

**SOIL RESOURCES AND AGRICULTURAL USE AND QUALITY
OF LAND NORTH OF ENDERBY, LEICESTERSHIRE**

F.W Heaven, BSc, MISoilSci

Report 656/1

Land Research Associates Ltd
Lockington Hall,
Lockington,
Derby
DE74 2RH

11th December, 2009

SUMMARY

A detailed survey of 369 ha of land near between Leicester Forest East and Enderby has shown that 92% is in agricultural use, arable and pasture.

Most of the site has poorly-drained heavy soils over clay. There are smaller areas of lighter loamier soils over clay.

Most of the agricultural land (70%) is limited by wetness over slowly permeable subsoils and has an agricultural land quality of 3b. The remaining more freely draining and lighter soils are of best and most versatile quality in sub-grade 3a and grade 2.

Two topsoil and two subsoil resources have been identified. The lighter topsoils and subsoils are a more versatile resource for landscaping and gardens than the heavy topsoil over clay resource. Both resources need to be carefully used and protected to maintain their important environmental functions.

Introduction

- 1.1 This report provides information on the soil resources and agricultural quality and use of an area of 369 ha of land to the south of Leicester Forest East, Leicestershire. The land is proposed for development. The report is based on a soil and agricultural desk study, and surveys of the land in October 2009.

SITE ENVIRONMENT

- 1.2 The land investigated occupies gently undulating ground with slight slopes, and extends from Enderby in the south to Leicester Forest East in the north. Elevation ranges from about 70 m to 105 m aOD. It is bounded to the east by the M1 motorway and to the west by field boundaries. The northern edge is the urban area of Leicester Forest East, and the southern is field boundaries.
- 1.3 The land is principally in agricultural use with arable land predominant and lesser areas of grassland and woodland (Map 1). Some of the permanent grassland protects Lubbesthorpe Medieval Settlement, a scheduled ancient monument near Abbey Farm.

AGRICULTURAL USE

- 1.4 The land is owned by two landlords and farmed by four agricultural businesses (Map 2).
- 1.5 Hopyard Farm is a 135 ha acre mixed holding, half arable growing winter-sown crops, and half grassland used for fattening cattle. The scheduled ancient monument is inside the farm curtilage, and this cannot be disturbed by ploughing so can only be used for grazing on permanent grass.
- 1.6 Hunscombe Grange, Enderby is a 800 ha mixed farm supporting arable land for winter-sown cereal crops, and over 500 beef cattle, some as a suckler herd, and some fattened from stores. About 151 ha of the land are within the site, including land close to the motorway service area.
- 1.7 Old Warren Farm is a 60 hectare mixed holding growing grass for dairy cattle and maize for fodder. The rest of the land is given over to cereal cropping.
- 1.8 Lawn Farm is a mixed holding mainly given over to fattening 200 cattle. The arable land within the site is used for growing feed grain for the cattle and some temporary grassland. About 24 ha of the farm are within the site area.
- 1.9 The land is subject to several Entry Level Environmental Stewardship

agreements.

PUBLISHED INFORMATION

- 1.10 There is no published detailed soil map for the area but the National Soil Map¹ published at 1: 250,000 scale shows the soils to be in the Salop association, comprising slowly permeable seasonally waterlogged reddish fine loamy over clayey soils developed in reddish till, with associated better drained types
- 1.11 A map summarising pre-1988 agricultural land classification surveys carried out by MAFF around Leicester Forest East and Enderby shows the land as grade 3 quality.² Most of the land is classed as moderate quality (sub-grade 3b and 3c³) with smaller areas of 'best and most versatile' land in sub-grade 3a.

¹ Ragg, J M *et al* (1984) *Soils and their Use in Midland and Western England*. Soil Survey of England and Wales Bull. No 12

² Natural England, *personal communication*.

³ Pre 1988, grade 3 was split into sub-grades a, b and c

2.0 Soil resources

- 2.1 The Defra Soil Strategy⁴ points out that soils deliver a range of vital functions for human activities including food and fibre production, support for ecosystems and habitats, and environmental services that play a vital role in the global carbon cycle, stabilising and degrading contaminants and providing clean water. One of the strategy's objectives is to ensure that soil functions (soil ecosystem services) are fully valued in the planning process.
- 2.2 A detailed soil resource and agricultural quality survey was carried out in October and November 2009. It was based on observations at the alternate intersects of a 100 m grid, giving a sampling density of one observation per two hectares. During the survey soils were examined by a combination of pits and augerings to a maximum depth of 1.2 m. A log of the sampling points and a map (Map 5) showing their location is in an appendix to this report.
- 2.3 The survey showed that the most widespread soil type is heavy textured and poorly-draining, but loamier types occur locally (Map 3).

