2721-016-89

RECTORY FARM
HOUNSLOW
MIDDX

MAFF Ministry of Agriculture Fisheries and Food

AGRICULTURAL LAND CLASSIFICATION

RECTORY FARM, HOUNSLOW, MIDDLESEX

1. BACKGROUND

1.1. The 41.4 ha site lies south of the M4 motorway, west of Heston in Middlesex. It is bounded to the north and east by housing and allotment gardens, to the west by the A312 and to the south by the A4 trunk road.

1.2. The site was surveyed during August and September 1989 using 110 and 120 cm Dutch soil augers, with samples being taken at approximately 100 m intervals across the site. Three soil inspections pits were dug.

Land-use

1.3. At the time of survey, most of the site was under cereal stubble, some of which had been burnt off. Small areas adjacent to the farm buildings at the south of the site and at Rectory Farm in the north were in vegetable production, (including cabbage, leeks, spinach, lettuce, marrows).

1.4. A limited amount of irrigation water is currently available from two boreholes on the site. Correspondence with the National Rivers Authority (Thames Region) indicates that in principle there would be no objection to the existing abstraction licences being reviewed so as to increase the water available to a level acceptable for intensive horticultural cropping of the whole site.

2. PHYSICAL FACTORS AFFECTING LAND QUALITY

Relief

2.1. The site lies at approximately 25 m A.O.D. falling very gently towards the south. There are also very slight falls towards the east and west away from the centre of the site.

Gradient is not a significant limitation in terms of land quality in this locality.

Climate

2.2. The average annual rainfall for this area is around 630 mm, (Met Office, 1989). The median accumulated temperature above 0°C between January and June, a measure of the relative warmth of the locality is expected to be 1484 day degrees which is relatively high in a national context (Met Office 1989). The site has a field capacity day period of 124 days (Met Office, 1989) which provides a measure of the effect of climate on the soil water regime and indicates the relative dryness of this locality. Crop adjusted moisture deficits are 116 mm for wheat and 112 mm for potatoes, again reflecting the dry climatic regime. The site is unlikely to be especially frost-prone or exposed.

2.3. Climatic factors per se place no limitation on agricultural land quality, but do affect interactive limitations between soil and climate, namely soil wetness and droughtiness.

Geology and Soils

2.4. British Geological Survey Sheet 270, South London, (1981) shows the site to be underlain by river brickearth deposits overlying third level river terrace gravels.

2.5. Soil Survey of England and Wales Sheet 6, Soils of South East England (1983) shows the whole area as typical argillic brown earths of the Hamble 2 association; deep, well drained stoneless silty soils.

2.6. Detailed field examination of the soils indicates that there are three broad groups present across the site:

2.7. Firstly, and most extensively are those soils which rest over clay. They can be divided into two varients.

Firstly are non-calcareous fine sandy silt loam, silt loam or medium silty clay loam topsoils, overlying similar or slightly heavier textures in the upper subsoil becoming clay below 60 cm. Gleying and evidence of wetness frequently occurs in or immediately above the clay, indicative of its slow permeability and these soils are thus appropriately assigned to wetness classes II or III. Gravel horizons are rare within 1 metre.

2.8. The second varient is similar to that described above, but has slightly poorer drainage conditions due to the occurrence of slowly permeable clay horizons at shallower depths, ie above 60 cm. The appearance of these soils is most notable towards the south east and north west of the site where the land is slightly lower lying than elsewhere. Profiles commonly comprise medium/heavy clay loam, silt loam or fine sandy silt loam topsoils, immediately overlying clay in the upper subsoil or medium/heavy silty clay loams or silt loam upper subsoil, becoming clay within 60 cm. Wetness is the main limitation of this soil type, although gravelly horizons are common from 60-100 cm causing a degree of droughtiness.

