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MAFF Ministry of Agriculture Fisheries and Food

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LITTLE PARK FARM, ANDOVER, HAMPSHIRE - SITES 59-63

Agricultural Land Classification

September 1996

Resource Planning Team
Guildford Statutory Group
ADAS Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

LITTLE PARK FARM, ANDOVER, HAMPSHIRE - SITES 59-63

INTRODUCTION

1. This report presents the findings of a semi-detailed Agricultural Land Classification (ALC) survey of 198 ha of land at Little Park Farm on the south western side of Andover in Hampshire. The site is encompassed by roads on three sides, with a railway line forming the northern boundary.

2. The survey was commissioned by the Ministry of Agriculture, Fisheries and Food's (MAFF) Land Use Planning Unit (Reading) in connection with the Test Valley Borough Local Plan Review. This survey supersedes previous ALC surveys on this land.

3. The work was conducted under sub-contracting arrangements by NA Duncan & Associates, and was supervised by members of the Resource Planning Team in the Guildford Statutory Group in 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 majority of the site was in stubble, with the main crop having been spring barley, although some land had already been cultivated. Other crops which had been grown on the site during the growing season comprised wheat, field beans and linseed. A few small areas of permanent grass occur on the site which are used for grazing cattle and horses. The site also includes a number of areas of "Other Land" comprising residential dwellings, farm buildings, a small complex of industrial units, woodland and roads.

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.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% Total site area	% Agricultural Area
2	60.2	30.5	34.9
3a	108.8	55.0	63.1
3b	3.4	1.7	2.0
Other Land	25.3	12.8	-
Total agricultural area	172.4	-	100
Total site area	197.7	100	-

7. The fieldwork was conducted at an average density of 1 boring per two hectares. A total of 97 borings was described which, backed up by data from four soil pits.

8. The whole site comprises soils developed on Upper Chalk, with relatively shallow soils overlying fissured chalk on the higher ground, with deeper soils confined to the lower lying valley features. The deeper soils on the site have been mapped as Grade 2, very good quality agricultural land, with the main limitation being due to a minor droughtiness restriction for deeper rooting crops. In the south-western corner of the site the soils are generally much deeper and have no droughtiness limitation, but topsoils typically comprise heavy silty clay loams and, therefore, under the prevailing climatic conditions these soils have a minor workability limitation restricting the land quality to Grade 2.

9. The shallower soils on the site have been classified as Subgrade 3a, good quality agricultural land. These areas have a moderate droughtiness limitation, especially for the deeper rooting crops, due to the limited depth to the underlying chalk.

10. A small area of Subgrade 3b, moderate quality agricultural land, has been mapped on the western side of the site, where the soils are very shallow and the land is moderately steep and uneven.

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).

Table 2: Climatic and altitude data

Factor	Units	Values
Grid reference	N/A	SU 335 445
Altitude	m, AOD	70
Accumulated Temperature	day°C (Jan-June)	1465
Average Annual Rainfall	mm	776
Field Capacity Days	days	167
Moisture Deficit, Wheat	mm	103
Moisture Deficit, Potatoes	mm	94

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 under this warm and relatively moist climate, wetness and workability limitations may be enhanced on heavier textured soils. In addition soils will need a moderately high available water capacity to avoid droughtiness limitations. There is however no overall climatic limitation in this area.

Site

16. The site comprises an area of gently sloping land, falling generally toward the south, which is dissected by two dry valley features running north south. The western side of the site falls more steeply into the valley occupied by the Pillhill Brook. The altitude of the area ranges from approximately 80 m AOD falling to 60 m AOD along the southern and western boundaries. Slopes on the site are generally relatively gentle, in the range of 1-5°, although slopes of 7-8° occur in a small area on the western edge of the site which is limiting in terms of ALC grading restricting this area to Subgrade 3b.

Geology and soils

17. The published geological information for the area (BGS, 1974) shows the whole of the site to be underlain by Upper Chalk, which is described as soft chalk with many flint nodules.

18. There is no detailed soil survey map for the area, but the reconnaissance soil map (SSEW, 1983) shows the majority of the site to comprise soils of the Andover 1 association. These soils are described as shallow well drained calcareous silty soils over chalk on the slopes and crests, with deep calcareous and non calcareous fine silty soils in the valley bottoms. The lower slopes on the southern and western edges of the site are mapped as the Charity 2 association, which comprises soils developed in flinty and chalky drift over chalk. The Charity 2 soils are well drained flinty fine silty soils in the valley bottoms with calcareous fine silty soils over chalk or chalk rubble on the valley sides.

