Soil Environment Services Ltd

AGRICULTURAL LAND CLASSIFICATION

Endurance Energy Wickham Ltd

Wickham Hall Solar Farm

Soil Environment Services Ltd
January 2024

Our Ref: SES/DLPEE/WHSF/#1 **Date: 5th June 2023**

Client:

Endurance Energy Wickham Hall Ltd

AGRICULTURAL LAND CLASSIFICATION

Wickham Hall Solar Farm

A report prepared on behalf of ***Soil Environment Services*** by:

[redacted] [redacted]
Environmental Consultant

Approved by:

[redacted] [redacted] *Contaminated Land Management*
Managing Director

This report has been prepared by Soil Environment Services with all reasonable skill, care and diligence, within the terms of The Contract with The Client. The report is the property of The Client who can assign this report to any third party who will then be afforded the same assurances as detailed within the terms of the original Contract with The Client.

Soil Environment Services
Agricultural Land Classification, Contaminated Land Risk Assessment, Mineral Extraction Soil Planning
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[redacted]

CONTENTS

1. INTRODUCTION

An Agricultural Land Classification (ALC) has been carried out on 34.23 ha of land at Wickham Hall, Hadham Road, Bishops Stortford (Drawing 1). The site is centred on OS Grid Ref. 546947, 223211.

The survey was conducted on the 31st March and the 1st April 2021 and classified the land into one or more of the below grades. On the initial survey date, the majority of site was in a recently cut arable crop.

1.1 Methodology

Agricultural land is classified into the following grades according to the 1988 guidelines[1].

Grade	Description
1	**Excellent quality agricultural land** with no or very minor limitations to agricultural use.
2	**Very good quality agricultural land** with minor limitations which affect crop yield, cultivation or harvesting.
3a **3b**	**Good quality agricultural land** capable of producing moderate to high yields of a narrow range of arable crops or moderate yields of a wider range of crops. **Moderate quality agricultural land** capable of producing moderate yields of a narrow range of crops or lower yields of a wider range of crops.
4	**Poor quality agricultural land** with severe limitations which significantly restrict the range of crops and/or level of yields.
5	**Very poor quality agricultural land** with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

The classification includes an initial desktop investigation to examine previously mapped soil types and to note the drift and solid geology followed by the field survey consisting of auger borings at one every 100 m in general and a pit excavated in each of the main soil types to confirm the structures and stone content if needed. Laboratory analysis of soil textures is undertaken if needed in order to confirm textures such the *heavy/medium* clay and *medium/fine* sand categories or stone content. All site survey profile data is listed in Appendix A.
All of the potential limitations are assessed and then the most limiting factor dictating the ALC grade was determined for this site and is detailed in Table 2.

1.2 Previous ALC gradings

Grading on the MAFF (1983) 1: 250 000 map indicated the site was predominantly mapped as ALC Grade 2 land with Grade 3 bounding the east. No detailed surveys have been undertaken for the site.

2. CLIMATIC LIMITATIONS

2.1 Overall climate

The climatological data for the site centre is detailed in Table 1.

Table 1
Climatological information[3]

Factor	Units	Value
Altitude AOD	m	100
Accumulated temperature	day°C (Jan-June)	1369.9
Average Annual Rainfall	mm	643.8
Field Capacity Days	days	124.4
Moisture Deficit Wheat	mm	108.7
Moisture Deficit Potatoes	mm	101.4
Overall climate ALC Grade	Grade 2	

Climate is not a significant limiting factor for the site.

2.2. Local climate

Local climate will not result in a significant limiting factor for this site.

3 SITE LIMITATIONS

3.1 Gradient

The gradient of less than 7 degrees results in no limiting factor for the site.

3.2 Microrelief

The microrelief will not result in a significant limiting factor for this site.

3.3 Flooding

A low risk of flooding from surface water and very low risk from rivers and sea has been identified for the site (https://flood-warning-information.service.gov.uk/long-term-flood-risk).

Flooding will not result in a significant limiting factor for this site.

4 SOIL LIMITATIONS

4.1 Texture and structure

Slight variations in soil texture exist to the degree that these influence the wetness or drought conditions of the soils.

The main soil type noted was slightly stony clay or clay loam (commonly calcareous) to 30 cm over a slightly stony clay, moderate, medium subangular blocky over a slightly to moderately stony clay with moderate medium prismatic structure to 120 cm. Some areas were slightly less stoney and some sandy zones were noted.