2.9. The second main group of soils occur principally towards the south west of the site and are characteristically deep and well drained but with a higher sand content than elsewhere. Profiles are typically non-calcareous sandy silt loam, medium clay loam or sandy clay loam topsoils, overlying similar textures in the upper subsoil but passing to sandy clay loam, sandy loam, loamy sand or occasionally sand at depth. In general these soils are well drained and are thus placed in wetness class I. However droughtiness forms a significant limitation in terms of agricultural land quality on soils of this type.

2.10. The third main group of soils do not have substantially clayey horizons within 1 metre and can be seen to broadly correlate to higher quality land on the site. Profiles typically comprise non-calcareous fine sandy silt loam or silt loam topsoils overlying similar textured or medium silty clay loam subsoils.

Some profiles become impenetrable at variable depths between 70-100 cm due to the presence of gravelly horizons, but in general these soils are deep and permeable (typically falling into wetness class I) with a good available water capacity.

3. AGRICULTURAL LAND CLASSIFICATION

3.1. The ALC grading of the survey area is primarily determined by interactions between climate and soil factors namely wetness and droughtiness. In accordance with the criteria for grading land, the availability of irrigation water has been taken into account. (see para 1.4). The extent to which the grading has been enhanced in this way, is not considerable, mainly because much of the land also has a slight wetness limitation which prevents it from rising into a higher grade. Where drought risk is the principal limitation it can be partially offset by the availability of adequate irrigation water and this is reflected in the grading of the site, albeit to a limited extent.

3.2. ALC grades 1, 2 and 3a have been mapped and a breakdown of these grades in terms of area and extent is given below.

Grade	ha	% of total agricultural land
1	16.92	41%
2	18.13	44%
3a	6.35	15%
Total agricultural area	41.4	100
Total area of site	41.4	100

Grade 1

3.3. Land of this quality represents 41%, (17.92 ha), of the total agricultural land area and occurs in two locations across the site; towards the south and west of the site, and at the north east of the site, near Rectory Farm, extending south along the eastern boundary.

3.4. Grade 1 land is associated with two situations. Firstly, towards the extreme south west of the site where well drained (wetness Class I) medium loamy over sandy soils are present. These typically have non-calcareous fine sandy silt loam or medium clay loam topsoils, overlying similar textures or sandy clay loam and sandy loam in the subsoil often passing to loamy sand or sand at depth. Typically the soils become impenetrable over gravel at approximately 70 to 80cm depth. However, the slight droughtiness limitation when this imposes, is at least partially offset by the availability of irrigation.

3.5. Secondly, soil profiles across the remaining areas of grade I land typically comprise non-calcareous fine sandy silt loam or silt loam topsoils, overlying similar textures or medium silty clay loam in the upper subsoil and occasionally to depth, but more commonly becoming medium silty clay, medium clay, or occasionally, sandy clay loam. The majority of profiles are well drained (wetness Class I) but occasional profiles exhibit slight drainage imperfections, (due to slowly permeable horizons), within the lower subsoil, (below circa 60 cm depth), and thereby within wetness class II*. No significant limitation affects the agricultural use of these soils and they are well suited to growing a wide range of agricultural and horticultural crops.

*only the topsoils of fine sandy silt loam are eligible for grade 1 under these circumstances.

Grade 2

3.6. Grade 2 land occupies 44%, (18.13 ha) of the total agricultural land on the site. The land has minor limitations to agricultural use and consequently forms very good quality land suitable for a variety of agricultural and horticultural purposes.

3.7. Profiles typically comprise non-calcareous fine sandy silt loam medium silty clay loam or silt loam topsoils, overlying similar textures in the upper subsoil, becoming heavy silty clay loam, heavy clay loam and medium clay in the lower subsoil. Occasional profiles comprise sandy clay loam topsoils with sandy clay, coarse loamy sand or coarse sand at depth.

3.8. Land is placed in this grade as a result of slight wetness and/or droughtiness limitations. Wetness imperfections caused by slowly permeable clay horizons in the lower subsoil result in the allocation of these profiles to wetness class II or III. Many of the profiles also have a droughtiness limitation due to relatively shallow depth over gravelly horizons, (ie, the soils become impenetrable to soil augers between 55 and 80 m from from the surface). Although such drought problems may be partially offset by the availability of irrigation water, the presence of a slight wetness limitation in most profiles, in addition to the drought restriction, prevent some soils rising into a higher grade.