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 III.

Grade 2

21. Land classified as Grade 2, very good quality agricultural land, has been mapped on the lower land associated with the valley features. These areas generally have deeper soils overlying the chalk, than on the surrounding higher land, giving rise to moderately good or good quantities of plant available water. Soils within these areas typically have a dark brown medium silty clay loam topsoil, although on the western side of the site the topsoils are typically heavy silty clay loam, overlying a brown, medium or heavy silty clay loam upper

subsoil. Below 50 cm depth the lower subsoil, which is typically heavy clay loam or heavy silty clay loam, often contains a large quantity of chalk fragments, before the underlying fissured chalk is encountered below at least 70 cm depth. In the south west corner of the site the underlying chalk was not encountered within 120 cm in some profiles. All the soils are free draining, Wetness Class I (see Appendix II). Moisture balance calculations indicate that the major limitation associated with the majority of these soils is a minor droughtiness restriction especially for deeper rooting crops restricting the land to Grade 2. However in the south western corner of the site where the deeper soils were encountered, there is no droughtiness limitation, but due to the presence of heavy silty clay loam topsoils, there will be a minor workability limitation, which under the prevailing climatic conditions restricts quality the land to Grade 2.

Subgrade 3a

22. The higher, gently sloping land on the site has been mapped as Subgrade 3a, good quality agricultural land, with the major limitation due to droughtiness. Soils in these areas typically have a dark brown, slightly flinty, silty clay loam topsoil, with the eastern half of the site being typically medium silty clay loam, whilst to the west the texture is more typically heavy silty clay loam. The majority of profiles then have a thin, heavy silty clay loam subsoil with abundant chalk fragments before the underlying fissured chalk is encountered at depths ranging from 35-60 cm depth. Plant roots typically extend approximately 30 cm into the chalk. All the profiles examined are free draining (Wetness Class I). Moisture balance calculations indicate that the soils will be slightly droughty for potatoes and moderately droughty for deeper rooting crops such as wheat, restricting the land quality to Subgrade 3a.

Subgrade 3b

23 A small area of Subgrade 3b, moderate quality agricultural land has been mapped on the western side of the site. This area is moderately steep and uneven, 7-8°, and has shallow soils overlying fissured chalk. The soils in this area are similar to those described in paragraph 20, but lack any definite subsoil, with the topsoils directly overlying the fissured chalk. In addition the topsoils are considerably more stony with 10-12 % flints in addition to chalk fragments. Moisture balance calculations indicate that these soils will be very droughty especially for the deeper rooting crops restricting the land to Subgrade 3b.

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SOURCES OF REFERENCE

British Geological Survey (1974) *Sheet No.283*, Andover
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, *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 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:

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	M.REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1P	SU3330449	STB					1	1	93	-10	99	5	3A				DR	3A	
2	SU33804520	STB					1	1	94	-9	97	3	3A				DR	3A	
2P	SU33904490	WHT	E	02			1	1	122	19	111	17	2				DR	2	
3P	SU32704420	PLO	S	02			1	1	109	6	112	18	2				DR	2	
4	SU34004520	STB					1	1	92	-11	95	1	3A				DR	3A	HRD CH60
4P	SU32804440	LIN	E	02			1	1	92	-11	98	4	3A				DR	3A	
6	SU33304510	BAR	N	02			1	2	88	-15	93	-1	3A				DR	3A	
8	SU33504510	WHT	NW	02			1	2	98	-5	103	9	3A				DR	3A	
10	SU33704510	STB					1	1	127	24	121	27	2				DR	2	STN-90
12	SU33904510	STB					1	1	101	-2	111	17	3A				DR	3A	STNS-65
14	SU34104510	STB					1	1	83	-20	83	-11	3A				DR	3B	SEE PIT1
15	SU33004500	BAR	SE	03			1	2	117	14	114	20	2				DR	2	
17	SU33204500	BAR	NW	02			1	2	85	-18	89	-5	3A				DR	3A	
19	SU33404500	WHT	NW	03			1	2	87	-16	91	-3	3A				DR	3A	
21	SU33604500	STB					1	1	117	14	121	27	2				DR	2	STNS-80
23	SU33804500	STB					1	1	95	-8	101	7	3A				DR	3A	STNS-60
25	SU34004500	STB					1	1	76	-27	76	-18	3B				DR	3B	SEE PIT1
28	SU32804490	STB	E				1		111	8	108	14	2				DR	2	
29	SU32904490	BAR	E	02			1	2	107	4	109	15	3A				DR	3A	
31	SU33104490	BAR	W	02			1	2	76	-27	79	-15	3B				DR	3B	
33	SU33304490	BAR	N				1	2	91	-12	96	2	3A				DR	3A	
35	SU33504490	WHT	S	01			1	2	86	-17	90	-4	3A				DR	3A	
37	SU33704490	GRS					1	1	61	-42	61	-33	3B				DR	3B	STNS-35
39	SU33904490	STB					1	1	87	-16	87	-7	3A				DR	3A	SEE PIT2
41	SU34104490	STB					1	1	93	-10	96	2	3A				DR	3A	
44	SU32704480	STB	E				1	1	112	9	108	14	2				DR	2	
45	SU32804480	STB	E				1	1	105	2	104	10	3A				DR	3A	
47	SU33004480	BAR	E				1	2	130	27	119	25	2				DR	2	
51	SU33404480	WHT	W	02			1	2	81	-22	83	-11	3B				DR	3B	
53	SU33604480	WHT	S	03			1	2	92	-11	96	2	3A				DR	3A	
55	SU33804480	STB	E	02			1	1	122	19	111	17	2				DR	2	
57	SU34004480	STB					1	1	88	-15	88	-6	3A				DR	3A	SEE PIT2
61	SU32504470	STB	E				1	1	89	-14	92	-2	3A				DR	3A	
67	SU33104470	PGR	S	02			1	1	84	-19	87	-7	3A				DR	3A	
69	SU33304470	BAR	S	01			1	1	112	9	115	21	2				DR	2	
71	SU33504470	WHT	S	01			1	2	83	-20	85	-9	3A				DR	3A	
73	SU33704470	CER	SE	04			1	1	107	4	109	15	3A				DR	3A	
83	SU32604460	STB	E				1	1	54	-49	54	-40	3B				DR	3B	SEE PIT4
85	SU32804460	STB	E	02			1	1	101	-2	109	15	3A				DR	3A	STNS-65
89	SU33204460	PGR	SW	02			1	1	99	-4	105	11	3A				DR	3A	
91	SU33404460	BAR	S	01			1	2	106	3	107	13	3A				DR	3A	
93	SU33604460	BAR	SE	02			1	2	97	-6	103	9	3A				DR	3A	

