BSR Energy




Agricultural Land Classification

Land near South Fambridge

September 2020

ADAS

ADAS GENERAL NOTES

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EXECUTIVE SUMMARY

ADAS have been instructed by BSR Energy to undertake an agricultural land classification survey of 63.5 ha of land near South Fambridge in Essex.

The survey has identified slowly permeable clayey soils, with some slowly permeable fine loamy over clayey soils. The soils are imperfectly draining and belong to soil wetness class III. The soils have heavy-textured topsoil. The principal limitation to the agricultural use of such land is soil wetness. The survey has identified land of subgrade 3b quality throughout.

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1 INTRODUCTION

ADAS have been instructed by BSR Energy to undertake an agricultural land classification survey. This report provides information on the soils and agricultural quality of 63.5 ha of land near South Fambridge in Essex. The report is based on a survey of the land undertaken in August 2020.

1.1 Site Environment

The land surveyed is located to the south east of South Fambridge. The land surveyed spans three agricultural fields and a very small extent of a fourth agricultural field. The land is bordered to the north, south, east and west by adjoining agricultural land. An existing solar development is located immediately to the south east of the survey area. A residential property and a number of farm buildings and associated hard standing is located immediately to the west of the survey area. The survey area is bound by drainage ditches which drain the land into the River Crouch, which is located c. 0.5 km to the north. The land slopes towards these drainage ditches and is gently (2-3°) sloping with an average elevation of approximately 5 m AOD.

1.2 Agricultural Use

At the time of survey the land was in arable rotation with spring barley being close to harvest.

1.3 Published Information

1.3.1 Geology

1:50,000 scale BGS information[1] records the basal geology of the site as London Clay. In lower lying areas, closest to drainage ditches, the Clay is shown to be overlain by tidal flat deposits, comprised of clay and silt. A limited extent of drift deposits, comprised of clay, silt, sand and gravel, is shown to overly the Clay in the north.

1.3.2 Soils

The national soil map, published at 1:250,000 scale, records the land of the survey area as belonging to the Wallasea 1 and Windsor 1 soil associations. The Wallasea 1 association is described as being comprised of deep stoneless non-calcareous and calcareous clayey soils, locally with organic rich surface horizons, formed in marine alluvium and with groundwater controlled by diches and pumps. This association is mapped on the site's lower lying land. The Windsor 1 association is described as being comprised of slowly permeable seasonally waterlogged clayey soils formed in Tertiary clay, with some fine loamy over clayey, fine silty over clayey and clayey soils with only slight seasonal waterlogging[2].

[1] British Geological Survey, 2019. *Geology of Britain viewer*. Online resource: http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html

[2] Hodge, C.A.H. et al., 1984. *Soils and their use in Eastern England*. Soil Survey of England and Wales; Harpenden.

1.3.3 Previous Agricultural Land Classification

No detailed post-1988 agricultural land classification is publically available for this site. However, the provisional ALC map, published at 1:250,000 scale prior to the revision and subdivision of grade 3 in 1988, records the land as principally being of grade 3 quality[3].

1.3.4 Flood risk

The land is considered by the Environment Agency to be at low risk of flooding by rivers and seas. The land is considered by the Environment Agency to be at very low risk of flooding by surface water. A 'low risk' of flooding is defined by the Environment Agency as there being each year '*a chance of flooding of between 0.1% and 1%*'[4]. The information published by the Environment Agency indicates that flood risk offers no significant limitation to agricultural use of the land or to ALC grade.

[3] Defra, 2020. *Interactive map of Great Britain*. Online resource: https://magic.defra.gov.uk/MagicMap.aspx

[4] Environment Agency, 2020. *Long term flood risk*. Online resource: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

2 METHODOLOGY

A detailed soil survey was carried out in August 2020. The survey was based on observations at intersects of a 100 m grid, giving a sampling density of at least one observation per hectare. During the survey soils were examined via a combination of auger borings (63) and soil description pits (2) to a maximum depth of 1.2 m.

A log of the details of each observation point is attached to this report as Appendix 1. A map showing the location of each observation point is attached to this report as Appendix 2 (Map 1).

Soil samples were taken representative of the top 25 cm of the soil profile and these were submitted to NRM for laboratory particle size distribution (PSD) analysis. Full details of the analysis is included in Appendix 5.

3 SOILS

3.1 Soil Types

There are two principal soil types at this site. On low lying land, often close to drainage ditches, greyish slowly permeable clayey soils are dominant. On slightly raised land brownish slowly permeable clayey soils are dominant, with some brownish slowly permeable fine loamy over clayey soils. The distribution of each soil type is shown in Map 2, attached to this report as Appendix 3, and descriptions are given below.

3.1.1 Slowly permeable greyish clayey soils

These soils typically have a very dark greyish brown clay topsoil over a poorly structured, slowly permeable, mottled, greyish clay subsoil. The soils are gleyed[5] within 40 cm depth and are slowly permeable immediately beneath the topsoil. The soils are stoneless and non-calcareous.

