SOILS AND
AGRICULTURAL QUALITY
OF LAND OFF COXMOOR ROAD
KIRKBY IN ASHFIELD

Report 1284/1

23rd February, 2017

Land Research ASSOCIATES

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OF LAND OFF COXMOOR ROAD, KIRKBY IN ASHFIELD

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Report 1284/1
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SUMMARY

This report provides information on the soils and agricultural quality of 20.5 ha of land off Coxmoor Road, Kirkby in Ashfield.

The soils that make up the majority of the site comprise sandy loam topsoils over medium sand subsoils. Sandy clay loam topsoils over medium sand giving way to slowly permeable sandy clay soils are found in the north and south-west. The site is predominantly of subgrade 3a agricultural quality limited by either droughtiness or wetness, with an area of subgrade 3b land in the south-east limited by gradient.

Were the site to be developed, the medium loamy sand and sandy clay loam topsoils would provide high quality resources for re-use in landscaping.

1.0 Introduction

1.1 This report provides information on the soils and agricultural quality of 20.5 ha of land off Coxmoor Road, Kirkby in Ashfield. The report is based on a survey of the land in February 2017.

SITE ENVIRONMENT

1.2 The land investigated comprises two arable fields. The site is bordered to the north by Newark Road (B6022) and residential development, to the east by Coxmoor Road (B6139), and on other sides by adjoining agricultural land.

1.3 The land is undulating with a high point of 175 m AOD in the south-eastern corner. The average elevation of the site is approximately 150 m AOD.

AGRICULTURAL USE

1.4 Both fields had been sown to winter cereals at the time of survey. The eastern field is registered to an Entry Level plus Higher Level Stewardship scheme as part of a wider 290 ha holding; the land in the west is not registered to any agri-environment schemes.

PUBLISHED INFORMATION

1.5 1:50,000 scale BGS information records the land to be underlain by Lenton Sandstone Formation, with an outcrop of Nottingham Castle Sandstone in the east. Superficial deposits of glacial sand and gravel or Head are marked in small areas in the south of the site.

1.6 The National Soil Map (published at 1:250,000 scale) shows the land as within the Cuckney 1 Association, described as well drained sandy and coarse loamy soils over soft sandstones[1].

1.7 Provisional Agricultural Land Classification (ALC) mapping of the site shows the land as grade 3. No more detailed mapping has been published.

[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 The National Planning Practice Guidance states that the planning system should protect and enhance valued soils and prevent the adverse effects of unacceptable levels of pollution. This is because soil is an essential finite resource that provides important ecosystem services, for example as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution.

2.2 A detailed soil resource and agricultural quality survey was carried out in February 2017. 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 1.0 m. A log of the sampling points and a map (Map 1) showing their location is in an appendix to this report.

SOILS

2.3 The soils across the site vary in texture. The majority of the soils comprise medium sandy loams over reddish medium sands that are freely-draining. On mid slopes and plateaus the topsoils are sandy clay loams over medium sandy loam upper subsoils, with a slowly permeable sandy clay at approximately 50 cm depth.

Loamy over sandy soils

2.4 These soils underlie the majority of the site. They are freely-draining medium sandy loams over reddish medium sands that grade to soft sandstone within 100 cm depth in places.

2.5 An example profile is described below from a pit at observation 10 (Map 1).

0-31cm	Dark reddish brown (5YR 3/3) medium sandy loam; slightly stony with small and medium subrounded pebbles; moderately developed fine subangular blocky structure; very friable; smooth abrupt boundary to:
31-66 cm	Yellowish red (5YR 3/3) medium sandy loam with few pale diffuse reddish brown (5YR 4/4) mottles; single grain; loose; smooth gradual boundary to:
66-100 cm+	Reddish yellow (5YR 6/6) medium sand / soft sandstone; bleached grains; single grain; loose.

2.6 These soils are freely-draining (Soil Wetness Class I) and have a high capacity to absorb excess winter rainfall.

Loamy over clayey soils

2.7 These soils are located on midslopes and plateaus where the sandy clay loam topsoils over medium sandy loams give way to a slowly permeable sandy clay

subsoil at variable depths below 50 cm.

