RETFORD CIRCULAR ECONOMY PROJECT

TECHNICAL APPENDIX 10.2 ALC SURVEY

AREA A

FEBRUARY 2023

SOILS AND AGRICULTURAL QUALITY OF LAND EAST OF SUTTON-CUM-LOUND RETFORD

Report 2106/1

15th February 2023

Land Research ASSOCIATES
www.lra.co.uk

SOILS AND AGRICULTURAL QUALITY

OF LAND EAST OF SUTTON-CUM-LOUND,RETFORD

M W Palmer, PhD, MISoilSci, CSci

Report 2106/1
Land Research Associates Ltd
Lockington Hall,
Lockington,
Derby
DE74 2RH
www.lra.co.uk

15th February 2023

SUMMARY

A soil resources and agricultural land quality survey has been undertaken of 107.1 ha of land east of Sutton Cum Lound in January 2023.

The land has thin sandy restored soils of Pulverised Fuel Ash. Land quality is mainly limited to Grade 4 by droughtiness.

Full recommendations for soil restoration and management according to the proposed landscape plan are included in the report.

1.0 Introduction

1.1 This report provides information on the soils and agricultural quality of 107.1 ha of land east of Sutton Cum Lound, Bassetlaw, Nottinghamshire. The land is proposed for mineral extraction. The report is based on a survey of the land in January 2023.

SITE ENVIRONMENT

1.2 The site investigated comprises ten fields separated by blocks and strips of woodland plantation. Most of the land comprises an artificially elevated area, with lower ground in the north. Average elevation is approximately 15 m AOD.

1.3 At the time of survey all of the land was under grass used as sheep pasture.

PUBLISHED INFORMATION

1.4 British Geological Survey 1:50,000 scale information records the solid geology of the land as Chester Formation pebbly sandstone. Drift cover is not recorded.

1.5 The National Soil Map (published at 1:250,000 scale) records most of the land as Blackwood Association: mainly deep sandy soils affected by shallow groundwater[1].

1.6 The land has been subject to tipping of pulverised fuel ash (PFA) from former neighbouring coal-fired power stations. This has significantly changed the underlying materials and topography of the site compared to the natural baseline.

[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 soils and agricultural quality survey was carried out in January 2023 in accordance with MAFF (1988) Agricultural Land Classification guidelines[2]. It was based on observations at alternate intersects of a 100 m grid, giving a density of one observation per two hectares. During the survey, soils were examined by hand augerings and pits 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 A general consultation response from Natural England indicated that the site *'may require a detailed Agricultural Land Classification survey'*, which would normally involve observations at a density of one observation per hectare. However, comments from the Planning Officer suggested that while restored land cannot be assumed to be of poor quality '*some proportionate information could be persuasive of the assumption that the quality is poor'.* A semi-detailed investigation (one observation per two hectares) has been judged to be proportionate in this instance.

2.3 The soils were found to be broadly consistent across the site. They comprise thin natural sandy soil layers (typically 300-400 mm in thickness). Topsoils are often very thin or absent, commonly comprising only *c.*100 mm of concentrated organic material. The sandy loam, loamy sand and sand layers are underlain by deep stoneless grey pulverised fuel ash (PFA). This material is coarse loamy in texture, but investigations indicate that adverse chemical status means it does not serve as a rootable layer for grass. There is no evidence of earthworm activity, suggesting bio-toxic conditions. In places cemented layers occur within the PFA, and may be the explanation for occasional waterlogging encountered.

2.4 Example profiles are described from investigation pits at observation points 11, 30 and 39 (see Map 1) in the appendix to this report.

[2]MAFF, (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 Classification[3]. The relevant site data for point at grid reference SK 6932, 8486 and an average elevation of 15 m is given below.

• Average annual rainfall:	576 mm
• January-June accumulated temperature >0°C	1414 day°
• Field capacity period (when the soils are fully replete with water)	111 days early Dec-early Apr
• Summer moisture deficits for:	wheat: 113 mm potatoes: 106 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 primarily determined by droughtiness and steep gradient. Other factors have been assessed but do not affect the land grade. Land of grades 3 and 4 has been identified.