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	M.REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
95	SU33804460	BAR	W	05			1	1	111	8	114	20	2				DR	2	
105	SU32704450	STB	E				1	1	110	7	116	22	2				DR	2	STNS-75
107	SU32904450	STB	E	02			1	1	85	-18	85	-9	3A				DR	3A	STNS-50
111	SU33304450	BAR	S	01			1	2	85	-18	90	-4	3A				DR	3A	
113	SU33504450	BAR	S	01			1	1	102	-1	104	10	3A				DR	3A	
115	SU33704450	STB	W	02			1	1	101	-2	109	15	3A				DR	3A	2-3A
117	SU33904450	BAR	W	01			1	1	121	18	121	27	2				DR	2	
123	SU32604440	LIN	SW	01			1	2	88	-15	92	-2	3A				DR	3A	
125	SU32804440	LIN	E	03			1	2	80	-23	83	-11	3B				DR	3B	SEE PIT4
129	SU33204440	BAR	SW	02			1	2	95	-8	101	7	3A				DR	3A	
131	SU33404440	BAR	S	02			1	1	111	8	116	22	2				DR	2	
133	SU33604440	STB	W	02			1	1	124	21	121	27	2				DR	2	
134	SU33704440	STB	W	03			1	1	103	0	112	18	3A				DR	3A	
135	SU33804440	STB	W				1	1	102	-1	111	17	3A				DR	3A	
143	SU32704430	LIN	S	02			1	2	93	-10	99	5	3A				DR	3A	
146	SU33004430	BAR	E	03			1	2	120	17	117	23	2				DR	2	
147	SU33104430	BAR	W	06			1	1	91	-12	97	3	3A				DR	3A	
149	SU33304430	BAR	S	02			1	2	108	5	109	15	2				DR	2	AS PIT 2
151	SU33504430	STB	S	02			1	1	94	-9	100	6	3A				DR	3A	SEE PIT2
153	SU33704430	STB	W				1	1	91	-12	94	0	3A				DR	3A	
155	SU33204420	STB	E	02			1	1	93	-10	99	5	3A				DR	3A	
158	SU32504420	PLO	W	07			1	1	77	-26	80	-14	3B				DR	3B	
160	SU32704420	PLO	S	03			1	2	122	19	119	25	2				DR	2	
164	SU33104420	BAR	W	06			1	1	104	1	103	9	3A				DR	3A	
167	SU33404420	STB	S	02			1	1	108	5	121	27	2				DR	3A	SEE PIT2
169	SU33604420	STB	S				1	1	88	-15	91	-3	3A				DR	3A	
171	SU33804420	STB	E				1	1	93	-10	99	5	3A				DR	3A	
175	SU32704410	PLO	S	03			1	2	139	36	117	23	1				WK	2	
177	SU32904410	PLO	S	02			1	1	116	13	113	19	2				DR	2	
178	SU33004410	BAR	E	01			1	1	91	-12	94	0	3A				DR	2	IMP 55
183	SU33504410	STB	S	02			1	1	91	-12	94	0	3A				DR	3A	
186	SU32604400	PLO	S	04			1	2	118	15	117	23	2				WK	2	IMP 85
188	SU32904400	LIN	S	03			1	1	101	-2	112	18	3A				DR	3A	IMP 70
190	SU33004400	BAR	E	02			1	2	125	22	119	25	2				WK	2	IMP 90
191	SU33104400	BAR	W	01			1	2	92	-11	98	4	3A				WK	2	IMP 60
194	SU33404400	STB	S	02			1	1	88	-15	88	-6	3A				DR	2	
196	SU32804390	PLO	S	04			1	2	142	39	115	21	1				WK	2	STY TOP

