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**AGRICULTURAL QUALITY AND SOIL  
RESOURCES - LAND AT CHAPEL FARM,  
SHARDLOW, DERBYSHIRE**

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## **Introduction**

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This report provides detailed information on the agricultural quality and soil resources of land to the east of Shardlow, Derbyshire. The information is based on a survey carried out in February 1995; this was based on a 100 m grid with occasional additional sampling to check the location of boundaries. During the survey soils were examined by a combination of pits and augerings to a depth of 1.2 m. A log of the sampling points and a map (Map 3) showing their location is in an appendix to this report.

### **LOCATION, RELIEF AND LAND USE**

The land is situated to the east of Shardlow on the floodplain of the River Trent. It is bounded to the north by the Trent and Mersey canal, to the east by the River Trent and to the south by farmland. The west end of the site extends almost to the floodbank which protects the village of Shardlow. All the land is essentially flat at around 30 m AOD and with a total elevation range of only 2.5 m. Numerous low channels extend south from the stream which drains through the centre of the site. Much of the site is permanent grassland infested by coarse grasses but some fields have been reseeded. All is used as summer grazing land.

### **AGRICULTURAL CLIMATE**

This locality has an average annual rainfall of 628 mm and a January-June accumulated temperature above 0°C of 1426 day degrees. It has a field capacity period (when the soils are fully replete with water) of 137 days, extending on average from mid-late November to early April. During the growing season moisture deficits build up and those for wheat and potatoes average 111 mm and 104 mm respectively.

## GEOLOGY

The soil parent material over most of the site is loamy or clayey greyish alluvium over sands and gravels.

## Agricultural Quality

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The site is covered by a published land classification sheet at a scale of 1:63,360 but these maps were not designed to be interpreted in detail for areas less than 80 ha. The whole site has thus been newly classified using the revised guidelines for agricultural land classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food.

Only grades 3 and 4 were identified and the distribution of these is shown on Map 1. They represent a gradation from the wettest, most frequently flooded, land (grade 4) to land that is never flooded (grade 3a).

### GRADE 3

Grade 3 land accounts for much of the site and comprises two main types, grade 3a on the raised, relatively level, fields and grade 3b on the wetter or channelled land that is subject to flooding.

#### Subgrade 3a

Subgrade 3a land occurs in two blocks. One forms the raised parts of field OS 4654 and the two fields immediately west of it accessed by Porter's Bridge. Topsoils are very dark greyish brown heavy clay loams with up to 5% hard stones, mainly of quartzite. The immediate subsoil is a yellowish brown heavy clay loam with a moderate fine subangular blocky structure. In the field to the south-west of Porters Bridge this subsoil is very stony and passes to gravel within 70 cm depth. In the other two fields it typically passes to a stony clay or clay within 60 cm of the surface. This layer is mottled greyish brown and strong brown and, in places, overlies gravel within 1 m depth. Grade 3a land also occurs in the west of the site. Soils over part of this area are similar to those described above - medium or heavy loams with a wetness class of II and passing to gravel or clay at depth. However, between the western edge of the site and the nearby wet channel, subsoils are sandy loams passing to slightly mottled loamy sand and eventually to sand and gravel.

The grade 3a land is never affected by floods and its utilization is not significantly restricted by the wet channels which cross much of the land. It has been reseeded and is capable of more flexible agricultural use than the rest of the site.

### **Subgrade 3b**

The subgrade 3b land is mainly downgraded because of the restrictions of winter flooding and wetness in channels.

Soils are of two main types, loamy and permeable on raised land and wet and clayey in hollows and channels. The former have very dark greyish brown, stoneless, heavy clay loam or medium clay loam topsoils, 14-18 cm thick and with a strong fine subangular blocky structure. Upper subsoils are of similar texture and brown and unmottled. Below 40-60 cm depth subsoils become mottled and, in many places, pass to sandy clay loam or sandy loam textures before gravel is encountered at depth. In the lower parts of this landscape and in a small area south of the sewage works the soils have heavy clay loam topsoils and pass immediately to brown and greyish brown mottled clays as described for the grade 4 land below.

The agricultural limitation to use of this land is the irregular surface topography and the risk of frequent flooding, of short duration on the highest land but of medium to long duration in the hollows. It is all in permanent pasture.

### **GRADE 4**

All of the lowest parts of the site are grade 4. Soils are heavy and wet. Topsoils are very dark greyish brown heavy silty clay loams or clays with common fine reddish brown root channel mottles. They are over stoneless, coarsely structured, brown clays with many greyish brown and yellowish red mottles. Subsoils become dominantly greyish brown and strong brown mottled below 40-50 cm depth.