Subgrade 3a

3.5 A small area has deeper soils formed from restored natural materials, which provides a greater depth of rooting than elsewhere on the site. This land is limited by moderate droughtiness under the local climate due to the sandy nature of the soils, which would affect average yields of arable crops, although realistically arable cropping is not feasible given the limitations of the surrounding land.

[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*.

Subgrade 3b

3.6 An area has moderately deep soils over PFA but is nevertheless very droughty under the local climate. Average yields of arable crops would be expected to be low.

Grade 4

3.7 Most of the land has shallow rooting depth, which means the land is extremely droughty for arable as well as grass crops. In places the absence of topsoil is judged equally limiting.

3.8 Some of the land comprises very steep slopes (in excess of 11 degrees) and this constitutes an equally limiting factor for this land.

Other land

3.9 This comprises blocks of woodland plantation and access tracks.

Grade areas

3.10 The land grade is shown on Map 2 and the area occupied is shown below.

Table 1: Areas occupied by the different land grades

Grade/subgrade	*Area (ha)*	*% of the land*
Subgrade 3a	2.8	3
Subgrade 3b	8.1	8
Grade 4	73.1	68
Other land	23.1	21
Total	107.1	100

4.0 Soil resources

4.1 There is realistically only one soil resource unit, which comprises the surface layer above the PFA. This is a sandy loam/loamy sand topsoil of variable thickness, over sandy material with variable depth to PFA. To preserve the best quality resource for reuse it is recommended that this material be stripped to a standard thickness of 300 mm (including the turf layer) as a single resource. This mixed material is a low quality resource for reuse given on average it is sandy with organic matter concentrations.

The estimated maximum potential yield is **320,000 m^3.**

4.2 Other material not considered a recoverable mineral resource (i.e. deeper natural subsoil) should be reserved for use as a base layer. No attempt is made to estimate the available potential yield of this material given the variable thickness, but areas of grade 3 land indicate an area where appreciable volumes may be recovered; elsewhere it is likely to constitute a layer 100-200 mm in thickness above the PFA.

5.0 Soil use in restoration

5.1. If land is to be restored to agricultural use, restoring a 300 mm layer above a base layer of PFA would give land of grade 4 quality, suitable for light grazing. It would be essential to ensure sufficient elevation above the natural water table (by leaving some resource in situ) if the land is to remain freely-draining and suited to winter stocking.

5.2. Emplacement of imported subsoil or soil forming resources (such as waste aggregate) could potentially increase rootable soil depth and improve agricultural land quality. Importation of topsoil would also be advantageous for agriculture given much of the land is lacking sufficient depth of natural topsoil.

5.3. Creation of dry acid grassland habitat should be possible with existing soil resources provided the final levels remain clear of the natural water table: The low nutrient sandy material is well suited to this purpose.

6.0 Soil management

6.1 The sandy soils of the site are resistant to machinery handling damage when wet and may be moved in a range of conditions throughout the year. However, soil movement and traffic should be avoided during or just after heavy rainfall. They are susceptible to wind blow and therefore it is not advised that soil handling should be undertaken in windy conditions during drier parts of the year (June to August).

6.2 If direct placement of stripped soils onto areas being restored is not possible, the resources should be stripped and stored separately in low bunds (no more than 3 m high for topsoil and 5 m for subsoil). Topsoil should be stripped from areas designated for storing subsoil. The bunds should be constructed either by excavator or bulldozer (Sheet B of the Good Practice Guide for Handling Soils in Mineral Workings) avoiding over-compaction. They should be sown with grass to help maintain biological activity and prevent wind and water erosion.

6.3 The soils should be removed from storage (Sheet C in the Good Practice Guide for Handling Soils in Mineral Workings) and replaced by excavator using the loose tipping technique (Sheet D in the Good Practice Guide for Handling Soils in Mineral Workings), which avoids traffic on the restored surfaces.

6.4 Sandy soils are susceptible to traffic compaction, which can limit rooting depth and affect drainage. It is recommended that any trafficked restored areas be loosened with a ripper tine before overlying soil layers are emplaced.

