# AGRICULTURAL QUALITY
# OF LAND WEST OF RATBY, LEICESTERSHIRE

Report 2253/1
16th November 2023

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Report 2253/1
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**SUMMARY**

An agricultural land quality survey has been undertaken of 34.1 ha of land west of the village of Ratby, Leicestershire during November 2023.

The majority of the land has poorly-drained heavy soils, with wetness/workability limiting land quality to Subgrade 3b. Smaller areas with better-draining soils are of Subgrade 3a quality.

# 1.0 Introduction

1.1 This report provides information on the soils and agricultural quality of 34.1 ha of land west of the village of Ratby, Leicestershire. The report is based on a survey of the land during November 2023.

**SITE ENVIRONMENT**

1.2 The survey area comprises ten fields or parts of fields and is bounded to the north and west by adjoining agricultural land, to the south by a lane to Holywell Farm and to the east by residential properties.

1.3 At the time of survey the agricultural land was all under grass.

**PUBLISHED INFORMATION**

1.4 British Geological Survey 1:50,000 scale BGS information records the bedrock geology of the survey area as mainly Gunthorpe or Edwalton member mudstone, with a thin band of Cotgrave Sandstone Member running across the centre and north of the area. Superficial deposits of Thrussington Member glacial till are recorded in the north-east, and of River terrace sands and gravels in the south.

1.5 The National Soil Map (published at 1:250,000 scale) records the whole of the survey area as Whimple 3 Association: mainly reddish fine loamy or fine silty over clayey soils with slowly permeable subsoils[1].

1.6 Part of the land to the north of Burroughs Road within the present survey area was covered in a survey by Cambridge Resource Planning Team on behalf of MAFF in 1996, and is mapped as a mix of Subgrades 3a and 3b. However, no details of the survey are available.

[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, Harpenden.

## 2.0 Soils

2.1 A detailed soils and agricultural quality survey was carried out in November 2023 in accordance with MAFF (1988) guidelines[2]. It was based on observations at intersects of a 100 m grid, giving a density of one observation per hectare. During the survey, soils were examined by a combination of pits and augerings to a maximum depth of 1.2 m. A log of the sampling points and a map (Map 1) showing their locations are in an appendix to this report.

2.2 Three soil types were identified within the survey area, two of which are slowly permeable immediately below the topsoil and poorly-drained (Soil Wetness Class IV): One soil type has a brown or greyish brown, gleyed and mottled, clay upper subsoil which overlies similar coloured, slowly permeable, clay lower subsoil or occasionally overlies a reddish clay lower subsoil. The second poorly drained soil type has reddish clay subsoils which are not mottled but are slowly permeable. These red coloured subsoils contain bands of grey or greenish grey sandstone (skerry) in various stages of weathering and so may be soft or hard and hence sometimes prevented sampling to full depth.

2.3 The third soil has slowly permeable layers at greater depth and in places they are absent (Soil Wetness Class III or II).

2.4 Topsoil texture varied from medium clay loam, heavy clay loam or clay within all the soil types.

2.5 An example of the better drained soil type is described below from a pit at observation 10 (Map 1).

| | |
|---|---|
| 0-44 cm | Brown (10YR 4/3) heavy clay loam; non-calcareous, very slightly stony (4%), small to medium rounded quartzite and sub-angular sandstone fragments; moderately developed fine sub-angular blocky structure; friable; abundant fine roots; smooth abrupt boundary to: |
| 44-48 cm | Brown, yellowish brown (10YR 5/3, 5/6) heavy clay loam; non-calcareous; very slightly stony (5%), small to medium sub-angular sandstone fragments; moderately developed coarse sub-angular blocky structure; firm; many fine fibrous roots; >0.5% biopores; very many prominent ochreous mottles (10YR 5/6); smooth clear boundary to: |
| 48-100 cm+ | Grey, yellowish brown (10YR5/1, 5/6) clay; non-calcareous; very slightly stony (5%), small to medium sub-angular sandstone fragments; weakly developed |

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

very coarse prismatic structure; firm; few fine fibrous roots; <0.5% bio-pores; very many prominent ochreous mottles (10YR 5/6).