Grade 3a

3.9. Land of this quality occupies approximately 6.35 ha of the site, (15% of the total agricultural land area), and occurs in two main areas, namely the south eastern part of the site which is slightly lower lying than elsewhere, and along the western boundary adjacent to the A312. Soil profiles in these locations are broadly similar in type and typically comprise non-calcareous medium clay loam or silt loam topsoils directly overlying clay or sandy clay in the subsoil or with heavy clay

loam/heavy silty clay loam upper subsoils passing into clay. All profiles exhibit strong evidence of gleying (usually within 40 cm of the surface) in the subsoil and are typically slowly permeable within circa 45 cm of the surface. They are thus assigned to wetness class III. In addition, towards the far south eastern corner, profiles tend to become impenetrable over gravelly horizons between 60 and 80 cm. Although, the droughtiness limitation which such a depth restriction imposes may be partially offset by the availability of irrigation water, the drainage imperfections are such as to prevent the land rising to a higher grade.

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SOURCES OF REFERENCE

BRITISH GEOLOGICAL SURVEY (1981) Geological Map Sheet No. 270, South London 1:50,000.

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

METEOROLOGICAL OFFICE (1989) Climatological datasets for Agricultural Land Classification.

SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 6, Soils of South-East England.

APPENDIX 1

DESCRIPTION OF THE GRADES AND SUBGRADES

Grade 1 – excellent quality agricultural land

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

Grade 2 – very good quality agricultural land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the 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.

Grade 3 – good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where 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 level of yields. It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 – very poor quality agricultural land

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

FIELD ASSESSMENT OF SOIL WETNESS CLASS

SOIL WETNESS CLASSIFICATION

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six revised soil wetness classes (Hodgson, *in preparation*) are identified and are defined in Table 11.

Table 11 Definition of Soil Wetness Classes

Wetness Class	Duration of Waterlogging[1]
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years[2].
II	The soil profile is wet within 70 cm depth for 31-90 days in most years *or*, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but not wet within 40 cm depth for more than 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 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 and 90 days in most years.
IV	The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years *or*, if there is no slowly permeable layer 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.

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

[2] 'In most years' is defined as more than 10 out of 20 years.

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

RECTORY FARM HOUNSLOW

AUGUER BORING SCHEDULE

1. very slight falls to south stubble

0 - 30	SCL	10 yr 3/2 slightly stony
30 - 50	SCL	10 yr 4/3 slightly more gritty occ. Fe concs.
50 - 60	SCL	f ew ochreous mottles
60 - 80	SC	10 yr 5/2 and 5/3 common ochreous mottles - 10 yr 5/6 gleyed stony
80+		Impenetrable - stones

Wetness Class II grade 3a (drought)
*(grade 2 with irrigation)

2. Very slight falls south and east, burnt stubble

0 - 28	M/HCL	2.5 y 3/2, non-calc, v.slightly stony
28 - 60	HCL	2.5 y 6/2-6/4 common prominent ochreous mottles - Gleyed Mn concs increasing with depth
60- 70	(M) C	2.5 y 5/4 2.5y 6/2 - 6/4 Many ochreous mottles , 10 yr 5/8 slightly stony (fine gravel)
70+		Impenetrable - stone

Wetness Class III Grade 3a (wetness/drought)

3. Flat burnt stubble

0 - 32	MCL	2.5 yr 3/2
32 - 45	MCL	10 yr 5/2 and 10 yr 5/4 common distinct ochreous mottles (gleyed?)
45 - 60	C	10 yr 5/2 common distinct ochreous mottles (gleyed)
60 - 70	C	becoming more stony/gravelly (gleyed)
70+		Impenetrable - gravel/stone

Wetness Class III grade 3a (wetness/drought)

