SOILS AND AGRICULTURAL QUALITY OF LAND AT BOURBLES FARM PREESALL

Report 2092/2

6th February, 2023

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SOILS AND AGRICULTURAL QUALITY

OF LAND AT BOURBLES FARM, PREESALL

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Report 2092/2
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6th February, 2023

SUMMARY

A soil resources and agricultural land quality survey has been undertaken of 22.1 ha of land at Bourbles Farm, Preesall in December 2022.

The land has a mixture of sandy and silty soils, variably affected by shallow groundwater. Land quality is mainly a mixture of grade 2 and subgrades 3a and 3b.

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 22.1 ha of land at Bourbles Farm, Preesall, Poulton-le-Fylde. The land is proposed for sand and gravel extraction. The report is based on a survey of the land in December 2022.

SITE ENVIRONMENT

1.2 The site investigated comprises three blocks of land (see Map 1 in an appendix to the report): the western block comprised horse paddocks, a small caravan park and hard standings adjoining Whinmore Fold Farm. The central block comprised two arable fields to the north and south of fishing ponds, an area of marshy grass to the south of the ponds and a commercial poultry production to their east. The eastern block comprised rough pasture and horse paddocks.

1.3 The western and central blocks are linked by a proposed access corridor crossing an area of recently-restored landfill.

1.4 The northern part of the site, between Bourbles Farm and Whinmoor Fold Farm forms a low ridge running east to west, at an approximate elevation of 6-7 m AOD. Land to the north, south and east of this ridge is low-lying reclaimed former tidal marshland, at an elevation of approximately 5 m AOD.

PUBLISHED INFORMATION

1.5 British Geological Survey 1:50,000 scale information records the solid geology of the land as Sherwood Sandstone Group. Drift cover is recorded across the whole site: the majority of the area recorded as Raised Storm Beach sand and gravel deposits. The lowest ground in the north and east is recorded as Tidal Flat Deposits of clay and silt.

1.6 The National Soil Map (published at 1:250,000 scale) records most of the land as Rockliffe Association: mainly deep silty and fine sandy soils affected by shallow groundwater formed in marine alluvium. Land in the south-west is recorded as Downholland 2 Association: mainly alluvial clays with peaty topsoil with shallow groundwater[1].

1.7 There is no published detailed Agricultural Land Classification survey of the site. Provisional data published at 1:250,000 scale by MAFF shows most of the land as grade 2, with a small area on the western margin as grade 3. However, this mapping was prepared to the original ALC guidelines (prior to the subdivision of grade 3) and using very limited field data. For these reasons Natural England guidance states that "*These maps are not at*

[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.

a scale suitable or accurate for assessment of individual fields or sites".[2] Therefore, the applicant has commissioned this survey to the current guidelines to be undertaken to inform their site layout and include with their planning application.

[2] Natural England, (2021). Guide to assessing development proposals on agricultural land - GOV.UK

2.0 Soils

2.1 A soils and agricultural quality survey was carried out in December 2022 in accordance with MAFF (1988) Agricultural Land Classification guidelines[3]. It was based on observations at intersects of a 100 m grid, giving a density of one observation per hectare. The location of some points were relocated from the sampling grid due to access restrictions, and some additional points were added to better determine soil boundaries. 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 The soils were found to vary in texture and drainage. The main soil types are shown by Map 2 in an appendix to this report and are described below.

SOILS DEVELOPED IN SAND AND GRAVEL DEPOSITS

2.3 These soils occur over much of the land, comprising slightly higher ground in the north and east of the site (see Map 1). They comprise loamy sand or sandy loam topsoil, over sand or gravel. In the north the soils are stony and freely-drained (elevated above the groundwater table). In the east they are stoneless and are located on undulating topography (possibly former dune systems) with freely-drained higher ground and groundwater affected hollows with rushes and reeds (see image below). In places these wetter sands have organic topsoils.

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

2.4 Example profiles are described from investigation pits at observation points 6 and 14 (see Map 1) in the appendix to this report.