APPENDIX

DETAILS OF OBSERVATIONS

MAPS

SELECTED DROUGHTINESS CALCULATIONS

SITE PHOTOGRAPHS

Land east of Sutton-Cum-Lound: 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	0-40	MSL	0	40-75	PFA	-	75+	Hard layer		<1	I/II	3b	D
2	0-20	MSL	0	20-30	MSL+SCL	xx	30-110	Hard layer		0	II	4	D
3	0-20	MSL	0	20-50	LMS	o	50+	Hard layer		0	I/II	4	D
4	0-20	MSL	0	20-40	MSL+SCL	xx	40-80 80+	PFA wet @ 60 Hard layer	-	0	II	3b	D
5	0-30	MSL mix top and subsoil	0	30-120	PFA	-				0	I/II	4	D
7	0-30	MSL	0	30-120	PFA	-				0	I/II	4	D
8	0-25	SCL	0	25-40	SCL	xxx	40-110	MS wet	-	0	II	3a	D
9	0-25	MSL	0	25-40	slst MSL	o	40-120	PFA	-	0	I/II	3b/4	D
10	0-14	LMS	0	14-39	LMS(r)	o	39-90+	PFA(FSZL)	-	0	I	4	D
11	0-26	vslstLMS	<5	26-43	LMS	o	43-120	PFA(FSZL)		0	I	4	D
12	0-13	slstMSL	<5	13-90+	PFA (FSL)	-				0	I	4	D
13	0-35	SCL	0	35-120	PFA wet @ 90	-				0	I/II	4	D
14	0-20	MSL	0	20-90	MSL+SCL	x	90-110	PFA	-	0	I/II	3a	D
15	0-30	SCL	0	30-120	PFA wet @ 100					0	I/II	4	D
16	0-17	vslstMSL	<5	17-40	LMS	o	40-90+	PFA(FSL)	-	0	I	4	D
17	0-11	MSL	0	11-28	LFS	o	28-39 39+	PFA(FSZL) Hard layer	-	0	I	4	D
18	0-14	LMS	0	14-37	MS(r)	o	37-63 63+	PFA(FSL/FSZL) Hard layer	-	0	I	4	D
19	0-30	MSL	0	30-50	st LMS+C	x	50+	Hard layer		4	II	4	D
20	0-35	MS top + sub mix	0	35-50	PFA		50+	Hard layer		0	I/II	4	D
21	0-30	MSL	0	30-35	MSL	x	35-100+	PFA	-	0	I	4	D
22	0-27	vslstMSL	0	27-90+	PFA(FSZL)	-				0	I	4	D
23	0-13	MSL	0	13-55	LMS	o	55+	PFA(FSZL)		0	I	4	D
24	0-43	slstSCL	0	43-90+	PFA(FSZL) wet	-				0	II	3b	D
25	0-10	MSL	0	10-40	st MS	x	40+	stop on stones		0	II	3b/4	D
26	0-20	MSL	0	20-40	MSL	x	40-80+	PFA wet @ 80+	-	0	II	4	D
28	0-26	slstSCL/MSL	0	26-52	SCL	o	52-90+	PFA(FSZL)	-	0	I	3b	D
29	0-10	LMS	0	10-43	MS	o	43-90+	PFA(FSL)	-	0	I	4	D
30	0-7	vslstLMS	0	7-37	vslstLMS(r)	o	37-58 58+	PFA(FSZL) Hard layer	-	0	I	4	D
31	0-13	vslstMSL	0	13-53	MS	o	53-90+	PFA(FSL)	-	0	I	4	D