2.6 An example of the poorly drained brown/greyish brown subsoil soil type is described below from a pit at observation 16 (Map 1).

| | |
|---|---|
| 0-34 cm | Brown (10YR 4/3) clay; non-calcareous, very slightly stony (4%), small to medium rounded quartzite and sub-angular sandstone fragments; moderately developed medium sub-angular blocky structure; friable; abundant fine roots; smooth abrupt boundary to: |
| 34-62 cm | Brown, yellowish brown (10YR 5/3, 5/6) clay; non-calcareous; very slightly stony (3%), small to medium sub-angular sandstone fragments; moderately developed very coarse angular blocky structure; firm; many fine fibrous roots; <0.5% biopores; very many prominent ochreous mottles (10YR 5/6); smooth clear boundary to: |
| 62-100 cm+ | Red (2.5YR 4/6) clay; non-calcareous; very slightly stony (3%), small to medium sub-angular sandstone fragments; weakly developed very coarse prismatic structure; firm; few fine fibrous roots; <0.5% bio-pores; no mottles. |

2.7 An example of the reddish subsoil soil type is described below from a pit at observation 25 (Map 1).

| | |
|---|---|
| 0-25 cm | Brown (7.5YR4/3) heavy clay loam; non-calcareous, very slightly stony (5%), small to medium sub-angular sandstone fragments; moderately developed fine sub-angular blocky structure; friable; abundant fine roots; smooth abrupt boundary to: |
| 25-70 cm | Red, greenish grey (2.5YR 4/6, 5GY 6/1) clay; non-calcareous; slightly stony (15%), small to medium sub-angular sandstone fragments (skerry bands); weakly developed coarse angular blocky structure; firm; many fine fibrous roots; <0.5% biopores; no mottles; smooth clear boundary to: |
| 70-100 cm+ | Red (2.5YR 4/6) clay; non-calcareous; very slightly stony (5%), small to medium sub-angular sandstone fragments; weakly developed very coarse prismatic structure; firm; few fine fibrous roots; <0.5% bio-pores; no mottles. |

## 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. This report describes the main limitations affecting ALC grades at this site. Other factors (e.g. soil depth, flood risk, micro-relief etc.) were assessed but did not affect the overall grading of the site.

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 the land at an elevation of 97 m AOD is given below.

- Average annual rainfall: 691 mm
- January-June accumulated temperature >0°C 1359 day°
- Field capacity period (when the soils are fully replete with water) 157 days
- Summer moisture deficits for: wheat: 105 mm, potatoes: 95 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[4]. There are no climatic limitations at this locality.

**SURVEY RESULTS**

3.4 The agricultural quality of the land is determined by a wetness and workability limitation with land of Grade 3 being identified.

**Subgrade 3a**

3.5 This land has moderate to high topsoil clay content and slight to moderate drainage restrictions. Under the local climate wetness/workability restrictions

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

often prevent cultivation in winter and early spring, although late spring (as well as autumn) sowings are usually possible.

**Subgrade 3b**

3.6 This land has medium to high topsoil clay content and severely impeded drainage (Soil Wetness Class IV). This combination means that opportunities for spring cultivations are rare due to wetness/workability limitations and as a result arable cropping is mainly limited to autumn rotations.

**Other Land (non-agricultural)**

3.7 This includes areas of woodland or scrub, a recreation field in the east, an area in the north being used for portacabins and parking, plus roads, tracks and water courses.

**Grade areas**

3.8 The land grades are shown on Map 2 and the areas occupied shown below.

**Table 1: Areas occupied by the different land grades**

| *Grade/subgrade* | *Area (ha)* | *% of the land* |
|---|---|---|
| **Subgrade 3a** | 3.0 | 10 |
| **Subgrade 3b** | 25.84 | 76 |
| **Other land** | 4.84 | 14 |
| **Total** | 34.08 | 100 |

