

**SOIL RESOURCES AND
AGRICULTURAL USE & QUALITY
OF LAND OFF HENTHORN ROAD,
CLITHEROE**

Report 687/1

8th July, 2010

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OF LAND OFF HENTHORN ROAD, CLITHEROE**

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Report 687/1

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1.0 Introduction

- 1.1 This report provides information on the soils, agricultural quality and use of an area of 15.6 ha of land off Henthorn Road, Clitheroe. The report is based on a soil and agricultural desk study and a survey of the land in June 2010.

SITE ENVIRONMENT AND AGRICULTURAL USE

- 1.2 The site lies to the north of Henthorn Road. The gardens of housing along Fairfield Drive form the eastern boundary, the River Ribble and a caravan site abut the western edge and agricultural land forms the northern boundary. The land forms part of Henthorn Farm, the former buildings of which are just outside the south-east corner of the site.
- 1.3 The topography is mainly gently rolling at around 60 m aOD but there is a steep sided valley that runs south from the land. On the western side moderate slopes lead down to the river bank at 50 m aOD.
- 1.4 The land is disposed as five fields of improved pasture on the gently sloping land and two fields on steeper ground that provide rough grazing between trees. At the time of the survey the improved pasture had been mown for hay or silage and cattle were grazing the aftermath.



Improved grassland on gentle slopes,
typical of most of the land



Rough grazing on the slopes leading
down to the river

PUBLISHED INFORMATION

- 1.5 BGS 1:50,000 geology maps show that the basal geology of Clitheroe Limestone and Hodder Mudstone formation site is entirely covered by Devensian till within the site boundary.

- 1.6 There are no published detailed soil surveys of the area, but the area is covered by the national soil map¹, published at 1:250,000 scale. This shows the land as Brickfield 3 association, which comprises slowly permeable clay loam and clay soils developed in till.
- 1.7 Reconnaissance agricultural land classification (ALC) mapping carried out in the 1970s shows the agricultural land of the study area as grade 3.

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

2.0 Soils

- 2.1 The Defra Soil Strategy² 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 June 2010. It was based on observations at the intersects of a 100 m grid, giving a sampling density of one observation per hectare. During the survey soils were examined by a combination of pits and augerings to a maximum depth of 1.1 m. A log of the sampling points and a map (Map 3) showing their location is in an appendix to this report.
- 2.3 The survey showed that a clay loam over clay soil is typical of the whole site (Map 1) with stony till encountered between 50 and 100 cm depth, depending on slope. The topsoil (cultivation layer) is typically 20 cm thick and medium clay loam in texture, though heavy clay loam topsoil occurs around the pond. Rusty-coloured mottles are common throughout. The topsoil is either directly over clay subsoil or, more commonly, over a 10-20 cm thick grey-mottled heavy clay loam with clay encountered at a depth of 30-40 cm. The clay is dense, slowly permeable and dark grey in colour and passes below to stony weathered till.
- 2.4 An example profile from observation 5 (Map 3) is described below:
- | | |
|----------|--|
| 0-19 cm | Very dark greyish brown (10YR 3/2) medium clay loam with common fine and extremely fine yellowish red (5YR 4/6) prominent mottles along root channels; a few small and medium hard stones of quartzite, sandstone and igneous rocks; moderately developed fine subangular blocky structure; firm consistency; 4% fine macropores; abundant very fine fibrous roots; abrupt smooth boundary to: |
| 19-32 cm | Brown to dark brown (10YR 4/3) heavy clay loam with many distinct fine and medium mottles of dark greyish brown (10YR 4/2) and prominent fine mottles of strong brown (7.5 YR 4/6); stones as horizon above; weakly developed very |

² Safeguarding our Soils: a Strategy for England (Defra, 2009)

coarse subangular blocky structure with dark greyish brown ped faces; very firm consistency; 3% coarse macropores: common very fine fibrous roots; abrupt smooth boundary to:

- 32-57 cm Dark grey to dark greyish brown (10YR 4/1-4/2) clay with many distinct fine and medium mottles of dark yellowish brown (10YR 4/4); stones as above but with some large stones; weak very coarse prismatic structure breaking to very coarse angular blocky, extremely firm consistency; 2% fine macropores; a few very fine fibrous roots, mainly on structure faces and in pores; clear smooth boundary to:
- 57-80+ cm Dark grey (10YR 4/1) and dark yellowish brown (10YR 4/4) heavy clay loam (weathered till); very stony with large, medium and small igneous rocks, sandstones and limestone; calcareous.