SOILS DEVELOPED IN ALLUVIAL DEPOSITS

2.5 These soils occupy the lower ground in the south of the central block. They comprise coarse and medium silts affected by groundwater. The silts are relatively permeable but remain affected by shallow groundwater due to the absence of effective drainage.

2.6 An example profile is described from an investigation pit at observation point 8 (see Map 1) in the appendix to this report.

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[4]. The relevant site data for an average elevation of 5 m is given below.

• Average annual rainfall:	909 mm
• January-June accumulated temperature >0°C	1428 day°
• Field capacity period (when the soils are fully replete with water)	204 days mid Oct-early May
• Summer moisture deficits for:	wheat: 79 mm potatoes: 65 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[5]. There are no climatic limitations at this locality.

3.4 Large parts of the site are affected by shallow groundwater: in the absence of long-term records of water tables, interpretations of the limitations to agriculture presented by the resultant wetness are made from:

- Topography
- Water levels at the time of survey (early December)
- Historical aerial photographs
- Soil survey publications
- Information from the landowner

3.5 This approach is consistent with the Agricultural Land Classification Guidelines. However, in accordance with those guidelines, a level of uncertainty must be acknowledged.

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

RISK OF FLOODING

3.6 The higher ground in the north is not judged to be at significant risk of flooding. The remainder of the land is inefficiently ditch drained, but has coarse textured highly permeable soils, which means that flood duration is likely to be short (once ditch levels recede). Reports from the landowner indicate that winter flooding is a frequent occurrence when ditches surcharge in wet weather, but summer flooding is less common. It is judged that the land in the south-west is limited to subgrade 3a by frequent winter floods of short duration. Risk of flooding is not the most limiting factor for the rest of the land.

SURVEY RESULTS

3.7 The agricultural quality of the land is primarily determined by wetness/workability, droughtiness and adverse topsoil texture. Other factors have been assessed but do not affect the land grade. Land of grades 2, 3 and 4 has been identified.

Grade 2

3.8 This land comprises the higher ground with freely-draining soils formed in sand and gravel deposits. The high stone content and/or sand content of the subsoils means soil moisture retention is low. However, these soils are only slightly droughty under the moist local climate and yields are only likely to be affected in dry summers.

3.9 Much of this land also has loamy sand textured topsoil. These soils are susceptible to windblow under cultivation in dry conditions, as well as structural breakdown, both of which present slight limitations to agricultural use.

3.10 Some patches on the margins to groundwater-affected areas are likely to be subject to slight waterlogging (Soil Wetness Class II) which is likely to restrict winter access for cultivations.

Subgrade 3a

3.11 This land occurs in the south-west, and parts of the site on the transition from the freely-draining soils described above, to the groundwater-affected soils described below. They appear likely to be subject to prolonged periods of shallow groundwater in winter and judged to be imperfectly-draining (Soil Wetness Class III), although given their relatively light topsoils this is unlikely to prevent late spring (or autumn access) for cultivations.

3.12 Land in the south-west is equally limited by frequent winter flooding, which is likely to cause some crop damage and cause additional wetness limitations to winter access with harvest machinery.

Subgrade 3b

3.13 The land in the east is subject to undulating topography with variably shallow groundwater. While this limitation could potentially be removed by intensive drainage measures, current management status (in the absence of pumping) means significant areas are judged poorly-draining (Soil Wetness Class IV). Were the land to be used for arable production, this is likely to preclude winter and spring access with cultivation machinery and mainly limit agricultural use to autumn sowings. The variable nature of the land means that while significant areas have lesser drainage restrictions, all of the land is effectively limited by the wetter areas and this land is graded accordingly (a *micro-relief* limitation.

Grade 4

3.14 The former landfill area (proposed to be crossed by an access corridor) in the west has thin (*c*. 15 cm topsoil) directly over a clay cap. This land is not judged suitable for arable cultivation and is therefore limited to use as improved pasture.