Heavy soils

- 2.4 These soils are developed in glacial till, mostly reddish, but in some areas, greyish-coloured with chalk stones. The topsoils are mainly heavy clay loam or clay, less often medium clay loam, with up to 5% small and medium rounded quartzite stones. Where developed in reddish tills, the topsoils overlie either 15-20 cm of heavy clay loam upper subsoil with grey colours and ochreous mottling indicative of poor drainage, or are directly over impermeable grey-mottled reddish clay subsoils. An example profile from close to observation 7 (Map 5) is described below:

0-30 cm	Dark brown (7.5YR 3/2) heavy clay loam with 3% small rounded quartzite stones; moderately developed medium and coarse subangular blocky structure; common fine fibrous roots; sharp smooth boundary to:
30-52 cm	Grey (7.5YR 5/2) heavy clay loam with common strong brown (7.5YR 5/6) mottles; 3% small rounded quartzite stones; weakly developed coarse

⁴ Safeguarding our Soils: a Strategy for England (Defra, 2009)

subangular blocky structure; 3% fine pores; a few fine fibrous roots; clear smooth boundary to:

52-100+ cm Yellowish red (5YR 4/6) clay with common grey (5YR 6/1) and strong brown (7.5YR 5/6) mottles; a few small stones of sandstone, limestone and quartzite; weak very coarse prismatic structure; 1% fine pores; a few fine fibrous roots.

2.5 Soils over chalky tills have grey-mottled clay upper subsoils overlying grey-mottled calcareous clay subsoils containing chalk stones. An example soil profile from close to observation 40 (Map 5) is described below.

0-28 cm Dark greyish brown (10YR 4/2) heavy clay loam with 3% small rounded quartzite stones; moderately developed medium subangular blocky structure; common pores and fissures; many fine fibrous roots; sharp smooth boundary to:

28-36 cm Light brownish grey (10YR 6/2) clay with abundant strong brown (7.5YR 5/8) mottles; 1% small rounded quartzite stones; weakly developed very coarse blocky structure; 3% fine pores; common fine fibrous roots; clear smooth boundary to:

36-45 cm Bluish grey (5PB 6/1) clay with many strong brown (7.5YR 5/6) mottles; a few small subangular flint stones; structureless, massive; 1% fine pores; common fine fibrous roots; merging to:

45-90 cm Bluish grey (5PB 5/1) calcareous clay with abundant strong brown (7.5YR 5/6) mottles; common very small rounded chalk stones; structureless, massive: 2% fine pores; a few fine roots; merging to:

90-110+ cm Yellowish red (5YR 4/6) and bluish grey (5PB/6/1) calcareous clay with a few small chalk and sandstone stones.

2.6 These heavy soils are slowly permeable and poorly drained (wetness class III and IV) and are waterlogged in winter. Successful cultivation is confined to autumn and spring, limiting the range of food and fibre production they can support. They have a limited capacity to absorb excess winter rainfall and throughflow is slow. Excess water tends to run-off the soils, limiting their usefulness in water and flood control. They provide moist, neutral habitats for plant communities but are generally too wet to be attractive to burrowing mammals.

Loamy soils

2.7 These soils occur across many areas of the site where there is a thicker loamier drift over the till. Topsoils are medium sandy loam or sandy clay loam, some stony. The upper subsoils are of a similar texture and relatively permeable. Some are heavily mottled (wetness class III) but on sloping sites they are browner and less mottled. The lower subsoils are mainly slowly permeable reddish clays which occur below 40 cm depth. An example soil profile from close to observation 80 (Map 5) is described below.

0-26 cm	Dark brown (7.5YR 3/2) medium sandy loam with 4% small rounded quartzite and subangular flint stones; moderately developed medium subangular blocky structure; common pores and fissures; many fine fibrous roots; clear smooth boundary to:
26-42 cm	Brown (7.5YR 4/3) medium sandy loam with a few yellowish red (5YR 5/8) mottles; 3% small rounded quartzite stones; moderately developed medium and fine subangular blocky structure; common pores and fissures; common fine fibrous roots; clear smooth boundary to:
42-110 cm	Yellowish red (5YR 4/6) clay with common grey (5YR 6/1) and strong brown (7.5YR 5/8) mottles; common ferri-manganiferous concretions; a few small sandstone limestone and quartzite stones; weakly developed coarse prismatic becoming structureless, massive deeper; 1% fine pores; a few fine roots.

2.8 There are local variations. In some parts, slowly permeable clay is not present, and the soils are deep and loamy throughout. Elsewhere, there are sandy layers at depth and the soils are freely draining (wetness class I and II).

