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SOILS AND AGRICULTURAL QUALITY

OF LAND OFF HEMPSTED LANE

GLOUCESTER

Report 1583/1

7th October, 2019

Land Research ASSOCIATES
www.lra.co.uk

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SUMMARY

A soil and agricultural land quality survey has been undertaken of 12.5 ha of land off Hempsted Lane, Gloucester.

The land comprises heavy clay loam topsoils overlying slowly permeable clay subsoils. The land is limited to subgrade 3b agricultural quality by wetness.

1.0 Introduction

1.1 This report provides information on the soils and agricultural quality of 12.5 ha of land off Hempsted Lane, Gloucester. The report is based on a survey of the land in September 2019.

SITE ENVIRONMENT

1.2 The site investigated comprises three fields, bordered to the north and north-east by Hempsted Lane, to the south-east by Secunda Way (A430), to the south by adjoining agricultural land and to the west by Rea Lane.

1.3 The land is gently sloping, with an average elevation of approximately 15 m AOD.

AGRICULTURAL USE

1.4 The land was under arable use at the time of survey.

PUBLISHED INFORMATION

1.5 1:50,000 scale BGS information records the basal geology of the land as Blue Lias Formation and Charmouth Mudstone Formation (undifferentiated). Superficial Tidal Flat Deposits are recorded to overlie the basal geology along the southern boundary of the site.

1.6 The National Soil Map (published at 1:250,000 scale) shows the land as within the Compton Association: typically stoneless reddish clayey soils affected by groundwater.[1]

1.7 Provisional mapping from the 1970s shows the agricultural land quality of the site as grade 3. No more recent information has been published for this site.

[1]Findlay D.C. *et al*., (1984). *Soils and their use in South West England,* Soil Survey of England and Wales. Bulletin No. 14, Harpenden.

2.0 Soils

2.1 A detailed soil resource and agricultural quality survey was carried out in September 2019. It was based on observations at 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 70 cm (depth limited by agreement with landowner to avoid any potential damage to field drains). A log of the sampling points and a map (Map 1) showing their location is in an appendix to this report.

HEAVY SLOWLY PERMEABLE SOILS

2.2 This soil type underlies the entire site. The soils comprise a very slightly stony heavy clay loam topsoil, directly over slowly permeable clay subsoil.

2.3 A typical profile is described below from a pit at observation 8 (Map 1).

0-28 cm	Very dark greyish brown (10YR 3/2) heavy clay loam; very slightly stony (small sub-rounded hard stones); moderately developed medium and coarse sub-angular blocky structure; friable to firm; smooth clear boundary to:
28-70cm+	Yellowish brown (10YR 5/4) clay with common brownish yellow (10YR 6/6) and grey (10YR 5/1) mottles; very slightly stony (small sub-rounded hard stones); weakly developed coarse and very coarse prismatic structure; very firm.

2.4 These soils are poorly-draining (Soil Wetness Class IV) with a low capacity to absorb excess winter rainfall.

3.0 Agricultural land 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 ALC system classifies land into five grades numbered 1 to 5, with grade 3 divided into two subgrades (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[2]. The relevant site data for an average elevation of 15 m is given below.

- Average annual rainfall: 669 mm
- January-June accumulated temperature >0°C 1508 day°C
- Field capacity period (when the soils are fully replete with water) 148 days mid Nov-mid Apr
- Summer moisture deficits for: wheat: 112 mm potatoes: 105 mm

3.3 The survey described in the previous section was used in conjunction with the agro-climatic data above to classify the site using the revised guidelines for ALC issued in 1988 by MAFF[3]. There are no climatic limitations in this locality.

SURVEY RESULTS

3.4 The agricultural quality of the land is determined by wetness. Land of grade 3 has been identified.

Subgrade 3b

3.5 All of the agricultural land within the site is of this quality, limited by wetness. The land has high topsoil clay content and impeded subsoil drainage (Soil Wetness Class IV). This combination means that, under the local climate, opportunities for spring land access are rare and arable cropping is mainly limited to autumn-sown cereal-based rotations.