All of this land is severely affected by annual flooding and the flood water can sit for weeks in the lowest parts. Much of the pasture is invaded by coarse grasses and is only useful for summer and autumn grazing.

The distribution of the different land grades is shown on Map 1 and the areas given in the table below:

Grade/subgrade	Area (ha)	% of site
Subgrade 3a	7.5	29
Subgrade 3b	9.4	36
Grade 4	9.1	35
TOTAL	26.0	100

## Soil Resources

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Soil resources vary across the site in a similar way to the agricultural land grades. The grade 4 land tends to be associated with clayey soils and the grade 3 mainly with loamy soils. The site is thus divided into two basic resource units, A and B, as shown on Map 2.

### RESOURCE UNITS

#### Unit A

Unit A is mainly coincident with the grade 3 land. The loamy topsoils (T1) are generally up to 20 cm thick and well structured. The upper subsoils (S1) are of similar texture and well structured. Below about 60 cm depth the soils become more variable in texture, more mottled and more weakly structured (S2). A typical profile is described below:

#### *Typical soil profile*

- 0-18 cm Dark greyish brown (10YR 3/2) stoneless or very slightly stony medium or heavy clay loam; strong fine subangular blocky structure (T1)
- 18-60 cm Dark yellowish brown (10YR 4/4) heavy clay loam; moderate fine subangular blocky structure (S1)
- 60-100 cm Dark yellowish brown (10YR 4/4) sandy clay loam, clay loam or clay with common brown to greyish brown and strong brown mottles and weaker structure (S2)

#### Unit B

Unit B is mainly coincident with the grade 4 land shown on Map 1 but also includes grade 3b land to the south of the sewage works. Topsoils (T2) are heavier than elsewhere and overlie mottled clay subsoils (S3).

#### *Typical soil profile*

- 0-16 cm Dark greyish brown (10YR 4/2) stoneless heavy clay loam with common fine reddish brown (5YR 4/4) mottles; strong fine subangular blocky structure (T2)
- 16-50 cm Mottled brown (7.5YR 4/4), greyish brown (10YR 5/2-3) and yellowish red (5YR 4/6) clay; strong moderate subangular blocky structure becoming coarser and more angular with increasing depth (S3)
- 50-120 cm Grey (10YR 5/1) clay with abundant strong brown (7.5YR 4/6) mottles and common manganiferous concretions; weak coarse prismatic structure (S3)

## RESOURCE LAYERS

Over the whole site there are thus two separate topsoil resources and three separate subsoil resources. They are:

- T1      clay loam topsoil from resource unit A
- T2      heavy clay loam or clay topsoil from resource unit B
- S1      clay loam upper subsoil from resource unit A
- S2      loamy lower subsoil from resource unit A
- S3      clay subsoil from resource unit B

In productivity terms, resources T1 and S1 are the most valuable. The latter are stony in the field south-west of Porter's Bridge and, if stripped for restoration, should be kept separate from other S1 subsoils.

## SOIL STRIPPING AND STORAGE FOR WORKING PHASES

Details of the exact depths of the various topsoil and subsoil resources at each sample location are given in an Appendix to this report. These need to be interpreted to provide detailed information on soil volumes for individual phases of working and restoration.

Any stripping of soils that are to be retained for restoration should be scheduled to occur between the months of May and October on unit A and in late summer (i.e. August/early September) on the wet land unit B. Stripping of topsoils should be to the distinct topsoil/subsoil colour change rather than to a specific depth.

Different soil resources stripped for restoration should be stored in separate stockpiles. Whilst topsoils should be stored on land from which no soil has been stripped, subsoils should be stored only on land from which topsoils have already been stripped; this is to ensure that topsoils do not become contaminated with subsoil.

