

**AGRICULTURAL QUALITY
OF LAND NEAR BARKESTONE**

Report 1630/3

15th July, 2020

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OF LAND NEAR BARKESTONE**

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Report 1630/3
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15th July, 2020

1.0 Introduction

- 1.1 This report provides information on the agricultural quality of 74.3 ha of land near the village of Barkestone. The findings are based on surveys of the land in November 2019 and July 2020.
- 1.2 The land comprises approximately 74.3 ha currently in arable use. The site is level to very gently sloping, at an average elevation of approximately 35 m AOD.
- 1.3 1:50,000 scale BGS information records the geology of the land as Granby Member inter-bedded mudstone and limestone, with narrow outcrops of named limestone beds.
- 1.4 The National Soil Map (published at 1:250,000 scale) shows the site as Evesham 2 Association, comprising mainly calcareous clayey soils with impeded subsoil drainage, formed in Jurassic clays¹.

¹Hodge, C.A.H., *et al.*, (1984). *Soils and their Use in Eastern England*, Soil Survey of England and Wales Bulletin No. 13, Harpenden.

2.0 Soils

2.1 The site was first surveyed in semi-detail (1 observation per 5 ha) in November 2019. A detailed agricultural quality survey was carried out in July 2020. 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 in pits and hand augerings to a maximum depth of 1.2 m. A log of the sampling points and a map (Map 1) showing their location is in an appendix to this report.

2.2 The soils were found to be heavy clays with poor subsoil structure. In places thin bands of limestone are found within the subsoil layers. The topsoils and upper subsoils are variably calcareous, while the lower subsoil is strongly calcareous throughout.

2.3 A typical calcareous profile is described below from observation 25 (Map 1).

0-25 cm	Dark greyish brown (2.5Y 4/2) clay; stoneless; moderately developed very coarse sub-angular blocky structure; firm; calcareous; smooth clear boundary to:
25-43 cm	Greyish brown (2.5Y 5/2) clay with common faint fine yellowish brown (10YR 5/6) mottles; stoneless; moderately developed very coarse sub-angular blocky structure firm; no visible macro-pores; calcareous; smooth gradual boundary to:
43-58 cm	Greyish brown (2.5Y 5/2) clay with many fine distinct strong brown (7.5YR 5/8) and grey (10YR 5/1) mottles; moderately stony (medium hard and soft weathered limestone); weakly developed very coarse angular blocky structure to structureless (massive); very firm; very calcareous; smooth gradual boundary to:
58-120 cm	Dark grey (2.5Y 4/1) clay with many distinct fine strong brown (7.5YR 5/8) mottles; stoneless; structureless (massive); very firm; very calcareous; common fine calcareous concretions.

2.4 An example decalcified profile is described below from observation 16 (Map 1).

0-30 cm	Dark greyish brown (2.5Y 4/2) clay; stoneless; moderately developed very coarse cloddy structure; moderately strong; non-calcareous; smooth clear boundary to:
30-68 cm	Light olive brown (2.5Y 5/3) clay with common distinct fine reddish yellow (7.5YR 6/6) mottles; stoneless; weakly developed very coarse prismatic structure to structureless (massive); very firm; no visible macro-pores; non-calcareous; smooth diffuse boundary to:
68-120 cm	Dark grey (2.5Y 4/1) clay with many distinct fine and medium reddish yellow (7.5YR 6/6) mottles; stoneless; structureless (massive); very firm; calcareous; common fine calcareous concretions.

2.5 Both soils types are imperfectly-draining (Soil Wetness Class III).

3.0 Agricultural land quality

2.1 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 Classification². The relevant site data for the site is given below for an average elevation of 35 m.

- Average annual rainfall: 587 mm
- January-June accumulated temperature >0°C 1406 day°
- Field capacity period 117 days
(when the soils are fully replete with water) earlyDec-early Apr
- Summer moisture deficits for: wheat: 113mm
potatoes:107 mm

2.2 There are no climatic limitations to agricultural land quality at this locality.

2.3 The survey was used in conjunction with the agro-climatic data above to classify the site using the revised guidelines for ALC issued in 1988 by MAFF³.

SURVEY RESULTS

Subgrade 3b

2.4 The land was all found to have clay soils with imperfect subsoil drainage (Soil Wetness Class III). This causes significant wetness constraints to agriculture.

