

**AGRICULTURAL QUALITY
OF LAND AT BALL GREEN FARM**

Report 1937/1

7th January 2022

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SUMMARY

An agricultural land quality survey has been undertaken of 1.8 ha of land at Ball Green Farm, Stoke-on Trent in December 2021.

The land has a mixture of poorly-draining and imperfectly-draining fine loamy soils. Land quality is mainly limited to subgrade 3b by wetness and slope gradient, with minor areas of subgrade 3a where better draining soils occur on gentle slopes.

1.0 Introduction

- 1.1 This report provides information on the soils and agricultural quality of 1.8 ha of land at Ball Green Farm, Stoke-on-Trent. The report is based on a survey of the land in December 2021.

SITE ENVIRONMENT

- 1.2 The survey area covers a single field, plus narrow sections of two further fields to its west (proposed for vehicle access). The land is bordered to the west by Bemersley Road, to the east by woodland, and to the north and south by adjoining agricultural land.
- 1.3 The land slopes from a ridge summit in the west to valley footslopes in the east, via moderately steep midslopes. Average elevation is approximately 165 m AOD.
- 1.4 At the time of survey the land was under grass.

PUBLISHED INFORMATION

- 1.5 1:50,000 scale BGS information records the geology of the land as mudstone of the Pennine Lower Coal Measures, mainly overlain by Devensian glacial till.
- 1.6 The National Soil Map (published at 1:250,000 scale) records the land as Bardsey Association, comprising mainly slowly permeable fine loams and fine loams over clay formed in mudstone, with some better-draining soils formed in interbedded sandstone¹.

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

2.0 Soils

2.1 A detailed soils and agricultural quality survey was carried out in December 2021 in strict accordance with MAFF (1988) guidelines². It was based on observations at alternate intersects of a 50 m grid, giving a density of two observations per hectare; additional survey points were located on gridlines within the proposed access route area. 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 1) showing their locations are in an appendix to this report.

2.2 The soils were found to comprise medium loamy upper layers, over dense slowly permeable heavy clay loam, silty clay loam or clay. The subsoils show *gleying* evidence of seasonal waterlogging (greyish and pale colours with ochreous mottles), although on steeper slopes the upper subsoil is only slightly gleyed. These soils are imperfectly to poorly-draining under the local climate (Soil Wetness Class III to IV).

2.3 An example profile is described below from a pit at observation point 2 (Map 1).

0-25 cm	Very dark greyish brown (10YR 3/2) medium clay loam; stoneless; moderately developed medium sub-angular blocky structure; friable; common fine fibrous roots; smooth gradual boundary to:
25-43 cm	Pale brown (10YR 6/3) medium clay loam with 20% faint fine brownish yellow (10YR 6/6) mottles; stoneless; moderately developed fine sub-angular blocky structure; friable; low packing density; common fine fibrous roots; smooth gradual boundary to:
43--110 cm+	Light grey (10YR 7/1) heavy silty clay loam with 15% distinct fine and medium strong brown (7.5YR 5/8) mottles; stoneless; weakly developed very coarse angular blocky structure very firm; high packing density; no macro-pores below 55 cm; few fine fibrous roots.

²MAFF, (1988). *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

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 Classification³. The relevant site data for an average elevation of 165 m is given below.

- Average annual rainfall: 906 mm
- January-June accumulated temperature >0°C 1189 day°
- Field capacity period 223 days
(when the soils are fully replete with water) late Sept-early May
- Summer moisture deficits for: wheat: 63 mm
potatoes: 41 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 MAFF⁴. The slightly cool moist local climate limits land quality to a maximum of grade 2.

SURVEY RESULTS

3.4 The agricultural quality of the land is determined by soil wetness and slope gradient. Other factors were assessed but do not affect the land grade. Land of grade 3 has been identified.

Subgrade 3a

3.5 This subgrade comprises land on more gentle gradients with imperfectly-draining soils (Soil Wetness Class III) and moderately high topsoil clay content. Under the local climate this combination means safe machinery access for

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

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

cultivations is usually restricted in winter and early spring, although late spring (as well as autumn) sowings are usually possible.