2.8 An example profile is described below from a pit at observation 19 (Map 1).

0-30 cm	Reddish brown (5YR 3/3) sandy clay loam; slightly stony with small and medium subrounded pebbles; strongly developed fine subangular structure; very friable; smooth abrupt boundary to:
30-50 cm	Red (2.5YR 4/6) medium sandy loam; slightly stony with small and medium subrounded pebbles; 2% pale diffuse light reddish brown (2.5YR 6/4) mottles; weakly developed fine subangular blocky structure; very friable; smooth gradual boundary to:
50-100 cm+	Dark red (2.5YR 3/6) sandy clay with fine pink (2.5YR 8/3) ped faces and 10% reddish yellow (7.5YR 6/8) mottles; weakly developed very coarse prismatic structure; firm.

2.9 These soils are imperfectly-draining (Soil Wetness Class III) and have a low capacity to absorb excess winter rainfall.

3.0 Agricultural land quality

3.1 To assist in assessing land quality, the former 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 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 150 m is given below.

- Average annual rainfall: 728 mm
- January-June accumulated temperature >0°C 1275 day°
- Field capacity period (when the soils are fully replete with water) 167 days early Nov–mid Apr
- Summer moisture deficits for: wheat: 90 mm potatoes: 75 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 Agricultural Land Classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food[3]. The relatively cool climate of the area limits the land to a maximum of grade 2 agricultural quality.

SURVEY RESULTS

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

Subgrade 3a

3.5 This land makes up the majority of the site comprising the loamy over sandy soils limited by droughtiness and the loamy over clay soils limited by wetness.

[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*.

3.6 The loamy over sandy soils will hold restricted moisture reserves for crops in summer months, which is likely to result in a slight reduction in grass and arable crop yields.

3.7 The land with a slowly permeable clay subsoil will be restricted by the dense clay impeding drainage of water during winter months when access with farm machinery will be constrained. This will restrict cultivation timings and therefore may affect land use.

Subgrade 3b

3.8 This land comprises an area of the site restricted by gradient in the south-east. The land is limited to moderate quality agricultural land due to limitations on the safe and efficient use of farm machinery on steeply sloping land (in this case of around 12^{o}). Furthermore, the erosion of coarse-textured soils is a high risk under arable cultivation on such steep slopes.

Non agricultural

3.9 This land comprises two copses in the north and north-west of the site and mature hedgerows that bound the fields.

Grade areas

3.10 The boundaries of the land grades are shown on Map 3 and the areas occupied by each shown below.

Table 1. Areas occupied by the different land grades

Grade/subgrade	*Area (ha)*	*% of the agricultural land*
Subgrade 3a	19.2	97
Subgrade 3b	0.6	3
Non agricultural	0.7	-
Total	20.5	100

4.0 Soil resources and their use

4.1. As part of the Government's 'Safeguarding our Soils' Strategy, the Department for Environment, Food and Rural Affairs (Defra) published a code of practice on the sustainable use of soils on construction sites, which can be helpful in design of developments and setting planning conditions. An Environment Agency strategy Soil a Precious Resource: Our strategy for protecting, managing and restoring soil (Environment Agency, 2007) has complementary aims.

Topsoil

4.2. The high quality medium sandy loam and sandy clay loam topsoil resources are well structured and will hold adequate moisture reserves for crops in summer. Both resources are easy to handle unless very wet, therefore soil handling with machinery should be avoided during or within 24 hours of heavy rain.

Subsoil

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

Soil Handling

4.4. 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.

4.5. 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 re-use. 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 off Coxmoor Road, Kirkby in Ashfield: 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	0-29	SCL	<5	29-41	SCr	xxx	41-80 80+	MSr R	xxx	0	IV	3b	W
2	0-27	SCL	<5	27-80+	MSr	xxx				1	I	3a	D
3	0-35	SCL	<5	35+	Black flyash - disturbed					5		3a	
4	0-37	MSL	<5	37-100	MSr	o				4	I	3a	D
5	0-30	SCL	<5	30-72	MSr	xxx	72-100	SCr	xxx	7	II	2	W
6	0-32	MSL/LMS	<5	35-61	MSr	o	61-100	LMS	o	2	I	3a	D
7	0-35	MSL/LMS	<5	35-61	MSr	o	61-100	LMS	o	3	I	3a	D
8	0-36	MSL	<5	36-60	MSr	o	60+	Stopped on stone		4	I	3a	D
9	0-32	MSL	<5	32-80	MSr	o	80+	R		2	I	3a	D
10	0-31	MSL	<5	31-66	MSr	o	66-100+	MSr	o	3	I	3a	D
11	0-34	LMS	<5	34-100+	MSr	o				4	I	3a	D
12	0-37	SCL	<5	37-56	MSLr	xxx	56-100	SC	xxx	1	III	3a	W
13	0-32	MSL	<5	32-100	MSr	o				4	I	3a	D
14	0-30	MSL	<5	30-72	MSL	o	72+	R		12	I	3b	SI
15	0-31	MSL	<5	31-100	MSr	o				4	I	3a	D
16	0-32	SCL	<5	32-100	MSr	o				4	I	3a	D
17	0-34	SCL	<5	34-50	MSLr	o	50+	Stopped on stone		2	I	3a	D
18	0-50+	SCL + subsoil (disturbed)								1			
19	0-30	SCL	<5	30-50	MSLr	xxx	50-100	SCr	xxx	0	III	3a	W

