BSR Energy




Agricultural Land Classification

Preston Farm Solar

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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 47.1 ha of land at Preston Farm, Preston Candover, Hampshire.

The survey has identified poorly-draining fine silty over clayey soils, imperfectly-draining fine silty over clayey soils and freely-draining chalky soils. These soils form agricultural land of subgrade 3a (11.5 ha, 24 %) and subgrade 3b (33.9 ha, 72 %) quality. The principal limitation to agriculture is soil wetness.

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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 47.1 ha of land at Preston Farm, Preston Candover, Hampshire. The report is based on a survey of the land undertaken in April 2021.

1.1 Site Environment

The survey area is formed of three agricultural fields enclosed by and divided by trees. The land is a level (0-1° slope) plateau over central and eastern areas, with gentle (2-3°) to moderate (4-7°) slopes off the plateau in the north and south and towards a shallow valley feature in the west. In the far west of the survey area the land is level again. The land has an average elevation of approximately 153 m AOD.

1.2 Agricultural Use

At the time of survey the land was in an arable rotation.

1.3 Published Information

1.3.1 Geology

1:50,000 scale BGS information[1] records the basal geology of the site as Cretaceous chalk of the Newhaven Chalk Formation. Overlying surface deposits of clay-with-flints are recorded in the east and the west of the site.

1.3.2 Soils

The national soils map, published at 1:250,000 scale, records the site as predominantly belonging to the Carstens soil association, with a minor inclusion of the Charity 2 soil association in the south east of the site.

The Carstens soil association is described as an association of fine silty over clayey, clayey and fine silty soils, often very flinty. These soils are formed in plateaux drift and clay-with-flints, overlying chalk. The Charity 2 soil association is described as an association of flinty fine silty soils, formed in drift in valley bottoms, and calcareous fine silty soils, often shallow, formed on valley sides in chalk or chalk rubble[2].

1.3.3 Previous Agricultural Land Classification

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

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

[2] Jarvis M.G. et al.; 1984. *Soils and their use in South East England*. Soil Survey of England and Wales; Harpenden.

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

2 METHODOLOGY

A detailed soil survey was carried out in April 2021. The survey 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 via a combination of auger borings and soil description pits to a maximum depth of 1.2 m. A log of the details of each observation point is attached to this report as Appendix 4. A map showing the location of each observation point is attached to this report as Appendix 1, Map 1.

Three soil description pits were dug at this site. Five topsoil samples were submitted to NRM laboratories for particle size distribution analysis by the pipette methodology in order to confirm site findings. The results of this analysis is are given in Section 3 and in Appendix 5.

3 SOILS

3.1 Soil Types

There are three principal soil types at this site. On the plateau in central and eastern areas, on the shoulder of the plateau and on level ground in the far west, poorly-draining fine silty over clayey soils dominate. These soils are formed in very thin drift overlying clay-with-flints. Around the shallow valley feature running north to south in the west of the site there are deeper drift deposits overlying the clay and imperfectly-draining fine silty over clayey soils dominate. In the north and south of the site, where land falls away from the plateau, there are freely-draining chalky soils formed on chalk and chalk rubble.

The spread of these soil types is shown in Appendix 2, Map 2. Each soil type is described in further detail below.

3.1.1 Poorly-draining fine silty over clayey soils

These are the dominant soils at this site. These soils have a non-calcareous medium silty clay loam topsoil overlying a poorly structured non-calcareous clayey subsoil. The subsoil has a reddish (5YR) or brownish (7.5YR) hue, and often has ferri-manganiferous concentrations alongside pale ped faces and ochreous mottles. These soils are gleyed[4] and slowly permeable immediately beneath the topsoil. Generally, these soils are very slightly stony (<5%), with a few subangular flints and/or a few small chalk fragments.

An example soil profile is described below from the pit at observation 36 (see Map 1).

0-26 cm	Brown (7.5YR 4/2) medium silty clay loam; very slightly stony (<5%), with a few medium and large subangular flints; moderately developed coarse subangular blocky structure; firm; common fine fibrous roots; non-calcareous; smooth clear boundary to:
26-50 cm	Light brown (7.5YR 6/3 + 6/4) clay with many very fine strong brown (7.5YR 5/8) mottles and a few medium red (2.5YR 5/6) mottles and common ferri-manganiferous concentrations; very slightly stony (<5%), with a few medium and large subangular flints; moderately developed very coarse angular blocky structure; very firm; a few fine fibrous roots; <0.5% macropores; non-calcareous; smooth gradual boundary to:
50-75+ cm	Brown (7.5YR 5/4) and light brown (7.5YR 6/4) clay with common very fine yellowish brown (10YR 5/6) mottles; very slightly stony (<5%), with a few medium and large subangular flints; massive structure; very firm; no roots; <0.5% macropores; non-calcareous.

These soils are poorly-draining and belong to Wetness Class IV. They have a low capacity to absorb excess winter rainfall.

3.1.2 Imperfectly-draining fine silty over clayey soils

These soils have a medium silty clay loam topsoil overlying a fine loamy or fine silty upper subsoil and a clayey lower subsoil. The upper subsoil is moderately structured and permeable. The lower subsoil is poorly structured, gleyed and slowly permeable. These soils are gleyed and slowly permeable above 68 cm depth but not above 40 cm depth. These soils

[4] Gleying is a soil colouring indicative of periodic or permanent waterlogging.

tend to be very slightly stony (<5%) in the topsoil and upper subsoil, with a few angular and subangular flints. The lower subsoil clay is slightly (5-15%) to moderately (15-20%) stony, with common to many small and medium angular flints. These soils are non-calcareous.