4 Very gentle falls east, stubble

0 - 29	ZL/MCL	10yr 4/2 slightly stony
29 - 50	C	10 yr 5/4 common faint ochreous mottles and few Mn concs. slightly stony
50 - 60	C	10 yr 5/3 common faint ochreous mottles, few Mn concs, stony/gritty (gleyed) (gravelly 50+)
60+		Impenetrable - stones

Wetness Class III Grade 3b (drought)
*(Grade 3a with irrigation)

5. V. gentle falls east , stubble

0 - 28	FSZL	10 yr 4/2
28 - 40	HCL/C	10 yr 5/4 few faint ochreous mottles few Mn Concs
40 - 45	c	10 yr 5/4, few faint ochreous mottles few Mn Concs
45 - 70	c	10 yr 5/3 becoming paler common ochreous & grey mottles (gleyed)
70 - 75	SC	becoming more sandy and more orange v. gritty
75 +	Impenetrable - gravel	

Wetness Class III Grade 2/a (Drought)
* (Grade 2 with irrigation)

6. Market gardening area - cabbage, leeks, spinach, lettuce, marrows.

Fallow

0 - 28	FSZL	10 yr 4/1, v. slightly stony
28 - 55	MCL	10 yr 4/3 occasional faint ochreous mottles & Mn conc.
55 - 60	(M) SCL	10 yr 4/4
60 - 80	(M) SL	10 yr 4/4 gravelly
80 -120+	(M) S	10 yr 5/6, 6/6 stoneless & loose some bands of darker (10 yr 3/4) LS

Wetness Class I Grade 2 (Drought)
* (Grade 1 with irrigation)

7. Stubble, slightly stony on surface (c. 5%)

0 - 40	MCL	10 yr 3/2
40 - 70	SL	10 yr 3/2
70 - 95	LS	7.5 yr 5/6, coarse sand few faint ochreous mottles becoming slightly paler with depth
95+	Impenetrable - gravel	

Wetness Class I Grade 2 (drought)
*(Grade 1/2 mth irrigation [stone content])

8 Slightly lower lying, stubble

0 - 30	FSZL/MCL	10 yr 4/1, v. slightly stony
30 - 48	MCL	10 yr 4/2, v. slightly stony
48 - 80	C	10 yr 6/3 and 7.5 yr 5/8 Gravelly 50 - 65 many ochreous mottles - Gleyed becoming 2.5 yr 6/4 with many prominent ochreous mottles
80 - 90	CSC	becoming more sandy (coarse) & gravelly.
90 +	Impenetrable - gravel	

Wetness Class II Grade 2 (drought/wetness)
*(Grade 1/2 with irrigation [wetness])

9. Flat, stubble

0 - 30	FSZL/MCL	10 yr 4/2
30 - 48	MCL/SCL	10 YR 4/2
48 - 60	MCL/SCL	10 YR 5/4
60 - 80	SCL	becoming SL from c.70 + becoming lighter and sandier
80 - 95	LS	
95 -100	SCL	gritty/gravelly
100+	Impenetrable - gravel	

Wetness Class I Grade 2 (droughty)
* (Grade 1 with irrigation)

10. Flat/v. gently undulating, stubble

0 - 30	FSZL/ZL	10 YR 3/1, v. slightly stony
30 - 50	FSZL/ZL	10 YR 4/3, v. slightly stony
50 - 60	ZL	10 YR 4/3 - 4/4, slightly stony
60 - 75	ZCL/ZL	10 YR 5/4
75 - 80+	MZCL	10 YR 5/4 (dry and difficult to auger)

Wetness Class I Grade 1

11. Flat, burnt stubble

0 - 30	fszl	10YR 4/1
30 - 60	FSZL	10YR 4/2 tending to 4/3 with depth v.slightly stony
60 - 85	MZCL	10 YR 4/2 - 4/3 occ Mn conc, slightly stony
85 - 90+	MZCL	10 YR 4/2 - 4/3 occ faint ochreous mottle, slightly stony

Wetness Class I Grade I

12, Flat/v. gently falls to east, stubble

0 - 28	ZL/FSZL	10 YR 4/1, v. slightly stony
28 - 60	ZL	10 YR 4/3, v. slightly stony
60 - 90	MZCL (becoming slightly stony from c. 60 cm + HZCL	10 YR 4/4
90 -110+	C	10 YR 4/4; few faint ochreous mottles & Mn concs.