Other land

3.15 This comprises fishing ponds in the centre of the site, a caravan park in the west and access tracks elsewhere.

Grade areas

3.16 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 2	4.7	21
Subgrade 3a	2.6	12
Subgrade 3b	11.6	52
Grade 4	0.1	<1
Other land	3.1	14
Total	22.1	100

4.0 Soil resources

4.1 There are four soil resource units, which are described below and shown on Map 3.

TOPSOIL

TS1 This resource comprises the loamy sand (occasionally sandy loam) topsoils which are found across much of the site. They are a high quality resource for use in restoration, although care is required to prevent wind blow losses when handling and stockpiling (see section 5.0).

The estimated maximum potential yield is **40,500 m^3.**

TS2 This resource comprises the silty topsoils in the south. This is a high quality resource and where excavated should be separated from TS1 and stockpiled separately for restoration.

It is not clear how much of this area would be disturbed, but the maximum estimated maximum potential yield is **17,000 m^3.**

SUBSOIL

SS1 This resource comprises the sandy subsoils of much of the site. These are a moderate quality resource for reuse, often stony and with low moisture retention capacity. Some of this material may constitute a mineral resource, and could effectively be replaced in restoration by suitable material (see Section 5.0).

It is not clear how much of this area would be disturbed, but the maximum estimated maximum potential yield is **121,800 m^3.**

SS2 This resource comprises the silty subsoils in the south. These are a high quality resource and where excavated should be separated from SS1 and stockpiled separately for restoration.

It is not clear how much of this area would be disturbed, but the maximum estimated maximum potential yield is **50,500 m^3.**

5.0 Soil use in restoration

5.1. If land is to be restored to agricultural use, subsoil resource SS2 (and resource SS1 if not treated as a mineral resource) should be emplaced to a minimum thickness of 300 mm. To restore land to equivalent quality, it would be necessary to restore land to existing levels with permeable inert fill (e.g. waste aggregate) in order to provide sufficient freeboard drainage. Levelling of the undulating land in the east could improve drainage and agricultural quality.

5.2. Topsoil resources TS1 and TS2 should be replaced to a minimum thickness of 300 mm.

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 (Sheets 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

Bourbles 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	0-60+	vslstMSL(dist)	<5							0	-	-	-
2	0-45	vslstMSL	<5	40-80	MS	xxx	80+	Stopped on stones		1	II	2	D/W
3	0-22	LMS	<5	22+	Gravel					1	-	2	S
4	0-15	slstSCL	5-10	15-45	C(r)dist	-				0	IV	4	S/De
5	0-45	vslstLMS	<5	45-90+	MS	xx				2	I	2	D
6	0-35	slstMSL	<5	35-120	mstLCS	x				1	I	2	D/S
7	0-26	HZCL(org)	0	26-37	HZCL	xxx	37-90+	HZCL	xxx	0	III/IV	3b/4	W
8	0-26	FSZL	0	26-110+	MSZL	xxx				0	III	3a	W
9	0-60+	FSZL(dist)	0							0	-	-	-
10	0-22	MZCL	0	22-38	MZCL(pan)	xxx	38-90+	MZCL		0	IV	3b	W
11	0-29	SCL	0	29-42	SCL	xxx	42-70 70+	MS(wet) waterlogged (stopped)		0	IV	3b	W
12	0-40	LMS(org)	0	40-90+	LMS(wet)	xxx				0	IV	3b	W
13	0-30	LMS	0	30-90+	LMS	xx				0	I/II	3b	T
14	0-29	LMS	0	29-70	MS	o	70-120	MS(wet)	o	2	III	3b	T
15	0-27	slstLMS	0	27-75	slstLCS	xx	75+	Stopped on stones		1	I/II	3b	T
16	0-30	LMS(org)	0	30-54	MS	o	54-90+	slstMS	o	1	I	3b	T
17	0-40	LMS(org)	0	40-90+	MS(wet)	o				1	IV	3b	W
18	0-26	LMS	0	26-100+	MS	o				2	I	3b	T
19	0-44	LMS(org)	0	44-100+	slstMS	xx				1	I/II	3b	T
20	0-30	slstLMS	0	30-100+	slstMS	o				1	I	3b	T
21	0-47	MCL/MZCL	0	47-60+	FSZL	xxx				0	II/III	3a	W/F
22	0-37	LMS	0	37-90+	MS	x				1	II	2	D/S