An example soil profile is described below from the pit at observation 15 (see Map 1).

0-18 cm	Very dark greyish brown (10YR 3/2) clay; stoneless; strongly developed very fine subangular blocky structure above 3 cm, moderately developed coarse subangular blocky structure below 3 cm; extremely firm; common fine fibrous roots; <0.5% macropores; non-calcareous; smooth clear boundary to:
18-32 cm	Grey (2.5Y 5/1 + 5/2) clay with common fine yellowish brown (10YR 5/6) mottles; stoneless; weakly developed very coarse subangular blocky structure; extremely firm; a few fine fibrous roots; <0.5% macropores; non-calcareous; smooth clear boundary to:
32-70+ cm	Dark greenish grey (5GY 4/1) clay with common fine yellowish red (5YR 4/6) and many medium strong brown (7.5YR 4/6) mottles; stoneless; moderately developed coarse angular blocky structure; extremely firm; a few fine fibrous roots; <0.5% macropores; non-calcareous.

These soils are imperfectly draining and belong to soil wetness class III. They have a moderate capacity to absorb excess winter rainfall.

3.1.2 Slowly permeable brownish clayey soils

These soils typically have a heavy clay loam or clay topsoil overlying a poorly structured, slowly permeable, mottled, olive brown or brown clay subsoil. These profiles are gleyed within 40 cm depth and are slowly permeable immediately beneath the topsoil. Where thin loamy drift overlies the London Clay some profiles have a heavy clay loam topsoil and upper subsoil overlying a poorly structured, slowly permeable, mottled, olive brown or brown clay lower subsoil. These profiles are gleyed within 40 cm depth and are slowly permeable within 55 cm depth. The soils are very slightly stony or stoneless. The soils are non-calcareous.

An example soil profile is described below from the pit at observation 26 (see Map 1).

0-20 cm	Dark olive brown (2.5Y 3/3) clay; very slightly stony (0-5%) with a few medium hard stones; strongly developed very fine subangular blocky structure above 3 cm, weakly developed very coarse angular blocky structure below 3 cm; extremely firm;

[5] Gleying is a greyish, pale and ochreous colouring of the soil caused by periodic or permanent waterlogging.

common fine fibrous roots; <0.5% macropores; non-calcareous; wavy clear boundary to:

20-40 cm — Light olive brown (2.5Y 5/3) clay with greyish brown (2.5Y 5/2) ped faces and many fine yellowish brown (10YR 5/6) mottles; stoneless; weakly developed coarse prismatic structure; very firm; a few fine fibrous roots; <0.5% macropores; non-calcareous; smooth gradual boundary to:

40-60 cm — Greyish brown (2.5Y 5/2) clay with common very fine yellowish brown (10YR 5/6) mottles; stoneless; moderately developed coarse angular blocky structure; very firm; a few fine fibrous roots; <0.5% macropores; non-calcareous; smooth clear boundary to:

60-100+ cm — Brown (7.5YR 5/3 + 5/2) clay with a few fine yellowish brown (10R 5/8) mottles, becoming brown (7.5YR 5/2) clay with common fine strong brown (7.5YR 5/6) mottles below 80 cm; stoneless; very firm; no roots; non-calcareous.

These soils are imperfectly draining and belong to soil wetness class III. They have a moderate capacity to absorb excess winter rainfall.

3.2 Laboratory Analysis

Samples representative of the top 25 cm of the soil profile were taken from observations at points 12, 15, 26 and 58. These were submitted to NRM Laboratories for particle size distribution analysis. The textures were confirmed as heavy clay loam, clay, clay and heavy silty clay loam respectively.

4 AGRICULTURAL LAND CLASSIFICATION

The Agricultural Land Classification (ALC) system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use for food production. The limitations can operate in one or more of four principal ways; they may affect the range of crops which can be grown, the level of crop yield, the consistency of crop yield, and the cost of obtaining a crop.

The classification system gives considerable weight to flexibility of cropping, whether actual or potential, however the ability of some land to produce consistently high yields of a narrower range of crops is also taken into account.

The 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 by the then Ministry of Agriculture, Fisheries and Food (MAFF) in the 1960s and revised in 1988. A description of the grades used in the ALC system is attached to this report as Appendix 5.

4.1 Climate

The agricultural climate is an important factor in assessing the agricultural quality of land, and the agricultural climate of this site has been calculated using the Climatological Data for Agricultural Land Classification[6]. The relevant site data for an average elevation of 5 m AOD is given below.