Wetness class 1 Grade 1

13. v. slightly lower slopes, stubble

0 - 28	MCL	10YR 3/1, non-calc
28 - 50	MCL (becoming HCL)	10 YR 5/4, common faint ochreous mottles, common Mn concs.
50 -100 +	(M) C	10 YR 5/3 (patches of 10 YR 5/4 and 5/6) common faint ochreous mottles & Mn concs - gleyed

Wetness Class II/III Grade 2/3a (wetness)

14. v. slightly lower slopes, burnt stubble

0-30	ZL	10 YR 4/2, non-calc
30-80+	(M) C	10 YR 5/2 matrix with 10 YR 5/4 patches few faint ochreous mottles and few Mn concs gleyed Increasing clay content with depth v. slightly stony
Wetness Class III		Grade 3a (wetness)

15. v. slightly lower slopes, stubble

0-28	ZL	10 YR 3/1, v. slightly stony.
28-40	ZL/FSZL	10 YR 4/2
40-60	MZCL/ZL	10 YR 5/3 common faint/distinct ochreous mottles Gleyed
60-80	HZCL	10 YR 5/3 common faint/distinct ochreous mottles Gleyed
80-100+	(M) C	Common distinct ochreous and grey mottles Gleyed.
Wetness Class II		Grade 2 (wetness)

16. v. slight slope to east, burnt stubble

0-25	FSZL	10 YR 5/2.
25-75	MZCL	10 YR 4/3, occasional faint ochreous motts from C. 55 cm +
75-100+	(M) C	10 YR 5/2 and 5/4 occasional ochreous mottles and Mn concs (Gleyed?)
Wetness Class II		Grade 1

17. Flat, stubble

0-28	FSZL	10 YR 4/2, v slightly stony (c. 1-2%)
28-40	FSZL	10 YR 4/3, v slightly stony (c. 1-2%)
40-60	ZL	10 YR 4/3, v slightly stony (c. 1-2%)
60-100+	MZCL	10 YR 4/3, v slightly stony (c. 1-2%) few faint ochreous mottles from c. 85 cm +
Wetness Class I		Grade 1

18. Flat, stubble

0-30	FSZL	10 YR 4/2, v. slightly stony
30-48	FSZL	10 YR 4/3, v. slightly stony
48-70	ZL/ MZCL	10 YR 5/4, few faint ochreous mottles v slightly stony
70 + 100+	SCL	increasingly mottled stony (gravel)

Wetness Class I/II Grade 1

19. v gentle falls to west, (slight hollow) stubble

0-30	FSZL	10 YR 4/1
30-40	FSCL	Common distinct ochreous & grey mottles gleyed
40-85	coarse loamy sand and grit with fine gravel	
85+	coarse sand	

Wetness Class I (Grade 3a (Drought)
* Grade 2 with irrigation)

20. v gentle falls to west, stubble

0-29	ZL	10 YR 4/2, slightly stony (c. 5%)
29-45	MZCL	10 YR 5/4, many faint ochreous mottles Mn concs, slightly stony (c. 5%)
45-60	MZCL	10 YR 5/3 many prominent ochreous mottles - 7.5 YR 5/8, Mn concs slightly stony (c. 5%) gleyed
60-70	SCL	10 YR 6/4 & 6/6 increasingly sandy and stony with depth, common prominent ochreous mottlese stony (c. 15%)
70+	Impenetrable - stones	

Wetness Class II/III Grade 3a/2 (wetness)