**APPENDIX**  
**LOCATION AND DETAILS OF OBSERVATIONS**

APPENDIX SITE INFORMATION - CHAPEL FARM, SHARDLOW ALC/SOIL RESOURCE SURVEY

Obs No.	Topsoil			Upper subsoil			Lower subsoil			Wetness Class	Main ALC	Limitation
	Depth (cm)	Texture	Hard stones >2cm(%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling			
1	0-30	dist C	0	30+	? gravel		(under water)			IV-V	4	F
2	0-22	org CL	0	22-75	C	X	75+	gravel		IV-V	4	F
3	0-18	HCL	0	18-30	C	X	50-60	stony C	XXXX			
				30-50	C	XXX	60+	stopped		IV	3b	W
4	0-18	HCL	1	18-40	HCL	0	60-100	C	XXX			
				40-60	HCL	XX	100+	stony C	XXXX	II	3a	W
5	0-15	C	0	15-40	C	XXX	40-120	C	XXXX	IV-V	4	F
6	0-17	M/HCL	0	17-40	HCL	0	60-80	SCL	XXX			
				40-60	C	XX	80-120	S	XXX	II	3b	F/M
7	0-18	HCL	1	18-60	HCL	0	60-100	SCL	XX			
							100+	S+gravel		II	3b	F/M
8	0-27	MCL	0	27-55	SCL	0	55-120	LS	X	I	3b	F/M
9	0-23	MCL	0	23-50	MCL	X	60-110	LCS	XXX	IV	3b	W
				50-60	HCL	XXX	110-120	SCL	XXXX	II-III	3a	W
10	0-23	HCL	1	23-50	C	XXX	80-100	LMS	XXXX			
				50-80	C	XXXX	100+	gravel		IV	3b	W
11	0-13	MCL	2	13-30	MCL	XXX	30+	gravel		IV-V	4	F
12	0-20	MCL	5	20-45	stony HCL	0	45+	stopped		I-II	3a	D
13	0-23	HCL	4	23-70	stony HCL	0	70+	gravel		II	3a	D/W
14	0-17	HCL	2	17-40	HCL	0	40-80	st. C+SCL	XXX			
							80+	gravel		II	3a	W
15	0-17	HCL	0	17-40	HCL/C	0	40-120	C	XXX	II	3b	F/M
16	0-18	HCL	0	18-50	HCL	0	50-65	HCL	XX			
							65-120	C	XXXX	II	3b	F/M
17	0-16	HZCL	0	16-30	C	XXX	60-100	C	XXXX			
				30-60	C	XXX	100-120	LS+C	XXXX	IV	4	F
18	0-17	HCL	0	17-50	C	X	80-110	SCL	XXX			
				50-80	C	XXX	110+	gravel		III	3b	F/M
19	0-14	MCL	0	14-60	MCL	0	60-95	MSL	0			
							95+	gravel		I	3b	F/M
20	0-22	SCL	4	22-50	MSL	0	50-90	LMS	XX			
							90+	S+gravel	XXX	II	3a	D
21	0-16	HCL	1	16-50	HCL	0	50-75	HCL	XX			
							75-120	C	XXX	II	3a	W
22	0-19	MCL	2	19-45	HCL	0	70-90	stony SL	XXX			
				45-70	SCL	XX	90+	gravel		II	3a	D
23	0-20	HCL	0	20-80	C	XXX	80-120	C	XXXX	IV	4	F
24	0-18	MCL	2	18-50	MCL	0	50-70	MCL	XXX			
							70-120	SCL	XXXX	II	3b	M
25	0-10	HZCL	0	10-40	C	XXX	40-90	C	XXXX			
							90+	gravel		IV	4	F
26	0-20	HCL	3	20-60	HCL	0	60-70	stony C	XX			
							70+	stopped		II	3a	W
27	0-11	HCL	0	11-50	HCL	0	50-70	HCL	XX			
							70-120	C	XXXX	II	3b	F/M
28	0-19	MCL	0	19-50	HCL	0	50-80	MCL	X			
							80-120	SCL	XXX	II	3b	F/M
29	0-18	HCL	0	18-60	HCL	0	80-110	MSL	XXX			
				60-80	HCL	XX	110+	gravel		II	3b	F/M

APPENDIX SITE INFORMATION - CHAPEL FARM, SHARDLOW ALC/SOIL RESOURCE SURVEY

(CONTINUED)

Obs No.	Topsoil			Upper subsoil			Lower subsoil			Wetness Class	Main ALC	Limitation
	Depth (cm)	Texture	Hard stones >2cm(%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling			
30	0-18	HCL	1	18-50	HCL	0	60-90	HCL	XXX	II	3b	F/M
				50-60	HCL	XX	90-120	MSL	XXXX			
31	0-17	HCL	0	17-60	HCL	0	60-100	MCL	XX	II	3b	F/M
							100-120	MSL	XXX			

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 (M-medium, H-heavy)
- ZCL - silty clay loam (M-medium, H-heavy)
- SCL - sandy clay loam
- SZL - sandy silt loam (F-fine, M-med, 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)
- ca - calcareous

Limitations:

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