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	CALC
1P	0-30	mzcl	75YR44 00						3	0	HR	6						Y
	30-36	hzcl	75YR54 00						0	0	CH	15	MDMSAB FR	G				Y
	36-70	ch	10YR81 00						0	0		0		P				Y
2	0-30	mzcl	10YR44 00						0	0	HR	3						
	30-50	mzcl	10YR46 00						0	0	CH	20		M				Y
	50-60	ch	10YR81 00						0	0		0		M				Y
2P	0-30	mzcl	10YR44 00						2	0	HR	4						Y
	30-60	hcl	75YR44 00						0	0	HR	6	MDCSB FM	M	Y			
	60-85	mcl	10YR56 00						0	0	CH	35	M VM	P	Y			Y
	85-100	ch	10YR81 00						0	0		0		P				
3P	0-33	hcl	75YR44 00						5	0	HR	8						Y
	33-60	hzcl	75YR46-00						0	0	HR	8	MDCSAB FR	M				Y
	60-75	c	75YR46-00						0	0	HR	7	MDCSAB FM	M				Y
	75-85	ch	10YR81 00						0	0	HR	3		P				Y
4	0-30	mzcl	10YR44 00						0	0	HR	4						
	30-50	mzcl	10YR44 81						0	0	CH	25		M				Y
	50-60	ch	10YR81 00						0	0		0		M				Y
4P	0-27	hzcl	10YR46 00						4	0	HR	8						Y
	27-55	hzcl	75YR58 00						0	0	HR	15	MDCSAB FM	M				Y
	55-65	ch	10YR81 00						0	0	HR	5		P				Y
6	0-28	hzcl	75YR44 00						2	2	HR	6						Y
	28-37	hzcl	75YR64 00						0	0	CH	25		M				Y
	37-67	ch	10YR81 00						0	0	HR	3		P				Y
8	0-30	hzcl	75YR44 00						2	0	HR	4						Y
	30-38	hzcl	75YR56 00						0	0	HR	3		M				Y
	38-50	hcl	10YR73 00						0	0	CH	45		M				Y
	50-70	ch	10YR81 00						0	0	HR	3		P				
10	0-30	mzcl	10YR44 00						0	0	HR	2						
	30-90	mzcl	10YR46 00						0	0	CH	10		M				
12	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-45	mzcl	10YR46 00						0	0	HR	2		M				
	45-55	mzcl	10YR46 81						0	0	HR	5		M				
	55-65	mzcl	10YR46 81						0	0	CH	25		M				Y
14	0-35	mzcl	10YR44 00						0	0	CH	4						
	35-40	mzcl	10YR44 00						0	0	CH	25		M				Y
	40-50	ch	10YR81 00						0	0		0		M				Y
15	0-28	hzcl	75YR44 00						2	0	HR	6						Y
	28-48	hzcl	75YR55 00						0	0	HR	5		M				Y
	48-70	hcl	10YR73 00						0	0	CH	30		M				Y
	70-90	ch	10YR81 00						0	0	HR	3		P				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
17	0-33	hzcl	75YR44 00						2	2	HR	5						Y
	33-63	ch	10YR81 00						0	0	HR	3		P				
19	0-30	hzcl	75YR44 00						3	0	CH	10						Y
	30-35	hzcl	75YR54 00						0	0	CH	30		M				Y
	35-65	ch	10YR81 00						0	0	HR	3		P				
21	0-30	mzcl	10YR44 00						0	0	HR	4						
	30-60	mzcl	10YR46 00						0	0	CH	5		M				
	60-80	mzcl	10YR46 00						0	0	CH	10		M				
23	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-60	mzcl	10YR46 00						0	0	HR	8		M				
25	0-30	mcl	10YR44 00						0	0	HR	5						
	30-45	mzcl	10YR46 81						0	0	CH	10		M				Y
28	0-30	hzcl	10YR44 00						0	0	HR	3						
	30-45	hcl	75YR44 00						0	0	CH	10		M				Y
	45-55	hcl	10YR46 00						0	0	CH	30		M				Y
	55-85	ch	10YR81 00						0	0		0		P				Y
29	0-30	hzcl	75YR44 00						2	0	CH	5						Y
	30-55	zc	75YR56 00						0	0	HR	5		M				Y
	55-65	hcl	75YR64 00						0	0	CH	50		M				Y
	65-80	ch	10YR81 00						0	0	HR	3		P				
31	0-27	hcl	10YR44 00						5	0	CH	10						Y
	27-60	ch	10YR81 00						0	0	HR	3		P				
33	0-30	hzcl	75YR43 00						3	0	HR	5						Y
	30-38	hzcl	75YR54 00						0	0	CH	15		M				Y
	38-68	ch	10YR81 00						0	0	HR	3		P				
35	0-28	hzcl	75YR44 00						2	0	CH	10						Y
	28-35	hzcl	10YR54 00						0	0	CH	35		M				Y
	35-65	ch	10YR81 00						0	0	HR	3		P				
37	0-35	mzcl	10YR44 00						0	0	HR	8						
39	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-50	mzcl	10YR46 00						0	0	HR	5		M				
41	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-50	mzcl	10YR46 81						0	0	CH	20		M				Y
	50-60	ch	10YR81 00						0	0		0		M				Y
44	0-30	mzcl	10YR44 00						0	0	HR	3						
	30-45	hcl	10YR46 00						0	0	CH	5		M				
	45-55	mcl	10YR46 81						0	0	CH	30		M				Y