An example soil profile is described below from the pit at observation 10 (see Map 1).

0-27 cm	Brown (7.5R 4/2) medium silty clay loam; very slightly stony (<5%), with a few small, medium and large angular and subangular flints; weakly developed coarse subangular blocky structure; friable; common fine fibrous roots; non-calcareous; smooth clear boundary to:
27-55 cm	Brown (7.5YR 5/3) heavy silty clay loam; very slightly stony (<5%), with a few small, medium and large angular and subangular flints; moderately developed medium angular blocky structure; friable; a few fine fibrous roots; >0.5% macropores; non-calcareous; wavy clear boundary to:
55-90+ cm	Light reddish brown (5R 6/4) clay with many very fine strong brown (7.5YR 5/6) mottles and common ferri-manganiferous concentrations; slightly to moderately stony (10-20%), with common to many small and medium angular flints; massive structure; very firm; no roots; <0.5% macropores; non-calcareous.

These soils are imperfectly-draining and belong to Wetness Class III. They have a moderate capacity to absorb excess winter rainfall.

3.1.3 Chalky soils

These soils are quite variable but tend to have a very calcareous silty clay topsoil overlying very calcareous silty clay subsoil. Stoniness increases considerably with depth. The topsoil tends to be slightly stony (5-15%), with common flints and chalk fragments. The subsoil tends to be very stony (35-60%), with abundant small and medium subangular chalk fragments (chalk rubble). These soils are well structured and are permeable throughout.

An example soil profile is described below from the pit at observation 7 (see Map 1).

0-28 cm	Dark yellowish brown (7.5R 4/4) silty clay; slightly stony (5-10%), with common small and medium subangular chalk fragments and a few large subangular flints; weakly developed medium subangular blocky structure; friable; common fine fibrous roots; very calcareous; smooth abrupt boundary to:
28-34 cm	Pink (7.5YR 7/4) silty clay; slightly stony (10-15%), with common small and medium subangular chalk fragments; moderateldy developed medium subangular blocky structure; friable; a few fine fibrous roots; >0.5% macropores; very calcareous; wavy clear boundary to:
34-45 cm	Very pale brown (10YR 8/4) silty clay; very stony (40%), with abundant medium subangular chalk fragments; moderately developed fine subangular blocky structure; friable; no roots; >0.5% macropores; very calcareous; wavy gradual boundary to:
45-60+ cm	As above but with 60% stone and increasing with depth.

These soils are freely-draining and belong to Wetness Class I. They have a high 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 7, 10, 13, 27 and 36. These soils were submitted to NRM Laboratories for particle size distribution (PSD) analysis. The textures are confirmed in the table below.

Table 3.2: PSD analysis results

Observation	PSD Analysis
7	Silty clay
10	Medium silty clay loam
13	Medium silty clay loam
27	Medium silty clay loam
36	Medium (silty) clay loam

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 6.

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[5]. The relevant site data for an average elevation of 153 m AOD is given below.

Table 4.1: Agro-climatic variables

Average Annual Rainfall (AAR)	884 mm
January-June Accumulated Temperature (AT0)	1365 day °C
Field Capacity Days (FCD)	191
Field Capacity Period	mid Oct - late Apr
Moisture Deficit Wheat (MDW)	90 mm
Moisture Deficit Potatoes (MWP)	77 mm
Climate (upper grade limit)	1

The site is located in lowland 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

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

Land Classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food (now Defra)[6].

This report has identified agricultural land of subgrade 3a and subgrade 3b quality. The principal limitation to agricultural use of the land 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

There are 11.5 ha of subgrade 3a land at this site. This land is principally formed on imperfectly-draining fine silty over clayey soils such as those described in Section 3.1.2. These soils have medium-textured topsoil and belong to wetness class III. In these soils surface water is held at moderate depth above slowly permeable subsoil. The principal limitation to agriculture on such land is soil wetness. This is a moderate limitation to agriculture which restricts opportunities for safe cultivation of the land, particularly in the early spring. The land would be best suited to autumn crop establishment.

Subgrade 3b

There are 33.9 ha of subgrade 3b land at this site. This land is principally formed on poorly-draining fine silty over clayey soils such as those described in Section 3.1.1. These soils have medium-textured topsoil and belong to wetness class IV. In these soils surface water is held at shallow depth above slowly permeable subsoil. The principal limitation to agriculture on such land is soil wetness. This is a limitation to agriculture which restricts opportunities for safe cultivation of the land, particularly in the spring. The land would be best suited to autumn crop establishment.

A limited extent of subgrade 3b land is also formed on freely-draining chalky soils with a clayey topsoil, such as those described in Section 3.1.3. These soils belong to wetness class I. These soils have heavy-textured topsoil and the principal limitation to agriculture on such land is soil wetness. This is a moderate limitation to agriculture which restricts opportunities for safe cultivation of the land, particularly in the spring. The land would be best suited to autumn crop establishment.

Grade 4

No land of this quality has been mapped.

Grade 5

No land of this quality has been mapped.

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

Non-agricultural

There are 1.7 ha of non-agricultural land at this site. This area accounts for the trees which divide the fields and a small area of woodland in the south eastern corner of the site.

Urban

No land of this quality has been mapped.