21. Flat, stubble, c. 5-10% surface stones

0-30	ZL	10 YR 4/2
30-50	MZCL	10 YR 5/3 & 5/4 few faint ochreous mottles
50-55	HCL	10 YR 4/4, common distinct ochreous mottles
55+	Impenetrable - stones	

Wetness Class II Grade 3a (Drought)
*(Grade 2 with irrigation)

22. Flat/v. gentle slopes, stubble

0-32	ZL	10 YR 4/2, v slightly stony c. 2%
32-40	ZL	10 YR 5/3 & 5/6, common faint ochreous mottles - gleyed
40-80	MZCL	10 YR 5/3 & 5/6, common prominent ochreous mottles - gleyed becoming HZCL from c. 60 cm +
80-100	HZCL	10 YR 6/2, becoming paler common Mn concs
Wetness Class II/III		Grade 2/3a (wetness)

23. v gentle falls east, stubble

0-30	ZL	10 YR 4/2, v slightly stony
30-50	ZL/ MZCL	10 YR 5/4
50-70	MZCL	10 YR 5/4 occasional mottles, 10 YR 5/3 & 7.5 YR 5/8 Mn concs - not gleyed
70-85	HZCL	10 YR 5/3 & 5/4 common faint ochreous & grey mottles & Mn concs - gleyed
85+	C	10 YR 5/3 common prominent ochreous & grey mottles and many Mn concs - gleyed
Wetness Class II		Grade 2 (wetness)

24. v gentle falls to the east, stubble

0-30	ZL	10 YR 4/1
30-37	MZCL	10 YR 5/4
37-55	HZCL	10 YR 5/4 and 7/1 common distinct ochreous and grey mottles (gleyed)?
55-70	HZCL	10 YR 6/3 common distinct ochreous mottles - 7.5 YR 5/8 many Mn concs
70-100+	C	10 YR 6/3 common distinct ochreous mottles & Mn concs
Wetness Class III		Grade 3a (wetness)

25. v slightly lower than elsewhere, stubble

0-37	ZL	10 YR 4/1
37-50	HZCL	10 YR 4/4
50-70	C	10 YR 4/4 & 5/3 few faint ochreous mottles
70-100	C	10 YR 4/4 and 5/3 common distinct ochreous mottles some paler colours from c. 80 cm +
Wetness Class II		(Grade 2 (wetness)

26. Flat/v gentle falls, stubble

0-25	FSZL	10 YR 4/2
25-45	ZL	10 YR 4/3
45-60	MZCL	10 YR 4/3 few faint ochreous mottles
60-95	C	10 YR 5/4 and 4/4 common distinct ochreous mottles common Mn concs
95+	Impenetrable - stones	

Wetness Class II (Grade 1/2 drought)
* Grade 1 with irrigation)

27. Flat/v gentle falls, stubble

0-32	FSZL/ZL	10 YR 4/2
32-50	FSZL/ZL	10 YR 5/4 and 4/4
50-80+	MZCL	10 YR 5/4 and 4/4, common distinct ochreous mottles and Mn concs
Wetness Class I		Grade 1

28. Flat, stubble

0-30	ZL	10 YR 4/2
30-55	MZCL	10 YR 4/3
55-65	MZCL	10 YR 4/3 few faint ochreous mottles
65-80	MZCL	7.5 YR 6/6 common distinct ochreous mottles few Mn concs
80-85	HCL	10 YR 6/3, 6/2 and 5/3, common Mn concs slightly stony
85+	Impenetrable - stones	
Wetness Class II		Grade 2 (wetness/drought)

29. Flat, stubble

0-30	FSZL	10 YR 4/2
30-60	MZCL	10 YR 5/4 few faint ochreous mottles and Mn conc from c. 40 cm +
60-90	HZCL	10 YR 5/3 and 5/4 prominent ochreous & grey mottles - Gleyed many Mn concs
90-100+	MZC	
Wetness Class II		Grade 1