2.9 The permeable loamy upper soil layers allow absorption of excess winter rainfall, and on slopes allow lateral drainage, so that the soils are relatively freely draining and able to support a wider range of food and fibre crops. They have sufficient clay content to effectively filter, stabilise and degrade any contaminants passing through the soil. They provide relatively dry habitats for plant communities and burrowing animals

3.0 Agricultural Quality

3.1 To assist in assessing land quality, the Ministry of Agriculture, Fisheries and Food (MAFF) developed a method for classifying agricultural land by grade according to the extent to which physical or chemical characteristics impose long-term limitations on agricultural use for food production. The MAFF Agricultural Land Classification (ALC) system classifies land into five grades numbered 1 to 5, with grade 3 divided into two sub-grades (3a and 3b). The system was devised and introduced in the 1960s and revised in 1988.

3.2 The agricultural climate is an important factor in assessing the agricultural quality of land and has been calculated using the Climatological Data for Agricultural Land Classification⁵. The relevant site data for an average elevation of 90 m is given below.

- Average annual rainfall: 654 mm
- January-June accumulated temperature >0°C 1368 day°
- Field capacity period 148 days
(when the soils are fully replete with water) mid Nov-early April
- Summer moisture deficits for: wheat: 103 mm
potatoes: 93 mm

3.3 The survey described in the previous section was used in conjunction with the agroclimatic data above to classify the site using the revised guidelines for agricultural land classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food⁶.

SURVEY RESULTS

3.4 The agricultural quality in the survey area is principally determined by the degree of surface wetness in winter, a function of the depth to a slowly permeable layer and the texture of the topsoil. Grades 2, 3 and 4 are present.

⁵ *Climatological Data for Agricultural Land Classification*. Meteorological Office, 1989

⁶ *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*. MAFF, 1988.

Grade 2

- 3.5 There are 33 ha of grade 2 land mainly on hilltops and upper slopes. The soils are as described in paragraphs 2.7-2.9, typically having more than 40 cm thickness of sandy over a clay substrate. Such soils are in wetness class II and the land quality is limited by slight winter wetness.
- 3.6 In parts of the south and north-west are soils with sandy rather than clayey lower subsoils. These are freely draining (wetness class I), but the sandy layers are unable to hold sufficient moisture to fully maintain crop growth, so the land is limited by slight droughtiness.

Sub-grade 3a

- 3.7 This sub-grade accounts for about 61 ha (18%) of the agricultural land with soils similar to those described in paragraph 2.7. They have mottled upper subsoils indicative of wetness class III. They are often sandy clay loam in texture, so that moderate winter wetness is the principal limit to agricultural quality.

Sub-grade 3b

- 3.8 There are 236 ha of sub-grade 3b land amounting to 70% of the agricultural land. The soils are the heavy types described in paragraph 2.4-2.6, and the land quality is limited by winter wetness over slowly permeable clay subsoils.

Grade 4

- 3.9 In order to protect important architectural features, the land designated as scheduled monument cannot be cultivated, therefore precluding any crop but permanent grass. The land can be used for grazing and forage crops but not arable use, and this severely limits its agricultural potential. It has thus been classified as Grade 4.

Other land

- 3.10 There are several areas of woodland on the site (Map 1) and a number of farmsteads. Some land on the site of old farmsteads is not in agricultural use

Grade areas

- 3.11 The boundaries between the different grades of land are shown on Map 3 and the areas occupied by each are shown below.

Table 1. Areas within the survey area occupied by the different land grades

<i>Grade/sub-grade</i>	<i>Area (ha)</i>	<i>% of agricultural land</i>	<i>% of the site</i>
Grade 2	33	10	9
Sub-grade 3a	61	18	17
Sub-grade 3b	236	70.	64
Grade 4	9	2	2
Other land	30		8
Total	369	100	100

4.0 Soil resources and their use

- 4.1 An objective of the Defra Soil Strategy is to ensure that the construction industry and planning authorities take sufficient account of the need to protect soil resources, and ensure soils are able to fulfil as many as possible of their functions. An Environment Agency strategy *Soil a Precious Resource: Our strategy for protecting, managing and restoring soil* (Environment Agency, 2007) has complementary aims.
- 4.2 The soil types across the site have been described in Section 2. There are essentially two types of soil resource on the site. The most widespread has heavy textured topsoils over heavy textured subsoils. The topsoils need careful handling during handling and storage in order to maintain their structure. They less suited for garden soils, and are easily damaged in any landscaped situations that have heavy foot traffic in winter. The heavy clay loam and clay subsoils are easily damaged by traffic when exposed during building work and have the potential to become intractable if mismanaged during construction work. For reinstatement to landscaping, these subsoils will need loosening.
- 4.3 The less extensive loamy soils have medium and light loam topsoils over similar textured upper subsoils. The sandy loam and sandy clay loam topsoils are a versatile resource for gardens and landscaping and more resistant to damage during handling. They should be stored separately from the heavier types. The loamy subsoils are susceptible to damage by traffic when exposed during building work and for reinstatement to landscaping they will need loosening.
- 4.4 The distribution of the soil resources is shown on Map 3.