	55-85	ch	10YR81 00						0	0		0		P				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
45	0-30	hzcl	10YR44 00						0	0	HR	5						
	30-40	hcl	10YR46 00						0	0	HR	5		M				Y
	40-50	mcl	10YR46 81						0	0	CH	30		M				Y
	50-80	ch	10YR81 00						0	0		0		P				Y
47	0-30	hzcl	75YR44 00						4	0	HR	6						Y
	30-85	hzcl	75YR55 00						0	0	HR	5		M				Y
	85-100	ch	10YR81 00						0	0	HR	3		P				
51	0-30	hzcl	75YR44 00						0	0	CH	10						Y
	30-60	ch	10YR81 00						0	0	HR	3		P				
53	0-30	hzcl	75YR44 00						3	0	HR	6						Y
	30-44	hzcl	75YR55 00						0	0	HR	5		M				Y
	44-64	ch	10YR81 00						0	0	HR	3		P				
55	0-30	mzcl	10YR44 00						0	0	HR	4						
	30-60	hcl	75YR44 00						0	0	HR	7		M				
	60-85	mcl	10YR56 00						0	0	CH	35		P				Y
	85-100	ch	10YR81 00						0	0		0		P				Y
57	0-30	mzcl	10YR44 00						0	0	HR	2						
	30-50	mzcl	10YR46 00						0	0	HR	5		M				
61	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-45	mzcl	10YR46 00						0	0	CH	30		M				Y
	45-60	ch	10YR81 00						0	0		0		P				Y
67	0-25	mzcl	75YR44 00						2	0	HR	5						Y
	25-33	hzcl	75YR55 00						0	0	CH	25		M				Y
	33-63	ch	10YR81 00						0	0		0		P				
69	0-30	hzcl	75YR44 00						3	0	HR	4						Y
	30-50	hzcl	75YR56 00						0	0	HR	3		M				Y
	50-62	hzcl	75YR74 00						0	0	CH	15		M				Y
	62-80	ch	10YR81 00						0	0	HR	3		P				
71	0-30	hzcl	75YR44 00						2	0	HR	5						Y
	30-37	hzcl	75YR54 00						0	0	CH	20		M				Y
	37-57	ch	10YR81 00						0	0	HR	3		P				
73	0-30	mzcl	75YR44 00						3	0	HR	6						Y
	30-60	hcl	10YR74 00						0	0	CH	15		M				Y
	60-80	ch	10YR81 00						0	0	HR	3		P				
83	0-30	mzcl	10YR44 00						0	0	HR	5						
85	0-30	hzcl	10YR44 00						0	0	HR	3						
	30-65	hcl	10YR46 00						0	0	CH	10		M				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
89	0-27	mzcl	75YR43 00						3	0	HR	5						Y
	27-40	hzcl	75YR46 00						0	0	CH	5		G				Y
	40-70	ch	10YR81 00						0	0		0		P				
91	0-27	hzcl	75YR43 00						3	0	HR	7						Y
	27-45	hzcl	75YR56 00						0	0	HR	8		M				Y
	45-60	hcl	10YR64 00						0	0	CH	35		M				Y
	60-80	ch	10YR81 00						0	0		0		P				
93	0-28	hzcl	75YR43 00						3	0	HR	6						Y
	28-40	hzcl	10YR64 00						0	0	CH	15		G				Y
	40-70	ch	10YR81 00						0	0		0		P				
95	0-30	mzcl	75YR44 00						3	0	HR	4						Y
	30-60	hzcl	75YR56 00						0	0	HR	3		M				Y
	60-80	ch	10YR81 00						0	0	HR	3		P				
105	0-30	hzcl	10YR44 00						0	0	HR	4						
	30-65	hcl	75YR46 56						0	0	HR	3		M				
	65-75	mcl	75YR46 00						0	0	CH	30		M				Y
107	0-30	mzcl	10YR44 00						0	0	HR	4						
	30-50	hcl	10YR46 00						0	0	HR	5		M				
111	0-27	hzcl	75YR44 00						2	0	HR	5						Y
	27-35	hzcl	10YR65 00						0	0	CH	50		M				Y
	35-65	ch	10YR81 00						0	0		0		P				
113	0-30	mzcl	75YR43 00						3	0	HR	7						Y
	30-50	hzcl	75YR65 00						0	0	CH	20		M				Y
	50-75	ch	10YR81 00						0	0		0		P				
115	0-30	mzcl	10YR44 00						0	0	HR	2						
	30-65	hcl	75YR56 00						0	0	HR	5		M				
117	0-28	mzcl	75YR45 00						2	0	HR	3						Y
	28-40	mzcl	75YR55 00						0	0	HR	2		M				Y
	40-70	hzcl	75YR65 00						0	0	CH	10		M				Y
	70-90	ch	10YR81 00						0	0	HR	3		P				
123	0-28	hzcl	75YR44 00						5	0	HR	10						
	28-45	c	75YR46 00						0	0	HR	10		M				Y
	45-65	ch	10YR81 00						0	0	HR	3		P				
125	0-28	hzcl	75YR44 00						4	0	HR	8						Y
	28-35	zc	75YR46 00						0	0	HR	10		M				Y
	35-60	ch	10YR81 00						0	0	HR	5		P				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
129	0-30	hzcl	75YR44 00						2	0	HR	4						Y
	30-40	hzcl	75YR55 00						0	0	CH	10		M				Y
	40-70	ch	10YR81 00						0	0		0		P				
131	0-30	mzcl	75YR44 00						4	0	HR	6						Y