- 2.5 These soils are slowly permeable and only have a limited capacity to absorb excess winter rainfall. Consequently water ponds above the clay subsoil in winter months. The soils do however, have a moderate capacity to absorb or attenuate any pollutants being deposited on the soil surface. They are not favoured by burrowing animals, except possibly on the steeper slopes.

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 Classification*³. The relevant site data for an average elevation of 60 m is given below.

- Average annual rainfall: 1,179 mm
- January-June accumulated temperature >0°C 1359 day°
- Field capacity period 264 days
(when the soils are fully replete with water) mid Aug-mid May
- Summer moisture deficits for: wheat: 64 mm
potatoes: 44 mm

3.3 The site's location on the edge of the Pennines gives rise to a relatively wet agricultural climate with a long period when the soils are wet. This limits the land quality to sub-grade 3a or below.

3.4 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 Food⁴.

SURVEY RESULTS

3.4 Most of the land is classified as grade 4 but there is an area of grade 5 on steep valley sides.

³ *Climatological Data for Agricultural Land Classification*. Meteorological Office, 1989

⁴ *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*. MAFF, 1988.

Grade 4

- 3.5 This is the dominant grade of the site, accounting for 14.6 ha of it. The most extensive type occurs on gently sloping ground with loamy over clayey soils as described in paragraphs 2.3-2.5. These soils lie wet for long periods in winter months (wetness class V) as a result of slowly permeable clay within 40 cm of the surface. This limits opportunities for cultivation and tends to restrict agricultural use to grass. A small area around the pond has heavier topsoil than the surrounding land, with slowly permeable grey clay directly below it. Consequently it tends to lie wetter than the adjacent slopes.
- 3.6 The other type of grade 4 land occupies the moderate slopes that lead down to the River Ribble. These are slightly hummocky, perhaps from minor landslipping, and consequently difficult to improve and use for anything other than rough grazing. The upper soil horizons are similar to those described in paragraphs 2.3-2.5 but pass quickly downwards into stony calcareous till of heavy clay loam texture, without an intervening clay layer.

Grade 5

- 3.7 This land occupies a steep sided narrow valley that runs south from the site. Trees and scrub occupy part of it and the rest is only suitable for rough grazing.

Other land

- 3.8 This includes the pond, a footpath and the land below the footpath that runs along the lower slope of the Ribble valley and then along the bottom edge of the site.

Grade areas

- 3.9 The boundaries between the different grades of land are shown on Map 2 and the areas occupied by each are shown below.

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

<i>Grade/subgrade</i>	<i>Area (ha)</i>	<i>% of site</i>
Grade 4	14.6	93
Grade 5	0.4	3
Pond, footpath and river bank	0.6	4
Total	15.6	100

APPENDIX
LOCATION AND DETAILS OF OBSERVATIONS

Soil and agricultural land quality survey, land north of Henthorn Road, Clitheroe - 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	MCL	2	20-30 30-40	MCL HCL	xx xxx	40-110	C	xxx	1	V	4	W
2	0-18	MCL	1	18-35	HCL	xx(x)	35-65 65+	C stopped	xxx	1	V	4	W
3	0-20	M/HCL	1	20-35	C	xxx	35-110	gy C	xxxx	1	V	4	W
4	0-20	MCL	1	20-35	HCL	xx	35-55 55-110	C stoneless C	xxx xxxx	4	V	4	W
5	0-19	MCL	2	19-32	HCL	xxx	32-57 57+	C HCL till ca	xxx xxx	2	V	4	W
6	0-19	MCL	4	19-32	HCL	xxx	32-65 65-75+	C HCL+C ca	xxx xxx	3	V	4	W
7	0-15	HCL	1	15-65	gy C	xxxx	65-75+	C till ca	xxx	½	V	4	W
8	0-20	MCL	3	20-38	HCL	xx(x)	38-50 50+	C stopped	xxx	4	IV-V	3b/4	W
9	0-20	MCL	3	20-37	HCL	xx(x)	37-60 60+	C HCL till ca	xxx	1	IV-V	3b/4	W
10	0-19	MCL	1	19-70	C	xxx	70-110	dk HCL ca	xxx	2	V	4	W
11	0-19	MCL	4	19-38	HCL	xxx	38-65 65-110	C dk HCL	xxx xxx	1	V	4	W
12	0-16	MCL:	1	16-40	HCL	xxx	40-60 60+	C stopped	xxx	1	V	4	W
13	0-16	MCL	5	16-35	C	xx	35-50 50+	dk C ca stopped	xxx	9	IV	4	T
14	0-20	MCL	0	20-40	HCL	xxx	40-50 50+	dk HCL ca stopped	xxx	½	V	4	W
15	0-20	MCL	2	20-45	C	xxx	45-50 50+	dk C till ca stopped	xxx	3	V	4	W
16	0-20	M/HCL	2	20-75	C	xxx	75-110	dk C ca	xx	1	V	4	W
17	0-15	MCL	3	15-40	stony HCL ca	xx	40+	stopped		10	III	4	T
18	0-18	MCL	1	18-35	HCL	xx	35-55 55+	C stony C till ca	xxx	2	V	4	W