Soil handling

- 4.5 Areas not being built over (e.g. environmental buffers and landscape area) should not be trafficked by construction vehicles as this will render the soils impermeable, preventing percolation of rainfall beyond the base of the topsoil, which will quickly become saturated

- 4.6 Stripped topsoil should be stored in separate resource bunds no more than 3 m high, and kept grassed and free from construction traffic until required for re-use.
- 4.7 The recently published *Construction Code of Practice for Sustainable Use of Soils on Construction Sites* (Defra 2009) provides guidance on good practice in soil handling.

5.0 Conclusions

- 5.1 A detailed survey of 369 ha of land near between Leicester Forest East and Enderby has shown that 92% is in agricultural use, arable and pasture.
- 5.2 Most of the site has poorly-drained heavy soils over clay. There are smaller areas of lighter loamier soils over clay.
- 5.3 Most of the agricultural land (70%) is limited by wetness over slowly permeable subsoils and has an agricultural land quality of 3b. The remaining more freely draining and lighter soils are of best and most versatile quality in sub-grade 3a and grade 2.
- 5.4 Two topsoil and two subsoil resources have been identified. The lighter topsoils and subsoils are a more versatile resource for landscaping and gardens than the heavy topsoil over clay resource. Both resources need to be carefully used and protected to maintain their important environmental functions.

APPENDIX
LOCATION AND DETAILS OF OBSERVATIONS

ALC and soil resources survey of land north of Enderby, autumn 2009 - Details of observations at each sampling point

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling			Grade	Main limitation
1	0-20	HCL	3	20-30	HCL	xxx	30-110	r C	xxx	0	IV	3b	W
2	0-33	dist MCL	1	33-45	SCL-MCL	xx	45-110	r C	xxx	<1	III	3a	W
3	0-28	HCL	4	28-110	r C	xxx				<1	IV	3b	W
4	0-45	MCL	3	stopped on stones						0			
5	0-24	MCL	5	24-65	SCL	xxx	65-110	r C	xxx	1	III	3a	W
6	0-30	MCL	3	30-50	r C	xx	50-70 70-110	r HCL r C	xxx xxx	1	IV	3b	W
7	0-27	SCL	2	27-35	SCL	xxx	35-70	r C	xxx	2	IV	3b	W
8	0-25	MCL	1	25-40 40-60	MCL caMSL tpsl	xx	60-80	caMSL+gravel		3			
9	0-25	SCL	3	25-60	SCL	xxx	60-110	r C	xxx	1	III	3a	W
10	0-31	MSL	2	31-55	MSL	x	55-80	r C	xxx	2	II	2	D/W
11	0-27	MSL	3	27-48	MSL	x	48-110	r C	xxx	3	III	2	W
12	0-25	HCL	3	25-110	r C	xxx				1	IV	3b	W
13	0-28	SCL	10	28-90	gr C	xxx	90-110	r C	xxx	0	IV	3b	W
14	0-25	SCL-MSL	2	25-45	SCL	x	45-110	r C	xxx	2	III	3a	W
15	0-28	SCL	5	28-60	MSL	x	60-110	r C	xxx	3	II	2	W
16	0-24	r br HCL	4	24-110	st r C	xx				0	IV	3b	W
17	0-30	SCL	3	30-65	SCL-MSL	xxx	65-110	r C	xxx	0	III	3a	W
18	0-19	MCL	2	19-32	SCL	xxx	32-110	r C	xxx	2	IV	3b	W
19	0-25	HCL	3	25-60	gr C	xxx	60-110	C+chk stones	xxx	0	IV	3b	W
20	0-28	MSL	4	28-50	MSL	xxx	stopped on stones			0	III	2	W
21	0-24	SCL	2	24-48	SCL	xxx	48-110	r C	xxx	0	III	3a	W
22	0-22	MCL	2	22-45	MCL	xx	45-110	r C	xxx	0	III	3a	W
23	0-25	SCL	8	25-35	SCL	xxx	35-110	r C	xxx	0	IV	3b	W
24	0-25	MCL	2	25-50	gr C	xxx	50-110	r C	xxx	0	IV	3b	W
25	0-27	SCL	2	27-35	SCL	xxx	35-110	r C	xxx	0	IV	3b	W
26	0-25	MCL	5	25-42	SCL	xxx	42-110	r C	xxx	<1	III	3a	W
27	0-30	HCL	5	30-110	br C	xxx				0	IV	3b	W
28	0-30	C	3	30-110	gr C	xxxx				0	IV	3b	W
29	0-25	MSL	3	25-54	MSL	x	54-110	r C	xxx	0	II	2	D
30	0-28	MCL	3	28-70	gr C	xxx	70-110	C+chk stones	xxx	0	IV	3b	W
31	0-28	MCL	2	28-50	gr C	xxx	50-100	r C	xxx	0	IV	3b	W
32	0-28	HCL	1	28-60	gr C	xxx	60-110	rC+chk stones	xxx	0	IV	3b	W
33	0-26	SCL-MCL	5	26-45	SCL	xx	45-110	r C	xxx	<1	III	3a	W
34	0-27	MCL	4	27-40	gr C	xxx	40-110	r C	xxx	1	IV	3b	W
35	0-25	MSL	2	25-60	MSL	x	60-110 110-120	r C RC	xxx xxx	1	II	2	D
36	0-30	MCL	6	30-110	gr C	xxx				0	IV	3b	W
37	0-28	MCL	2	28-52	st SCL	xxx	52-110	r C	xxx	0	III	3a	W
38	0-30	MCL-SCL	5	30-45	SCL	xx	45-110	st r C	xxx	0	III	3a	W