The soils over most of the site have previously been mapped as the Hanslope Association which comprise greyish brown, slightly stony clay or clay loam or mottled slightly stony clay over mottled slightly to moderately stony clay. The soils are described as clayey to the surface, have slowly permeable subsurface horizons but are seldom seriously waterlogged. Hanslope soils have a calcareous, chalky subsurface horizon that is normally brown but can be grey mottled. It passes below into a dense mottled substrate containing chalk stones.

Superficial Geology 1:50 000 scale superficial deposits description:
Lowestoft Formation – Diamicton

Bedrock Geology 1:50 000 scale bedrock geology description*:*
London Clay Formation - Clay, Silt and Sand

4.2 Depth

Soil depth will not result in a significant limiting factor for this site.

4.3 Stoniness

Stoniness within the top 25 cm of soil is considered not to be a limiting factor for the soils on the site.

4.4 Chemical

Chemical contamination will not result in a significant limiting factor for this site.

5. INTERACTIVE LIMITATIONS

5.1 Wetness

In field wetness class assessment resulted in a Wetness Class of I or III depending on the depths of the slowly permeable layer and depth to gleying.

Consideration of the Wetness Class with the Field Capacity Days of 124.4 and the topsoil textures resulted in an ALC Grade of 2 or 3a.

5.2. Droughtiness

Following assessment of the soil characteristics and climatic factors, the soil was found to have a soil Moisture Balance which subsequently when considered with respect to wheat and potatoes resulted in a significant limiting factor in determining the ALC Grade in areas generally not subject to a Wetness Limitation. This occurred mainly in the west of the site and was influenced significantly by the amount of chalk in the profile.

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5.3 Erosion

Erosion will not result in a significant limiting factor for this site.

6. AGRICULTURAL LAND CLASSIFICATION

6.1 Most limiting factors

Grade 3a/2 land – Wetness Limitation

The combination of Wetness Class III for the majority of the soils (see Appendix A) with Field Capacity Days of 124.4 and a topsoil texture of calcareous clay results in an ALC Grade of 3a. Soils with a Wetness Class of I with a heavy clay loam result in ALC Grade 2. A small area of heavy clay loam on the west has a Wetness Class of I due to no mottling of gleying and thus results on Grade 2.

An area to the east of the site (not surveyed during the original survey) are mapped on the same surveyed soils and thus are considered to be Grade 3a.

Grade 2 land –Droughtiness Limitation

A small area located on the west of the site has a droughtiness limitation.

6.2 Current grading

This survey has resulted in an Agricultural Land Classification of the following grades (Drawing 1):

Table 2. ALC gradings and limitations

Grade	ha	%	Limitation
1			
2	7	20.59	Wetness & Drougtiness
3a	27	79.41	Wetness
3b			
4			
5			
Non-agricultural land			
Total	34	100%	