4.3 Summary of grade areas

The boundaries between the different grades of land are shown on Appendix 3, Map 3. The area occupied by each grade is shown below.

Table 4.3: Grade areas

Grade / subgrade	Area (ha)	Area (%)
Grade 1	-	-
Grade 2	-	-
Subgrade 3a	11.5	24
Subgrade 3b	33.9	72
Grade 4	-	-
Grade 5	-	-
Non-agricultural	1.7	4
Urban	-	-
Total	**41.7**	**100**

5 CONCLUSION

ADAS have been instructed by BSR Energy to undertake an agricultural land classification survey of 47.1 ha of land at Preston Farm, Preston Candover, Hampshire.

The survey has identified poorly-draining fine silty over clayey soils, imperfectly-draining fine silty over clayey soils and freely-draining chalky soils. These soils form agricultural land of subgrade 3a (11.5 ha, 24 %) and subgrade 3b (33.9 ha, 72 %) quality. The principal limitation to agriculture is soil wetness.

6 APPENDICES

Appendix 1 – Map 1: Location of Observations

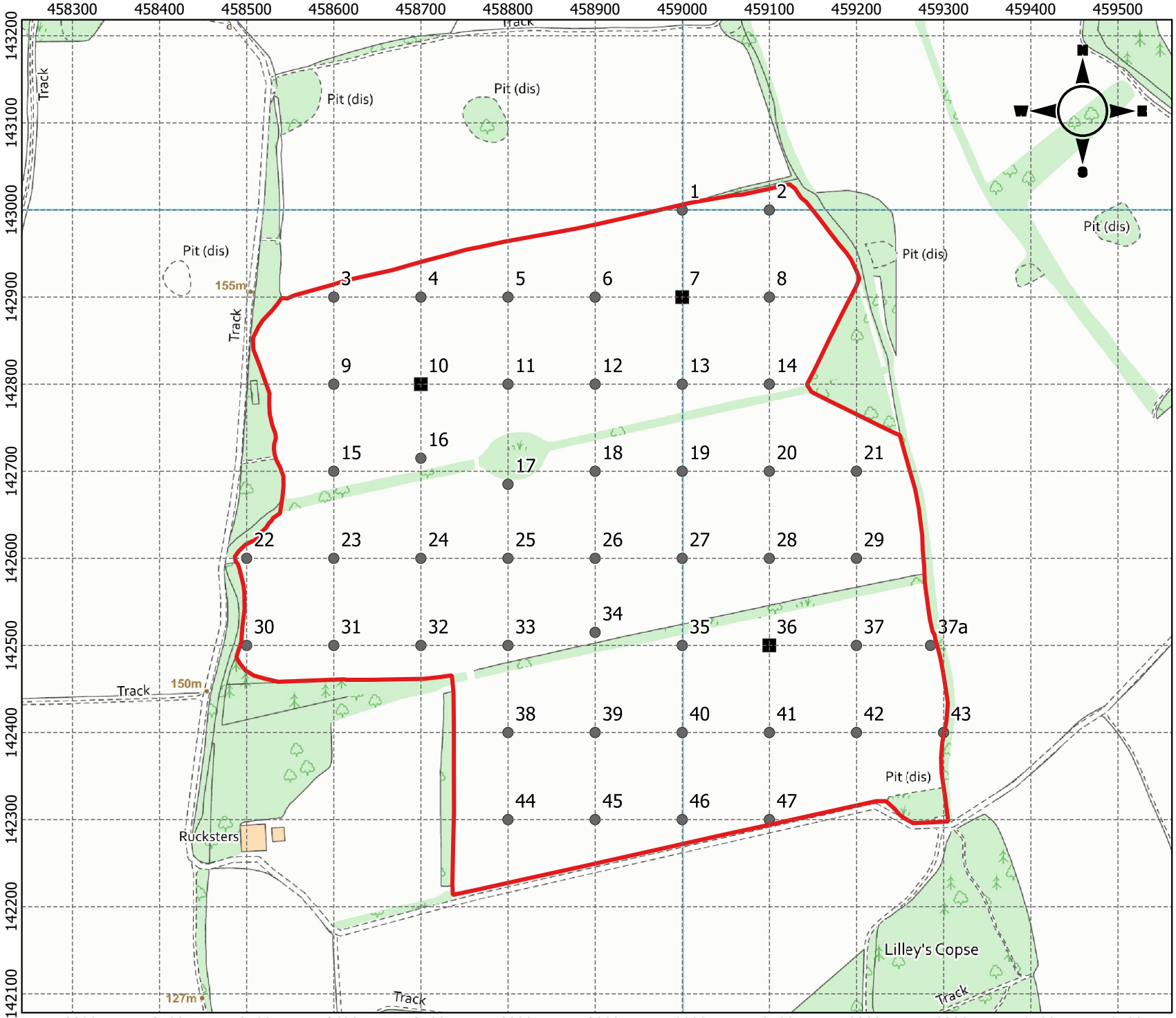
Appendix 2 – Map 2: Soil Types

Appendix 3 – Map 3: Agricultural Land Classification

Appendix 4 – ALC Survey Details

Appendix 5 – PSD Analysis

Appendix 6 – ALC Grades System



Title

Appendix 1: Map 1
Location of Observations

Project

Preston Farm Solar

Client

BSR Energy

Key

- Survey Area
- Soil description pit
- Soil auger

Date: 01 / 06 / 2021

Scale: 1 : 6,000 at A4

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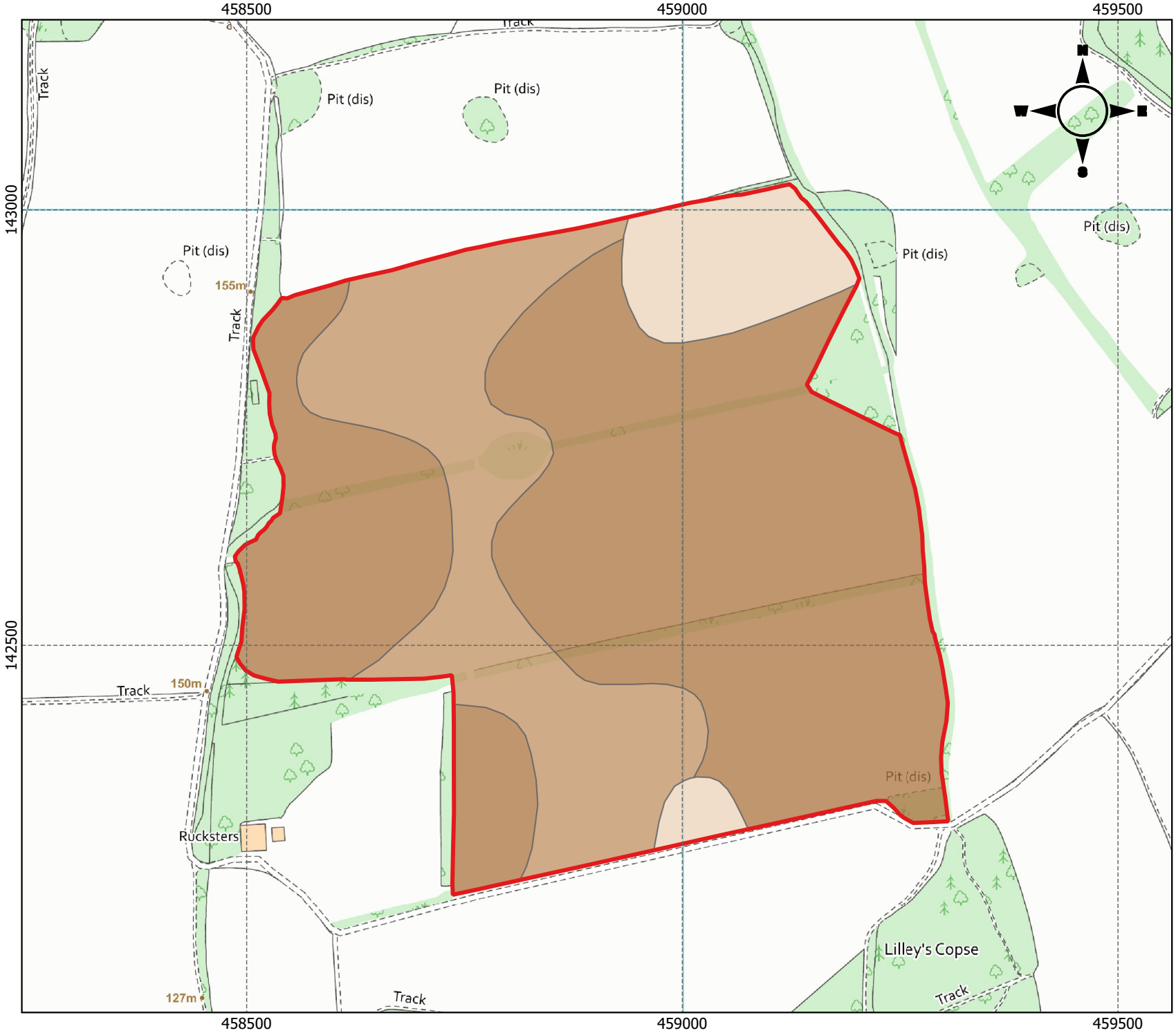