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
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
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. <u>50</u>) indicates
the top of a slowly permeable layer

A wavy underline (e.g. <u>50</u> 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 6 (see Map 1)

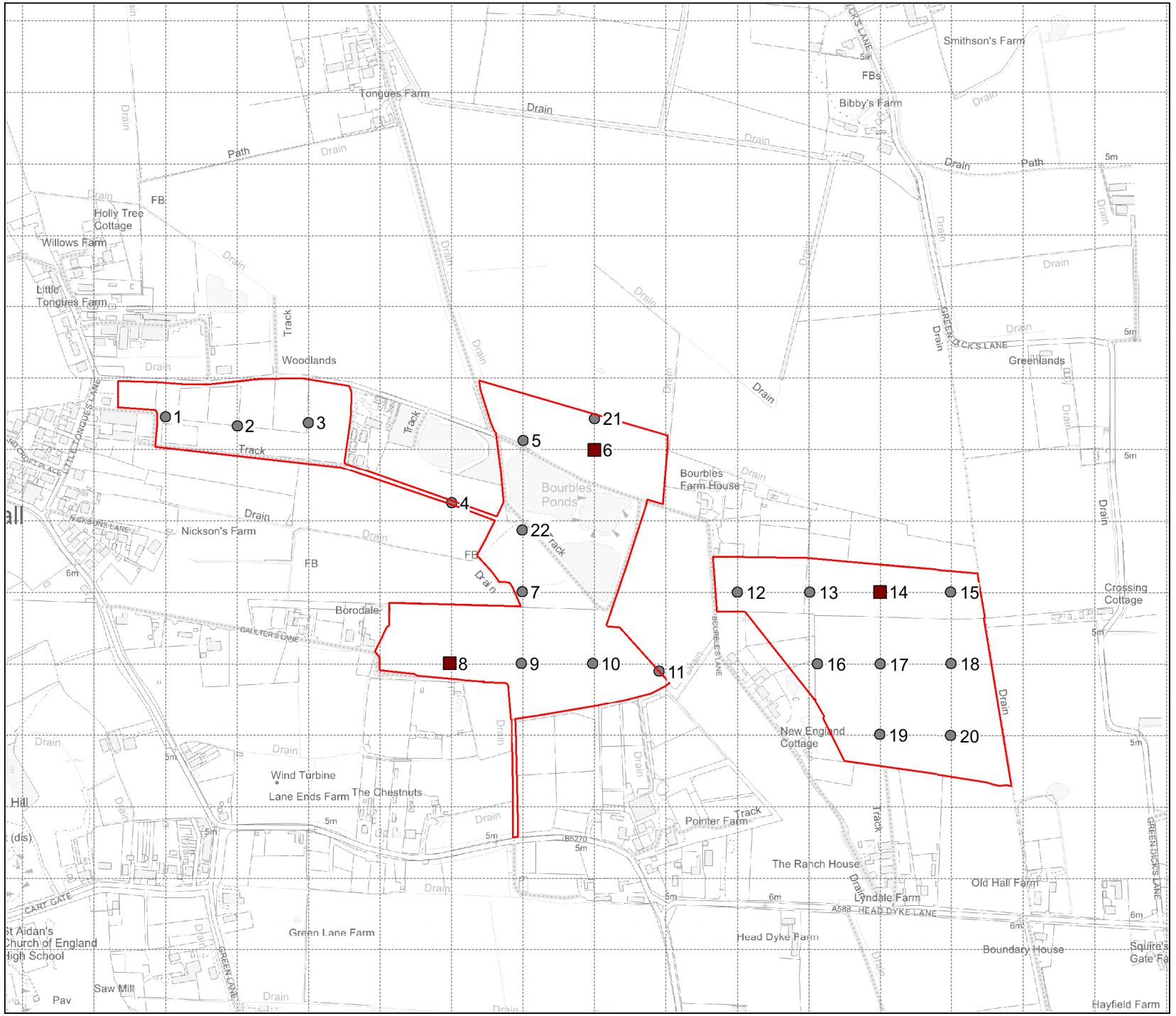
0-35 cm	Very dark greyish brown (10YR 3/2) medium sandy loam; 10% small sub-mixed pebbles (<5% >20 mm); moderately developed fine sub-angular blocky structure; friable; smooth diffuse boundary to:
35-120 cm	Pale brown (10YR 6/3) loamy coarse sand; 30% small and medium hard pebbles; weakly developed fine sub-angular blocky structure to structureless (singe grain); very friable to loose.