	30-68	hzcl	75YR56 00						0	0	CH	15		M				Y
	68-80	ch	10YR81 00						0	0		0		P				
133	0-30	mzcl	10YR44 00						0	0	HR	2						
	30-80	mzcl	75YR56 00						0	0	HR	5		M				Y
	80-90	ch	10YR81 00						0	0		0		P				Y
134	0-30	mzcl	10YR44 00						0	0	CH	5						
	30-40	mzcl	75YR56 00						0	0	CH	10		M				Y
	40-60	mzcl	10YR46 81						0	0	CH	30		M				Y
	60-70	ch	10YR81 00						0	0		0		P				Y
135	0-35	mzcl	10YR44 00						0	0	HR	5						
	35-60	mzcl	10YR46 81						0	0	CH	30		M				Y
	60-70	ch	10YR81 00						0	0		0		P				Y
143	0-30	hzcl	75YR44 00						4	0	HR	7						Y
	30-40	hzcl	75YR56 00						0	0	HR	5		M				Y
	40-70	ch	10YR81 00						0	0		0		P				
146	0-30	hzcl	75YR43 00						3	0	HR	5						Y
	30-60	hzcl	75YR46 00						0	0	HR	9		M				Y
	60-80	c	75YR56 00						0	0	HR	3		M				Y
	80-90	hcl	10YR74 00						0	0	CH	15		M				Y
147	0-28	mzcl	75YR44 00						1	0	CH	8						Y
	28-38	hzcl	75YR44 00						0	0	CH	50		G				Y
	38-68	ch	10YR81 00						0	0		0		P				
149	0-30	hzcl	75YR44 00						3	0	HR	5						Y
	30-50	hzcl	75YR46 00						0	0	HR	5		M				Y
	50-80	hcl	10YR56 00						0	0	CH	35		P				Y
151	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-60	hcl	10YR46 00						0	0	HR	5		M				
153	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-50	mzcl	10YR46 81						0	0	CH	30		M				Y
	50-60	ch	10YR81 00						0	0		0		P				Y
155	0-30	mzcl	10YR44 00						0	0	HR	5						Y
	30-40	mzcl	75YR46 81						0	0	CH	30		M				Y
	40-70	ch	10YR81 00						0	0		0		P				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
158	0-30	mzcl	75YR44 00						10	0	HR	12						Y
	30-60	ch	10YR81 00						0	0	HR	3		P				
160	0-30	hzcl	75YR44 00						6	0	HR	8						Y
	30-45	hzcl	75YR45 00						0	0	HR	3		M				Y
	45-80	hzcl	75YR56 00	00MN00	00	F			0	0	HR	2		M				Y
	80-90	ch	10YR81 00						0	0	HR	3		P				
164	0-30	mzcl	10YR44 00						2	0	CH	8						Y
	30-50	hzcl	75YR65 00						0	0	CH	40		M				Y
	50-80	ch	10YR81 00						0	0		0		P				
167	0-30	mzcl	10YR44 00						0	0	HR	2						
	30-70	mzcl	10YR46 00						0	0	HR	4		M				
169	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-50	mzcl	10YR46 81						0	0	CH	50		M				Y
	50-60	ch	10YR81 00						0	0		0		P				
171	0-30	mzcl	10YR44 00						0	0	HR	5						
	30-40	mzcl	10YR46 81						0	0	CH	30		M				Y
	40-70	ch	10YR81 00						0	0		0		P				Y
175	0-33	hzcl	75YR44 00						5	0	HR	7						Y
	33-50	hzcl	75YR56 00						0	0	HR	5		M				Y
	50-120	c	75YR56 00						0	0	HR	5		M				Y
177	0-30	mzcl	10YR44 00						7	0	HR	10						Y
	30-80	hzcl	75YR46 00						0	0	HR	10		M				Y
	80-90	ch	10YR81 00						0	0	HR	5		P				
178	0-30	mzcl	10YR44 00						2	0	HR	4						Y
	30-40	hzcl	75YR46 00						0	0	HR	5		M				Y
	40-55	mzcl	10YR46 00						0	0	HR	10		M				Y
183	0-30	mzcl	10YR44 00						0	0	HR	5						Y
	30-50	mzcl	10YR46 00						0	0	CH	30		M				Y
	50-60	ch	10YR81 00						0	0		0		P				Y
186	0-30	hzcl	75YR44 00						4	0	HR	6						Y
	30-85	hzcl	75YR45 00						0	0	HR	7		M				Y
188	0-30	mzcl	75YR43 00						4	0	HR	7						Y
	30-50	hcl	75YR46 00						0	0	HR	10		M				Y
	50-70	hcl	75YR73 00						0	0	CH	20		M				Y
190	0-30	hzcl	10YR44 00						3	0	HR	5						Y
	30-40	hzcl	75YR45 00						0	0	HR	3		M				Y
	40-90	hzcl	75YR56 00						0	0	HR	5		M				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
191	0-30	hzcl	10YR44 00						2	0	HR	5						Y
	30-60	hcl	75YR55 00						0	0	HR	10		M				
194	0-30	mzcl	10YR44 00						0	0	HR	3						
	30-50	mzcl	10YR46 00						0	0	HR	5		M				Y
196	0-30	hzcl	10YR34 00						6	3	HR	12						Y
	30-80	hzcl	10YR46 00						0	0	HR	5		M				Y
	80-120	zc	75YR56 00	00MN00	00	F			0	0	HR	5		M				Y