Table 4.1 Agro-climatic variables

Average Annual Rainfall (AAR)	564 mm
January-June Accumulated Temperature (AT0)	1481 day °C
Field Capacity Days (FCD)	101
Field Capacity Period	mid Dec-late March
Moisture Deficit Wheat (MDW)	126 mm
Moisture Deficit Potatoes (MWP)	124 mm
Climate (upper grade limit)	1

The site is located in Eastern England and there is no agro-climatic limitation to agriculture.

4.2 Results

The results of the soil survey described in section 3 were used in conjunction with the agro-climatic data above to classify the land according to the revised guidelines for Agricultural

[6] Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

Land Classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food (now Defra)[7].

This report has identified agricultural land of subgrade 3b quality. The principal limitation to agricultural use is soil wetness.

Grade 1

No land of this quality has been mapped.

Grade 2

No land of this quality has been mapped.

Subgrade 3a

No land of this quality has been mapped.

Subgrade 3b

This land grade is mapped over the entire site; 63.5 ha. This land is formed on slowly permeable clayey soils, with some slowly permeable fine loamy over clayey soils, such as those described in sections 3.1.1 and 3.1.2. These soils are poorly draining and belong to wetness class III. These soils have heavy-textured topsoil and the principal limitation to the agricultural use of such land is soil wetness.

On such land there are moderate limitations to the flexibility of cultivations and harvest. Safe access for cultivation is restricted to late spring or autumn in most years. Such land is best suited to cereals and oilseeds, for which moderate average yields can be achieved, or grass.

Grade 4

No land of this quality has been mapped.

Grade 5

No land of this quality has been mapped.

Non-agricultural

No land of this quality has been mapped.

Urban

No land of this quality has been mapped.

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

4.3 Summary of grade areas

The boundaries between the different grades of land are shown on Map 3, attached to this report as Appendix 4. The area occupied by each grade is shown below.

Table 4.2 Grade Areas

Grade / subgrade	Area (ha)	Area (%)
Grade 1	-	-
Grade 2	-	-
Subgrade 3a	-	-
Subgrade 3b	63.5	100
Grade 4	-	-
Grade 5	-	-
Non-agricultural	-	-
Urban	-	-
Total	**63.5**	**100**

5 CONCLUSION

ADAS have been instructed by BSR Energy to undertake an agricultural land classification survey of 63.5 ha of land near South Fambridge in Essex.

The survey has identified slowly permeable clayey soils, with some slowly permeable fine loamy over clayey soils. The soils are imperfectly draining and belong to soil wetness class III. The soils have heavy-textured topsoil. The principal limitation to the agricultural use of such land is soil wetness. The survey has identified land of subgrade 3b quality only.

Appendix 1: South Fambridge ALC - Survey Notes

Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
1	0 - 28 28 - 50 50 - 90	V Dk Gr Br Pl Br + Li Br Gr Gr Br + Br	HCL HCL C	- xxx xxx	- no yes		1 1 0				2	III	3b	3a	3b	WE
2	0 - 26 26 - 40 40 - 60 60 - 90	V Dk Gr Br Li Br Gr Gr Gr Br	HCL HCL C C	- xxx xxxx xxx	- no yes yes		1 1 1 0				1	III	3b	3a	3b	WE
3	0 - 23 23 - 90	Dk Gr Br Pl Br + Li Br Gr	HCL C	- xxx	- yes		2 5			FMCs	1	III	3b	3a	3b	WE
4	0 - 24 24 - 50 50 - 90	V Dk Gr Br Gr + Gr Br Dk Gr	C C C	- xxx xxxx	- yes yes		0 0 0				0	III	3b	3a	3b	WE
5	0 - 30 30 - 53 53 - 90	V Dk Gr Br Dk Gr Gr + Yl Rd	C C ZC	- xxxx xxxx	- yes yes		0 0 0				0	III	3b	3a	3b	WE
6	0 - 25 25 - 40 40 - 90	Dk Gr Br Br + Br Br	HCL C C	- xxx xxx	- borderline yes		1 1 0			FMCs FMCs	1	III	3b	3a	3b	WE
7	0 - 25 25 - 40 40 - 90	V Dk Gr Br Pl Br Br	HCL C C	- xxx xxx	- yes yes		1 1 0			FMCs	1	III	3b	3a	3b	WE

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Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
8	0 - 19 19 - 90	V Dk Gr Br Br + Gr Br	HCL C	- xxx	- yes		1 1				1	III	3b	3a	3b	WE
9	0 - 18 18 - 35 35 - 80 80 - 100	V Dk Gr Br Dk Gr Gr Li Gr	C C C MZCL	- xxxx xxxx xxx	- yes yes no		0 0 0 0				1	III	3b	3a	3b	WE
10	0 - 20 20 - 45 45 - 90	V Dk Gr Br Dk Gr + Pl Br Dk Gr	C C C	- xxx xxxx	- yes yes		0 0 0				0	III	3b	3a	3b	WE
11	0 - 26 26 - 120	V Dk Gr Br Gr	C C	- xxxx	- yes		0 0				1	III	3b	3a	3b	WE
12	0 - 25 25 - 45 45 - 90	Dk Gr Br Li Br Gr Br	HCL HCL-C C	- xxx xxx	- borderline yes		1 1 0				0	III	3b	3a	3b	WE
13	0 - 30 30 - 60 60 - 120	V Dk Gr Br Br Li Br Gr	HCL C C	- xxx xxx	- yes yes		1 3 3				1	III	3b	3a	3b	WE
14	0 - 28 28 - 80	V Dk Gr Br Pl Br	HCL C	- xxx	- yes		1 1			FMCs. Stopped too firm.	1	III	3b	3a	3b	WE