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling			Grade	Main limitation
39	0-25	HCL	1	25-35	HCL	xxx	35-70 70-110	C+chk stones r C	xxx xxx	0	IV	3b	W
40	0-27	MCL	1	27-50	gr C	xxx	50-110	r C	xxx	0	IV	3b	W
41	0-27	HCL	4	27-60	gr C	xxx	60-110	C+chk stones	xxx	0	IV	3b	W
42	0-25	MCL-HCL	3	25-50	gr C	xxx	50-110	r C	xxx	<1	IV	3b	W
43	0-23	SCL	5	23-36	SCL	xxx	36-110	r C	xxx	<1	IV	3b	W
44	0-29	MSL	3	29-60	st SCL	x	stopped on stones			0	II	2/3a	D/W
45	0-23	MCL-SCL	4	23-42	MCL-SCL	xxx	42-110	r C	xxx	0	III	3a	W
46	0-30	M-HCL	3	30-40	SCL	xxx	40-110	r C	xxx	1	IV	3b	W
47	0-27	MCL	1	27-55	SCL	xxx	stopped on stones			<1	III	3a	W
48	0-28	C	1	28-110	r C	xxx				<1	IV	3b	W
49	0-28	HCL	3	28-36	gr C	xxx	36-90 90-110	C+chk stones r C	xxx xxx	0	IV	3b	W
50	0-25	C	2	25-60	gr C	xxx	60-120	r C	xxx	0	IV	3b	W
51	0-28	HCL	4	28-42	HCL	xxx	42-110	r C	xxx	1	III	3b	W
52	0-25	MCL	1	25-40	HCL	xxx	40-120	r C	xxx	2	III	3a	W
53	0-28	r M-HCL	1	28-36	r MCL	x	36-110	r C	x	1	IV/III	3a/3b	W
54	0-30	MSL	3	30-48	MSL	x-xx	48-110	r C	xxx	0	III	2	W
55	0-30	HCL	3	30-50	HCL	xxx	50-110	r C	xxx	1	III/IV	3b	W
56	0-24	HCL	1	24-110	r C	xxx				2	IV	3b	W
57	0-23	HCL-C	2	23-60	br C	xxx	60-110	C+chk stones	xxx	1	IV	3b	W
58	0-24	HCL	2	24-50	br C	xxx	50-110	C+chk stones	xxx	1	III/IV	3b	W
59	0-32	HCL	3	32-40	gr C	xxx	40-110	C+chk stones	xxx	0	IV	3b	W
60	0-29	HCL	3	29-110	r C	xxx				0	IV	3b	W
61	0-28	HCL	3	28-45	gr C	xxx	45-110	r C	xxx	1	IV	3b	W
62	0-32	SCL-MSL	6	32-65	SCL	o-x	65-100 100-120	SCL r C	xx xxx	1	II	2	W
63	0-24	MCL	3	24-60	gr C	xxx	60-110	r C	xxx	0	IV	3b	W
64	0-28	HCL	2	28-60	C	xxx	60-110	C+chk stones	xxx	0	IV	3b	W
65	0-24	HCL	2	24-40	HCL	x	40-80 80-110	gr C C+chk stones	xxx xxx	0	III	3b	W
66	0-30	C	3	30-80	gr C	xxx	80-110	r C	xxx	1	IV	3b	W
67	0-29	HCL	2	29-110	r C	xxx				<1	IV	3b	W
68	0-32	HCL	4	32-40	HCL	xxx	40-110	r+grC	xxx	<1	III	3b	W
69	0-24	HCL	4	24-45	gr C	xxx	45-110	r C	xxx	0	IV	3b	W
70	0-25	MCL	4	25-110	r C	xx				1	IV	3b	W
71	0-27	SCL	4	27-48	MSL	x	48-75 stopped on stones	r C	xx	2	III	3a	W
72	0-21	MCL	1	21-40	HCL	xx	40-110	r C	xxx	0	III/IV	3a/3b	W
73	0-26	HCL	1	26-35	HCL	xx	35-55 55-110	gr C C+chk stones	xxx xxx	1	IV	3b	W
74	0-28	C	2	28-70	gr C	xxx	70-110	C+chk stones	xxx	0	IV	3b	W
75	0-28	HCL	3	28-60	r C	xxx	60-110	rC+chk stones	xxx	2	IV	3b	W
76	0-28	HCL	3	28-110	r C	xxx				1	IV	3b	W
77	0-23	HCL	3	23-100+	r C	xxx				1	IV	3b	W
78	0-25	HCL	2	25-35	HCL	xxx	35-80+	C	xxx	0	IV	3b	W
79	0-24	r C	1	24-110	r C	xxx				2	IV	3b	W