[2]Meteorological Office, (1989).*Climatological Data for Agricultural Land Classification*.
[3]MAFF, (1988).*Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

Non agricultural

3.6 This area comprises a pond.

Grade areas

3.7 The boundary of the land grades are shown on Map 2 and the area occupied shown below.

Table 1: Areas occupied by the different land grades

Grade/subgrade	*Area (ha)*	*% of the land*
Subgrade 3b	12.4	99
Non agricultural	0.1	1
Total	12.5	100

4.0 Soil resources and their use

TOPSOILS

4.1. The heavy clay loam topsoils are a moderate quality resource for reuse in landscaping and gardens should the site be developed. Soil handling would be best performed between May and October, when the soils are likely to be drier and less susceptible to compaction and smearing.

SUBSOILS

4.2. The subsoils are susceptible to compaction during construction activities which could result in restricted rooting depth, increased droughtiness and risk of localised flooding. If compacted during construction, subsoils should be loosened before any topsoil is spread on them.

SOIL HANDLING

4.3. Areas not being built over (e.g. environmental buffers and landscape areas) 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.

4.4. 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 reuse. The Construction Code of Practice for Sustainable Use of Soils on Construction Sites (Defra, 2009) provides guidance on good practice in soil handling.

APPENDIX

MAPS AND DETAILS OF OBSERVATIONS

Land at Hempsted Lane, Gloucester: ALC and soil resources survey – Details of observations at each sampling point

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope	Wetness	Agricultural quality	
No	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	(°)	Class	Grade	Main limitation
1	0-30	C nca		30-50+	C ca	xxx				5	IV	3b	W
2	0-32	HCL	<5	32-50	SC	xxx	50-70+	SC	xxx	2	III/IV	3b	W
3	0-31	HCL	<5	31-60+	SC	xxx				5	IV	3b	W
4	0-30	C	<5	30-50+	C	xxx				1	IV	3b	W
5	0-29	HCL	<5	29-50+	C	xxx				4	IV	3b	W
6	0-28	HCL	<5	28-60	C (sl dist.)	xxx				4	IV	3b	W
7	0-30	C	<5	30-45+	C	xxx				0	IV	3b	W
8	0-28	HCL	<5	28-70+	C	xxx				1	IV	3b	W
9	0-31	HCL	<5	31-70+	C	xxx				1	IV	3b	W
10	0-31	HCL	<5	31-70+	C	xxx				2	IV	3b	W
11	0-27	C	<5	27-60+	C	xxx				0	IV	3b	W