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Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
15	0 - 18	V Dk Gr Br	C	-	-		0				<1	III	3b	3a	3b	WE
	18 - 32	Gr + Gr Br	C	xxxx	yes		0									
	32 - 70+	Dk Gr + Gr	C	xxxx	yes		0									
16	0 - 23	V Dk Gr Br	C	-	-		0				1	III	3b	3a	3b	WE
	23 - 40	Br + Gr	C	xxx	yes		0									
	40 - 85	Gr	C	xxxx	yes		0									
	85 - 120	Br + Gr	C	xxx	yes		0									
17	0 - 20	V Dk Gr Br	C	-	-		0				1	III	3b	3a	3b	WE
	20 - 45	Pl Br	C	xxx	yes		0									
	45 - 90	Br	C	xxx	yes		0									
18	0 - 19	V Dk Gr Br	C	-	-		0				1	III	3b	3a	3b	WE
	19 - 55	Br + Gr Br	C	xxx	yes		0									
	55 - 90	Br	C	xx	yes		0									
19	0 - 20	V Dk Gr Br	ZC	-	-		0				1	III	3b	3a	3b	WE
	20 - 45	Gr	C	xxxx	yes		0									
	45 - 90	Gr	C	xxxx	yes		0									
20	0 - 20	V Dk Gr Br	C	-	-		0				1	III	3b	3a	3b	WE
	20 - 45	Li Ol Br + Gr	C	xxx	yes		0									
	45 - 90	Li Ol Br	C	xxx	yes		0									
21	0 - 26	V Dk Gr Br	HCL	-	-		3				1	III	3b	3a	3b	WE
	26 - 42	Gr + Pi Gr	HCL	xxx	no		3									

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Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
	42 - 54 54 - 90	Pl Br Li Yl Br	HCL-C C	xxx xxx	borderline yes	 sl ca	3 1									
22	0 - 24 24 - 65 65 - 120	V Dk Gr Br Br Br	HCL-C C C	- xxx xxx	- yes yes		1 0 0				1	III	3b	3a	3b	WE
23	0 - 23 23 - 40 40 - 100	V Dk Gr Br Li Br Gr + Pl Br Br	C C C	- xxx xxx	- yes yes		1 1 0				1	III	3b	3a	3b	WE
24	0 - 18 18 - 50	Dk Ol Br Li Ol Br	HCL C	- xxx	- yes		5 8			Stopped on stones	1	III	3b	3b	3b	WE
25	0 - 20 20 - 65 65 - 90	Dk Ol Br Li Ol Br Gr Br	HCL C C	- xxx xx	- yes yes		0 0 0				1	III	3b	3a	3b	WE
26	0 - 20 20 - 40 40 - 60 60 - 100+	Dk Ol Br Li Ol Br + Gr Br Gr Br Br	C C C C	- xxx xxx xx	- yes yes yes		3 0 0 0				1	III	3b	3a	3b	WE
27	0 - 23 23 - 40 40 - 90	V Dk Gr Br Br Rd Br	HCL-C C C	- xxx xxx	- yes yes		0 0 0				1	III	3b	3a	3b	WE
28	0 - 23	V Dk Gr Br	C	-	-		0				1	III	3b	3a	3b	WE

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Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
	23 - 90	Li Ol Br + Gr Br	C	xxx	yes		0									
29	0 - 28 28 - 70	V Dk Gr Br Br	C C	- x	- no		0 0				3	I	3a	2	3a	WE
30	0 - 25 25 - 42 42 - 70	V Dk Gr Br + Dk Ol Br Pl Br + Gr Br Br	HCL HCL C	- xxx xxx	- borderline yes		1 1 0				1	III	3b	3a	3b	WE
31	0 - 22 22 - 70	V Dk Gr Br Br + Gr Br	HCL C	- xxx	- yes		1 0			FMCs. Stopped too firm.	2	III	3b	3a	3b	WE
32	0 - 24 24 - 60 60 - 90	V Dk Gr Br Li Ol Br Rd Br	HCL C C	- xxx xx	- yes yes		3 0 0				4	III	3b	3a	3b	WE
33	0 - 20 20 - 40	Dk Gr Br Pl Br	HCL HCL	- xxx	- no		5 10			Stopped on stones	0	III	3b	3a	3b	WE
34	0 - 27 27 - 80	Dk Ol Br Gr Br + Li Ol Br	HCL C	- xxx	- yes		2 2				1	III	3b	3a	3b	WE