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
32	0-10	vslstMSL	0	10-25	LMS	o	25-90+	PFA(FSL)	-	0	I	4	D
33	0-90+	slstMSL &sandy inclusions	<5							0	I	3a/3b	D
34	0-14	vslstLMS	<5	14-31	LMS(r)	o	31+	Hard layer		0	I	4	D
35	0-20	vslstMSL	<5	20-24	PFA(FSL)	-				0	I	4	D
36	0-24	slstLMS	<5	24-31	PFA(FSL)	-	31+	Hard layer		0	I	4	D
37	0-21	slstMSL	<5	21-47	PFA(FSZL)	-	47+	Hard layer		0	I	4	D
38	0-17	vslstMSL	<5	17-41	PFA(FSZL)	-	41+	Hard layer		0	I	4	D
39	0-10	vslstLMS Topsoil&subsoil	<5	10-15	vslstLMS(r)	o	15-120	PFA(FSL)	-	0	I	4	D
40	0-15	vslstFSL	<5	15-45	PFA(FSL)	-	45-90+	PFA(FSL)	-	0	I	4	D/De

Soil log key

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 mottles or f-m concentrations (gleyed horizon)
xxxx	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
S – Soil limitations

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;
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)

Soil pit descriptions

Pit 11 (see Map 1)

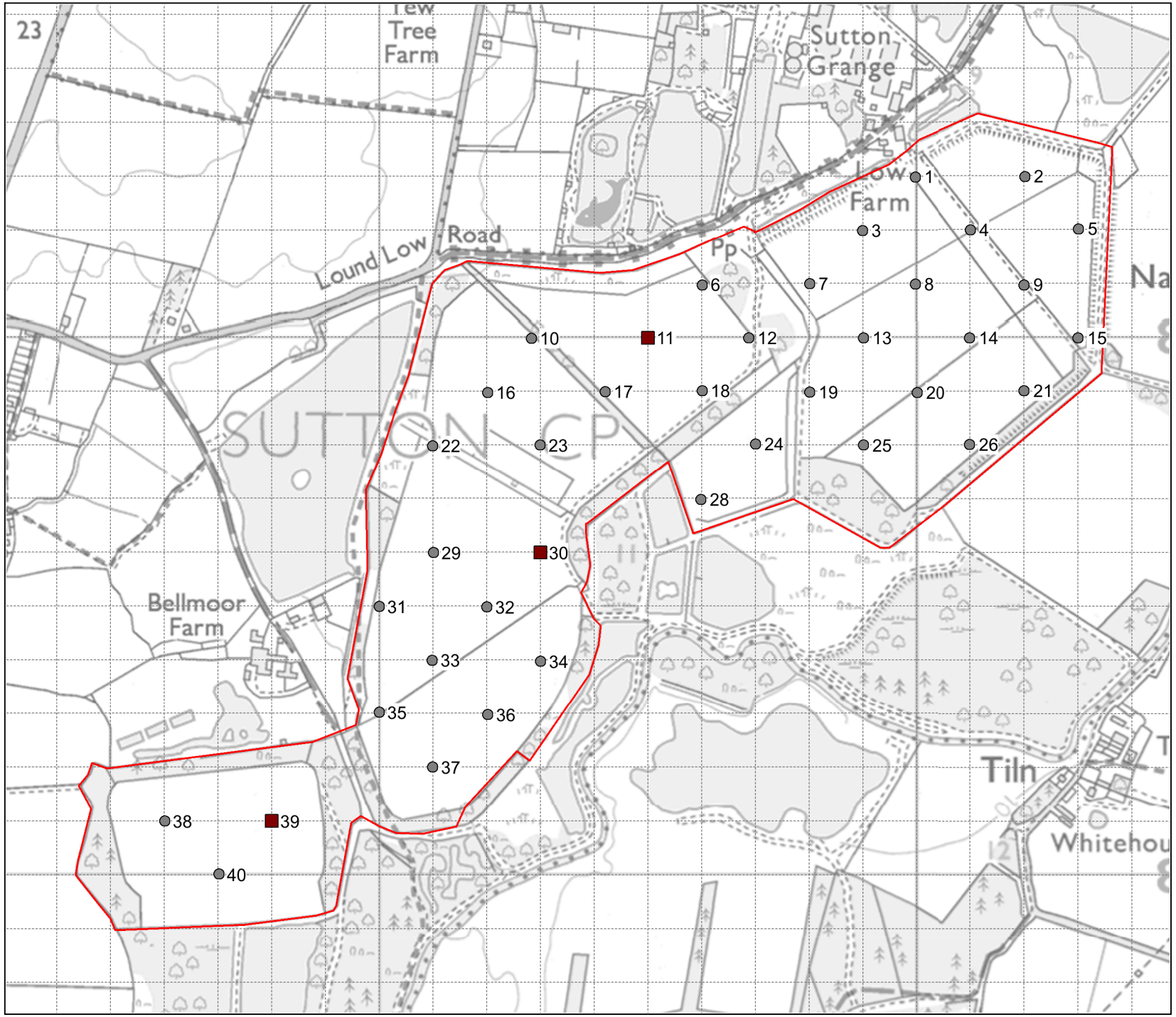
0-26 cm	Dark brown (7.5YR 3/3) loamy medium sand; 3-4% small hard pebbles; moderately developed medium and fine sub-angular blocky structure; friable; many fine fibrous roots smooth clear boundary to:
26-43 cm	Reddish brown (5YR 5/4) loamy medium sand; very slightly stony; weakly developed fine sub-angular blocky structure; very friable; few fine fibrous roots; smooth sharp boundary to:
43-120 cm	Dark grey (10YR 4/1) fine sandy sandy silt loam (Pulverised Fuel Ash); stoneless; structureless/coarse platy; friable; no roots.