Key to table

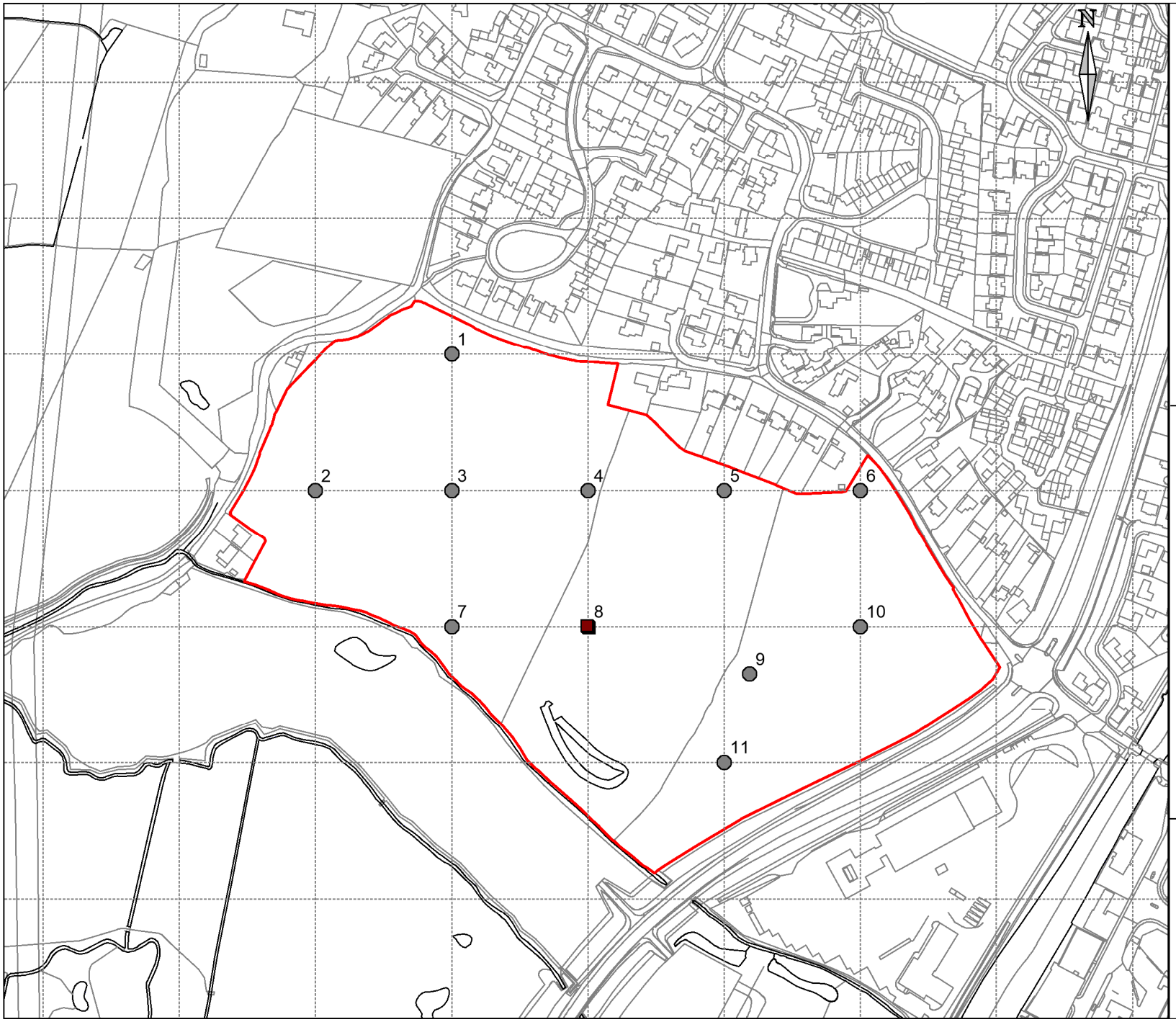
Mottle intensity:
- o unmottled
- x few to common rusty root mottles (topsoils) or a few ochreous mottles (subsoils)
- xx common to many ochreous mottles and/or dull structure faces
- xxx common to many greyish or pale mottles (gleyed horizon)
- xxxx dominantly grey, often with some ochreous mottles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

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

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
- R - bedrock

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
- gn – greenish, yb – yellowish brown, rb – reddish brown
- r – reddish; (v)st – (very) stony; sdst–sandstone;lst - limestone
- dist - disturbed soil layer; mdst - mudstone



KEY

- Auger observation
- Soil/land grade description pit
- Survey area

Client:

GLADMAN

Site:

Land off Hempsted Lane, Gloucester

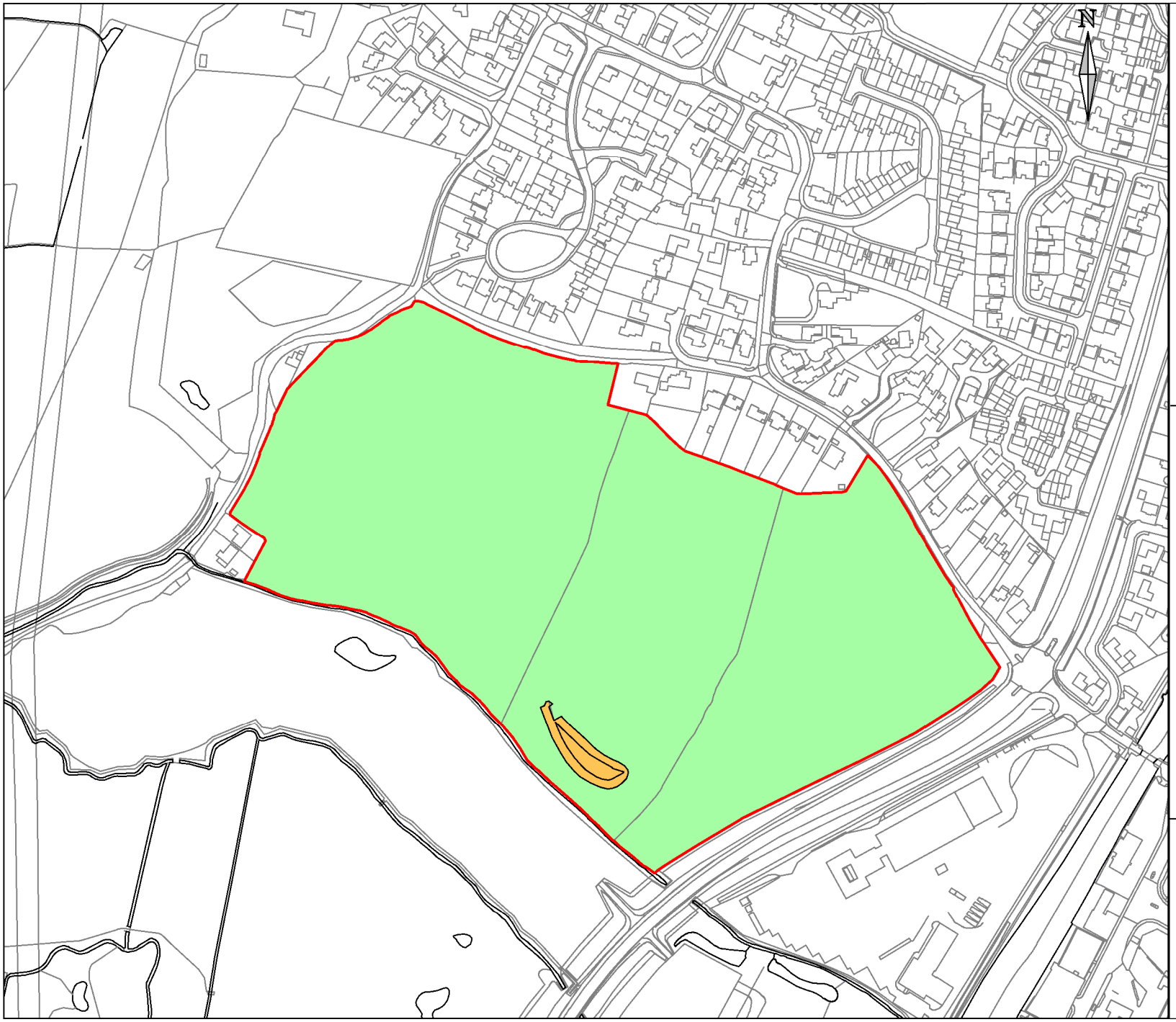
Map title:

Map 1
Survey observations

Land Research Associates
Lockington Hall
Lockington
Derby DE74 2RH
01509 670570

Scale: 1:4,000

Date: 07/10/2019



KEY

Subgrade 3b

Non agricultural

Survey area

Client:

GLADMAN

Site:

Land off Hempsted Lane, Gloucester

Map title:

Map 2
Agricultural Land Classification

Land Research Associates
Lockington Hall
Lockington
Derby DE74 2RH
01509 670570

Scale: 1:4,000

Date: 07/10/2019