**APPENDIX**
**DETAILS OF OBSERVATIONS**
**MAPS**

## Land West of Ratby, Leicestershire: 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 (%) | Depth (cm) | Texture | Mottling | Depth (cm) | Texture | Mottling | (°) | Class | Grade | Main limitation |
| 1 | 0-34 | C | 5 | 34-45 | r C | o | 45-120 | r C (skerry bands) | o | 5 | IV | 3b | W |
| 2 | | | | | | | | | | | | | Non-agricultural Woodland |
| 3 | 0-31 | HCL | 3 | 31-120 | r C (skerry bands) | x | | | | 1 | IV | 3b | W |
| 4 | 0-30 | MCL | 5 | 30-50 | C | xxx | 50-120 | r C (skerry bands) | o | 3 | IV | 3b | W |
| 5 | 0-29 | C | 5 | 29-65 | r C (skerry bands) | o | 65-75<br>75+ | Weathered sandstone (skerry)<br>Stopped on stone | o | 5 | IV | 3b | W |
| 6 | 0-30 | C | 5 | 30-100 | HCL fmn | xxx | 100+ | Stopped on stone | | 4 | II | 3b | W |
| 7 | 0-30 | C | 3 | 30-53 | C | xxx | 53-120 | SCL | xxx | 4 | IV | 3b | W |
| 8 | 0-30 | C | 3 | 30-120 | r C fmn (skerry bands) | o | | | | 4 | IV | 3b | W |
| 9 | 0-30 | HCL | 3 | 30-120 | r C (skerry bands) | o | | | | 1 | IV | 3b | W |
| 10 | 0-44 | HCL | 4 | 44-90 | HCL | xxx | 90-120 | C | xxx | 1 | II | 3a | W |
| 11 | 0-29 | C | 4 | 29-70 | r C | o | 70-120 | r C (skerry bands) | o | 3 | IV | 3b | W |
| 12 | 0-32 | HCL | 5 | 32-42 | r C | o | 42-70<br>70+ | r C (skerry bands)<br>Stopped on stone | o | 3 | IV | 3b | W |
| 13 | 0-32 | C | 5 | 32-120 | r C (skerry bands) | o | | | | 0 | IV | 3b | W |
| 14 | 0-34 | C | 5 | 34-120 | C | xxx | | | | 0 | IV | 3b | W |
| 15 | 0-30 | C | 5 | 30-70 | r C | o | 70-95<br>95+ | r C (skerry bands)<br>Stopped on stone | o | 3 | IV | 3b | W |
| 16 | 0-34 | C | 4 | 34-62 | C | xxx | 62-120 | r C | o | 1 | IV | 3b | W |
| 17 | 0-32 | C | 5 | 32-65 | C + weathered sandstone | xxx | 65-120 | r C | o | 5 | III | 3b | W |
| 18 | 0-25 | C | 5 | 25-50 | r C | o | 50-120 | r C (skerry bands) | o | 1 | IV | 3b | W |
| 19 | 0-22 | HCL | 3 | 22-95 | C | xxx | 95-120 | r SC | o | 0 | IV | 3b | W |
| 20 | 0-30 | MCL/HCL | 5 | 30-50 | C | xxx | 50-120 | r C (skerry bands) | o | 2 | IV | 3b | W |
| 21 | 0-30 | C | 7 | 30-120 | r C fmn (skerry bands) | xx | | | | 0 | IV | 3b | W |
| 22 | 0-34 | MCL | 5 | 34-120 | r C/HCL | o | | | | 1 | IV | 3b | W |
| 23 | 0-30 | MCL | 3 | 30-43 | r C | o | 43-120 | r C (skerry bands) | o | 2 | IV | 3b | W |
| 24 | 0-23 | C | 3 | 23-120 | C | xxx | | | | 2 | IV | 3b | W |
| 25 | 0-25 | HCL | 5 | 25-70 | r C (skerry bands) | o | 70-120 | r C | o | 1 | IV | 3b | W |
| 26 | 0-30 | C | 5 | 30-120 | r C (skerry bands) | o | | | | 3 | IV | 3b | W |
| 27 | 0-34 | MCL | 4 | 34-48 | r HCL | o | 48-80<br>80-120 | r C<br>r C (skerry bands) | o<br>o | 4 | III | 3a | W |
| 28 | 0-26 | HCL | 4 | 26-120 | C | xxx | | | | 3 | IV | 3b | W |
| 29 | 0-29 | MCL | 5 | 29-50 | r C | x | 50-80<br>80-120 | r C<br>r C (skerry bands) | o<br>o | 4 | IV | 3b | W |
| 30 | 0-24 | MCL | 4 | 24-70 | r C (skerry bands) | o | 70-120 | r C | o | 4 | IV | 3b | W |
| 31 | 0-25 | MCL | 3 | 25-63 | HCL | xxx | 63-120 | r C | o | 2 | III | 3a | W |
| 32 | 0-19 | MCL | 3 | 19-120 | C | xxx | | | | 0 | IV | 3b | W |

| Obs | Topsoil | | | Upper subsoil | | | Lower subsoil | | | Slope | Wetness | Agricultural quality | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No | Depth (cm) | Texture | Stones (%) | Depth (cm) | Texture | Mottling | Depth (cm) | Texture | Mottling | (°) | Class | Grade | Main limitation |
| 33 | 0-20 | MCL | 4 | 20-40 | HCL | xxx | 40-69<br>69-120 | SC<br>ZC | xxx<br>xxx | 1 | III | 3a | W |
| 34 | 0-25 | MCL | 3 | 25-55 | HCL | xxx | 55-120 | r SC + C | o | 1 | III | 3a | W |
| | | | | | | | | | | | | | |