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling			Grade	Main limitation
80	0-26	MSL	4	26-42	MSL	x	42-110	r C	xxx	2	III	2	W
81	0-21	HCL	1	21-40	br C	x	40-55 55-110	gr C C+chk stones	xxx	1	IV	3b	W
82	0-23	C	2	23-90	C+chk stones	xxx	90-110	C+chk stones	xxxx	1	IV	3b	W
83	0-24	HCL	2	24-90	HCL-C	xx(x)	stopped on stones			0	III	3b	W
84	0-26	r C	3	26-110	r C	xxx				1	IV	3b	W
85	0-23	HCL	3	23-62	HCL	xxx	62-110	r C	xxx	1	III	3b	W
86	0-28	HZCL	4	28-100	r C	xxx				2	IV	3b	W
87	0-30	HCL	4	30-110	C	xxx				2	IV	3b	W
88	0-30	MZCL	3	30-110	r C	xxx				0	IV	3b	W
89	0-26	SCL	4	26-45	SCL	o-x	45-110	r C	xxx	1	III	3a	W
90	0-30	M-HCL	5	30-38	HCL	xxx	38-110	r C	xxx	3	IV	3b	W
91	0-21	C	1	21-80	gr C	xxx	80-110	C+chk stones	xxxx	0	IV	3b	W
92	0-20	HCL	1	20-40	gr C	xxx	40-110	C+chk stones	xxx	1	IV	3b	W
93	0-28	HCL	1	28-45	SCL	xxx	45-100	r C	xxx	2	IV	3b	W
94	0-32	HCL	2	32-80	HCL	xx	110	r C	xxx	0	II	3a	W
95	0-25	HCL	3	25-46	SCL	xx	46-110	r C	xxx	2	III	3b	W
96	0-30	MCL	3	30-110	r C	xxx				2	IV	3b	W
97	0-28	MCL	3	28-110	r C	xxx				1	IV	3b	W
98	0-30	MCL	4	30-45	HCL	xxx	45-60	C	xxx	0	IV	3b	W
							stopped on stones						
99	0-35	HCL	2	35-70	r C	xxx	70-110	rC+chk stones	xxx	2	IV	3b	W
100	0-26	C	2	26-60	C	xxx	60-110	C+chk stones	xxx	1	IV	3b	W
101	0-23	HCL	2	23-45	C	xxx	45-110	C+chk stones	xxx	0	III	3b	W
102	0-33	MCL	1	33-55	HCL	xxx	55-110	r C	xxx	2	III	3a	W
103	0-24	HCL	2	24-110	r C	xxx				2	IV	3b	W
104	0-40	SCL	4	40-110	SCL	xx				1	II	2	W
105	0-30	MCL	4	30-110	r C	xxx				2	IV	3b	W
106	0-29	MCL	3	29-110	r C	xxx				1	IV	3b	W
107	0-23	SCL	0	23-50	SCL-MSL	xxx	50-110	r C	xxx	0	III	3a	W
108	0-27	HCL	2	27-50	r C	xxx	50-110	rC+chk stones	XXX	2	IV	3b	W
109	0-25	HCL-C	2	25-60	gr C	xxx	60-100	C+chk stones	xxx	1	IV	3b	W
110	0-24	HCL-C	1	24-55	HCL	xxx	55-100	C+chk stones	xxx	0	III	3b	W
111	0-26	MCL	3	26-45	HCL	xxx	45-110	r C	xxx	0	III	3a	W
112	0-28	HCL	2	28-110	r C	xxx				2	IV	3b	W
113	0-30	MCL	2	30-110	MCL	xx				4	II	2?	W
114	0-30	HCL	0	30-80	r C	xxx	80-110	gr C	xxxx	2	IV	3b	W
115	0-29	HCL	2	29-110	r+gr C	xxx				1	IV	3b	W
116	0-27	HCL	2	27-110	r C	xxx				2	IV	3b	W
117	0-23	HCL	2	23-50	gr C	xxx	50-100	C+chk stones	xxx	2	IV	3b	W
118	0-28	HCL	4	28-50	gr C	xxx	50-110	C+chk stones	xxx	1	IV	3b	W
119	0-30	HCL-C	3	30-45	br+gr C	xxx	45-110	ca C	xxx	0	IV	3b	W
120	0-32	HCL	2	32-110	r C	xxx				0	IV	3b	W
121	0-31	HCL	2	31-110	r C	xxx				<1	IV	3b	W
122	0-30	MCL	1	30-70	SCL	o-x	stopped on hard layer			1	II	2	W
123	0-28	SCL	2	28-80	SCL	xxx	80-110	MSL	xxx	2	III?	3a	W