Key to table

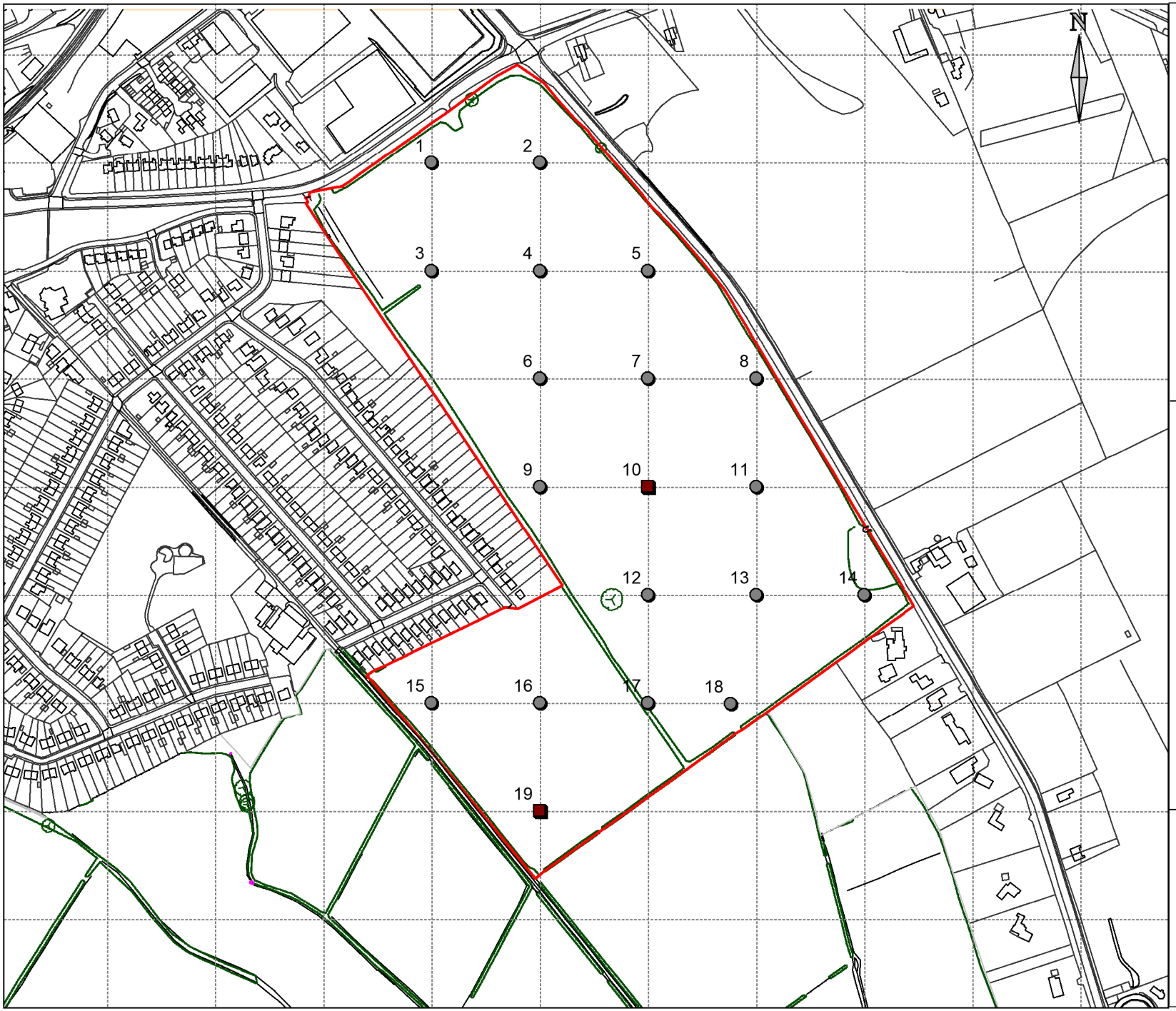
Mottle intensity:
- o unmottled
- x few to common rusty root mottles (topsoils) or a few ochreous mottles (subsoils)
- xx common to many ochreous mottles and/or dull structure faces
- xxx common to many greyish or pale mottles (gleyed horizon)
- xxxx dominantly grey, often with some ochreous mottles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