2.5 The topsoils are variably calcareous: in the ALC system, such soils are regarded to be more workable than other heavy soils, and therefore treated as of higher quality in parts of the country with a drier climate (less than 150 field capacity days) which allows spring cultivations. However, this higher grading does not apply to heavy clay topsoils (greater than 50% clay) in the ALC system. Accordingly, three point samples were submitted for particle size analysis testing at an UKAS-accredited laboratory (see laboratory certificate in an appendix to this report and Map 3 for sample number locations). This confirms that these topsoils have clay content significantly above 50%.

2.6 It is therefore concluded that the land at the site is exclusively of subgrade 3b quality: wetness prevents spring access and limits arable cropping to mainly autumn-sown cereal-based rotations.

²Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

³MAFF, (1988). *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

Other land (non-agricultural)

2.7 This land comprises woody scrub in the north of the site.

Grade areas

2.8 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 occupied by the different land grades

<i>Grade/subgrade</i>	<i>Area (ha)</i>	<i>% of the land</i>
Subgrade 3b	73.0	98
Other land	1.3	2
Total	74.3	100

APPENDIX

MAPS AND DETAILS OF OBSERVATIONS

Land at Barkestone: ALC survey – Details of observations at each sampling point

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture and stoniness	Mottling	Depth (cm)	Texture and stoniness	Mottling			Grade	Main limitation
1	0-30	C	0	30-90+	C	xxx				1	III	3b	W
2	0-30	C	0	30-90+	C	xxx				2	III	3b	W
3	0-19	C	0	19-90+	Cvslca	xxx				0	III	3b	W
4	0-31	Cvslca	0	31-90+	Cslca	xxx				2	III	3b	W
5	0-25	C	0	25-46	Cslca	xxx	46-90+	Cca	xxx	2	III	3b	W
6	0-29	Cca	0	29-42	Cca	xxx	42+	LST		1	III	3b	W
7	0-25	Cvslca	0	25-60	Cslca	xxx	60-90+	Cca	xxx	0	III	3b	W
8	Scrub woodland												
9	0-28	C	0	28-90+	C	xxx				2	III	3b	W
10	0-23	C	0	23-55	C	xxx	55-90+	Cca	xxx	2	III	3b	W
11	0-26	C	0	26-90+	Cca	xxx				1	III	3b	W
12	0-31	C	<5	31-70+	C	xxx				0	III	3b	W
13	0-25	Cvslca	0	25-90+	Cvslca	xxx				0	III	3b	W
14	0-32	Cvslca	0	32-68	Cca	xxx	68+	LST		1	III	3b	W
15	0-25	Cslca	0	25-50	Cslca	xxx	50-70+	Cca	xxx	0	III	3b	W
16	0-30	C	0	30-68	C	xxx	68-90+	Cca	xxx	0	III	3b	W
17	0-33	C	0	33-72	C	xxx	72-90+	Cca	xxx	0	III	3b	W
18	0-33	Cca	0	33-80+	Cca	xxx				2	III	3b	W
19	0-32	C	<5	32-60+	C	xxx				0	III	3b	W
20	0-25	Cvslca	0	25-64	C	xxx	64+	LST		1	III	3b	W
21	0-25	Cvslca	0	25-66	Cslca	xxx	66-90+	Cca	xxx	1	III	3b	W
22	0-30	C	0	30-80+	C	xxx				0	III	3b	W
23	0-27	C	0	27-80+	C	xxx				0	III	3b	W
24	0-28	Cslca/vslca	0	28-59	Cslca	xxx	59+	LST		2	III	3b	W
25	0-25	Cca	0	25-80+	Cca	xxx				2	III	3b	W
26	0-33	Cca	0	33-80+	Cca	xxx				0	III	3b	W
27	0-30	C	0	30-80+	Cca	xxx				0	III	3b	W
28	0-31	C	<5	31-66+	C wet	xxx				1	III	3b	W
29	0-28	Cvslca	0	28-90+	Cca	xxx				2	III	3b	W
30	0-24	Cvslca	0	24-44	Cca	xxx	44+	LST		1	III	3b	W
31	0-22	Cca	0	22-80+	Cca	xxx				1	III	3b	W
32	0-26	C	0	26-90+	C	xxx				0	III	3b	W
33	0-30	C	<5	30-80+	C	xxx				2	III	3b	W
34	0-32	Cca	0	32-55	Cca	xxx	55+	LST		0	III	3b	W
35	0-30	C	<5	30-72+	C	xxx				0	III	3b	W
36	0-24	Cslca	0	24-90+	Cvslca	xxx				0	III	3b	W
37	0-31	C	0	31-90+	C	xxx				0	III	3b	W
38	0-29	C	0	29-58	C	xxx	58-90+	Cca	xxx	0	III	3b	W
39	0-31	C	0	31-62	C	xxx	62+	LST		0	III	3b	W
40	0-22	C	0	22-42	C	xxx	42-80+	Cca	xx	0	III	3b	W
41	0-30	Cca	0	30-80+	Cca	xxx				0	III	3b	W
42	0-28	Cslca/vslca	0	28-90+	C	xxx				0	III	3b	W