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling			Grade	Main limitation
124	0-29	HCL	2	29-50	gr+r C	xxx	50-70 stopped on hard layer	hard r C	xx	1	IV	3b	W
125	0-28	SCL	2	28-60	SCL-MSL	xxx	60-110	r C	xxx	<1	III	3a	W
126	0-18	HCL	1	18-36	HCL	xx	36-50 50-110	gr C C+chk stones	xxx xxx	2	IV	3b	W
127	0-28	C	3	28-35	C	xx	35-110	C+chk stones	xxx	1	IV	3b	W
128	0-28	HCL	3	28-110	r C	xxx				0	IV	3b	W
129	0-30	HCL	3	30-40	HCL	xxx	40-110	r C	xxx	0	II/IV	3b	W
130	0-33	HCL	2	33-45	gr C	xxx	45-110	r C	xxx	1	IV	3b	W
131	Scheduled ancient monument											4	
132	0-20	HCL	3	stopped on stones									
133	0-28	HCL	3	28-45	HCL	xxx	45-110	r C	xxx	2	III	3b	W
134	0-18	MCL	0	18-35	MCL	xx(x)	35-100	r C	xxx	3	IV	3b	W
135	0-28	HCL-C	2	28-110	r C	xx				1	IV	3b	W
136	0-32	HCL	4	32-52	HCL	xxx	52-110	r C	xxx	1	III	3b	W
137	0-30	HCL	3	30-110	r C	xxx				1	IV	3b	W
138	0-24	MCL	2	24-35	MCL	x	35-120	r C	xxx	2	IV	3b	W
139	0-18	MSL	3	18-50	MSL	o	50-80+	r C	xxx	1	II	2	D
140	Scheduled ancient monument											4	
141	0-38	MCL	3	38-100	r C	xxx				0	IV	3b	W
142	0-28	HCL-SCL	3	28-35	HCL-SCL	xxx	35-110	r C	xxx	<1	IV	3b	W
143	0-18	M-HCL	1	18-38	HCL	xxx	38-110	r C	xxx	2	IV	3b	W
144	0-30	SCL	3	30-110	r C	xxx				1	IV	3b	W
145	0-32	SCL	2	32-48	SCL	xxx	48-110	r C	xxx	2	III	3a	W
146	0-34	SCL	1	34-50 50-75	SCL SCL-MSL	xx(x) xxx	75-100 100-120	SCL gr C	xxx xxx	0	II	2	D
147	0-10	MSL	1	10-80	MSL	xx	80-120	LMS	xxx	2	II	2	D
148	0-29	MSL	1	29-70	MSL	xxx	70-110	LMS	xxxx	1	II	2	D
149	0-30	SCL	2	30-40	SCL	xxx	40-110	C	xxx	<1	III	3a	W
150	0-18	HCL	0	18-60	gr HCL	xx(x)	60-90 stopped in gravel	st HCL	xx	0	III	3b	W
151	0-18	HCL	0	18-110	gr C	xxxx				0	IV	3b	W
152	0-24	MCL	0	24-50	gr C	xxx	50-110 stopped in gravel	LP		0	IV	3b	W
153	0-20	MSL	6	stopped in gravel									
154	0-24	HCL-C	3	24-45	gr C	xxx	45-80 80-110	gr MSL r HCL	xxx	0	IV	3b	W
155	0-28	SCL	5	28-100	r C	xxx				2	IV	3b	W
156	0-26	HCL-C	2	26-110	r C	xxxx				2	IV	3b	W
157	0-25	MCL	2	25-50	r SCL	o	50-110	r C	xxx	1	III	3a	W
158	0-30	HCL	2	30-60	gr C	xxx	60-100 100-120	st SCL st MS	xxx xxx	0	IV	3b	W
159	0-25	MCL	0	25-40	HCL	xxxx	stopped on stones			0	III?	3a	W
160	0-20	MCL	0	20-60	gr SCL	xxx	60-100 100-120	MSL MS	xx x	0	II	2	W
161	0-30	HCL	1	30-50	C	xxx	50-70 stopped on gravel	v st HCL		0	IV	3b	W
162	0-18	HCL	0	18-100	C	xxxx	stopped			0	IV	3b/4	W