HALLAM LAND MANAGEMENT

Site:

Land off Coxmoor Road, Kirkby in Ashfield

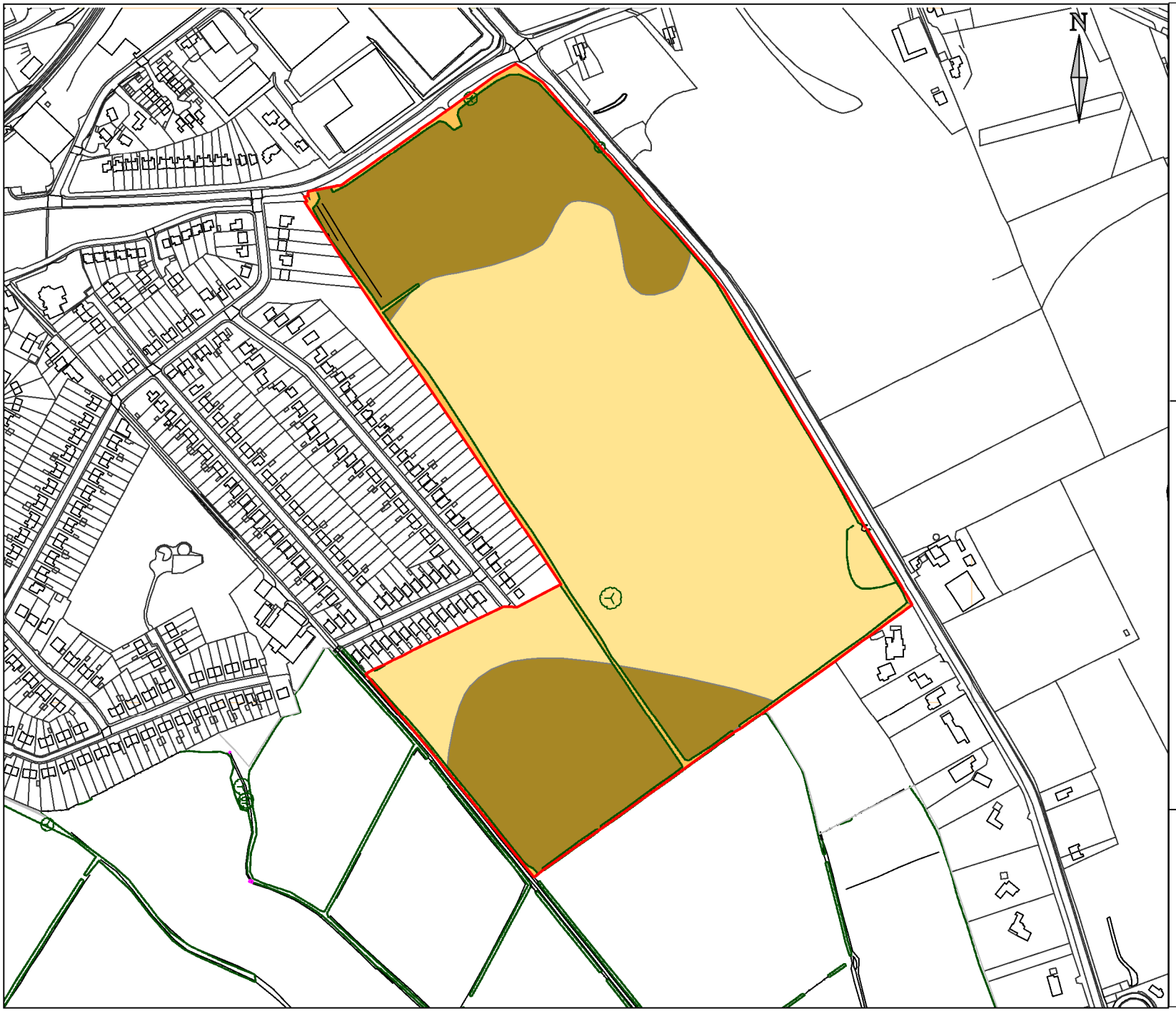
Map title:

Map 1
Survey observations

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

Scale: 1:5,000

Date: 08/02/2017



KEY

- Loamy over clayey soils
- Loamy over sandy soils
- Non agricultural
- Survey area