Title

Appendix 2: Map 2
Soil Types

Project

Preston Farm Solar

Client

BSR Energy

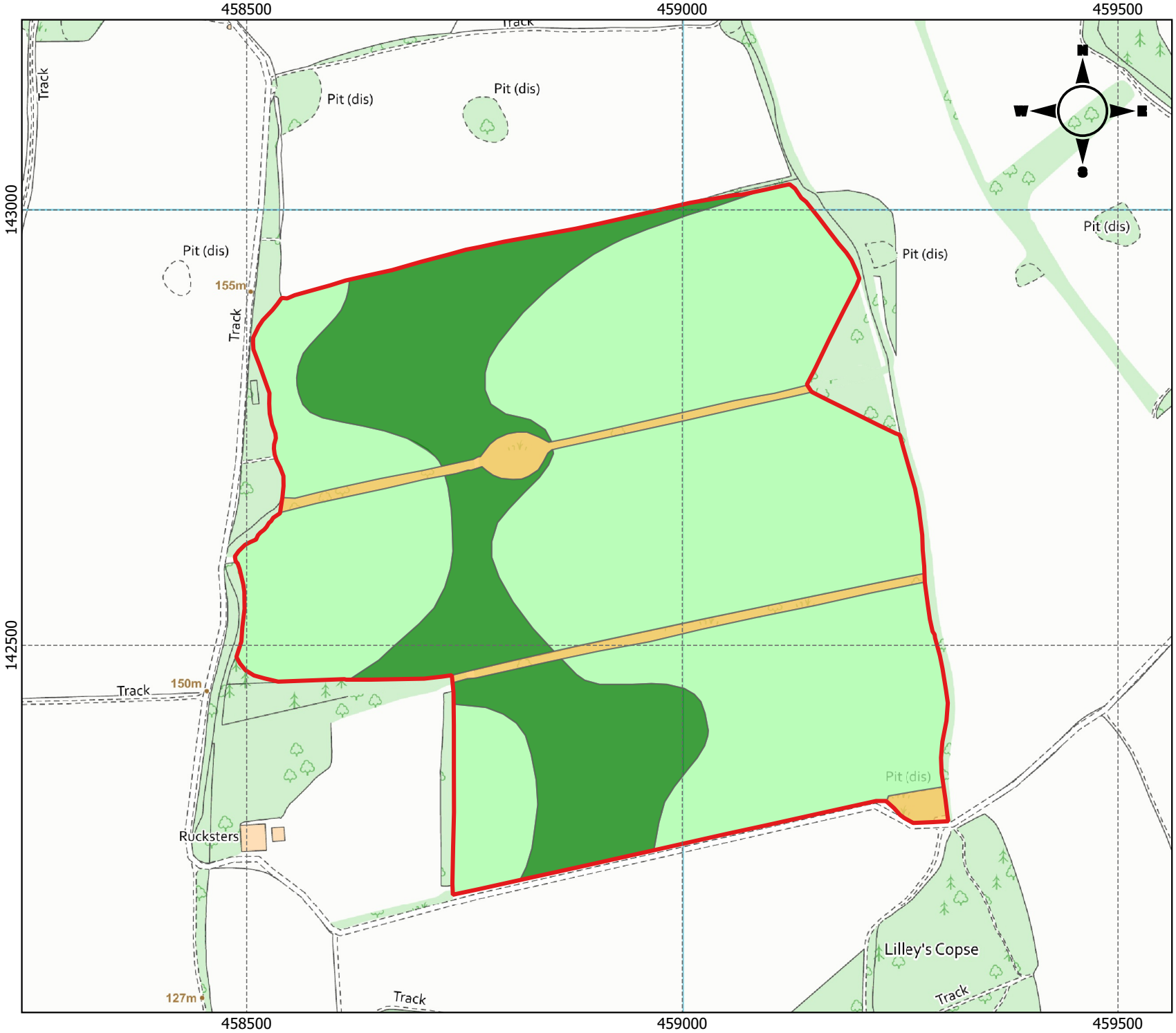
Key

- Survey Area
- Chalky soils
- WC III soils
- WC IV soils

Date: 01 / 06 / 2021

Scale: 1 : 6,000 at A4

ADAS
www.adas.uk



Title

Appendix 3: Map 3
Agricultural Land Classification

Project

Preston Farm Solar

Client

BSR Energy

Key

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

Date: 01 / 06 / 2021

Scale: 1 : 6,000 at A4

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Appendix 4: Preston Farm Solar Survey Details

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 - 27	Br	HZCL	-	-	v ca	5				**2**	**I**	**3a**	**2**	**3a**	**DR**
	27 - 41	Br	HZCL	o	no	v ca	5				Droughtiness Calculation					
	41 - 50	Rd Br	C	xx	no	v ca	5				MDW	MDP	MBW	MBP	Grade W	Grade P
	50 - 65	Li Yl Br + Wh	ZC	o	no	v ca	40			Stopped on chalk	90	77	29.2	41.3	2	1
2	0 - 28	Br	ZC	-	-	v ca	4				**5**	**I**	**3b**	**2**	**3b**	**WE**
	28 - 50	Wh + Br	ZC	o	no	v ca	40				Droughtiness Calculation					
	50 - 60	Wh	Other	o	no	v ca	0			Soft weathered chalk Stopped on chalk	MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	13.7	35.1	2	1
3	0 - 28	Br	MCL	-	-		3				**2**	**IV**	**3b**	**1**	**3b**	**WE**
	28 - 38	Br	HCL	xx	no		5				Droughtiness Calculation					
	38 - 80	Li Rd Br	C	xxx	yes		10				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	32.8	25.0	1	1
4	0 - 28	Br	MZCL	-	-		3				**2**	**III**	**3a**	**1**	**3a**	**WE**
	28 - 43	Br	HCL	x	no		5				Droughtiness Calculation					
	43 - 90	Br	C	xxx	yes		10				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	37.3	29.4	1	1
5	0 - 28	Br	MZCL	-	-		3				**3**	**III**	**3a**	**1**	**3a**	**WE**
	28 - 45	Br	HZCL	xx	no		3				Droughtiness Calculation					
	45 - 70	Li Br	HCL-C	xxx	yes		10				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	40.1	32.3	1	1
6	0 - 24	Br	MZCL	-	-		5				**3**	**IV**	**3b**	**1**	**3b**	**WE**
	24 - 90	Li Br + Yl Rd	C	xxx	yes		7				Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	30.9	22.4	1	1
7	0 - 28	Dk Yl Br	ZC	-	-	v ca	8				**3**	**I**	**3b**	**3a**	**3b**	**WE**
	28 - 34	Pk	ZC	o	no	v ca	15				Droughtiness Calculation					
	34 - 45	V Pl Br + Wh	ZC	o	no	v ca	40				MDW	MDP	MBW	MBP	Grade W	Grade P
	45 - 60	Wh + V Pl Br	ZC	o	no	v ca	60			Stopped on chalk	90	77	3.3	20.5	3a	1