SOIL PIT DESCRIPTION

Site Name : TEST VALLEY BLP ST 59-63 Pit Number : 1P

Grid Reference: SU3330449 Average Annual Rainfall : 776 mm
Accumulated Temperature : 1465 degree days
Field Capacity Level : 167 days
Land Use :
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 30	MZCL	75YR44 00	3	6	HR					Y
30- 36	HZCL	75YR54 00	0	15	CH		MDMSAB	FR	G	Y
36- 70	CH	10YR81 00	0	0					P	Y

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

Drought Grade : 3A APW : 93 mm MBW : -10 mm
APP : 99 mm MBP : 5 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Droughtiness

SOIL PIT DESCRIPTION

Site Name : TEST VALLEY BLP ST 59-63 Pit Number : 2P

Grid Reference: SU33904490 Average Annual Rainfall : 776 mm
Accumulated Temperature : 1465 degree days
Field Capacity Level : 167 days
Land Use : Wheat
Slope and Aspect : 02 degrees E

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 30	MZCL	10YR44 00	2	4	HR					Y
30- 60	HCL	75YR44 00	0	6	HR		MDCSB	FM	M	
60- 85	MCL	10YR56 00	0	35	CH		M	VM	P	Y
85-100	CH	10YR81 00	0	0					P	

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

Drought Grade : 2 APW : 122mm MBW : 19 mm
APP : 111mm MBP : 17 mm

FINAL ALC GRADE : 2
MAIN LIMITATION : Droughtiness

SOIL PIT DESCRIPTION

Site Name : TEST VALLEY BLP ST 59-63 Pit Number : 3P

Grid Reference: SU32704420 Average Annual Rainfall : 776 mm
Accumulated Temperature : 1465 degree days
Field Capacity Level : 167 days
Land Use : Ploughed
Slope and Aspect : 02 degrees S

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 33	HCL	75YR44 00	5	8	HR					Y
33- 60	HZCL	75YR46-00	0	8	HR		MDCSAB	FR	M	Y
60- 75	C	75YR46-00	0	7	HR		MDCSAB	FM	M	Y
75- 85	CH	10YR81 00	0	3	HR				P	Y

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

Drought Grade : 2 APW : 109mm MBW : 6 mm
APP : 112mm MBP : 18 mm

FINAL ALC GRADE : 2
MAIN LIMITATION : Droughtiness

SOIL PIT DESCRIPTION

Site Name : TEST VALLEY BLP ST 59-63 Pit Number : 4P

Grid Reference: SU32804440
Average Annual Rainfall : 776 mm
Accumulated Temperature : 1465 degree days
Field Capacity Level : 167 days
Land Use : Linseed
Slope and Aspect : 02 degrees E

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 27	HZCL	10YR46 00	4	8	HR					Y
27- 55	HZCL	75YR58 00	0	15	HR		MDCSAB	FM	M	Y
55- 65	CH	10YR81 00	0	5	HR				P	Y

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

Drought Grade : 3A
APW : 92 mm MBW : -11 mm
APP : 98 mm MBP : 4 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Droughtiness

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 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 sandston	**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 **ST**: strongly developed	**MD**: moderately developed
ped size	**F**: fine **C**: coarse	**M**: medium **VC**: very coarse
ped shape	**S** : single grain **GR**: granular **SAB**: sub-angular blocky **PL**: platy	**M**: massive **AB**: angular blocky **PR**: prismatic

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