DRAWING 1

ALC Grade

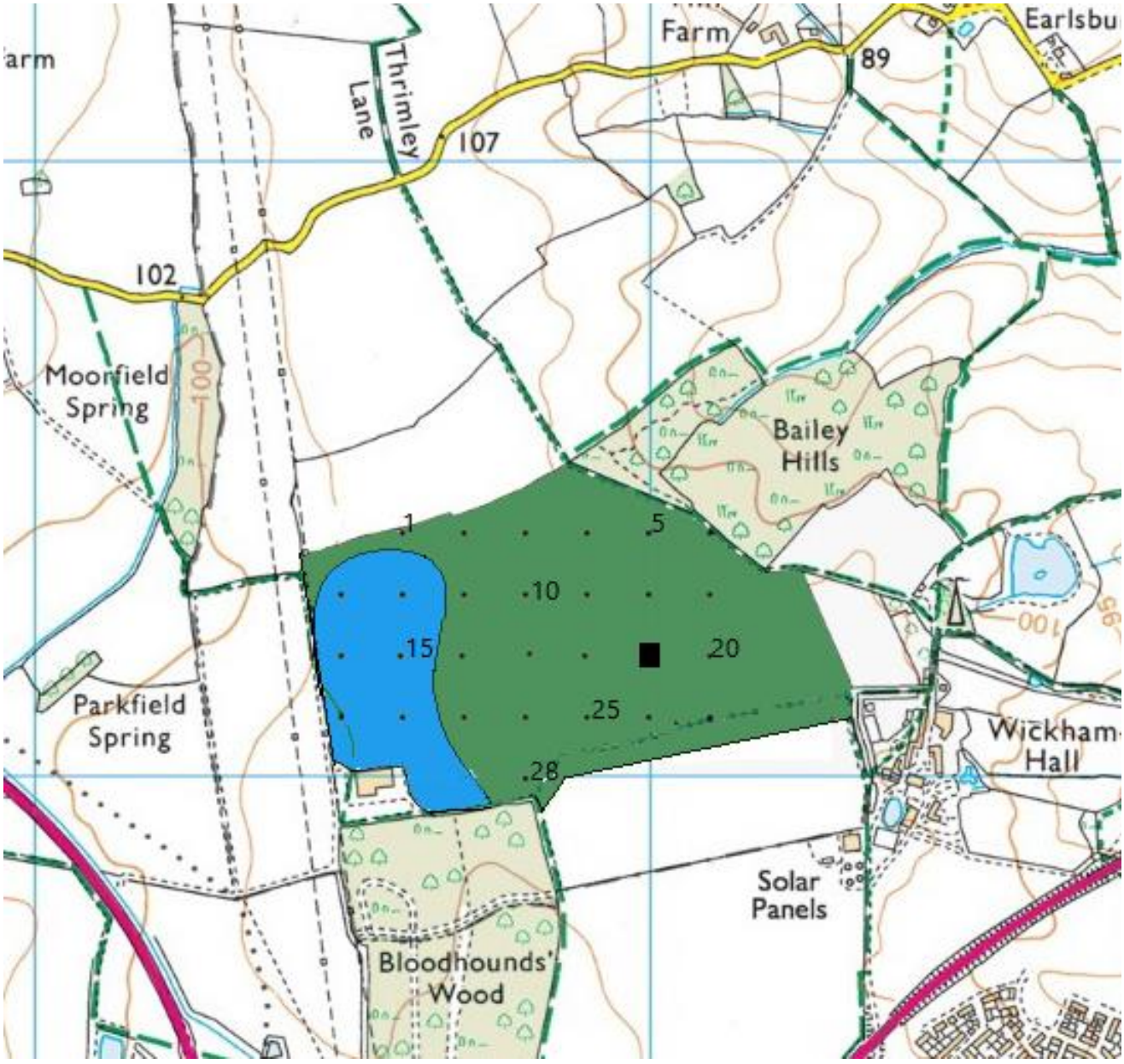
Key

ALC Grades
- Grade 1
- Grade 2
- Grade 3a
- Grade 3b
- Grade 4
- Grade 5
- Non agricultural land

● Boring
■ Pit

Soil Environment Services

Drawing Title: ALC Grade	Drawing No.: 1
Scale: 1:10000	Date: 05/06/2023



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APPENDIX A

Soil profile data

Notes

1 All abbreviations relating to soil parameters are standard and derived from the guidance documents:

Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. MAFF. 1988.
Soil Survey Field Handbook. Technical Monograph No.5. Soil Survey of England and Wales.1976.

2 The pit data is detailed in this table and information on structure and stone content copied to the appropriate boring profiles.

3 Any blanks or zeros in the cells indicate the data is not needed or appropriate for that cell.

4 If 'NA' is inserted in a cell the information is not appropriate on this occasion.

5. Boring or pit locations are directly (within 2 m accuracy) on the grid reference corresponding to the points on the map unless otherwise stated.

6 A point directly marked on a track, boundary or other feature will be moved 2-3 m off the point or omitted if surrounding points and soil types allow.

7. Borings that are potentially within 15 m of a gas pipeline are limited to 0.4 m depth and the strata description in the data table below this depth will be extrapolated from nearby borings and upper strata characteristics.

8. The *Observation Density* is 1 per ha on a 100 m grid using a semi *Free Survey* method if appropriate*. The letter 'B' in the second column of the data table refers to an observation point at which a boring may have been undertaken. In some situations it is not possible to visit the location due to for example crop status or animals in a field. In some cases the location is visited and observation of the soils at the surface is sufficient. In all cases the soil, geology, topography, flood risk and aerial crop patterns are assessed from published sources and the soils will be subject to a full 120 cm depth boring either side of a non-visited or non-bored point. If all data sources are agreeable, a soil pattern can be established.