Appendix 4: Preston Farm Solar Survey Details

Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	Stones (%) >2cm	Stones (%) >6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
8	0 - 27 27 - 44	Br Wh	ZC Other	- o	- no		8 50			Soft weathered chalk Stopped on chalk	**5**	**I**	**3b**	**3a**	**3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	-19.3	-6.3	3a	2
9	0 - 28 28 - 52 52 - 90	Br Gr Br Rd Br + Rd Gr	MCL HCL C	- xx xxx	- no yes		3 5 5				**3**	**III**	**3a**	**1**	**3a**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	39.8	30.9	1	1
10	0 - 27 27 - 55 55 - 90	Br Br Li Rd Br	MZCL HZCL C	- xx xxx	- no yes		2 3 15			FMCs	**2**	**III**	**3a**	**1**	**3a**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	42.3	36.4	1	1
11	0 - 33 33 - 90	Br Li Rd Br	MZCL C	- xxx	- yes		3 0				**3**	**IV**	**3b**	**1**	**3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	42.0	32.0	1	1
12	0 - 26 26 - 42 42 - 90	Br Br Rd Br	MZCL HCL C	- x xxx	- no yes		3 3 0			FMCs	**2**	**III**	**3a**	**1**	**3a**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	42.3	32.3	1	1
13	0 - 28 28 - 90	Br Rd Br + Li Rd Br	MZCL C	- xxx	- yes		2 0				**1**	**IV**	**3b**	**1**	**3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	39.8	29.8	1	1
14	0 - 28 28 - 65 65 - 90	Br Li Br Li Yl Br + St Br	MZCL C C	- xxx xxx	- yes yes		1 0 0			FMCs	**1**	**IV**	**3b**	**1**	**3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P

Appendix 4: Preston Farm Solar Survey Details

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)
											90	77	40.3	30.3	1	1
15	0 - 30 30 - 90	Br Li Rd Br	MZCL C	- xxx	- yes		3 3				**2**	**IV**	**3b**	**1**	**3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	38.3	28.9	1	1
16	0 - 28 28 - 65	Br Li Br + Li Rd Br	MCL C	- xxx	- yes		3 5				**2**	**IV**	**3b**	**1**	**3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	36.2	25.9	1	1
17	0 - 30 30 - 50 50 - 90	Br Gr Br Li Rd Br	MZCL HCL C	- xx xxx	- no yes		3 0 0				**4**	**III**	**3a**	**1**	**3a**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	43.5	33.5	1	1
18	0 - 26 26 - 90	Br Li Br + St Br	MZCL C	- xxx	- yes		3 0				**2**	**IV**	**3b**	**1**	**3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	38.2	28.2	1	1
19	0 - 30 30 - 55 55 - 90	Br Gr Br + Li Yl Br Li Br	MZCL HCL HCL-C	- xxx xxx	- borderline yes		3 0 0			FMCs	**1**	**III - IV**	**3a - 3b**	**1**	**3a - 3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	47.9	37.9	1	1
20	0 - 30 30 - 80	Br Li Rd Br + Li Br	MZCL C	- xxx	- yes		5 0				**2**	**IV**	**3b**	**1**	**3b**	**WE**
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	39.3	29.3	1	1
21	0 - 28 28 - 40	Br Br	MZCL C	- xxx	- yes		2 0			FMCs	**2**	**IV**	**3b**	**1**	**3b**	**WE**
											Droughtiness Calculation					

Appendix 4: Preston Farm Solar Survey Details

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)
	40 - 90	Li Br	C	xxx	yes		0				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	39.8	29.8	1	1
22	0 - 32	Dk Gr Br	MCL	-	-		5				**1**	**IV**	**3b**	**1 - 2**	**3b**	**WE**
	32 - 60	Li Br + St Br	C	xxx	yes		10			Stopped on stones	Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	30.6	22.7	1	1
23	0 - 26	Dk Gr Br	MCL	-	-		5				**2**	**III**	**3a**	**1**	**3a**	**WE**
	26 - 45	Dk Gr Br	HCL	xx	no		0				Droughtiness Calculation					
	45 - 80	Rd Br + Li Rd Br	C	xxx	yes		0				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	40.5	30.5	1	1
24	0 - 25	Br	MZCL	-	-		3				**1**	**IV**	**3b**	**1**	**3b**	**WE**
	25 - 80	Li Rd Br + Rd Br	C	xxx	yes		0				Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	37.7	27.7	1	1
25	0 - 30	Br	MZCL	-	-		3				**2**	**IV**	**3b**	**1**	**3b**	**WE**
	30 - 55	Li Rd Br	C	xxx	yes		0				Droughtiness Calculation					
	55 - 80	Li Rd Br	C	xxx	yes		0			FMCs	MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	40.4	30.4	1	1
26	0 - 28	Br	MZCL	-	-		2				**1**	**IV**	**3b**	**1**	**3b**	**WE**
	28 - 80	Li Br + Li Rd Br	C	xxx	yes		0				Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	39.8	29.8	1	1
27	0 - 27	Br	MZCL	-	-		3				**1**	**IV**	**3b**	**1**	**3b**	**WE**
	27 - 60	Li Br + Li Rd Br	C	xxx	yes		0				Droughtiness Calculation					
	60 - 80	Li Rd Br + Yl Rd	C	xxx	yes		0				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	38.7	28.7	1	1
28	0 - 30	Br	MZCL	-	-		2				**1**	**IV**	**3b**	**1**	**3b**	**WE**