Pit 30 (see Map 1)

0-7 cm	Dark brown (7.5YR 3/2) loamy medium sand; 2% small hard quartz pebbles; weakly developed fine sub-angular blocky structure; friable; common fine and medium fibrous roots; smooth gradual boundary to:
7-37 cm	Reddish brown (5YR 5/4) loamy medium sand; very slightly stony; weakly developed fine sub-angular blocky structure; very friable; few fine fibrous roots; smooth sharp boundary to:
37-58 cm	Dark grey (10YR 4/1) fine sandy loam/sandy silt loam (Pulverised Fuel Ash); stoneless; structureless (laminated); some compacted layers; no roots.
58 cm+	Impenetrable cemented layer.

Pit 39 (see Map 1)

0-10 cm	Dark brown (7.5YR 3/2) medium sandy loam/ loamy medium sand; 2-3% small hard quartz pebbles; moderately developed fine to medium sub-angular blocky structure; friable; common fine fibrous roots; wavy clear boundary to:
10-15 cm	Reddish brown (5YR 5/4) loamy medium sand; very slightly stony; weakly developed fine sub-angular blocky structure; very friable; common fine and medium fibrous roots; wavy sharp boundary to:
15-120 cm	Dark grey (10YR 4/1) fine sandy loam/sandy silt loam (Pulverised Fuel Ash); stoneless; structureless (laminated); some compacted layers; no roots or earthworms.



KEY

- Auger observations
- Pits
- Site boundary

Site:

Sutton Cum Lound

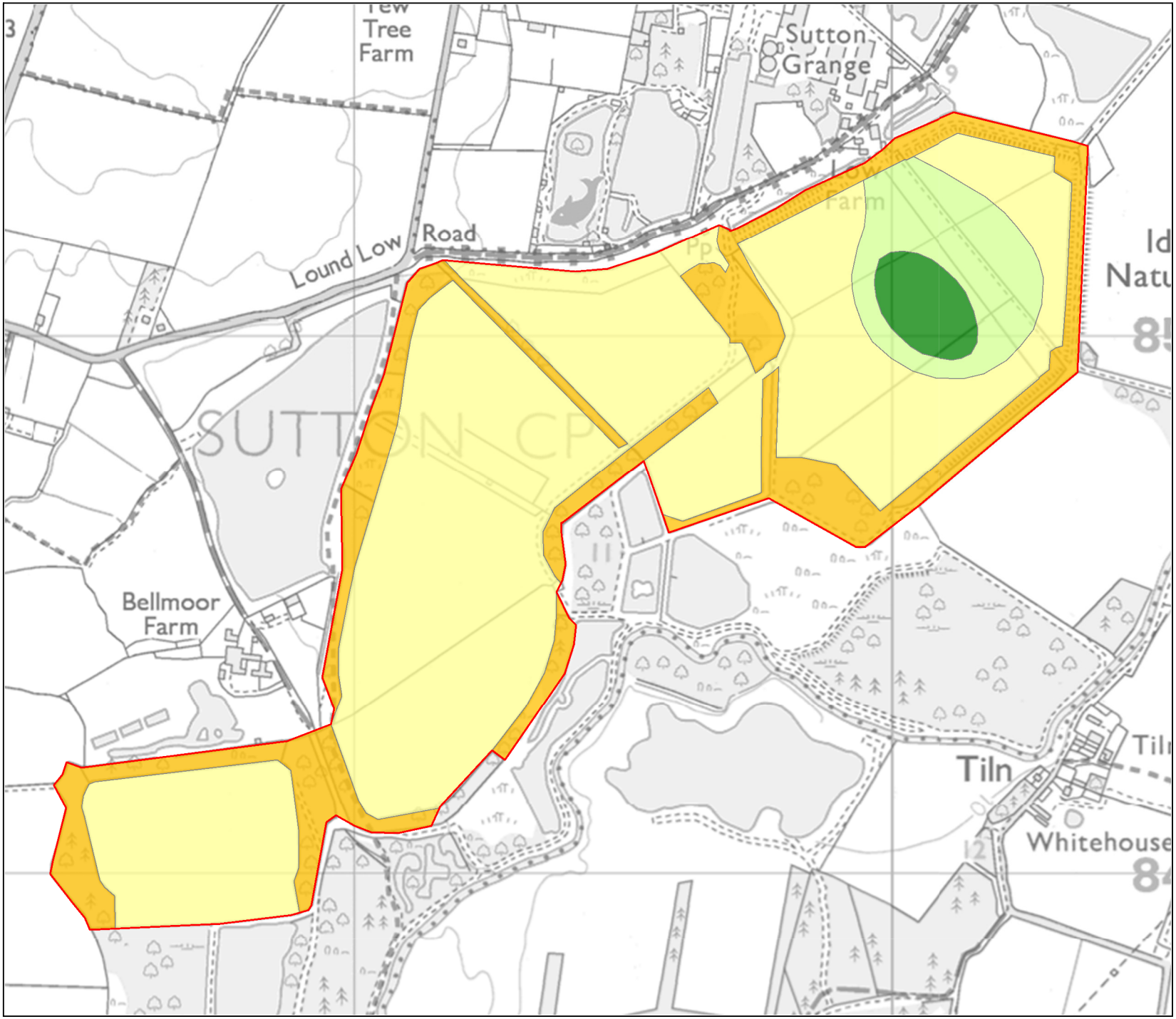
Map title:

MAP 1
Observations

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

Date: 15/02/2023

Scale: 1:10,000



KEY

- Subgrade 3a
- Subgrade 3b
- Grade 4
- Other land
- Site boundary

Site:

Sutton Cum Lound

Map title:

MAP 2
Agricultural Land Classification

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

Date: 15/02/2023

Scale: 1:10,000

SITE:	Sutton Cum Lound
Location:	8

Layer	*Lower depth* (cm)	*Texture symbol* (or stop)	*Structure* (Good, Moderate or Poor)	*% stones*	*Stone type* (see table)
Topsoil	25	scl	m	3	1
Subsoil 1	40	scl	m	3	1
Subsoil 2	120	ms	m	0	1
Subsoil 3	120	stop	m	0	1

(Lowest horizon depth must be 120 and topsoil cannot be greater than 70 cm (potatoes) or 50 cm (wheat))

DATA USED FROM MASTER TABLE

	Fine earth	*Stones*
Topsoil Av	17	1
Subsoil 1 TAv	15	1
Subsoil 1 EAv	10	0.5
Subsoil 2 TAv	7	1
Subsoil 2 EAv	5	0.5
Subsoil 3 TAv	0.1	1
Subsoil 3 EAv	0.1	0.5
	(ERR = no data)	

Stone codes	
0	No stones
1	Hard rocks or stones
2	Soft, medium or coarse grained sdst
3	Soft weathered ign or metamorph
4	Soft oolitic or dolomitic limestones
5	Soft fine-grained sandstone
6	Soft argillaceous or silty
7	Chalk
8	Gravel with non-porous stones
9	Gravel with porous stones

