	5			
	25-60	HCL	75YR46					0	0	HR	10		M	
	60-85	MCL	10YR44					0	0	HR	10		M	
	85-120	HZCL	25Y 64	10YR66		C	D	Y	0	0	HR	5		M
79	0-30	MCL	75YR44					0	0	HR	3			
	30-55	HZCL	25Y 64					0	0	ZR	5		M	
80	0-25	MCL	75YR46					4	0	HR	10			
81	0-30	MCL	75YR44					0	0	HR	15			
	30-70	MCL	75YR54					0	0	HR	10		M	

SAMPLE	DEPTH	TEXTURE	COLOUR	-MOTTLES		PED		STONES-		STRUCT/		SUBS		SPL	CALC	
				COL	ABUN	CONT	COL	GLE	2	6	LITH	TOT	CONSIST			
1P	0 30	MCL	75YR4344					0	0	HR	12	MDCAB	FR			
	30-45	HCL	75YR4446					0	0	HR	20	MDCSAB	FR M			
	45-76	HCL	75YR46					0	0	HR	30		M			
2P	0 35	MCL	75YR4344					7	3	HR	18					
	35-50	MCL	75YR4644					0	0	HR	57		M			
	50-62	MCL	75YR46					0	0	HR	68		M			
	62 70	HR	75YR46					0	0		0		P			
3P	0 24	MCL	75YR46					11	2	HR	27	MDCSAB	FR			
	24 38	MCL	10YR5456					0	0	HR	30	WKVCPL	FM P Y			COMPACTED
	38-62	MCL	10YR5456					0	0	HR	28	WKVCPL	FM P Y			COMPACTED
	62 120	MCL	10YR5456					0	0	HR	50	WKVCPL	FM P Y			COMPACTED
4P	0 35	MCL	75YR44					1	0	HR	12	MDCSAB	FR N			
	35-66	MCL	75YR44					0	0	HR	43	MDCSAB	VF G			
	66-87	MCL	75YR44					0	0	HR	69		M			PIT 87
	87 120	MCL	75YR44					0	0	HR	69		M			ROOTABLE AUG 120
5P	0 20	MCL	75YR44					0	0	HR	18	MVCSAB	FM			
	20 50	MCL	75YR44					0	0	HR	28	WKVCPL	VM P Y	Y		COMPACTED
	50 70	MCL	75YR44					0	0	HR	38	WKVCPL	VM P Y	Y		COMPACTED

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	Brassicacae
POT	Potatoes	SBT	Sugar beet	FCD	Fodder crops
LIN	Linseed	FRT	Soft and top fruit	FLW	Fallow
PGR	Permanent pasture	LEY	Ley grass	RGR	Rough grazing
SCR	Scrub	CFW	Coniferous woodland	OTH	Other
DCW	Deciduous woodland	BOG	Bog or marsh	SAS	Set Aside
HTH	Heathland	HRT	Horticultural crops	PLO	Ploughed

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

4 **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

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

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

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

Soil Pits and Auger Borings

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

S	Sand	LS	Loamy Sand	SL	Sandy Loam
SZL	Sandy Silt Loam	CL	Clay Loam	ZCL	Silty Clay Loam
ZL	Silt Loam	SCL	Sandy Clay Loam	C	Clay
SC	Sandy Clay	ZC	Silty Clay	OL	Organic Loam
P	Peat	SP	Sandy Peat	LP	Loamy Peat

PL Peaty Loam **PS** Peaty Sand **MZ** Marine Light Silts

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

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

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

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

3 **MOTTLE ABUN** Mottle abundance expressed as a percentage of the matrix or surface described
F few <2% **C** common 2-20% **M** many 20-40% **VM** very many 40% +

4 **MOTTLE CONT** Mottle contrast

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

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

6 **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	FSST	soft fine grained sandstone
ZR	soft argillaceous or silty rocks	CH	chalk
MSST	soft medium grained sandstone	GS	gravel with porous (soft) stones
SI	soft weathered igneous/metamorphic rock	GH	gravel with non porous (hard) stones

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

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

Degree of development	WK	weakly developed	MD	moderately developed
	ST	strongly developed		
Ped size	F	fine	M	medium
	C	coarse		
Ped shape	S	single grain	M	massive
	GR	granular	AB	angular blocky
	SAB	sub angular blocky	PR	prismatic
	PL	platy		

9 **CONSIST** Soil consistence is described using the following notation

L loose	FM firm	EH extremely hard
VF very friable	VM very firm	
FR friable	EM extremely firm	

10 **SUBS STR** Subsoil structural condition recorded for the purpose of calculating profile droughtiness
G good **M** moderate **P** poor

- 11 **POR** Soil porosity If a soil horizon has less than 0.5 / biopores >0.5 mm a Y will appear in this column
- 12 **IMP** If the profile is impenetrable to rooting a Y will appear in this column at the appropriate horizon
- 13 **SPL** Slowly permeable layer If the soil horizon is slowly permeable a Y will appear in this column
- 14 **CALC** If the soil horizon is calcareous a Y will appear in this column
- 15 Other notations

APW	available water capacity (in mm) adjusted for wheat
APP	available water capacity (in mm) adjusted for potatoes
MBW	moisture balance wheat
MBP	moisture balance potatoes