Appendix 4: Preston Farm Solar Survey Details

Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	Stones (%) >2cm	Stones (%) >6cm	Notes	Agricultural Land Classification (°)	W C	WE grade	DR grade	Overall grade	Limit(s)
	30 - 55	Li Rd Br	C	xxx	yes		0									
	55 - 80	Li Rd Br	C	xxx	yes		0									
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	38.0	28.0	1	1
29	0 - 30	Br	MZCL	-	-		3				**3**	**IV**	**3b**	**1**	**3b**	**WE**
	30 - 80	Rd Br + Li Rd Br	C	xxx	yes		0			FMCs						
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	37.5	27.5	1	1
30	0 - 30	Dk Gr Br	MZCL	-	-		3				**2**	**IV**	**3b**	**1**	**3b**	**WE**
	30 - 42	Br	C	xxx	yes		0									
	42 - 80	Li Br	C	xxx	yes		0				Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	37.5	27.5	1	1
31	0 - 30	Dk Br	MZCL	-	-		5				**3**	**IV**	**3b**	**1**	**3b**	**WE**
	30 - 70	Rd Br + Li Rd Br	C	xxx	yes		3			FMCs						
	70 - 90	Dk Rd Gr + V Dk Gr	C	xxxx	yes		0				Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	36.3	26.1	1	1
32	0 - 30	Dk Gr Br	MZCL	-	-		8				**4**	**III**	**3a**	**1**	**3a**	**WE**
	30 - 58	Dk Br	HCL	x	no		15			Stopped on stones						
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	31.6	24.9	1	1
33	0 - 25	Dk Br	MZCL	-	-		3				**4**	**III**	**3a**	**1**	**3a**	**WE**
	25 - 45	Pl Br	HCL-C	xx	no		3									
	45 - 90	Pl Br	C	xxx	yes		3			FMCs	Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	38.8	29.4	1	1
34	0 - 31	Dk Br	MZCL	-	-		2				**1**	**IV**	**3b**	**1**	**3b**	**WE**
	31 - 65	Li Br + St Br	C	xxx	yes		10			Stopped on stones						
											Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	31.6	23.8	1	1

Appendix 4: Preston Farm Solar Survey Details

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 - 25	Dk Br	MZCL	-	-		3				**2**	**IV**	**3b**	**1**	**3b**	**WE**
	25 - 55	Br + Li Br	C	xxx	yes		3				Droughtiness Calculation					
	55 - 85	Li Br + Rd	C	xxx	yes		3				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	33.0	23.6	1	1
36	0 - 26	Dk Br	MZCL	-	-	non	3				**1**	**IV**	**3b**	**1**	**3b**	**WE**
	26 - 50	Li Br	C	xxx	yes	non	3				Droughtiness Calculation					
	50 - 90	Br + Li Br	C	xxx	yes	non	3				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	33.4	24.1	1	1
37	0 - 28	Dk Br	MZCL	-	-		5				**2**	**IV**	**3b**	**1**	**3b**	**WE**
	28 - 42	Rd Br + Rd Br	C	xxx	yes		5			FMCs	Droughtiness Calculation					
	42 - 90	Rd Br + Rd Br	C	xxx	yes		5			FMCs	MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	34.7	25.8	1	1
37a	0 - 28	Dk Br	MZCL	-	-		3				**2**	**IV**	**3b**	**3b**	**3b**	**WE**
	28 - 38	Rd Br	C	xx	no		5				Droughtiness Calculation					
	38 - 70	Rd Br + Rd Br	C	xxx	yes		5			FMCs	MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	35.8	25.5	1	1
38	0 - 30	Dk Br	MZCL	-	-		2				**1**	**IV**	**3b**	**1**	**3b**	**WE**
	30 - 90	Li Br + Br	C	xxx	yes		5			FMCs	Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	34.5	25.6	1	1
39	0 - 30	Dk Br	MZCL	-	-		3				**2**	**III**	**3a**	**1**	**3a**	**WE**
	30 - 65	Br	HCL	xx	no		5				Droughtiness Calculation					
	65 - 100	Li Br	C	xxx	yes		0				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	45.8	35.3	1	1
40	0 - 30	V Dk Gr Br	MSL	-	-		3				**3**	**III**	**3a**	**1**	**3a**	**WE**
	30 - 45	Dk Gr Br	SCL	xx	no		5				Droughtiness Calculation					
	45 - 90	Li Br + Br	C	xxx	yes		5			FMCs	MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	33.9	25.0	1	1