Key to table

Mottle intensity:

o

x

xx

xxx

xxxx

Texture:

unmottled

few to common rusty root mottles (topsoils)

or a few ochreous mottles (subsoils)

common to many ochreous mottles and/or dull structure faces

common to many greyish or pale mottles (gleyed horizon)

dominantly grey, often with some ochreous mottles (gleyed horizon)

Limitations:

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)

LP - loamy peat; P - peat

W - wetness/workability

D - droughtiness

De - depth

St - stoniness

Sl - slope

F - flooding

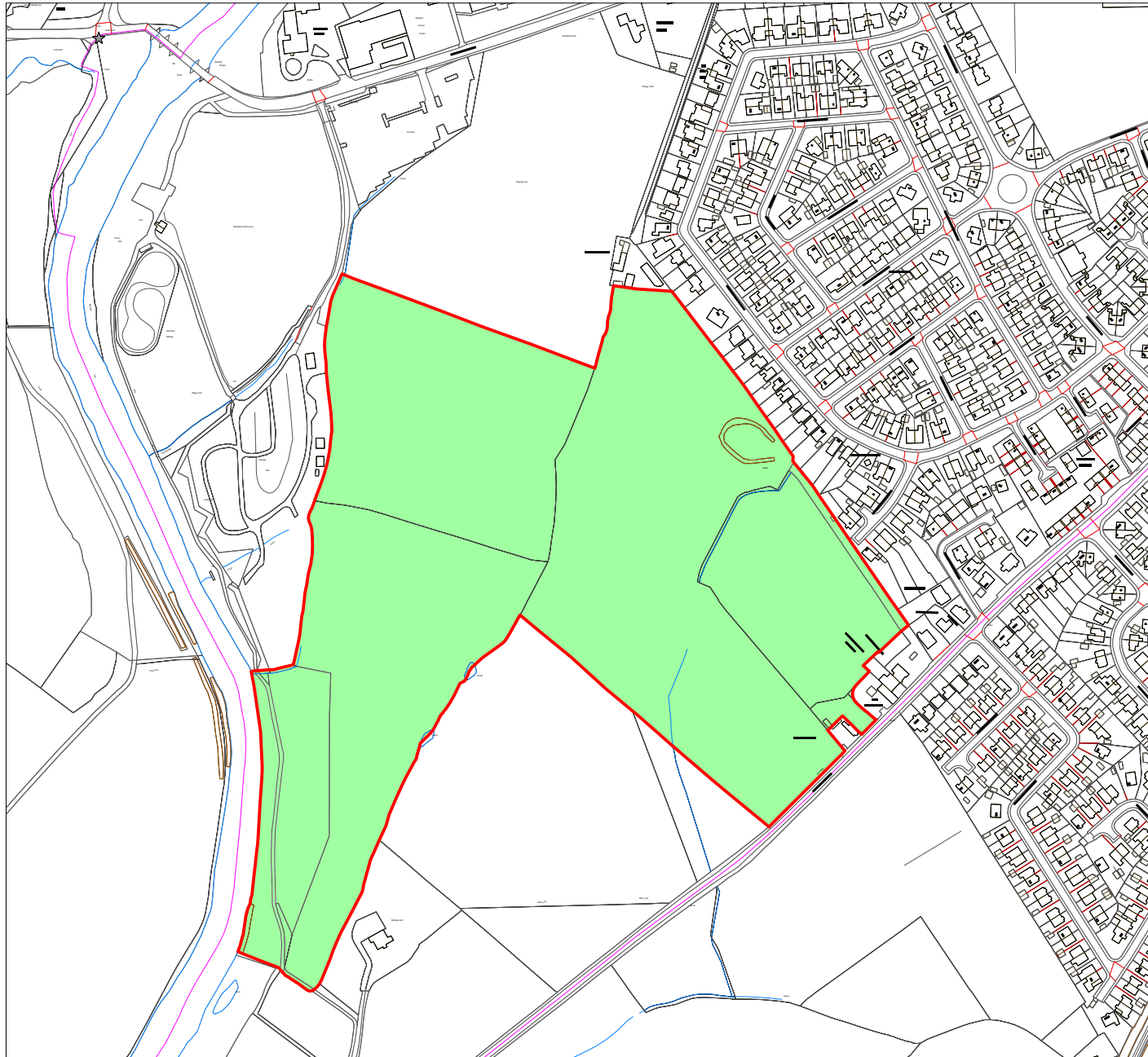
T - topography/microrelief

Texture suffixes & prefixes:

r - reddish; gy - grey; dk - dark

mn - ferrimanganiferous concretions

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



KEY



Survey area



Loamy topsoil/upper subsoil over slowly permeable clay over calcareous dense stony till (within 50 cm depth on steeper slopes)