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture and stoniness	Mottling	Depth (cm)	Texture and stoniness	Mottling			Grade	Main limitation
43	0-31	Cca	0	31-80+	Cca	xxx				0	III	3b	W
44	0-31	C	0	31-80+	C	xxx				0	III	3b	W
45	0-18	C	0	18-90+	C	xxx				0	III	3b	W
46	0-25	Cca	0	25-57	Cca	xxx	57+	LST		0	III	3b	W
47	0-30	C	<5	30-80+	C	xxx				0	III	3b	W
48	0-30	Cca	0	30-80+	Cca	xxx				0	III	3b	W
49	0-26	Cvslca	0	26-66	C	xxx	66+	LST		0	III	3b	W
50	0-28	C	<5	28-54+	C	xxx				1	III	3b	W
51	0-23	C	0	23-90+	C	xxx				0	III	3b	W
52	0-24	Cca	0	24-80+	Cca	xxx				0	III	3b	W
53	0-28	Cca	0	28-62	Cvslca	xxx	62-90+	Cca	xxx	0	III	3b	W
54	0-31	Cca	0	31-90+	Cca	xxx				0	III	3b	W
55	0-25	Cca	0	25-80+	Cca	xxx				0	III	3b	W
56	0-30	C	<5	30-60+	C	xxx				0	III	3b	W
57	0-28	C	0	28-57	C	xxx	57+	Stopped on stones		0	III	3b	W
58	0-28	Cslca	0	28-64	Cslca	xxx	64-80+	Cca	xxx	1	III	3b	W
59	0-34	Cslca	0	34-54	Cca	xxx	54+	LST		0	III	3b	W
60	0-25	C	0	25-90+	C	xxx				0	III	3b	W
61	0-30	Cca	0	30-78	Cca	xxx	78+	LST		0	III	3b	W
62	0-30	C	0	30-80+	C	xxx				0	III	3b	W
63	0-26	C	<5	26-50+	C	xxx				0	III	3b	W
64	0-26	C	0	26-62	C	xxx				0	III	3b	W
65	0-30	C	0	30-90+	C	xxx				0	III	3b	W
66	0-24	Cca	0	24-80+	Cca	xxx				0	III	3b	W
67	0-34	C	<5	34-62+	C	xxx				0	III	3b	W
68	0-23	Cvslca	0	23-71	Cvslca	xxx	71-90+	Cca	xxx	0	III	3b	W
69	0-26	Cca	0	26-80+	Cca	xxx				0	III	3b	W
70	0-27	C	0	27-54	C	xxx	54-72 72+	Cca Stopped on stones	xxx	0	III	3b	W
71	0-23	Cslca	0	25-90+	Cslca	xxx				0	III	3b	W
72	0-26	Cca	0	26-80+	Cca	xxx				0	III	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