***Gley indicators[1]***

| | |
|---|---|
| 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) |

***Texture[2]***

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

***Limitations:***

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

***Suffixes & prefixes:***

o - organic

(vsl, sl, m, v, x)**st** – (very slightly, slightly, moderately, very, extremely) **stony**[6]

(vsl, sl, m, v, x)**ca** (very slightly, slightly, moderately, very, extremely) **calcareous**[7]

***Slowly permeable layers[4]***

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

***Wetness Class[5]***

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

***Other abbreviations***

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

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

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

[3] Occasionally recorded in the texture box

[4]Permeability 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)

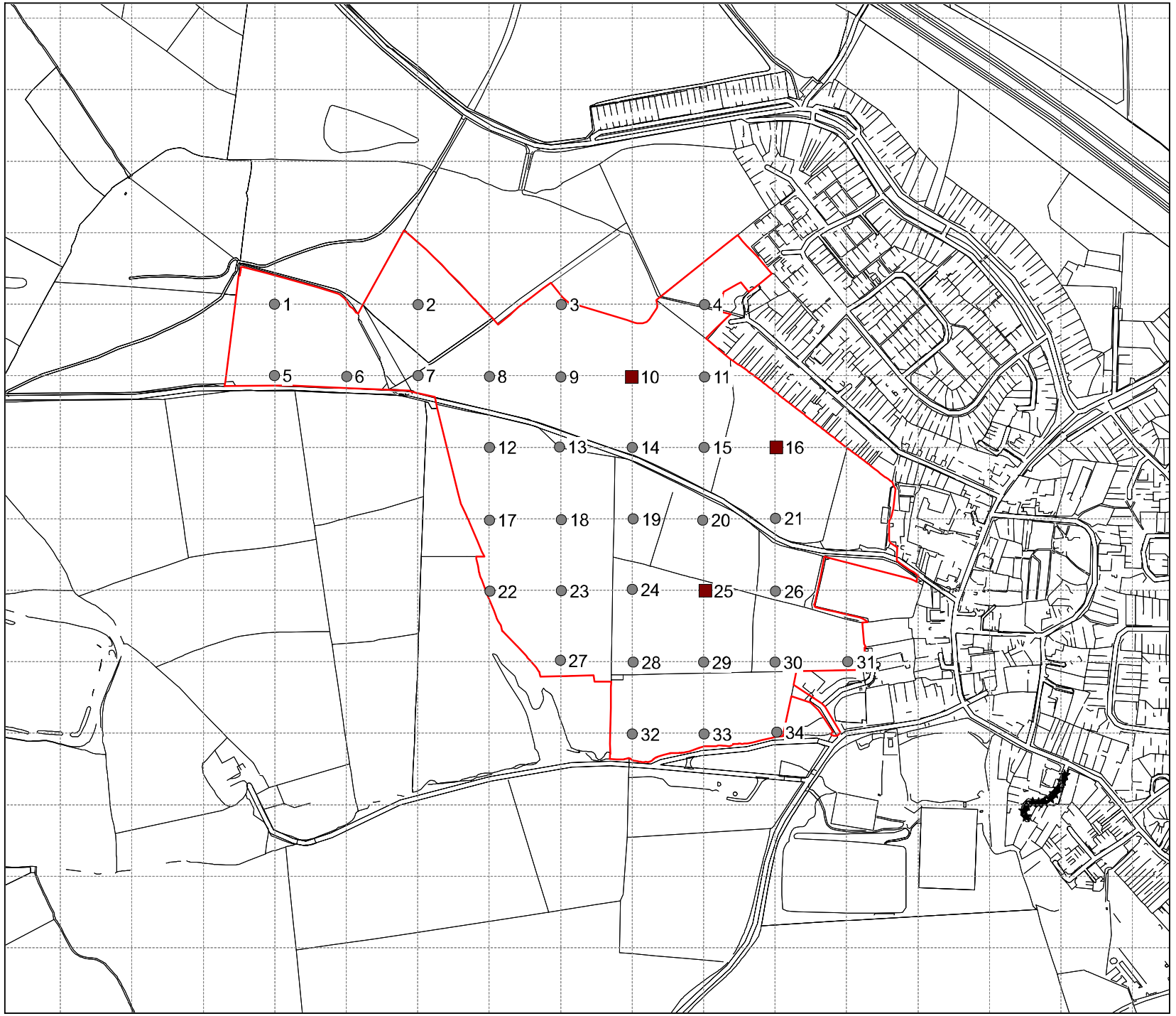
[5]Soil Wetness Classes are defined in Hodgson (1997)

[6]stoniness classes as defined in Hodgson (1997)