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Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
35	0 - 27 27 - 50 50 - 90	V Dk Gr Br Br Br	C C C	- xxx xx	- yes yes		2 2 0				1	III	3b	3a	3b	WE
36	0 - 21 21 - 44 44 - 90	Dk Ol Br Li Ol Br + Gr Br Gr Br	C C C	- xxx xx	- yes yes		1 0 0				1	III	3b	3a	3b	WE
37	0 - 24 24 - 55 55 - 90	V Dk Gr Br Gr Br Li Ol Br	C C C	- xxx xxx	- yes yes		0 0 0				1	III	3b	3a	3b	WE
38	0 - 25 25 - 37 37 - 70	V Dk Gr Br Gr Br + Pl Br Li Ol Br	HCL HCL-C C	- xxx xxx	- no yes		1 0 0				1	III	3b	3a	3b	WE
39	0 - 20 20 - 70	V Dk Gr Br Gr + Li Ol Br	HCL C	- xxx	- yes		0 0				1	III	3b	3a	3b	WE
40	0 - 20 20 - 60	V Dk Gr Br Li Ol Br	C C	- xxx	- yes		0 0			Stopped too firm	1	III	3b	3a	3b	WE
41	0 - 24 24 - 65 65 - 90	V Dk Gr Gr Br + Dk Gr Gr	C C C	- xxxx xxxx	- yes yes		0 0 0				4	III	3b	3a	3b	WE

Appendix 1: South Fambridge ALC - Survey Notes

Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
42	0 - 18 18 - 80 80 - 90	V Dk Gr Br Br Br	HCL C C	- xxx xx	- yes yes		2 0 0				2	III	3b	3a	3b	WE
43	0 - 20 20 - 70 70 - 90	Dk Ol Br Li Ol Br Br	HCL C C	- xxx xx	- yes yes		2 0 0				0	III	3b	3a	3b	WE
44	0 - 21 21 - 90	Dk Br Br + Gr Br	HCL-C C	- xxx	- yes		0 0				1	III	3b	3a	3b	WE
45	0 - 15 15 - 35 35 - 90	V Dk Gr Br Br Br	C C C	- xxx xx	- yes yes		0 0 0				2	III	3b	3a	3b	WE
46	0 - 30 30 - 70 70 - 120	V Dk Gr Br Dk Gr Gn Gr	C C C	- xxxx xxxx	- yes yes		0 0 0				1	III	3b	3a	3b	WE
47	0 - 24 24 - 46 46 - 90	V Dk Gr Br Gn Gr Gr + Gr Br	HCL-C C C	- xxxx xxxx	- yes yes		0 0 0				0	III	3b	3a	3b	WE
48	0 - 30 30 - 70	Dk Ol Br Gr Br	HCL C	- xxx	- yes		0 0				1	III	3b	3a	3b	WE

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Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
49	0 - 24 24 - 80	Dk Br Br	HCL C	- xxx	- yes		1 0				0	III	3b	3a	3b	WE
50	0 - 26 26 - 60	V Dk Gr Br Dk Gr + Li Ol Br	C C	- xxx	- yes		0 0			Stopped too firm	1	III	3b	3a	3b	WE
51	0 - 32 32 - 60 60 - 90	Bk Gr Br Dk Gr	C C C	- xxx xxxx	- yes yes		0 0 0				2	III	3b	3a	3b	WE
52	0 - 20 20 - 90	V Dk Gr Br Li Ol Br + Br	HCL-C C	- xxx	- yes		0 0				3	III	3b	3a	3b	WE
53	0 - 20 20 - 90	V Dk Gr Br Br	C C	- x	- no		0 0				3	I	3a	2	3a	WE
54	0 - 20 20 - 70 70 - 90	V Dk Gr Br Ol Gr Dk Gr	C C C	- xxx xxxx	- yes yes		0 0 0				2	III	3b	3a	3b	WE
55	0 - 20 20 - 50	V Dk Gr Br Dk Gn Gr	C C	- xxxx	- yes		0 0				0	III	3b	3a	3b	WE