* British Society of Soil Science. Working With Soil – The Professional Competency Scheme. Agricultural Land Classification: England and Wales. How2 sheet 4.2.4. 2018.

9. For moisture balance calculations, *strongly, moderately* and *well developed* structure will equate to *good, moderate* or *poor* structure terms respectively in Table 14 of the guidelines.

10. Pit information in addition to that listed in the table below will be detailed in Section 4.1 and 4.3 if needed.

Obs point	Grid ref. if off intersection	Boring or Pit	Grad. (deg)	Base Depth (cm)	OFFICE USE	Text.	Calc	Matrix colour	Motts./ black ferro. conc. %/ depth	Mott colour or FC if ferro. conc.	Ped face colour	Stns %	Stns type	Porosity	Struct (/F=firm consistence)	Degree of development	SPL depth (cm)	Gleying depth (cm)	SWC	Grade (wetness)	TAv	EAv	StTAv	StEAv	MBW	Grade (Drought. WHEAT)	MBP	Grade (Drought. POTATOES)
1		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
2		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
3		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
4		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
5		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
6		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
7		B	≤7	30		MSL	Y	10YR34				0									17		10					
				62		LFS		10YR56				0		P	MSAB	WK					15	13	10	7				
				120		LFS		10YR66				0		P	SG				I	1	15	13	10	7	63.30	1	9.56	2
				120																	0	0	0	0				
8		B	≤7	30		MSL	Y	10YR34				0									17		10					
				62		LFS		10YR56				0		P	MSAB	WK					15	13	10	7				
				120		LFS		10YR66				0		P	SG				I	1	15	13	10	7	63.30	1	9.56	2
				120																	0	0	0	0				
9		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				40		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
10		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
11		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
12		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
13		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
14		B	≤7	30		MSL	Y	10YR34				0									17		10					
				62		LFS		10YR56				0		P	MSAB	WK					15	13	10	7				
				120		LFS		10YR66				0		P	SG				I	1	15	13	10	7	63.30	1	9.56	2
				120																	0	0	0	0				
15		B	≤7	30		MSL	Y	10YR34				0									17		10					
				62		LFS		10YR56				0		P	MSAB	WK					15	13	10	7				
				120		LFS		10YR66				0		P	SG				I	1	15	13	10	7	63.30	1	9.56	2
				120																	0	0	0	0				
16		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
17		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
18		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
19		P	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				
20		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD					16	8	10	7				
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120																	0	0	0	0				

Obs point	Grid ref. if off intersection	Boring or Pit	Grad. (deg)	Base Depth (cm)	OFFICE USE	Text.	Calc	Matrix colour	Motts./ black ferro. conc. %/ depth	Mott colour or FC if ferro. conc.	Ped face colour	Stns %	Stns type	Porosity	Struct (/F=firm consistence)	Degree of development	SPL depth (cm)	Gleying depth (cm)	SWC	Grade (wetness)	TAv	EAv	StTAv	StEAv	MBW	Grade (Drought. WHEAT)	MBP	Grade (Drought. POTATOES)
21		B	≤7	30		HCL	N	10YR42	0			5	CH						I	2	18		10		42.55	1	10.36	1
				80		SCL		7.5YR56	20/30	10YR58		5	CH	P	MAB	MD					15	10	10	7				
				120		SCL		10YR56	20/80	10YR64		5	CH	P	MPR	MD					15	10	10	7				
				120																	0	0	0	0				
22		B	≤7	30		HCL	N	10YR42	0			5	CH						I	2	18		10		42.55	1	10.36	1
				80		SCL		7.5YR56	20/30	10YR58		5	CH	P	MAB	MD					15	10	10	7				
				120		SCL		10YR56	20/80	10YR64		5	CH	P	MPR	MD					15	10	10	7				
				120																	0	0	0	0				
23		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD					16	8	10	7				
				120																	0	0	0	0				
24		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD					16	8	10	7				
				120																	0	0	0	0				
25		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD					16	8	10	7				
				120																	0	0	0	0				
26		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD					16	8	10	7				
				120																	0	0	0	0				
27		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD					16	8	10	7				
				120																	0	0	0	0				
28		B	≤7	30		C	Y	10YR42				5	CH								17		10					
				45		C		2.5Y64	10/30	10YR56		15	CH	P	MAB	MD	45	30	III	3a	16	8	10	7	26.40	2	8.91	2
				120		C		2.5Y64	15/45	10YR56		15	CH	P	MPR	MD					16	8	10	7				
				120																	0	0	0	0				