Client:



Project:

Henthorn Road, Clitheroe

Map title:

**Map 1
Soil characteristics**



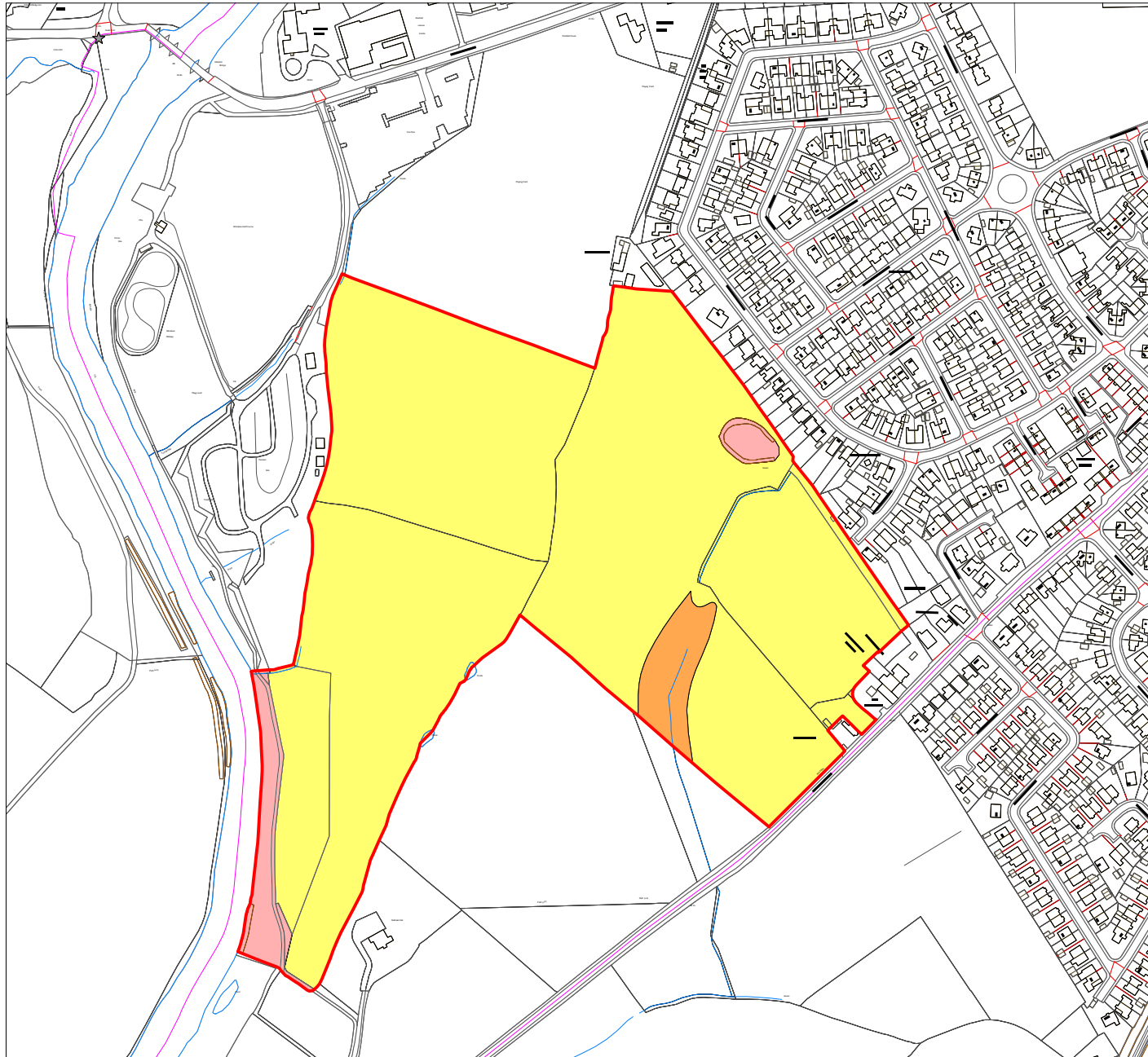
Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670570