Appendix 1: South Fambridge ALC - Survey Notes

Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
	50 - 90	Gr + Gr Br	C	xxxx	yes		0									
56	0 - 20	V Dk Gr Br	C	-	-		0				0	III	3b	3a	3b	WE
	20 - 45	Gr Br	C	xxx	yes		0									
	45 - 55	Gr	C	xxxx	yes		0									
	55 - 75	Gr + Gr Br	C	xxx	yes		0									
57	0 - 25	V Dk Gr Br	HCL-C	-	-		1				1	III	3b	3a	3b	WE
	25 - 48	Gr Br	C	xxx	yes		0									
	48 - 70	Gr Br + Br	C	xx	yes		0									
	70 - 90	Br	C	x	yes	sl ca	5									
58	0 - 20	Dk Ol Br	HZCL	-	-		1				0	III	3b	3a	3b	WE
	20 - 40	Pl Br	C	xxx	borderline		1									
	40 - 80	Gr Br	C	xxx	yes		0									
59	0 - 19	V Dk Gr Br	HCL-C	-	-		0				1	III	3b	3a	3b	WE
	19 - 44	Pl Br	C	xxx	borderline		0									
	44 - 80	Br + Gr Br	C	xx	yes		0									
60	0 - 25	V Dk Gr Br	C	-	-		0				2	III	3b	3a	3b	WE
	25 - 90	Dk Gr	C	xxxx	yes		0									
61	0 - 30	V Dk Gr Br	C	-	-		0				1	III	3b	3a	3b	WE
	30 - 90	Gr + Li Ol Gr	C	xxx	yes		0									
62	0 - 20	Dk Ol Br	C	-	-		0				0	III	3b	3a	3b	WE

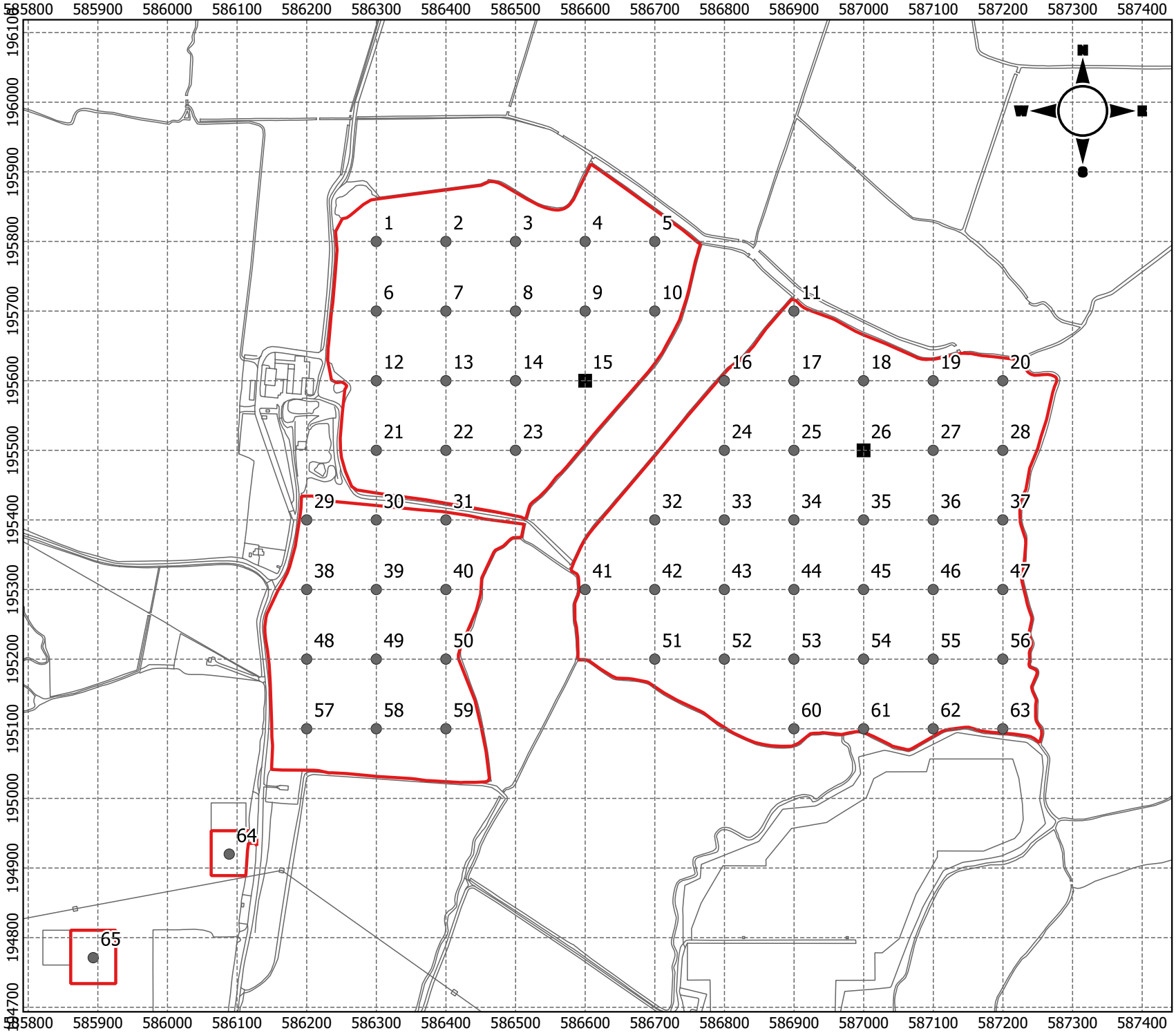
Appendix 1: South Fambridge ALC - Survey Notes

Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
	20 - 55 55 - 90	Dk Gr + Dk Gr Br Gn Gr	C C	xxx xxxx	yes yes		0 0									
63	0 - 32 32 - 60 60 - 90	V Dk Gr Br Dk Gr Br Gr	C C C	- xxx xxxx	- yes yes		0 3 0				0	III	3b	3a	3b	WE
64	0 - 20 20 - 65 65 - 90	Dk Br Br Br	C C C	- x xxx	- no yes	 sl ca ca	2 3 3				0	II	3a	3a	3a	WE, DR
65	0 - 28 28 - 53 53 - 90	V Dk Gr Br Pl Br + Li Br Gr Gr Br	HCL C C	- xxx xx	- yes yes		0 0 0				1	III	3b	3a	3b	WE

Key to Survey Notes:

Colour	Texture	Mottle intensity	Notes
Bk - black **Br** - brown **Bu** - blue **Dk** - dark **Du** - dusky **Gn** - green **Gr** - grey **Li** - light **Ol** - olive **Pi** - pink **Pl** - pale **Rd** - red **St** - strong **V** - very **Wk** - weak **Yl** - yellow	**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) **ZL** - silt loam **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) **Org** - organic (S-sand, L-loam, C-clay) **Pty** - peaty (S-sand, L-loam) **Pt** - peat (S-sandy, L-loamy, H-humified, SF-semi-fibrous, F-fibrous) **R** - bedrock	**o** – unmottled; **x** – a few ochreous mottles; **xx** – common to many ochreous mottles with greyish or pale colours NOT dominant in matrix or ped faces or dull soils with a few ochreous mottles; **xxx** – greyish or pale colours dominant in matrix or ped faces and common to very many ochreous mottles (**gleyed horizon**); **xxxx** – dominantly grey, often with some ochreous mottles (**gleyed horizon**).	**v sl ca** - very slightly calcareous **sl ca** - slightly calcareous **ca** - calcareous **v ca** - very calcareous **FMCs** – ferrimanganiferous concentrations

Principal Limitation(s) to Agriculture				
CL - climate	**DR** - droughtiness	**FL** - flooding	**MR** - microrelief	**TX** - texture
DE - depth	**ER** - erosion	**GR** - gradient	**ST** - stoniness	**WE** - wetness



Title

Appendix 2: Map 1
Location of Observations

Project

South Fambridge Solar

Client

BSR Energy

Key

- OS MM
- Survey Area
- Soil auger
- Soil description pit

Date: 09 / 09 / 2020

Scale: 1 : 7,500 at A4

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Appendix 3: Map 2
Soil Types