Statement of competence - Agricultural land Classification

SES Ltd undertake several dozen Agricultural Land Classification (ALC) or Land Capability Classifications for Agriculture (LCCA-Scotland) surveys a year and have worked on sites up to 1000 ha including housing, roads, solar farm and mineral extraction developments.. We have been undertaking ALC surveys for 25 years and have won many contracts to supply Land Classification reports to local authorities as part of their strategic development plans. A number of our staff have attended the training course Agricultural Land Classification: England and Wales. Working with Soil – The IPSS Professional Competency Scheme. BSSS & DEFRA.

DR ROBIN DAVIES BSc PhD F.I.SoilSci. (Managing Director)

- Fellow of The British Society of Soil Science
- Council Member of The Institute of Professional Soil Scientists for 4 years.
- PhD Soil Physics - Agricultural land drainage - University of Newcastle upon Tyne
- Founder and Managing Director of Soil Environment Services Limited for 25 years.

Selected peer reviewed scientific papers:

* **Soil nitrogen depletion - the threat from soil stockpiling**. Environmental Scientist: Journal of The Institution of Environmental Sciences, 1997.

* **Nitrogen loss from a soil, restored after surface-mining**. Journal of Environmental Quality, 1995

* **The influence of soil factors on the growth of a grass/clover sward on a restored site in Northumberland.** Grass & Forage Science, 1994.

* **The effect of post-restoration cropping regime on some physical properties of a restored soil.** Soil Use & Management, 1994

* **Water availability in a restored soil.** Soil Use & Management, 1992.

* **A laboratory Method for Investigating the Stabilisation of Mole** Channels.J.Agric.Eng.Res.1991.

Louise Tavasso BSc (Hons). (Soil surveyor/ Environmental Consultant)

Member of British Society of Soil Science

Postgraduate short course Contaminated Land Risk assessment – LQM Nottingham University

Worked for Soil Environment Services Limited for 16 years. Environmental consultant with initial work in contaminated land risk assessment and since 2011 as assistant soil surveyor with last three years as lead consultant on agricultural land classification surveys. All work areas have required field survey and identification and description of soils combined with an understanding of soil processes for reporting.

Completed the BSSS Agricultural Land Classification Course – 2021.

Main areas of specialisation

1 Agricultural Land Classification

Soil survey and Agricultural Land Classification for planning applications –, roads, housing, solar parks. Fully conversant with the procedures of the *Agricultural Land Classification of England and Wales, Guidelines and criteria for grading the quality of agricultural land,* 1988, MAFF, London.

2 Soil survey for habitat restoration

Soil survey and nutrient analysis assessment for conversion of farmland to species rich grassland.

3 Contaminated land risk assessment

Phase 1 site survey risk assessment of contaminated land; site investigation, on-site monitoring; risk analysis, modelling and communication; recommendations for Phase 2 and remediation options.

Examples of Agricultural Land Classification (ALC or LCCA Scotland) consultancy work

Kier Mining. Greenburn Opencast Coal Site. Soils and deep peat survey for LCCA report soil resources planning. 2011

Newcastle International Airport Ltd. ALC survey for solar park development. 2021.

Examples of soil survey habitat creation consultancy work

BSG Ecology. Backwork Estate – farmland conversion to wildflower meadow. 2020.

Private garden owner. Soil survey and recommendation for drainage system design. 2021

Examples of contaminated land consultancy work

Numerous risk assessments on petrol stations for hydrocarbon leakages (2006-2019)

Farm building risk assessments for conversion to residential housing (2006-2019)

GENERAL INFORMATION SOURCES

1. ***Agricultural Land Classification of England and Wales***. Revised guidelines and criteria for grading the quality of agricultural land. MAFF. 1988.

2. ***Soil Survey Field Handbook.*** Technical Monograph No.5. Soil Survey of England and Wales.1976.