PROFILE CALCULATIONS

	Ap potatoes	*Ap wheat*
Topsoil	413.0	413.0
Subsoil 1	0.0	218.7
Subsoil 1	218.7	0.0
Subsoil 2	210.0	0.0
Subsoil 2	0.0	400.0
Subsoil 3	0.0	0.0
TOTAL AP (mm)	84	103
MD (mm)	106	113
AP-MD (mm)	-22	-10

AGRICULTURAL LAND GRADE

Class	*Potatoes*	*Wheat*
1		
2		
3a	*	*
3b		
4		

SITE:	Sutton Cum Lound
Location:	9

Layer	*Lower depth* (cm)	*Texture symbol* (or stop)	*Structure* (Good, Moderate or Poor)	*% stones*	*Stone type* (see table)
Topsoil	25	msl		5	1
Subsoil 1	40	msl	g	10	1
Subsoil 2	120	stop	m	0	1
Subsoil 3	120	stop	m	0	1

(Lowest horizon depth must be 120 and topsoil cannot be greater than 70 cm (potatoes) or 50 cm (wheat))

DATA USED FROM MASTER TABLE

	Fine earth	*Stones*
Topsoil Av	17	1
Subsoil 1 TAv	17	1
Subsoil 1 EAv	13	0.5
Subsoil 2 TAv	0.1	1
Subsoil 2 EAv	0.1	0.5
Subsoil 3 TAv	0.1	1
Subsoil 3 EAv	0.1	0.5
	(ERR = no data)	

Stone codes	
0	No stones
1	Hard rocks or stones
2	Soft, medium or coarse grained sdst
3	Soft weathered ign or metamorph
4	Soft oolitic or dolomitic limestones
5	Soft fine-grained sandstone
6	Soft argillaceous or silty
7	Chalk
8	Gravel with non-porous stones
9	Gravel with porous stones

PROFILE CALCULATIONS

	Ap potatoes	*Ap wheat*
Topsoil	405.0	405.0
Subsoil 1	0.0	231.0
Subsoil 1	231.0	0.0
Subsoil 2	3.0	0.0
Subsoil 2	0.0	8.0
Subsoil 3	0.0	0.0
TOTAL AP (mm)	64	64
MD (mm)	106	113
AP-MD (mm)	-42	-49

AGRICULTURAL LAND GRADE

Class	*Potatoes*	*Wheat*
1		
2		
3a		
3b	*	*
4		

SITE:	Sutton Cum Lound
Location:	11

Layer	*Lower depth* (cm)	*Texture symbol* (or stop)	*Structure* (Good, Moderate or Poor)	*% stones*	*Stone type* (see table)
Topsoil	26	lms	m	3	1
Subsoil 1	43	lms	m	3	1
Subsoil 2	120	stop	m	0	1
Subsoil 3	120	stop	m	0	1

(Lowest horizon depth must be 120 and topsoil cannot be greater than 70 cm (potatoes) or 50 cm (wheat))

DATA USED FROM MASTER TABLE

	Fine earth	*Stones*
Topsoil Av	13	1
Subsoil 1 TAv	9	1
Subsoil 1 EAv	6	0.5
Subsoil 2 TAv	0.1	1
Subsoil 2 EAv	0.1	0.5
Subsoil 3 TAv	0.1	1
Subsoil 3 EAv	0.1	0.5
	(ERR = no data)	

Stone codes	
0	No stones
1	Hard rocks or stones
2	Soft, medium or coarse grained sdst
3	Soft weathered ign or metamorph
4	Soft oolitic or dolomitic limestones
5	Soft fine-grained sandstone
6	Soft argillaceous or silty
7	Chalk
8	Gravel with non-porous stones
9	Gravel with porous stones

PROFILE CALCULATIONS

	Ap potatoes	*Ap wheat*
Topsoil	328.6	328.6
Subsoil 1	0.0	148.9
Subsoil 1	148.9	0.0
Subsoil 2	2.7	0.0
Subsoil 2	0.0	7.7
Subsoil 3	0.0	0.0
TOTAL AP (mm)	48	49
MD (mm)	106	113
AP-MD (mm)	-58	-64