30. v.v. slightly lower than rest of area, stubble

0-30	MCL	10 YR 3/2, non-calc
30-60	M/HZCL	10 YR 5/3 many prominent ochreous mottles & Mn concs gleyed
60-70+	C	10 YR 6/2 and 6/3 mottles - 7.5 YR 5/8 slightly stony
Wetness Class III		Grade 3a (wetness)

31. Flat, stubble

0-30	FSZL	10 YR 3/3
30-45	FSZL/ZL	10 YR 4/3 and 4/4
45-60	MZCL/ MCL	10 YR 4/3 and 4/4 few faint ochreous mottles & common Mn concs
60-80	HCL	common prominent ochreous & grey mottles prominent Fe & Mn concs. gleyed slightly stony/gritty from c. 80 cm +
80-120	MC	10 YR 5/3 Many prominent 10 YR 5/6 mottles Stony
Wetness Class II		Grade 1

32. v.v. gentle falls, stubble

0-30	FSZL	10 YR 4/2
30-45	ZL	10 YR 4/4 common faint ochreous mottles below c. 40 cm +
45-60	C	10 YR 4/4 & 10 YR 5/4 common distinct ochreous mottles
60+	Impenetrable - stones	
Wetness Class II		Grade 2/3a (drought) * (with irrigation Grade 2 [wetness]

33. Flat/v gentle falls, stubble

0-30	FSZL	10 YR 3/2
30-40	FSZL	10 YR 3/2
40-50	ZL becoming MCL	10 YR 4/3
50-60	HCL	10 YR 4/3
60+	MC	10 YR 4/3 & 5/3 (gleyed?) common faint ochreous mottles & Mn concs.
Wetness Class II		Grade 1

34. Flat/v. gentle falls, stubble

0-30	FSZL/ZL	10 YR 3/2
30-45	ZL	10 YR 4/4
45-60	MZCL	10 YR 5/4 common faint ochreous & grey mottles & Mn concs
60-70	C	10 YR 5/3 and 5/4 common prominent ochreous & grey mottles & Mn concs - gleyed slightly gritty
70-75+	Impenetrable - gravel/stones	
Wetness Class II		Grade 1/2 (wetness/drought)

35. Flat/v gentle falls, stubble

0-30	FSZL	10 YR 3/2
30-45	MZCL	10 YR 4/3 and 6/4 common large Mn concs & many prominent ochreous mottles 7.5 YR 5/6
45-80	C	10 YR 5/3, many prominent ochreous & grey mottles - gleyed
80+	Impenetrable - gravelly C (hoggin)	
Wetness Class III		Grade 2 (wetness/drought)

36. Flat/v gentle falls, stubble

0-30	FSZL/MZCL	10 YR 3/2
30-40	ZL	10 YR 5/4 common prominent ochreous mottles not gleyed
40-55	MZCL	becoming HZCL 10 YR 5/3 common prominent ochreous & grey mottles gleyed
55-75	C	10 YR 5/3 Many prominent ochreous mottles 7-5 YR 5/8 gleyed 70+ gravelly (hoggin)
75+	Impenetrable - gravelly stones in clay matrix	
Wetness Class III		Grade 2/3a (wetness)

37. Flat/v gentle falls, stubble

0-28	FSZL/MCL	10 YR 3/2
28-35	MZCL	10 YR 6/4 and 5/3 common distinct ochreous mottles (gleyed)
35-70+	(M) C	10 YR 6/4 & 5/3 common distinct ochreous mottles - 7.5 YR 5/8 (gleyed)

Wetness Class III Grade 2/3a (wetness)

38. Flat, stubble

0-30	FSZL	10 YR 4/2
30-55	MZCL	becoming HZCL, 10 YR 6/3 common distinct ochreous & grey mottles & Mn concs mottles - 7.5 YR 5/6 - gleyed
55-60	C	10 YR 6/3 common distinct ochreous mottles - 7.5 YR 5/6 (gleyed)
60+		Impenetrable - gravelly
Wetness Class III		Grade 3a (Drought)

* (Grade 2 with irrigation [wetness]