3. ***Climatological Data for Agricultural Land Classification***, The Met. Office 1989

4. ***Soil Map of England and Wales: 1:250 000***. Soil Survey of England and Wales, Harpenden.

5. ***Soils and Their Use in South-East England.*** Soil Survey of England and Wales,

6. ***Agricultural Land Classification Map*** 1:250 000. MAFF 1983.

7. ***Risk of Flooding:*** https://flood-warning-information.service.gov.uk/long-term-flood-risk

8. ***Geology of Britain Viewer.*** *Reproduced with the permission of the British Geological Survey ©NERC. All rights Reserved*

9. ***Butler, B E.*** *Soil Classification for Soil Survey Monographs on Soil Survey (1980) Clarendon Press, Oxford*

10. ***Munsell Soil Colour Charts***, *Munsell Colour, Grand Rapids* ***1994.***

GLOSSARY

ABBREVIATIONS AND TERMS USED IN SURVEY DATA

Soil pit and auger boring information collected during ALC survey is held on a computer database and is reproduced in this report. Terms used and abbreviations are set out below. These conform to definitions contained in the Soil Survey Field Handbook (Hodgson, 1997).

1. Terms used on computer database, in order of occurrence.

GRID REF: National 100 km grid square and 8 figure grid reference.

LAND USE: At the time of survey

WHT:	Wheat	**SBT:**	Sugar Beet	**HTH:**	Heathland
BAR:	Barley	**BRA:**	Brassicas	**BOG:**	Bog or Marsh
OAT:	Oats	**FCD:**	Fodder Crops	**DCW:**	Deciduous Wood
CER:	Cereals	**FRT:**	Soft and Top Fruit	**CFW:**	Coniferous Woodland
MZE:	Maize	**HRT:**	Horticultural Crops	**PLO:**	Ploughed
OSR:	Oilseed Rape	**LEY:**	Ley Grass	**FLW:**	Fallow (inc. Set aside)
POT:	Potatoes	**PGR:**	Permanent Pasture	**SAS:**	Set Aside (where known)
LIN:	Linseed	**RGR:**	Rough Grazing	**OTH:**	Other
BEN:	Field Beans	**SCR:**	Scrub		

GRDNT: Gradient as estimated or measured by hand-held optical clinometer.

GLEY, SPL: Depth in centimetres to gleying or slowly permeable layer.

AP (WHEAT/POTS): Crop-adjusted available water capacity.

MB (WHEAT/POTS): Moisture Balance. (Crop adjusted AP - crop potential MD)

DRT: Best grade according to soil droughtiness.

If any of the following factors are considered significant, 'Y' will be entered in the relevant column.

MREL:	Microrelief limitation	**FLOOD:**	Flood risk	**EROSN:**	Soil erosion risk
EXP:	Exposure limitation	**FROST:**	Frost prone	**DIST:**	Disturbed land
CHEM:	Chemical limitation				

LIMIT: The main limitation to land quality: The following abbreviations are used.

OC:	Overall Climate	**AE:**	Aspect	**EX:**	Exposure
FR:	Frost Risk	**GR:**	Gradient	**MR:**	Microrelief
FL:	Flood Risk	**TX:**	Topsoil Texture	**DP:**	Soil Depth
CH:	Chemical	**WE:**	Wetness	**WK:**	Workability
DR:	Drought	**ER:**	Erosion Risk	**WD:**	Soil Wetness/Droughtiness

ST: Topsoil Stoniness

TEXTURE: Soil texture classes are denoted by the following abbreviations:-

S:	Sand	**LS:**	Loamy Sand	**SL:**	Sandy Loam
SZL:	Sandy Silt Loam	**CL:**	Clay Loam	**ZCL**	Silty Clay Loam
ZL:	Silt Loam	**SCL:**	Sandy Clay Loam	**C:**	Clay
SC:	Sandy clay	**ZC:**	Silty clay	**OL:**	Organic Loam
P:	Peat	**SP:**	Sandy Peat	**LP:**	Loamy Peat
PL:	Peaty Loam	**PS:**	Peaty Sand	**MZ:**	Marine Light Silts

For the sand, loamy sand, sandy loam and sandy silt loam classes, the predominant size of sand fraction will be indicated by the use of the following prefixes:-

F: Fine (more than 66% of the sand less than 0.2mm)
M: Medium (less than 66% fine sand and less than 33% coarse sand)
C: Coarse (more than 33% of the sand larger than 0.6mm)

The clay loam and silty clay loam classes will be sub-divided according to the clay content: **M:** Medium (< 27% clay) **H:** heavy (27 - 35% clay)

MOTTLE COL: Mottle colour using Munsell notation.