Subgrade 3b

- 3.6 This subgrade accounts for land where poorly-draining soils occur (Soil Wetness Class IV). In combination with moderately high topsoil clay content, the poor drainage means machinery land access opportunities are rare and arable cropping is therefore limited to autumn sowings.
- 3.7 Also included is land in central areas which slopes at gradients between 7 and 11 degrees. Such gradients restrict safe use of some cultivation machinery and pose increased risk of water erosion.

Grade areas

- 3.8 The land grade is shown on Map 2 and the area occupied 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 3a	0.2	10
Subgrade 3b	1.6	90
Total	1.8	100

**APPENDIX
DETAILS OF OBSERVATIONS
MAPS**

Land at Ball Green Farm: Soils and ALC 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	MZCL	0	30-45	MZCL	xxx	45 -90+	ZC	xxx	5	IV	3b	W
2	0-25	MCL	0	25-43	MCL	xxx	43 -110+	HZCL	xxx	9	IV	3b	W/SI
3	0-30	MZCL	0	30-36	SCL	xxx	36 -53 53 -80+	HZCL C	xxx xxx	3	IV	3b	W
4	0-22	MCL	0	22-37	MCL	xx	37 -80+	HZCL	xxx	6	III	3a	W
5	0-30	MCL	0	30-43	MCL	xx	43 -80+	HCL	xxx	5	III	3a	W
6	0-22	MCL	0	22-37	MCL(r)	o	37 -56 56 -90+	SCL(r) SCL(r)	xxx xxx	3	III	3a	W
7	0-22	MCL	0	22-49	MCL	xxx	49 -66 66 -90+	HCL HCL	xxx xxx	2	III/IV	3a/3b	W

Survey log key

Gley indicators¹

o	unmottled
x	1-2% ochreous mottles and brownish matrix (or a few to common root mottles (topsoils)) ³
xx	>2% ochreous mottles and brownish matrix and/or dull structure faces (slightly gleyed horizon)
xxx	>2% ochreous mottles and greyish or pale matrix (gleyed horizon) or reddish matrix and >2% greyish, brownish or ochreous mottles and pale ped faces
xxxx	mottles or f-m concentrations (gleyed horizon) dominantly blueish matrix often with some ochreous mottles (gleyed horizon)

Slowly permeable layers⁴

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

Texture²

C	- clay
ZC	- silty clay
SC	- sandy clay
CL	- clay loam (H-heavy, M-medium)
ZCL	- silty clay loam (H-heavy, M-medium)
SZL	- sandy silt loam (F-fine, M-medium, C-coarse)
LS	- loamy sand (F-fine, M-medium, C-coarse)
SL	- sandy loam (F-fine, M-medium, C-coarse)
S	- sand (F-fine, M-medium, C-coarse)
SCL	- sandy clay loam
P	- peat (H-humified, SF-semi-fibrous, F-fibrous)
LP	- loamy peat; PL - peaty loam

Wetness Class⁵

I (freely drained) to VI (very poorly drained)

Limitations:

W - wetness/workability
D - droughtiness
De - depth
F - flooding
St – stoniness
SI – slope
T – topography/microrelief

Suffixes & prefixes:

r-reddish, gn – greenish
o - organic
(m, v, x)st – (moderately, very,
extremely)

(vsl, sl, m, v, x)(very slightly, slightly,
moderately very, extremely) calcareous

Other abbreviations

fmn - ferri-manganiferous
concentrations
dist - disturbed soil layer;
R – bedrock (CH – chalk, SST –
sandstone
LST – limestone, MST – Mudstone)

¹Gley indicators in accordance with Hodgson, J.M., 1997. Soil Survey Field Handbook (third edition). Soil survey technical monograph No. 5

²Texture in accordance with particle size classes in Hodgson (1997)