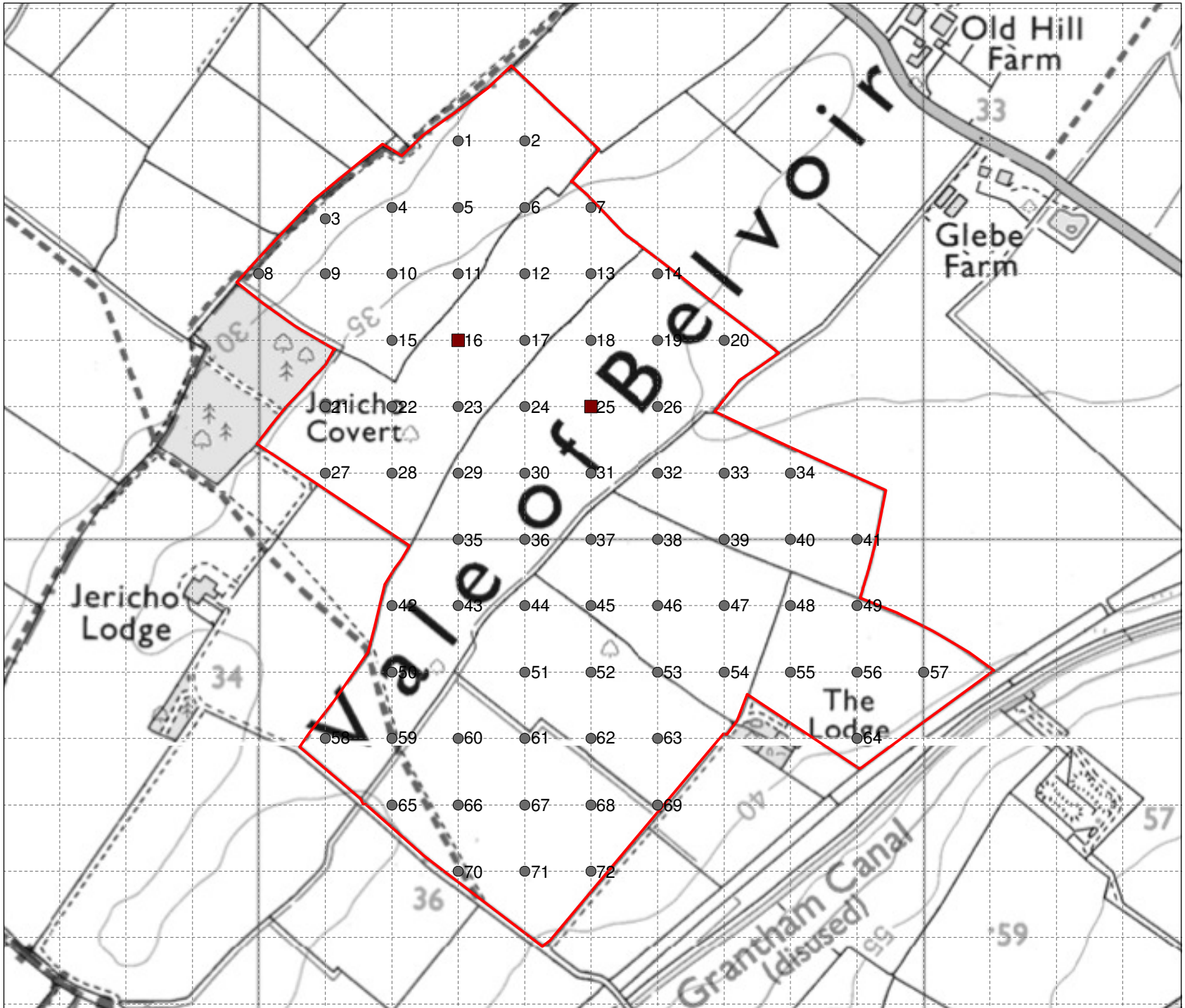
- a depth underlined (e.g. 50) indicates the top of a slowly permeable layer
- R - bedrock
- (a wavy underline indicates the top of a layer borderline to slowly permeable)

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, chky-chalky



- KEY**
- Auger observations
 - Pits
 - Site boundary

Client:



Site:

Barkestone

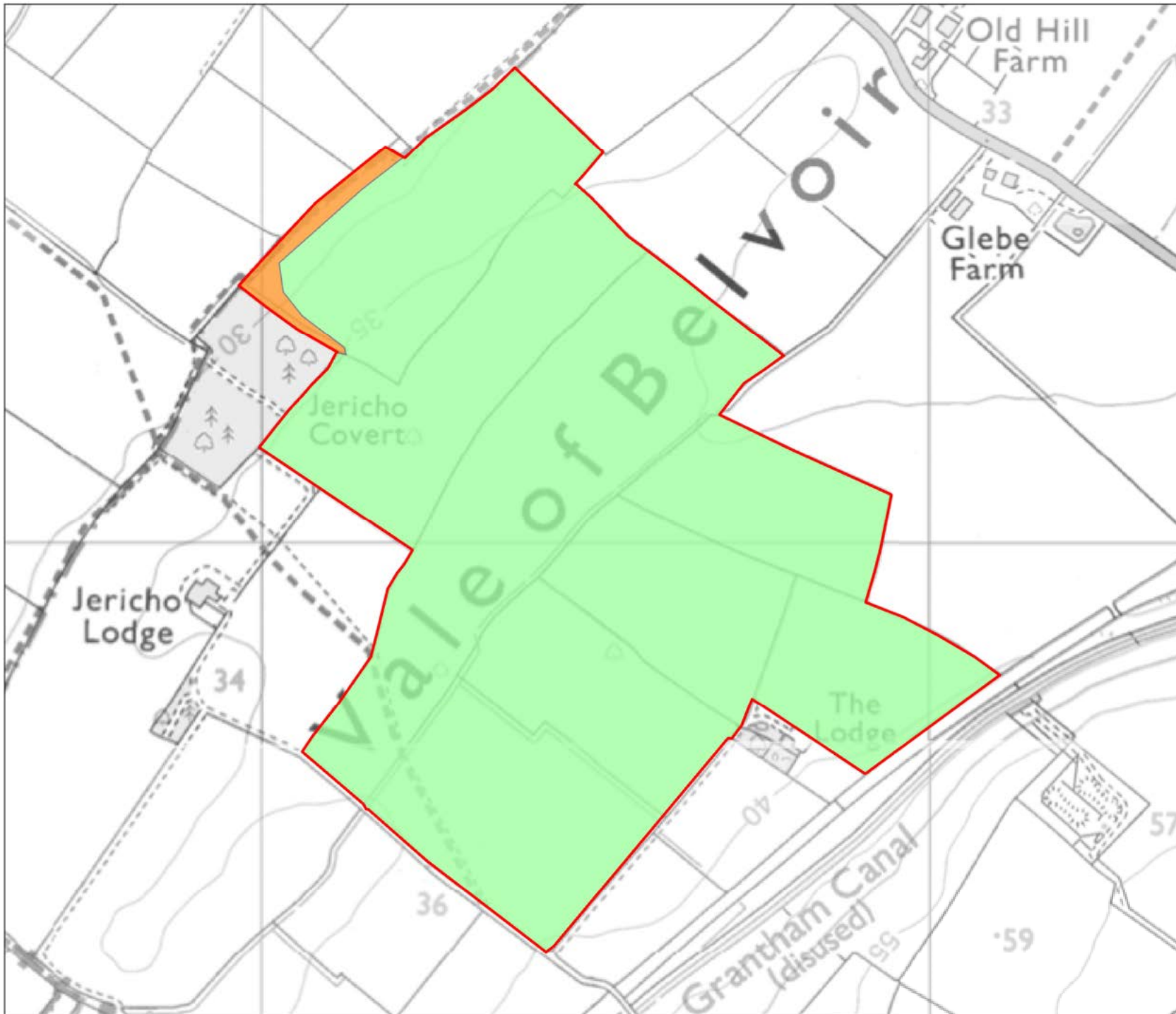
Map title:

MAP 1
Observations

Date: 16/07/2020



Scale: 1:8,000



- KEY
- Subgrade 3b
 - Other land
 - Site boundary

Client:




Site:

Barkestone

Map title:

MAP 2
Agricultural Land
Classification

	Date: 16/07/2020
	Scale: 1:8,000



ANALYTICAL REPORT

Report Number	14121-20	H579	MR MIKE PALMER
Date Received	08-JUL-2020		LAND RESEARCH ASSOCIATES
Date Reported	14-JUL-2020		LOCKINGTON HALL
Project	SOIL		LOCKINGTON
Reference	BARKESTONE		DERBY
Order Number			DE74 2RH

Laboratory Reference		SOIL483442	SOIL483443	SOIL483444						
Sample Reference		11	25	54						
Determinand	Unit	SOIL	SOIL	SOIL						
Sand 2.00-0.063mm	% w/w	8	19	8						
Silt 0.063-0.002mm	% w/w	24	22	26						
Clay <0.002mm	% w/w	68	59	66						
Textural Class **		C	C	C						

Notes

Analysis Notes The sample submitted was of adequate size to complete all analysis requested.
 The results as reported relate only to the item(s) submitted for testing.
 The results are presented on a dry matter basis unless otherwise stipulated.

Document Control **This test report shall not be reproduced, except in full, without the written approval of the laboratory.**

Reported by ***Myles Nicholson***
 Natural Resource Management, a trading division of Cawood Scientific Ltd.
 Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS
 Tel: 01344 886338
 Fax: 01344 890972
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** Please see the attached document for the definition of textural classes.

ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

Class	Code
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	C
Silty clay	ZC
Sandy clay	SC

For the *sand*, *loamy sand*, *sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

vf	Very Fine (more than 2/3's of sand less than 0.106 mm)
f	Fine (more than 2/3's of sand less than 0.212 mm)
c	Coarse (more than 1/3 of sand greater than 0.6 mm)
m	Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam* classes according to clay content are indicated as follows:

M	medium (less than 27% clay)
H	heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.