Appendix 4: Preston Farm Solar Survey Details

Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
41	0 - 26	Dk Br	MZCL	-	-	v ca	3				**2**	**IV**	**3b**	**2**	**3b**	**WE**
	26 - 75	Rd Br + Li Rd Br	C	xxx	yes	v ca	5			FMCs	Droughtiness Calculation					
	75 - 90	Wh + Dk Yl Br	MZCL	o	no	v ca	15				MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	16.2	23.0	2	1
42	0 - 34	Dk Br	MZCL	-	-	v ca	6				**2**	**IV**	**3b**	**1**	**3b**	**WE**
	34 - 70	Rd Br + Yl Rd	C	xxx	yes	v ca	5			FMCs	Droughtiness Calculation					
	70 - 95	Wh	Other	o	no	v ca	0			Soft weathered chalk	MDW	MDP	MBW	MBP	Grade W	Grade P
										Stopped on chalk	90	77	46.6	28.6	1	1
43	0 - 28	Dk Br	MZCL	-	-		3				**2**	**II - III**	**3a**	**1**	**3a**	**WE**
	28 - 65	Rd Br + Rd Gr	HCL	xx	no		10			Stopped on stones	Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	37.6	31.2	1	1
44	0 - 30	Dk Br	MZCL	-	-		3				**2**	**IV**	**3b**	**1**	**3b**	**WE**
	30 - 85	Br + Br	C	xxx	yes		5			FMCs	Droughtiness Calculation					
											MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	34.0	25.1	1	1
45	0 - 26	Dk Br	MZCL	-	-		3				**3**	**III**	**3a**	**1**	**3a**	**WE**
	26 - 43	Br + Br	HCL-C	x	no		5				Droughtiness Calculation					
	43 - 70	Br + Yl Rd	C	xxx	yes		5				MDW	MDP	MBW	MBP	Grade W	Grade P
	70 - 90	Li Yl Br + Wh	HZCL	o	no	v ca	15			Stopped on chalk	90	77	51.2	27.9	1	1
46	0 - 26	Dk Br	ZC	-	-	v ca	5				**4**	**I**	**3b**	**2**	**3b**	**WE**
	26 - 33	Br + Yl Rd	ZC	o	no	v ca	10				Droughtiness Calculation					
	33 - 65	Wh + Li Yl Br	ZC	o	no	v ca	40			Stopped on chalk	MDW	MDP	MBW	MBP	Grade W	Grade P
											90	77	13.5	27.4	2	1
47	0 - 27	Dk Br	MZCL	-	-		3				**2**	**IV**	**3b**	**2**	**3b**	**WE**
	27 - 57	Br + Yl Rd	C	xxx	yes		5				Droughtiness Calculation					
	57 - 80	Wh	MZCL	o	no	v ca	5			Soft weathered chalk	MDW	MDP	MBW	MBP	Grade W	Grade P

Appendix 4: Preston Farm Solar Survey Details

Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
										Stopped on chalk	90	77	13.1	29.1	2	1

Key to ALC Survey Notes:

Colour	Texture	Mottling	$CaCO_3$
Bk - black **Br** - brown(ish) **Bu** – blue(ish) **Dk** - dark **Du** - dusky **Gn** - green(ish) **Gr** - grey(ish) **Li** - light **Ol** - olive **Pi** - pink(ish) **Pl** - pale **Rd** - red(dish) **St** - strong **V** - very **Wk** - weak **Yl** - yellow(ish)	**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 soil; **x** – a few (<2%) *ochreous* mottles; **xx** –common (2-20%) to many (20-40%) *ochreous* mottles OR *greyish* or *pale* soil, typically with a few *ochreous* mottles; **xxx** – *greyish* or *pale* colours dominant in matrix and/or ped faces and common to very many (>40%) *ochreous* mottles OR if *reddish* colours are dominant in the matrix, > 2% *greyish*, *brownish* or *ochreous* mottles or ferri-manganiferous concentrations, and dominantly *pale* coloured ped faces (**gleyed horizon**); **xxxx** – dominantly grey soil, often with some *ochreous* mottles (**gleyed horizon**). '*greyish*', '*pale*' '*brownish*', '*ochreous*' and '*reddish*' colours are assessed in the field using a Munsell Soil Colour Book and defined according to Appendix 3 of the ALC Guidelines.	**non** - non-calcareous **v sl ca** - very slightly calcareous **sl ca** - slightly calcareous **ca** - calcareous **v ca** - very calcareous
		SPL	**Notes**
		yes - a slowly permeable layer **borderline** - a borderline slowly permeable layer **no** - not a slowly permeable layer	**FMCs** – ferri-manganiferous concentrations

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

Droughtiness Calculation

MDW - moisture deficit wheat (mm); **MDP** - moisture deficit potatoes (mm); **MBW** - moisture balance wheat (mm); **MBP** - moisture balance potatoes (mm); **Grade W** - droughtiness grade for wheat; **Grade P** - droughtiness grade for potatoes.

ANALYTICAL REPORT

Report Number	**52664-21**	**W195**	**MARTIN WORSLEY**	**Client**	**MARTIN WORSLEY**
Date Received	**14-MAY-2021**		**ADAS GLEADTHORPE**		
Date Reported	**20-MAY-2021**		**MEDEN VALE**		
Project	**1051020**		**MANSFIELD**		
Reference	**MARTIN WORSLEY**		**NOTTINGHAMSHIRE**		
Order Number	**P69101MW0605**		**NG20 9PD**		

Laboratory Reference		**SOIL515013**	**SOIL515014**	**SOIL515015**	**SOIL515016**	**SOIL515017**					
Sample Reference		**PIT 7**	**PIT 10**	**AUGER 13**	**AUGER 27**	**AUGER 36**					
Determinand	**Unit**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**					
Sand 2.00-0.063mm	% w/w	9	10	10	15	20					
Silt 0.063-0.002mm	% w/w	53	67	66	62	55					
Clay <0.002mm	% w/w	38	23	24	23	25					
Textural Class **		ZC	MZCL	MZCL	MZCL	MCL/MZCL					

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.

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

Reported by

Myles Nicholson

Natural Resource Management, a trading division of Cawood Scientific Ltd.
Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS
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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.