Client:

HALLAM LAND MANAGEMENT

Site:

Land off Coxmoor Road, Kirkby in Ashfield

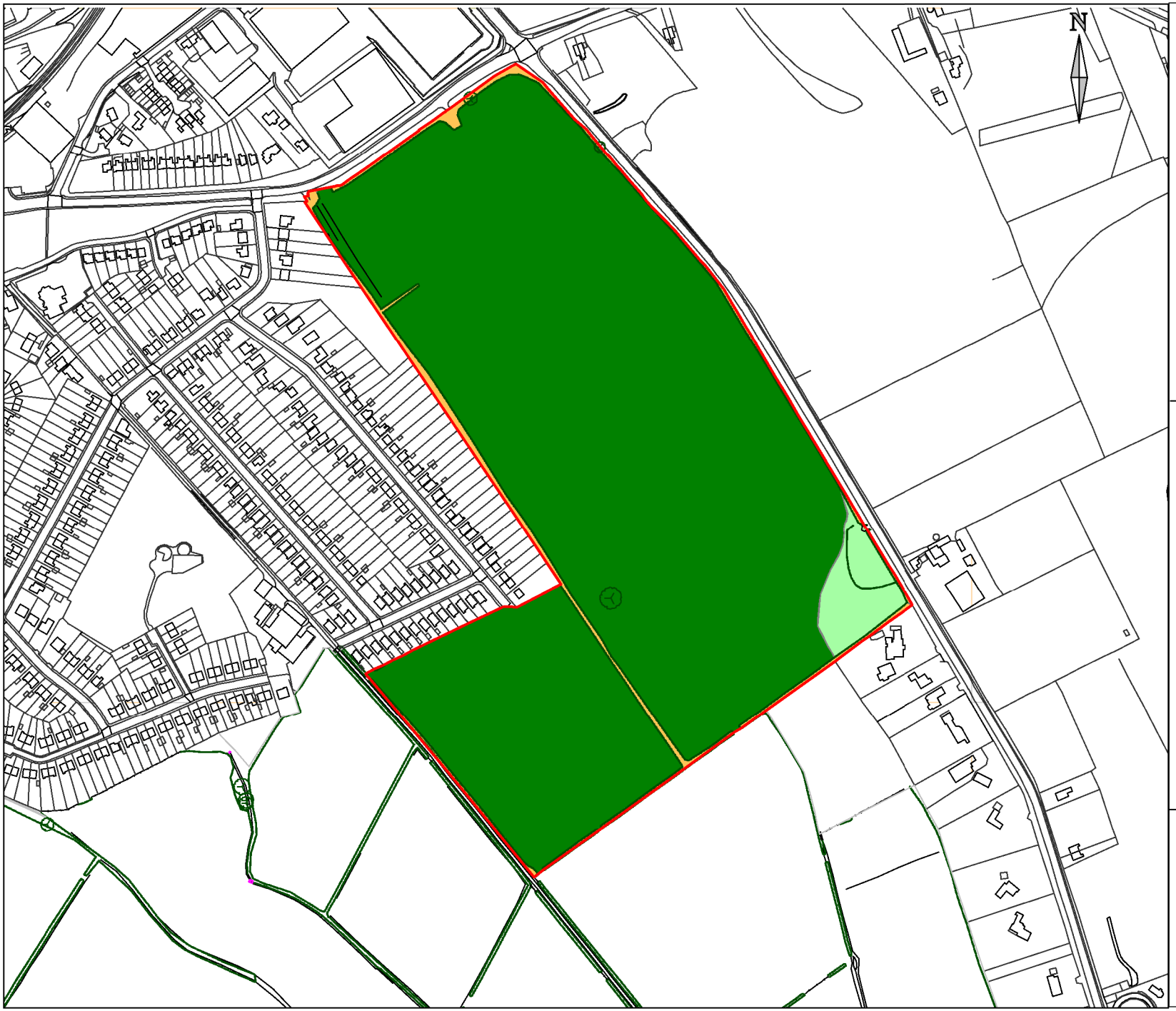
Map title:

Map 2
Soil types

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

Scale: 1:5,000

Date: 23/02/2017



KEY

- Subgrade 3a
- Subgrade 3b
- Non agricultural
- Survey area

Client:

HALLAM LAND MANAGEMENT

Site:

Land off Coxmoor Road, Kirkby in Ashfield

Map title:

Map 2
Agricultural Land Classification

Land Research Associates
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Derby DE74 2RH
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Scale: 1:5,000

Date: 23/02/2017