

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

Report 775/1

1st June, 2012

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

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1.0 Introduction

- 1.1 This report provides information on the soils, agricultural quality and use of 5.1 ha of land south of Henthorn Road, Clitheroe. The report is based on a soil and agricultural desk study and a survey of the land in late May 2012.

SITE ENVIRONMENT AND AGRICULTURAL USE

- 1.2 The site forms a gently sloping triangular block of land at 55m aOD alongside Henthorn Road. The gardens of housing along Kenilworth Drive and at the end of Stirling Close form the eastern boundary and other agricultural fields form the southern boundary.
- 1.3 The land is divided into two parts by a stream than runs north-south alongside a hedgerow in the eastern part of the block. To the west of the stream is small grass field with an access off Henthorn Road. The larger area to the east of the stream is farmed as a single field of permanent grassland, although it includes the remnants of hedgerows that formerly divided the land into three fields.

PUBLISHED INFORMATION

- 1.4 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.
- 1.5 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.
- 1.6 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 and agricultural quality survey was carried out in late May 2012. It was based on observations at the intersects and centres of a 100 m grid, giving a sampling density of two observations per hectare (11 in total). During the survey soils were examined by a combination of pits and augerings to a maximum depth of just over 1 m. A log of the sampling points and a map (Map 2) 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. The topsoil (cultivation layer) is typically a 15 cm thick rusty-mottled heavy clay loam, although medium clay loam topsoil was encountered in two locations and the topsoil in the small field tends to be slightly thicker – 22 cm. In most places the topsoil is directly underlain by grey-mottled clay subsoil but, in three locations is over 10-15 cm-thick heavy clay loam with the clay encountered at a depth of 25-37 cm. The clay is dense, slowly permeable and passes downwards into dark grey clay that in places is stony with sandstones and, in places, limestone.
- 2.4 An example profile from observation 6 (Map 2) is described below:
- | | |
|----------|--|
| 0-15 cm | Very dark greyish brown (10YR 3/2) heavy clay loam passing downwards into dark grey to very dark grey (10YR 4/1-3/1) heavy clay loam with common fine and extremely fine yellowish red (5YR 4/6) prominent mottles along root channels; a few small and medium soft stones, mainly of sandstone; moderately developed medium angular blocky structure; friable to firm consistency; 1% fine macropores; abundant very fine fibrous roots; abrupt smooth boundary to: |
| 15-31 cm | Dark greyish brown (10YR 4/2) clay with many fine dark yellowish brown (10YR 4/4 and 4/6) and common medium dark grey (10YR 4/1) prominent mottles; rare stones; moderately developed coarse prismatic structure with dark greyish |

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

brown (10YR 4/2) ped faces; firm consistency; 0.1% fine macropores: common
very fine fibrous roots, mainly on ped faces; clear smooth boundary to:

31-100 cm Very dark grey (10YR 3/1) clay with many fine and medium distinct dark
yellowish brown (10YR3/4) distinct mottles; stoneless; weak developed adherent
coarse prismatic structure becoming structureless massive below 50 cm; very
firm; no visible macropores; non calcareous; a few very fine fibrous roots above
50 cm.

- 2.5 These soils are slowly permeable and only have a very limited capacity to
absorb excess winter rainfall. Consequently water ponds above the clay
subsoil in winter months.

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 55 m is given below.

- Average annual rainfall: 1,179 mm
- January-June accumulated temperature >0°C 1359 day°
- Field capacity period 263 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

3.5 Most of the land is classified as grade 4 but there is a small area of sub-grade 3b where there is a greater depth of permeable soil over clay.

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.

Subgrade 3b

- 3.6 This is subgrade occupies less than half a hectare of land on a rise in the small field. A 22 cm-thick stony medium clay loam topsoil is over a 15 cm thick stony heavy clay loam upper subsoil with slowly permeable clay below. The greater thickness of permeable soil provides slightly better natural drainage (wetness class IV) than the rest of the land.

Grade 4

- 3.7 This is the dominant grade of the site, accounting for more than 90% of it. The soils described in paragraphs 2.3-2.5 are typical and, because of slowly permeable clay within 30 cm of the surface and gentle (1-2°) slopes, lie wet for long periods in autumn, winter and spring (wetness class V). This limits opportunities for cultivation and tends to restrict agricultural use to grass.