MOTTLE ABUN: Mottle abundance, expressed as a percentage of the matrix or surface described.

F: few <2% **C:** common 2 - 20% **M:** many 20 - 40% **VM:** very many 40%+

MOTTLE CONT: Mottle contrast

F: faint - indistinct mottles, evident only on close inspection
D: distinct - mottles are readily seen
P: Prominent - mottling is conspicuous and one of the outstanding features of the horizon.

PED. COL: Ped face colour using Munsell notation.

GLEY: If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

STONE LITH: Stone Lithology - One of the following is used.

HR:	All hard rocks and stones	**SLST:**	Soft oolitic or dolimitic limestone
CH:	Chalk	**FSST:**	Soft, fine grained sandstone
ZR:	Soft, argillaceous, or silty rocks	**GH:**	Gravel with non-porous (hard) stones
MSST:	Soft, medium grained sandstone	**GS:**	Gravel with porous (soft) stones
SI:	Soft weathered igneous or metamorphic rock		

Stone contents are given in % by volume for sizes >2cm, >6cm and total stone >2mm.

STRUCT: The degree of development, size and shape of soil peds are described using the following notation

Degree of development	**WA:**	Weakly developed Adherent	**WK:**	Weakly developed
	MD:	Moderately developed	**ST:**	Strongly developed
Ped size	**F:**	Fine	**M:**	Medium
	C:	Coarse	**VC:**	Very coarse
Ped Shape	**S:**	Single grain	**M:**	Massive
	GR:	Granular	**AB:**	Angular blocky
	SAB:	Sub-angular blocky	**PR:**	Prismatic
	PL:	Platy		

CONSIST: Soil consistence is described using the following notation:

L:	Loose	**VF:**	Very Friable	**FR:**	Friable	**FM:**	Firm
VM:	Very firm	**EM:**	Extremely firm			**EH:**	Extremely Hard

SUBS STR: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G:** Good **M:** Moderate **P:** Poor

POR: Soil porosity. If a soil horizon has poor porosity with less than 0.5% biopores >0.5mm, a 'Y' will appear in this column.

IMP: If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

SPL: Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

CALC: If the soil horizon is calcareous with naturally occurring calcium carbonate exceeding 1% a 'Y' will appear this column.

2. Additional terms and abbreviations used mainly in soil pit descriptions.

STONE ASSESSMENT:

V:	Visual	**S:**	Sieved	**D:**	Displacement

MOTTLE SIZE:

EF:	Extremely fine <1mm	**M:**	Medium 5-15mm
VF:	Very fine 1-2mm>	**C:**	Coarse >15mm
F:	Fine 2-5mm		

MOTTLE COLOUR: May be described by Munsell notation or as ochreous (OM) or grey (GM).

ROOT CHANNELS: In topsoil the presence of 'rusty root channels' might also be noted as RRC.

MANGANESE CONCRETIONS: Assessed by volume

N:	None		**M:**	Many	20-40%
F:	Few	<2%	**VM:**	Very Many	>40%
C:	Common	2-20%			

POROSITY:

P:	Poor - less than 0.5% biopores at least 0.5mm in diameter
G:	Good - more than 0.5% biopores at least 0.5mm in diameter

ROOT ABUNDANCE:

The number of roots per $100cm^2$:		Very Fine and Fine	Medium and Coarse
F:	Few	1-10	1 or 2
C:	Common	10.25	2 - 5
M:	Many	25-200	>5
A:	Abundant	>200	

ROOT SIZE

VF:	Very fine	<1mm	**M:**	Medium	2 - 5mm
F:	Fine	1-2mm	**C:**	Coarse	>5mm

HORIZON BOUNDARY DISTINCTNESS:

Sharp:	<0.5cm	**Gradual:**	6 - 13cm
Abrupt:	0.5 - 2.5cm	**Diffuse:**	>13cm
Clear:	2.5 - 6cm		

HORIZON BOUNDARY FORM: Smooth, wavy, irregular or broken.*

* See Soil Survey Field Handbook (Hodgson, 1997) for details.