Project

South Fambridge Solar

Client

BSR Energy

Key

- OS MM
- Survey Area
- Brownish clayey soils
- Greyish clayey soils

Date: 09 / 09 / 2020

Scale: 1 : 7,500 at A4

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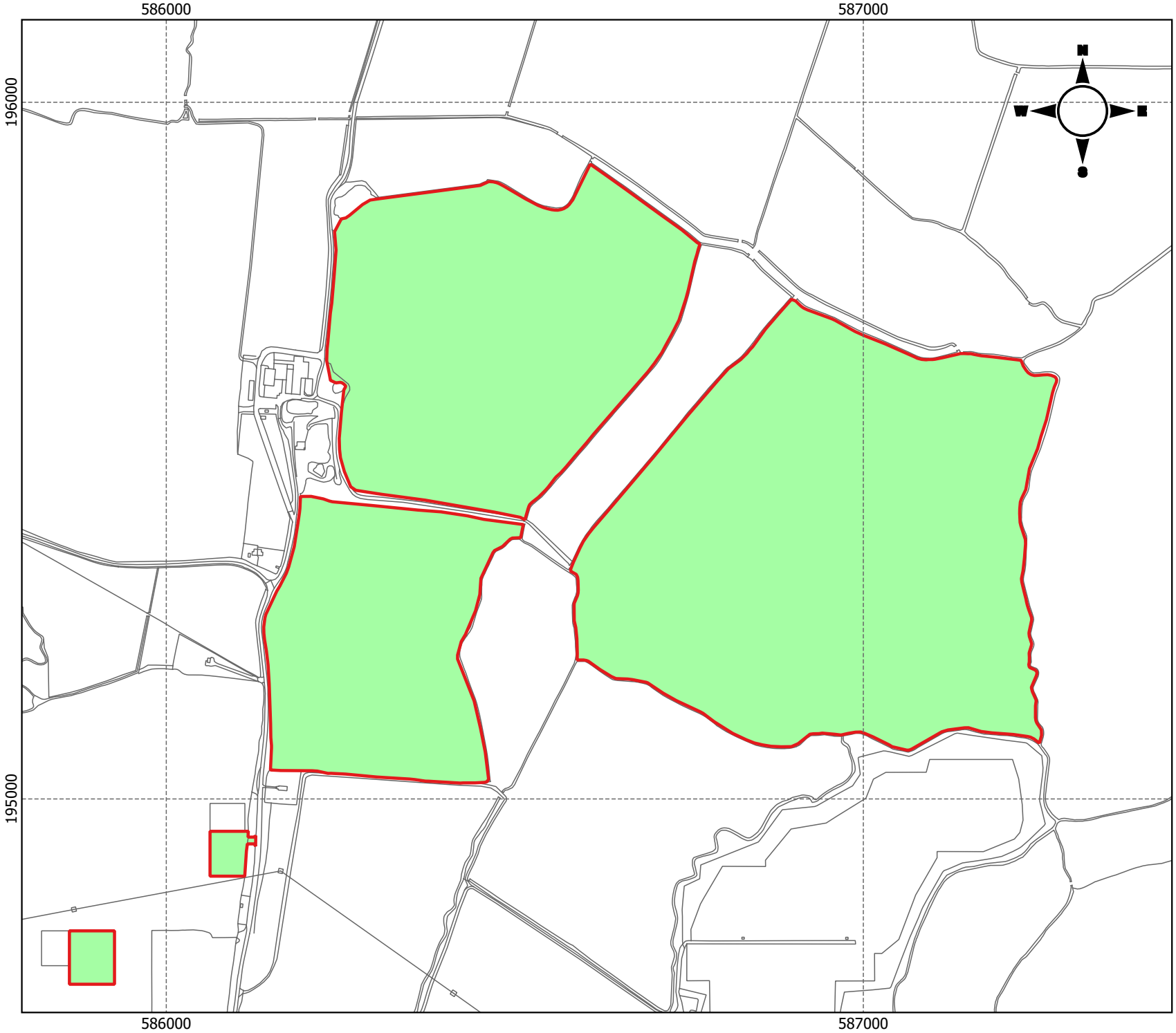

Title

Appendix 4: Map 3
Agricultural Land Classification

Project

South Fambridge Solar

Client

BSR Energy

Key

- OS MM
- Survey Area
- Subgrade 3b

Date: 09 / 09 / 2020

Scale: 1 : 7,500 at A4

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ANALYTICAL REPORT

Report Number	**19733-20**	**W195**	**MARTIN WORSLEY**	**Client**	**SOUTH FAMBRIDGE**
Date Received	**25-AUG-2020**		**ADAS GLEADTHORPE**		
Date Reported	**02-SEP-2020**		**MEDEN VALE**		
Project	**1010628 SOIL 17 08 20**		**MANSFIELD**		
Reference	**SOUTH FAMBRIDGE**		**NOTTINGHAMSHIRE**		
Order Number	**P69101MW1708**		**NG20 9PD**		

Laboratory Reference		**SOIL488503**	**SOIL488504**	**SOIL488505**	**SOIL488506**
Sample Reference		**12 TOPSOIL**	**15 TOPSOIL**	**26 TOPSOIL**	**58 TOPSOIL**
Determinand	**Unit**	**SOIL**	**SOIL**	**SOIL**	**SOIL**
Sand 2.00-0.063mm	% w/w	21	1	4	11
Silt 0.063-0.002mm	% w/w	47	29	41	56
Clay <0.002mm	% w/w	32	70	55	33
Textural Class **		HCL	C	C	HZCL

Notes

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.

Document Control

** Please see the attached document for the definition of textural classes.

Reported by

Katie Dunn

Natural Resource Management, a trading division of Cawood Scientific Ltd.
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ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

Class	Code
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	C
Silty clay	ZC
Sandy clay	SC

For the *sand, loamy sand, sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

- vf Very Fine (more than 2/3's of sand less than 0.106 mm)
- f Fine (more than 2/3's of sand less than 0.212 mm)
- c Coarse (more than 1/3 of sand greater than 0.6 mm)
- m Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam classes* according to clay content are indicated as follows:

- M medium (less than 27% clay)
- H heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.

APPENDIX 6 – DESCRIPTION OF ALC GRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. The 'best and most versatile agricultural land' falls into grades 1, 2 and subgrade 3a – which collectively comprises about one-third of the agricultural land in England and Wales. About half the land in England and Wales is either of moderate quality (subgrade 3b) or poor quality (grade 4). Although less significant on a national scale, such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in grade 5, which mostly occurs in the uplands.

Grade 1 – excellent quality agricultural land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 - very good quality agricultural land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 - good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a - good quality agricultural land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b - moderate quality agricultural land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4 - poor quality agricultural land

Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 - very poor quality agriculture land

Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.