Pit 8 (see Map 1)

0-26 cm	Very dark greyish brown (10YR 3/2) fine sandy silt loam; stoneless; moderately developed medium sub-angular blocky structure; friable; smooth clear boundary to:
26-58 cm	Light grey (10YR 7/1) medium sandy silt loam with 5-10% distinct fine strong brown (7.5YR 5/6) mottles; stoneless; weakly developed medium sub-angular blocky structure; friable; smooth diffuse boundary to:
58-110 cm+	Light grey (10YR 7/1) medium sandy silt loam with 5-10% distinct fine strong brown (7.5YR 5/6) mottles; stoneless; weakly developed medium platy structure/bedding planes; friable.

Pit 14 (see Map 1)

0-29 cm	Very dark greyish brown (10YR 3/2) loamy medium sand; stoneless; weakly developed fine sub-angular blocky structure; very friable; smooth clear boundary to:
29-120 cm	Light greyish brown (10YR 6/2) medium sand; stoneless; structureless (single grain); loose; saturated below 70 cm.



KEY

- Auger observations
- Pits
- Site boundary

Site:

Bourbles Farm

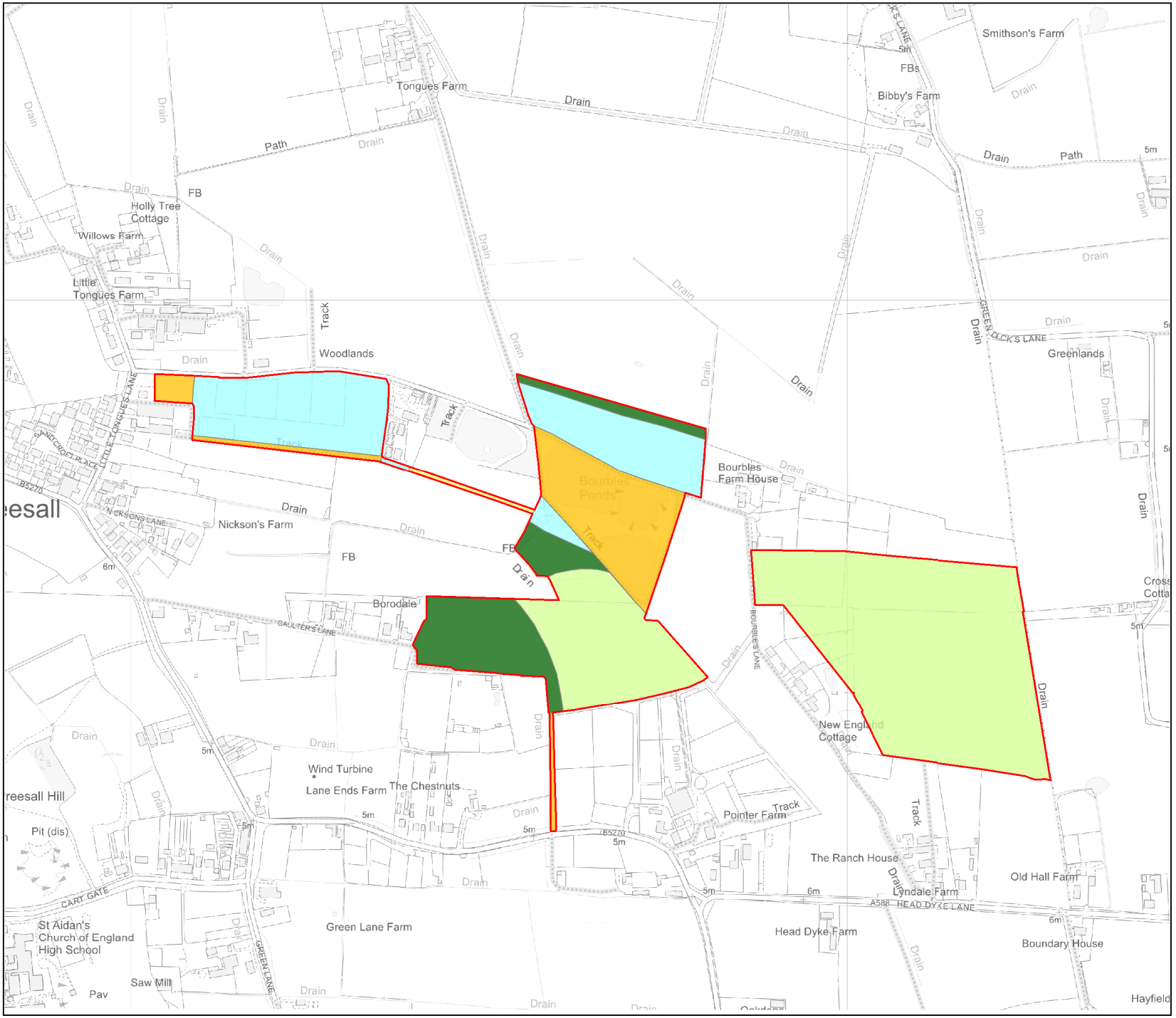
Map title:

MAP 1
Observations

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

Date: 06/02/2023

Scale: 1:7,500



KEY

- Grade 2
- Subgrade 3a
- Subgrade 3b
- Grade 4
- Other land
- Site boundary

Site:

Bourbles Farm

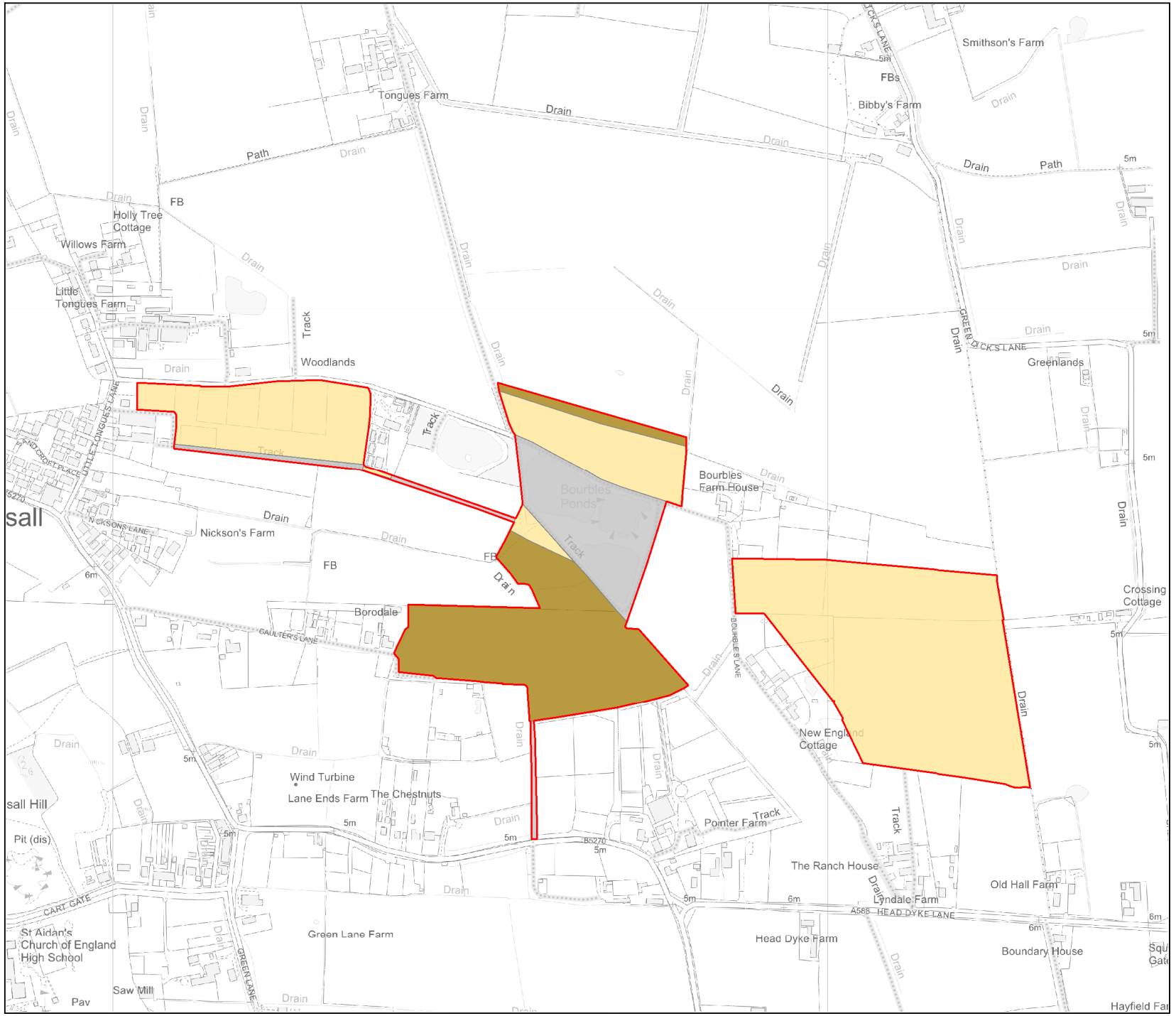
Map title:

MAP 2
Agricultural Land Classification

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

Date: 06/02/2023

Scale: 1:7,500



KEY

- Sandy soils TS1/SS1
- Silty soils TS2/SS2
- No reuseable resource
- Site boundary

Site:

Bourbles Farm

Map title:

MAP 3
Soil resource types

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

Date: 06/02/2023

Scale: 1:7,500

SITE:	Bourbles
Location:	6

Layer	*Lower depth* (cm)	*Texture symbol* (or stop)	*Structure* (Good, Moderate or Poor)	*% stones*	*Stone type* (see table)
Topsoil	35	msl	m	10	1
Subsoil 1	120	lcs	m	30	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	8	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	539.0	539.0
Subsoil 1	206.5	393.0
Subsoil 1	0.0	0.0
Subsoil 2	0.0	0.0
Subsoil 2	0.0	0.0
Subsoil 3	0.0	0.0
TOTAL AP (mm)	75	93
MD (mm)	65	79
AP-MD (mm)	10	14

AGRICULTURAL LAND GRADE

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

SITE: Bourbles
Location: 8

Layer	*Lower depth* (cm)	*Texture symbol* (or stop)	*Structure* (Good, Moderate or Poor)	*% stones*	*Stone type* (see table)
Topsoil	30	fszl	g	0	1
Subsoil 1	58	mszl	m	0	1
Subsoil 2	120	mszl	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	22	1
Subsoil 1 TAv	19	1
Subsoil 1 EAv	13	0.5
Subsoil 2 TAv	17	1
Subsoil 2 EAv	11	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	660.0	660.0
Subsoil 1	0.0	0.0
Subsoil 1	532.0	484.0
Subsoil 2	204.0	0.0
Subsoil 2	0.0	682.0
Subsoil 3	0.0	0.0
TOTAL AP (mm)	140	183
MD (mm)	65	79
AP-MD (mm)	75	104

AGRICULTURAL LAND GRADE

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

SITE: Bourbles
Location: 14

Layer	*Lower depth* (cm)	*Texture symbol* (or stop)	*Structure* (Good, Moderate or Poor)	*% stones*	*Stone type* (see table)
Topsoil	30	lms		0	1
Subsoil 1	120	lms	m	0	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	390.0	390.0
Subsoil 1	360.0	600.0
Subsoil 1	0.0	0.0
Subsoil 2	0.0	0.0
Subsoil 2	0.0	0.0
Subsoil 3	0.0	0.0
TOTAL AP (mm)	75	99
MD (mm)	65	79
AP-MD (mm)	10	20

AGRICULTURAL LAND GRADE

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