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling			Grade	Main limitation
163	0-30	HCL	2	30-50	HCL-SCL	xxx	<u>50</u> -110	r C	xxx	2	III	3b	W
164	0-30	HCL	3	<u>30</u> -110	r C	xxx				2	IV	3b	W
165	0-30	C	3	30-80	SCL	xxx	80-120	r HCL	o	0	II	3b	W
166	0-24	MCL	2	24-35 35-50	SCL SCL	x xxx	<u>50</u> -60	st r C		0	III	3a	W
167	0-28	SCL-HCL	2	28-45	HCL	xxx	45-110	r C	xxx	0	IV	3b	W
168	0-26	MSL	3	26-70	MSL)	70-110	LMS	o	0	I	2	D
169	0-23	HCL-SCL	2	23-100	HCL-SCL	xxx	100-120	gr HCL	xxxx	1	III	3a/3b	W
170	0-25	SCL	1	25-45	SCL	xxx	45-120	r C	xxx	1	III	3a	W
171	0-25	SCL	3	25-50	SCL	x	50-65 <u>65</u> -110	SCL r C	xxx xxx	0	II	2	W
172	0-30	MCL	3	30-110	r C	xxx				0	IV	3b	W
173	0-24	SCL	4	<u>24</u> -110	r C	xxx				1	IV	3b	W
174	0-26	HCL	5	<u>26</u> -60	st HCL	xxx	60-110	SCL	xxx	0	IV	3b	W
175	0-30	HCL	2	<u>30</u> -110	r C	xxx				2	IV	3b	W
176	0-28	HCL	2	<u>28</u> -40	gr HCL	xxx	40-110	r C	xxx	1	IV	3b	W
177	0-27	HCL	4	<u>27</u> -70	gr C	xxx	70-110	r+gr C	xxx	0	IV	3b	W
178	0-28	HCL	5	<u>28</u> -60	gr C	xxx	60-110	C+chk stones	xxx	2	IV	3b	W
179	0-28	SCL	2	28-50	SCL	o	50-90 90-120	SCL FSL	x xx	1	II	2	W
180	0-28	MCL	3	28-45 <u>45</u> -80	gr HCL gr C	xxx xxx	80-90	v st SCL	xxx	1	III	3a	W
181	0-28	SCL	4	28-80	HCL	o-x	80-120	MZL	xx	2	II	2	W
182	0-26	MCL	6	<u>26</u> -110	r C	xxx				1	IV	3b	W
183	0-30	SCL	8	30-70	SCL	o	70-90 90-120	SCL r C - HCL	xx XXX	1	II	2	W
184	0-20	SCL	2	20-35	SCL	xxx	<u>35</u> -110	r C	xxx	<1	IV	3b	W
185	0-30	MCL	3	30-110	r C	xxx				3	IV	3b	W
186	0-25	SCL	3	<u>25</u> -100	r C	xxx				1	IV	3b	W

Key to table

Mottle intensity:

- o unmottled
- x few to common rusty root mottles (topsoils) or a few ochreous mottles (subsoils)
- xx common to many ochreous mottles and/or dull structure faces
- xxx common to many greyish or pale mottles (gleyed horizon)
- xxxx dominantly grey, often with some ochreous mottles (gleyed horizon)

Texture:

- C - clay
- ZC - silty clay
- SC - sandy clay
- CL - clay loam (H-heavy, M-medium)
- ZCL - silty clay loam (H-heavy, M-medium)
- SCL - sandy clay loam
- SZL - sandy silt loam (F-fine, M-medium, C-coarse)
- SL - sandy loam (F-fine, M-medium, C-coarse)
- LS - loamy sand (F-fine, M-medium, C-coarse)
- S - sand (F-fine, M-medium, C-coarse)
- P - peat (H-humified, SF-semi-fibrous, F-fibrous)
- LP - loamy peat; PL - peaty loam

Limitations:

- W - wetness/workability
- D - droughtiness
- De - depth
- St - stoniness
- Sl - slope
- F - flooding
- T - topography/microrelief

Texture suffixes & prefixes:

- ca - calcareous: x-extremely, v-very, sl-slightly
- (ca) - marginally calcareous
- mn - ferrimanganiferous concentrations
- org - organic ;
- gr - greyish, br - brown; r = reddish

a depth underlined (e.g. 50) indicates the top of a slowly permeable layer