[7]calcareous classes as defined in Hodgson (1997)

Grades in brackets eg. (3a) raised by one grade due to calcareous topsoil

Observations close to or on grade boundaries are sometimes recorded as borderline e.g. 3a/3b. In these cases the former grade shows the estimated grading according to the criteria




KEY

- Auger observations
- Pits
- Site boundary

Site:

Ratby

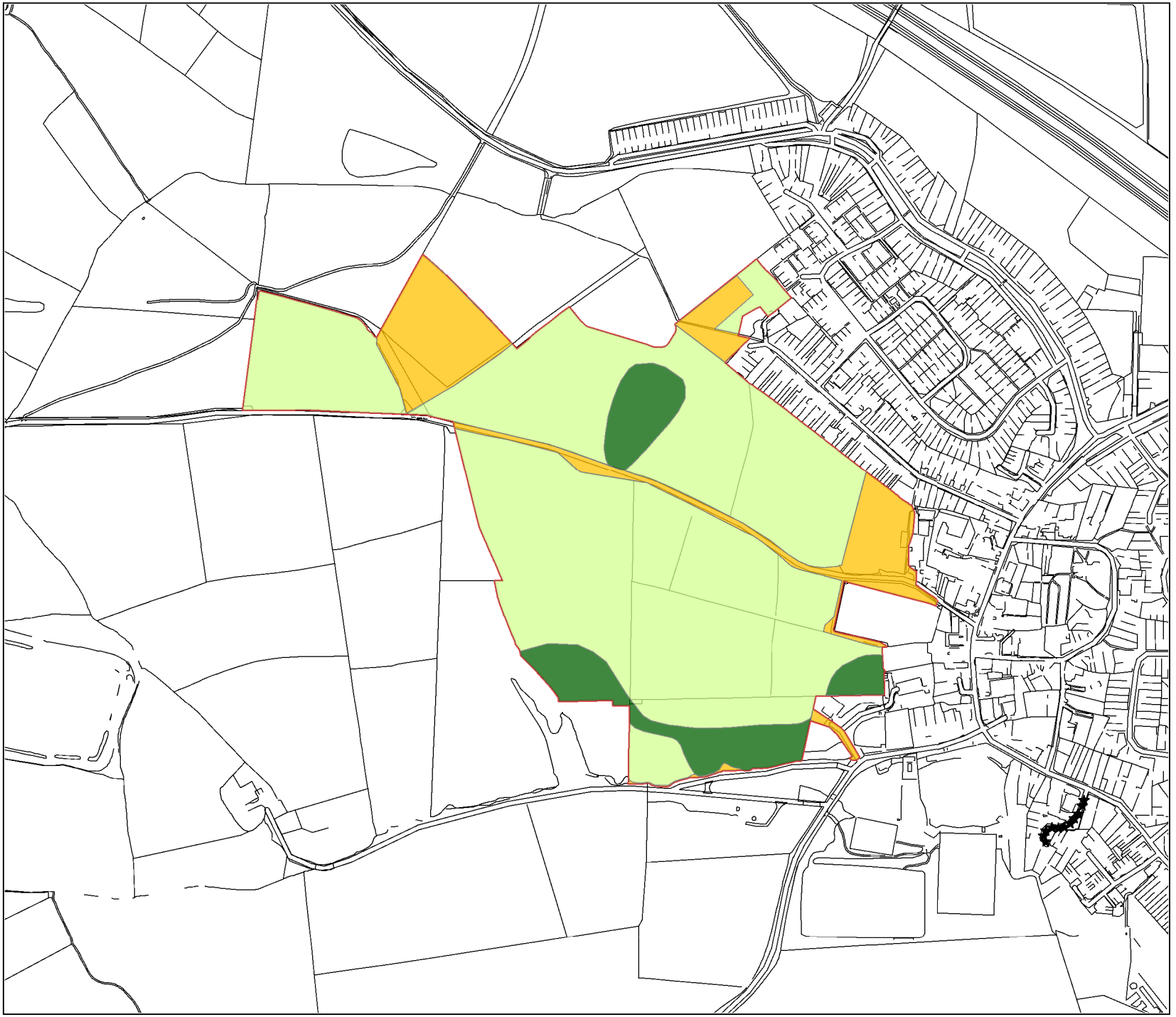
Map title:

MAP 1
Observations

Land Research ASSOCIATES
Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date: 15/11/2023

Scale: 1:7,500



KEY

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

Site:

Ratby

Map title:

MAP 2
Agricultural Land
Classification

Land Research ASSOCIATES
Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date: 15/11/2023

Scale: 1:7,500