Scale:





1:5,000 at A4

Date:

6/7/2010



KEY

-  Grade 4
-  Grade 5
-  Pond, footpath, wood, river bank
-  Survey area

Client:



Project:

Henthorn Road, Clitheroe

Map title:

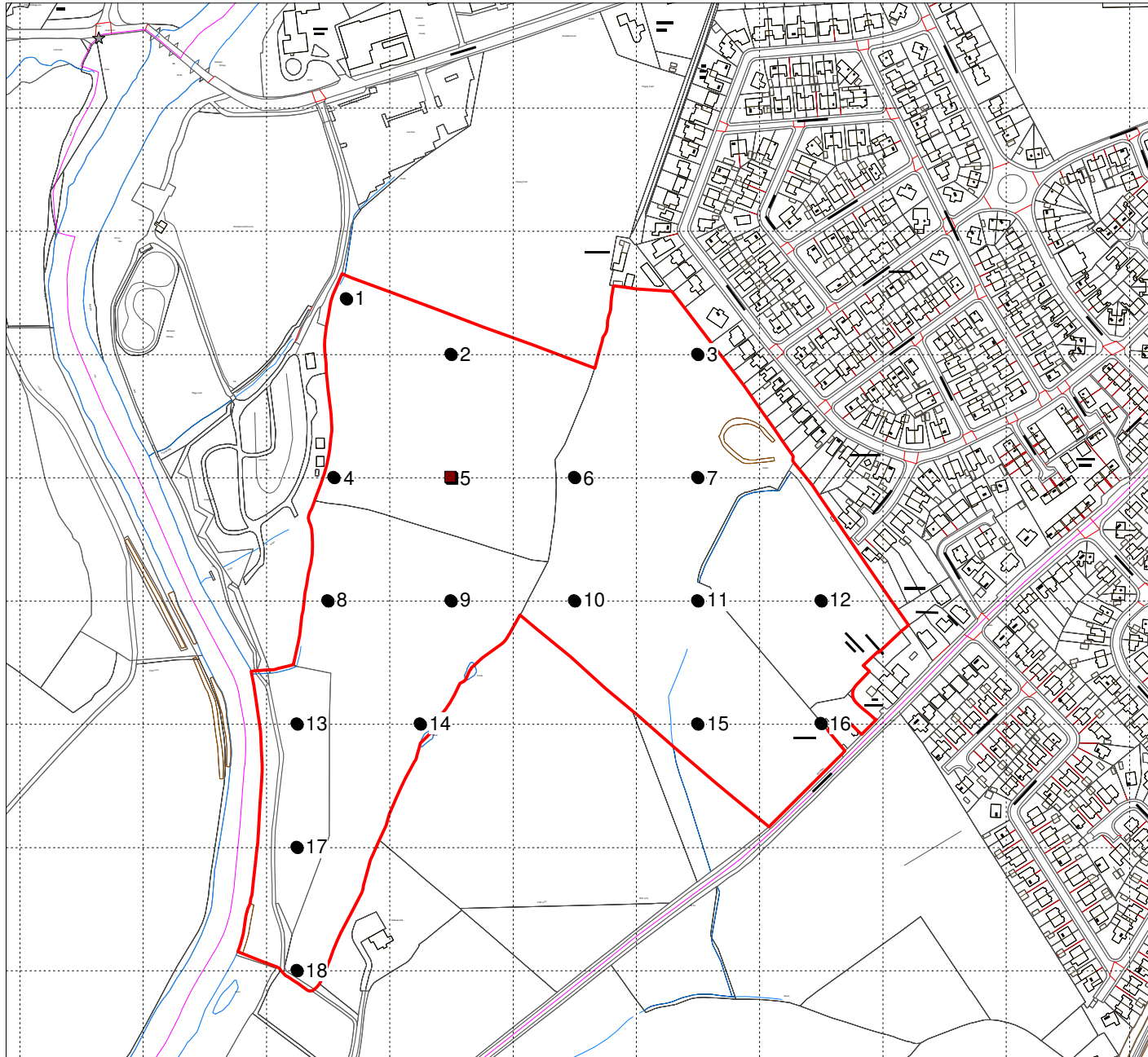
**Map 2
Agricultural land quality**




Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670570


Scale:
1:5,000 at A4


Date:
1/7/2010



KEY

 Survey area

 Shallow pits and/or augerings to >1 m

 Soil description pit

Client:



Project:

Henthorn Road, Clitheroe

Map title:

**Map 3
Survey observations**



Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670570

Scale:
1:5,000 at A4

Date:
6/7/2010