AGRICULTURAL LAND GRADE

Class	*Potatoes*	*Wheat*
1		
2		
3a		
3b		
4	*	*

SITE:	Sutton Cum Lound
Location:	30

Layer	*Lower depth* (cm)	*Texture symbol* (or stop)	*Structure* (Good, Moderate or Poor)	*% stones*	*Stone type* (see table)
Topsoil	7	lms	m	3	1
Subsoil 1	37	lms	m	3	1
Subsoil 2	120	stop	m	0	1
Subsoil 3	120	stop	m	0	1

(Lowest horizon depth must be 120 and topsoil cannot be greater than 70 cm (potatoes) or 50 cm (wheat))

DATA USED FROM MASTER TABLE

	Fine earth	*Stones*
Topsoil Av	13	1
Subsoil 1 TAv	9	1
Subsoil 1 EAv	6	0.5
Subsoil 2 TAv	0.1	1
Subsoil 2 EAv	0.1	0.5
Subsoil 3 TAv	0.1	1
Subsoil 3 EAv	0.1	0.5
	(ERR = no data)	

Stone codes	
0	No stones
1	Hard rocks or stones
2	Soft, medium or coarse grained sdst
3	Soft weathered ign or metamorph
4	Soft oolitic or dolomitic limestones
5	Soft fine-grained sandstone
6	Soft argillaceous or silty
7	Chalk
8	Gravel with non-porous stones
9	Gravel with porous stones

PROFILE CALCULATIONS

	Ap potatoes	*Ap wheat*
Topsoil	88.5	88.5
Subsoil 1	0.0	262.8
Subsoil 1	262.8	0.0
Subsoil 2	3.3	0.0
Subsoil 2	0.0	8.3
Subsoil 3	0.0	0.0
TOTAL AP (mm)	35	36
MD (mm)	106	113
AP-MD (mm)	-71	-77

AGRICULTURAL LAND GRADE

Class	*Potatoes*	*Wheat*
1		
2		
3a		
3b		
4	*	*

SITE:	Sutton Cum Lound
Location:	39

Layer	*Lower depth* (cm)	*Texture symbol* (or stop)	*Structure* (Good, Moderate or Poor)	*% stones*	*Stone type* (see table)
Topsoil	10	lms	m	3	1
Subsoil 1	15	lms	m	3	1
Subsoil 2	120	stop	m	0	1
Subsoil 3	120	stop	m	0	1

(Lowest horizon depth must be 120 and topsoil cannot be greater than 70 cm (potatoes) or 50 cm (wheat))

DATA USED FROM MASTER TABLE

	Fine earth	*Stones*
Topsoil Av	13	1
Subsoil 1 TAv	9	1
Subsoil 1 EAv	6	0.5
Subsoil 2 TAv	0.1	1
Subsoil 2 EAv	0.1	0.5
Subsoil 3 TAv	0.1	1
Subsoil 3 EAv	0.1	0.5
	(ERR = no data)	

Stone codes	
0	No stones
1	Hard rocks or stones
2	Soft, medium or coarse grained sdst
3	Soft weathered ign or metamorph
4	Soft oolitic or dolomitic limestones
5	Soft fine-grained sandstone
6	Soft argillaceous or silty
7	Chalk
8	Gravel with non-porous stones
9	Gravel with porous stones

PROFILE CALCULATIONS

	Ap potatoes	*Ap wheat*
Topsoil	126.4	126.4
Subsoil 1	0.0	43.8
Subsoil 1	43.8	0.0
Subsoil 2	5.5	0.0
Subsoil 2	0.0	10.5
Subsoil 3	0.0	0.0
TOTAL AP (mm)	18	18
MD (mm)	106	113
AP-MD (mm)	-88	-95

AGRICULTURAL LAND GRADE

Class	*Potatoes*	*Wheat*
1		
2		
3a		
3b		
4	*	*

Site Photographs

Pit 11 (see Map 1)

Pit 30

Pit 39