39. Flat/v. gentle falls, stubble

0-35	FSZL	10 YR 4/1
35-40	ZL	10 YR 5/4
40-55	HZCL	10 YR 6/3 and 5/3, ochreous mottles (gleyed)
55-75	(M) C	10 YR 6/3 abd 5/3 becoming gritty, ochreous mottles (gleyed)
75+		Impenetrable - gravel
Wetness Class III		Grade 2 (wetness/drought)

40. Flat/v gentle falls to east, stubble

0-30	FSZL/ZL	10 YR 4/1
30-40	ZL	few faint ochreous mottles 10 YR 5/4 matrix
40-60	HZCL	10 YR 5/3 and 5/4 matrix common prominent ochreous & grey mottles - gleyed
60-100+	(M) C	10 YR 5/4 common prominent ochreous & grey mottles & many Mn concs
Wetness Class III		Grade 2/3a (wetness)

41. Flat/v gentle falls, stubble

0-35	FSZL	10 YR 3/2
35-45	FSZL	10 YR 4/4
45-65	MZCL	10 YR 5/4 common faint ochreous mottles
65-100+	(M) C	10 YR 5/4 & 7.5 YR 5/6 mottles
Wetness Class II		Grade 1

42. Flat/v gentle falls, stubble

0-30	FSZL	10 YR 4/1
30-85	FSZL	10 YR 5/4
85-100	MZCL	10 YR 5/6
100-120+	ZL/MZCL	10 YR 5/4 common faint ochreous & grey mottles
Wetness Class I		Grade 1

43. Flat/v gentle falls, stubble

0-45	FSZL	10 YR 4/1 v deep top-soil
45-60	FSZL	10 YR 5/3 few Mn concs common distinct ochreous & grey mottles gleyed
60-80	MZCL	10 YR 5/3 few Mn concs common distinct ochreous & grey mottles gleyed, slightly stony
80+	Impenetrable - gravel	
Wetness Class I		Grade 1

PITS

PIT AT BORING 2

TOPSOIL	0-30	M/HCL 2.5 y 3/2, non-calc % stones > 2 cm = c. 3-4% c. 5% total stone content small-medium sub-angular flints
	topsoil/subsoil boundary - sharp and smooth	
SUBSOIL	30-45 HCL	Matrix - 10 YR 5/3 - gleyed common distinct ochreous mottles 7.5 YR 5/8 c. 12% > 2 cm stones c. 3% < 2 cm (c. 15% total) small-medium gravel/flints weakly developed structure, friable, coarse sub-angular blocky SLOWLY PERMEABLE.
	45-60 C	stony layer c. 20% stones no structural assessment - too stony
	60-80 C	moderately well developed, medium prismatic and medium - coarse angular blocky firm consistence, stones c. 10% matrix colour, 10 YR 6/2 gleyed; SLOWLY PERMEABLE
	80+	HOGGIN

Slowly permeable and gleyed from 30 cm + ; Wetness Class III

PIT AT BORING 33

TOPSOIL	0-30	FSZL
UPPER SUBSOIL	30-39	FSZL Weakly developed medium and coarse sub-angular blocky, friable consistence.
LOWER SUBSOIL	39-75 ZL; 50-60 moderate well developed coarse sub angular blocky friable.	
	MC ; 60+ medium - coarse primatic, firm	
	0.5% biopores, SLOWLY PERMEABLE	

Gleyed (?) and slowly permeable 60 cm + (see boring 33); Wetness Class II.

SMALL PIT AT BORING 43

SUBSOIL	45-60	FSZL	Weakly developed, medium - coarse sub angular, blocky, friable consistence > 0.5% biopores & abundant worm channels
	60-80	MZCL	Much Fe & Mn concs. Some cemented lumps v weakly developed blocky > 0.5% biopores & abundant worm channels; friable

Not slowly permeable within 80 cm, but gleyed 60 cm + (see boring 43)
Wetness Class I

* Since irrigation has been taken account of in the grading of this land, those individual auger borings which have soils limited solely by drought also have the non-irrigation grade included for reference purposes.