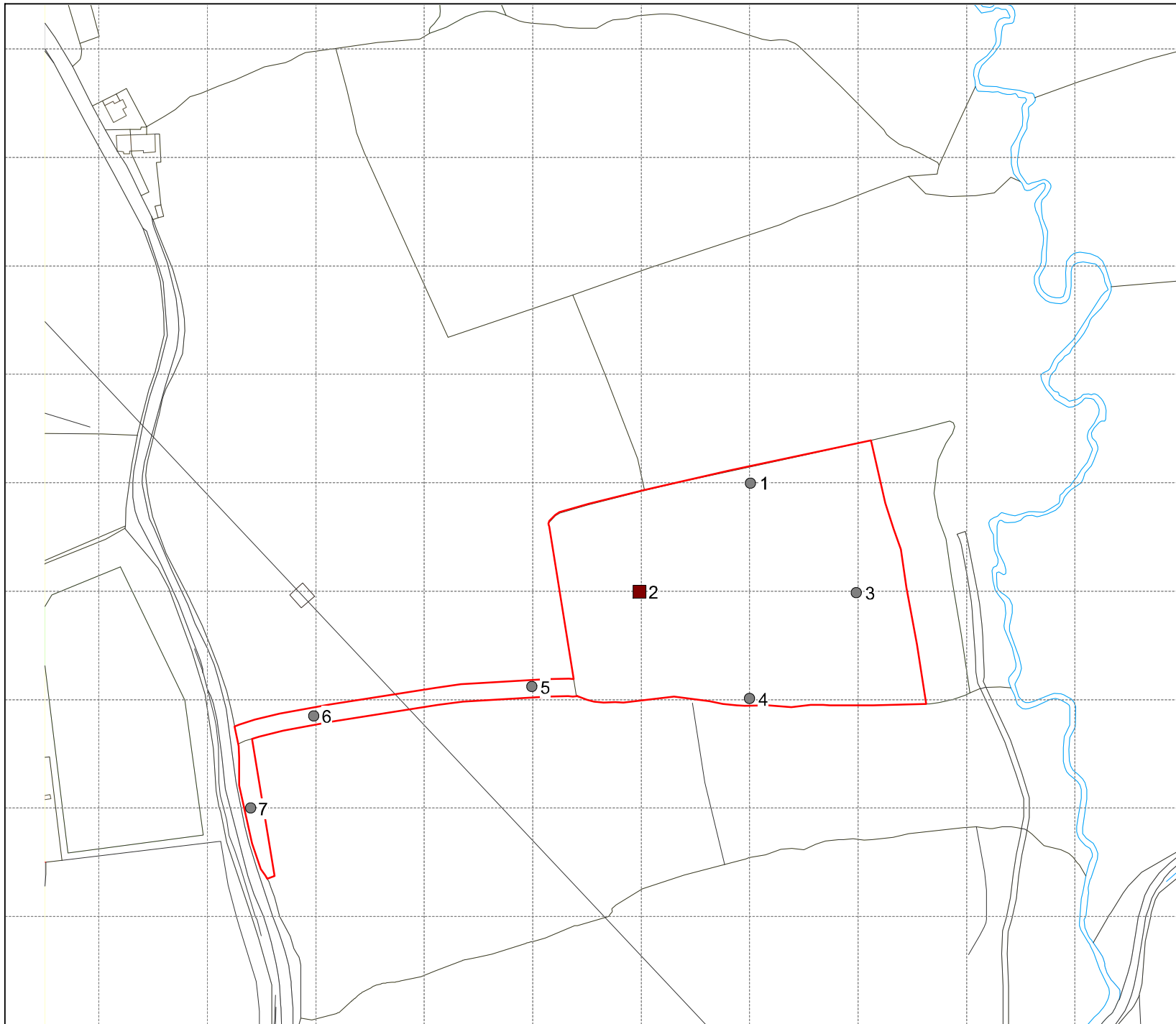
³ Occasionally recorded in the texture box

⁴Permeability is estimated for auger borings and must be confirmed by full pit observations in accordance with the definitions in:
Revised Guidelines for grading the quality of Agricultural Land (Maff 1988)

⁵Soil Wetness Classes are defined in Hodgson (1997)

⁶stoniness classes as defined in Hodgson (1997)

⁷calcareous classes as defined in Hodgson (1997)



KEY

- Auger observations
- Pits
- Site boundary

Client:



Site:

Ball Green Farm

Map title:

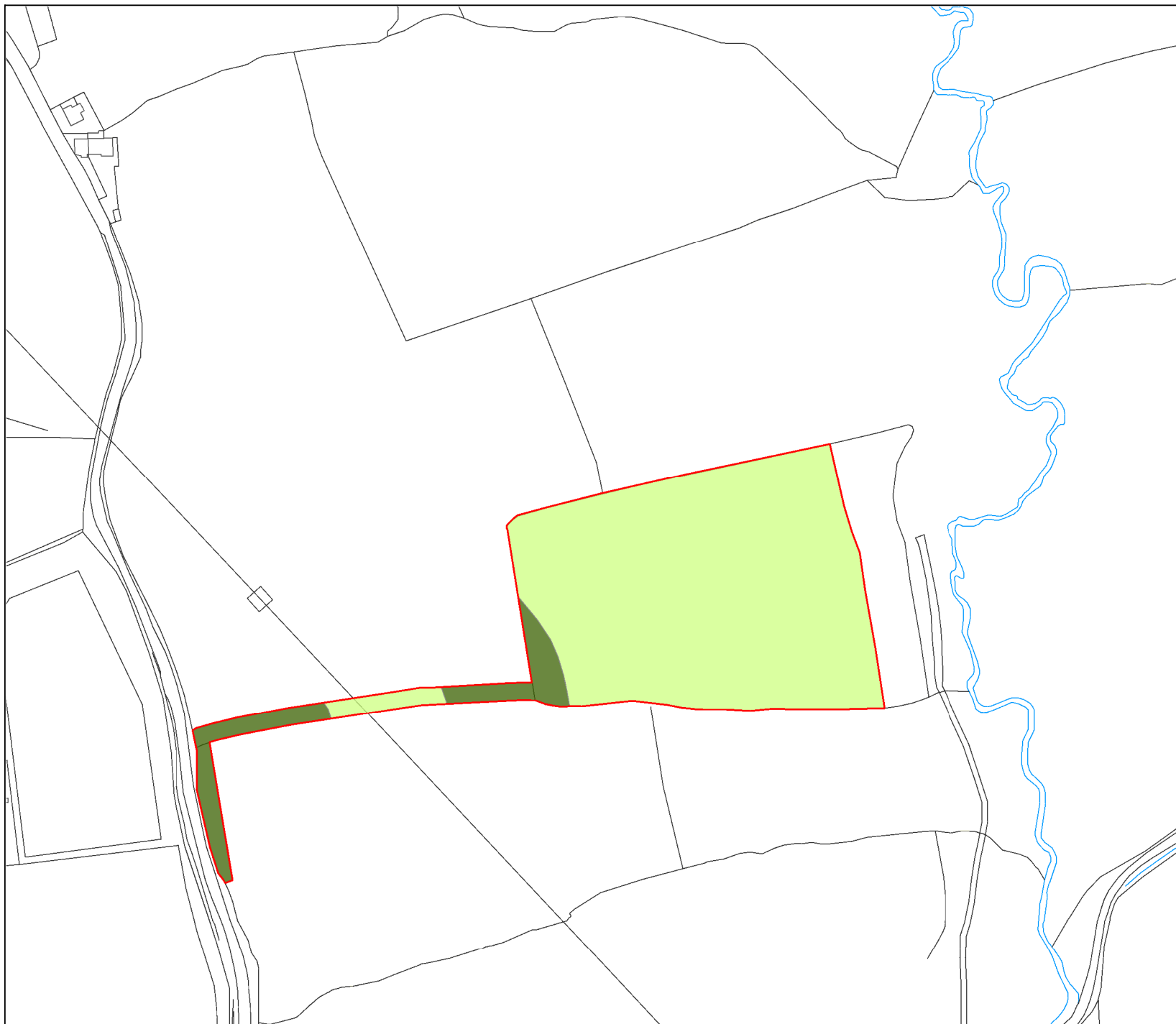
MAP 1
Observations

Land
Research
ASSOCIATES

Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date: 07/01/2022

Scale: 1:2,500



KEY

-  Subgrade 3a
-  Subgrade 3b
-  Site boundary

Client:



Site:

Ball Green Farm

Map title:

MAP 2
Agricultural Land
Classification

Land
Research
ASSOCIATES

Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date: 07/01/2022

Scale: 1:2,500