Grade areas

- 3.8 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>
Subgrade 3b	0.4	8
Grade 4	4.7	92
Total	5.1	100

APPENDIX
LOCATION AND DETAILS OF OBSERVATIONS

Soil and agricultural land quality survey, land south 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	0-16	HCL	<1	16-25	HCL	xxx	<u>25-75</u> 75-105	C Cca	xxx xxx	2	V	4	W
2	0-23	MCL	0	<u>23-40</u>	C	xxx	40-105	gyC	xxxx	1	V	4	W
3	0-15	HCL	<1	<u>15-45</u>	C	xxx	45-105	gyC	xxxx	2	V	4	W
4	0-15	HCL	<1	<u>15-50</u>	C	xxx	50-105	gyC	xxxx	1	V	4	W
5	0-22	HCL	2	<u>22-45</u>	C	xxx	45-70 70-105	stony HCL+SCL gyC	xxx xxxx	1	V	4	W
6	0-15	HCL	1	<u>15-30</u>	C	xxx	30-100	gyC	xxxx	2	V	4	W
7	0-15	HCL	2	<u>15-75</u>	C	xxx	75+	stopped by stones		2	V	4	W
8	0-22	MCL	5	22-37	stony HCL	xxx	37-85 85-105	gyC+HCL gy SCL	xxxx xxxx	2	IV	3b	W
9	0-15	MCL	<1	<u>15-45</u> 45-68	C stony C	xxx xxxx	68-87 87+	stony gyC stopped by stones	xxxx	2	V	4	W
10	0-15	HCL	<1	<u>15-70</u>	C	xxx	70-105	Cca	xxxx	2	V	4	W
11	0-15	HCL	<1	15-26	HCL	xxx	<u>26-45</u> 45+	C stony C	xxx	1	V	4	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)

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

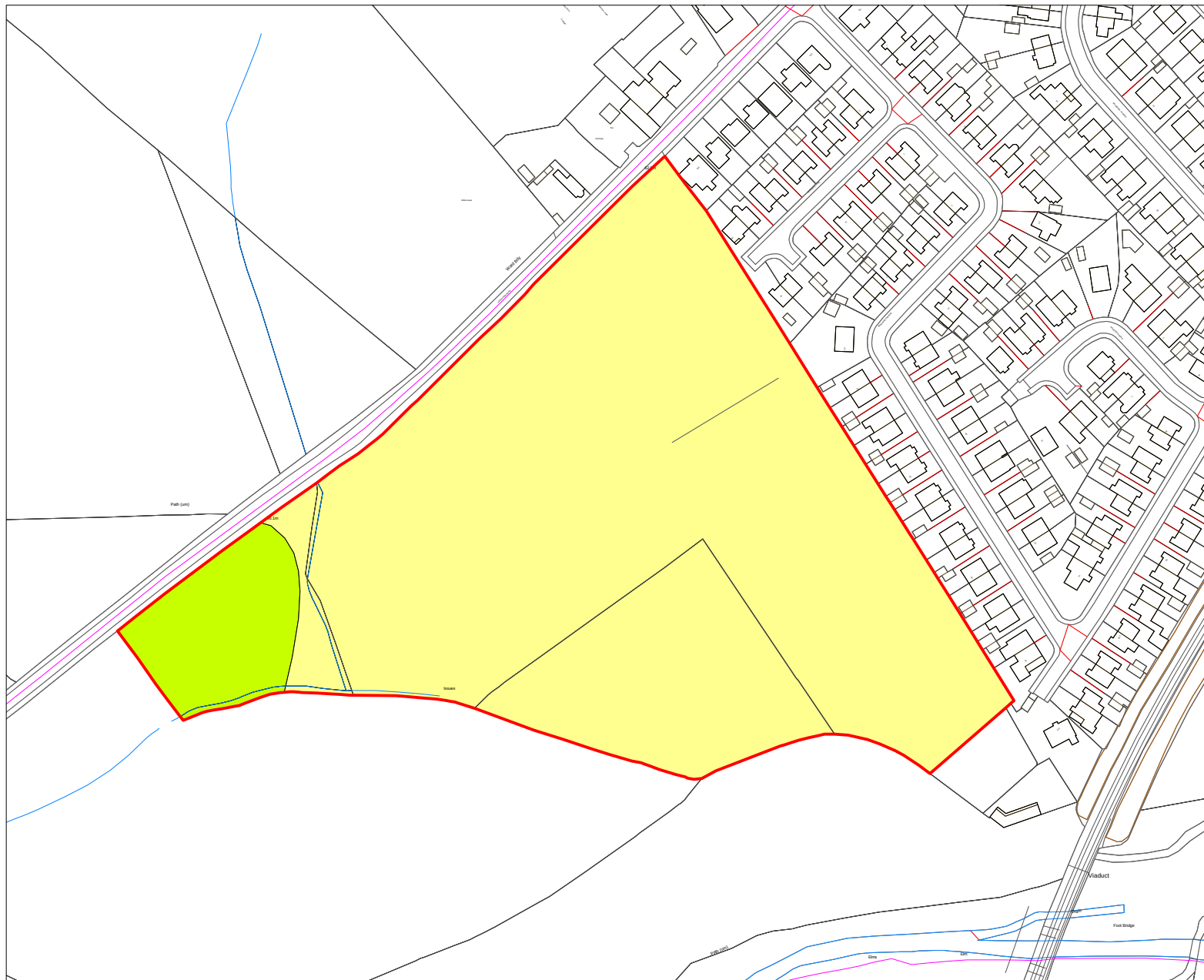
Limitations:

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



KEY

-  Survey area
-  Subgrade 3b
-  Grade 4

Client:

Strategic Land Group

Project:

**Land south of
Henthorn Road, Clitheroe**

Map title:

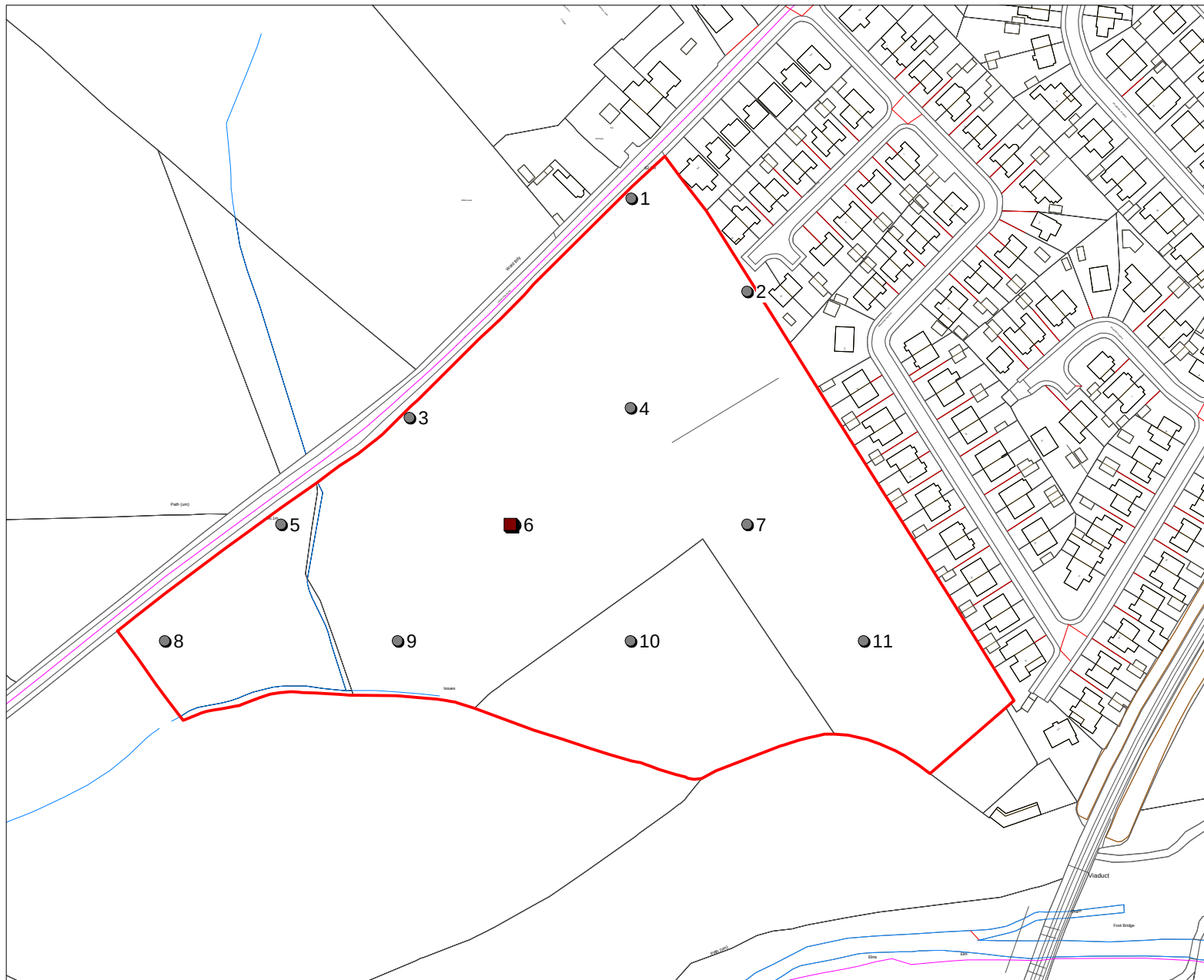
**Map 1
Agricultural land quality**

**Land
Research**
ASSOCIATES

Lockington Hall
Lockington, Derby DE74 2RH
Tel: 01509 670570

Scale:
1:2,500 at A4

Date:
1/6/2012



KEY



Survey area



Location of survey observations



Soil and land grade description pit

Client:

Strategic Land Group

Project:

**Land south of
Henthorn Road, Clitheroe**

Map title:

**Map 2
Survey Observations**

**Land
Research**
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Tel: 01509 670570

Scale:
1:2,500 at A4

Date:
1/6/2012