Soil Environment Services Ltd

AGRICULTURAL LAND CLASSIFICATION

Peel NRE Developments Acquisitions No 1 Ltd

Fiddlers Ferry Power Station
Warrington

Soil Environment Services Ltd
April 2023

Our Ref: SES/PNRE/FFPS/#1 **Date: 5th April 2023**

Client:

Peel NRE Developments Acquisitions No. 1 Ltd
Venus Building
1 Old Park Trafford City
Manchester
M41 7HA

AGRICULTURAL LAND CLASSIFICATION

Fiddlers Ferry Power Station
Warrington

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

Louise Tavasso BSc (Hons) M.I.SoilSci
Environmental Consultant

Approved by:

Dr Robin S Davies BSc PhD F.I.SoilSci PGC *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
Unit 8, Stocksfield Hill, Stocksfield, Northumberland, NE43 7TN
Tel: 01661 844 827, Email: rd@soilenvironmentservices.co.uk
www.soilenvironmentservices.co.uk

CONTENTS

1. INTRODUCTION

An Agricultural Land Classification (ALC) has been carried out on 43 ha of land at Fiddlers Ferry Power Station (Drawing 1). The site is centred on OS Grid Ref. 355059, 386353 on the eastern area of the site and 353861, 386639 on the area at the north-west.

The survey was conducted on the 21st March 2023 and classified the land into one or more of the below grades (see Drawing 1). On the survey date, the site was in part agricultural use and part grass.

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 provisional map indicated the site is mapped as Urban. A detailed survey bounding the west of the site grades the land as majority 3b.

2. CLIMATIC LIMITATIONS

2.1 Overall climate

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

Table 1 a Eastern area Climatological information[3]		
Factor	**Units**	**Value**
Altitude AOD	m	15
Accumulated temperature	day°C (Jan-June)	1433.2
Average Annual Rainfall	mm	800.1
Field Capacity Days	days	190.2
Moisture Deficit Wheat	mm	91.1
Moisture Deficit Potatoes	mm	79.3
Overall climate ALC Grade	Grade 1	

Table 1b Land at the north-west Climatological information[3]		
Factor	**Units**	**Value**
Altitude AOD	m	20
Accumulated temperature	day°C (Jan-June)	1433.3
Average Annual Rainfall	mm	808.5
Field Capacity Days	days	191.7
Moisture Deficit Wheat	mm	90.0
Moisture Deficit Potatoes	mm	77.9
Overall climate ALC Grade	Grade 1	

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

4 SOIL LIMITATIONS

4.1 Texture and structure

The topsoil textures noted across the site were typically sandy clay loam, medium or heavy clay loam over clay subsoils. Subsoil structure was generally moderate medium subangular blocky over coarse prismatic. All soils tested were non-calcareous.

Soil wetness is the main limitation on this site. All the soils have gleying within 40 cm of the surface. Soils that are slowly permeable above 52 cm fall into Wetness Class IV and soils with a SPL below 52 cm are Wetness Class III.

The site has previously been mapped as having soils of the following Association:
The Salop Association soils are mapped as: *Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Associated with similar well drained soils, some over gravel*. **(*https://www.landis.org.uk/*)**

Superficial Geology 1:50 000 scale superficial deposits description:
Majority of the site: *Till, Devensian - Diamicton*
North-west of the site: *Glaciofluvial Deposits, Devensian - Sand and gravel.*

Bedrock Geology 1:50 000 scale bedrock geology description*:*
Eastern area- *Wilmslow Sandstone Formation - Sandstone.*
North-west- *Chester Formation - Sandstone, pebbly (gravelly)*

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

The combination of Wetness Class IV for the majority of the soils (see Appendix A) with Field Capacity Days of 190.2-191.7 and a topsoil texture of sandy clay loam, medium or heavy clay loam results in an ALC Grade of 3b. Soils with a Wetness Class of III result in ALC Grade 3a for medium or sandy clay loam or 3b for heavy clay loam topsoil.

5.2. Droughtiness

The Available Water Capacity which subsequently when considered with respect to the Moisture Deficit for wheat and potatoes results in no significant droughtiness limitation for the site.

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/3b land – Wetness Limitation

The combination of Wetness Class IV for the majority of the soils (see Appendix A) with Field Capacity Days of 190.2-191.7 and a topsoil texture of sandy clay loam, medium or heavy clay loam results in an ALC Grade of 3b. Soils with a Wetness Class of III result in ALC Grade 3a for medium or sandy clay loam or 3b for heavy clay loam topsoil.

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			
3a	13	30.23	Wetness
3b	30	69.77	Wetness
4			
5			
Non-agricultural land			
Total	43	100%	

DRAWING 1

ALC Grade

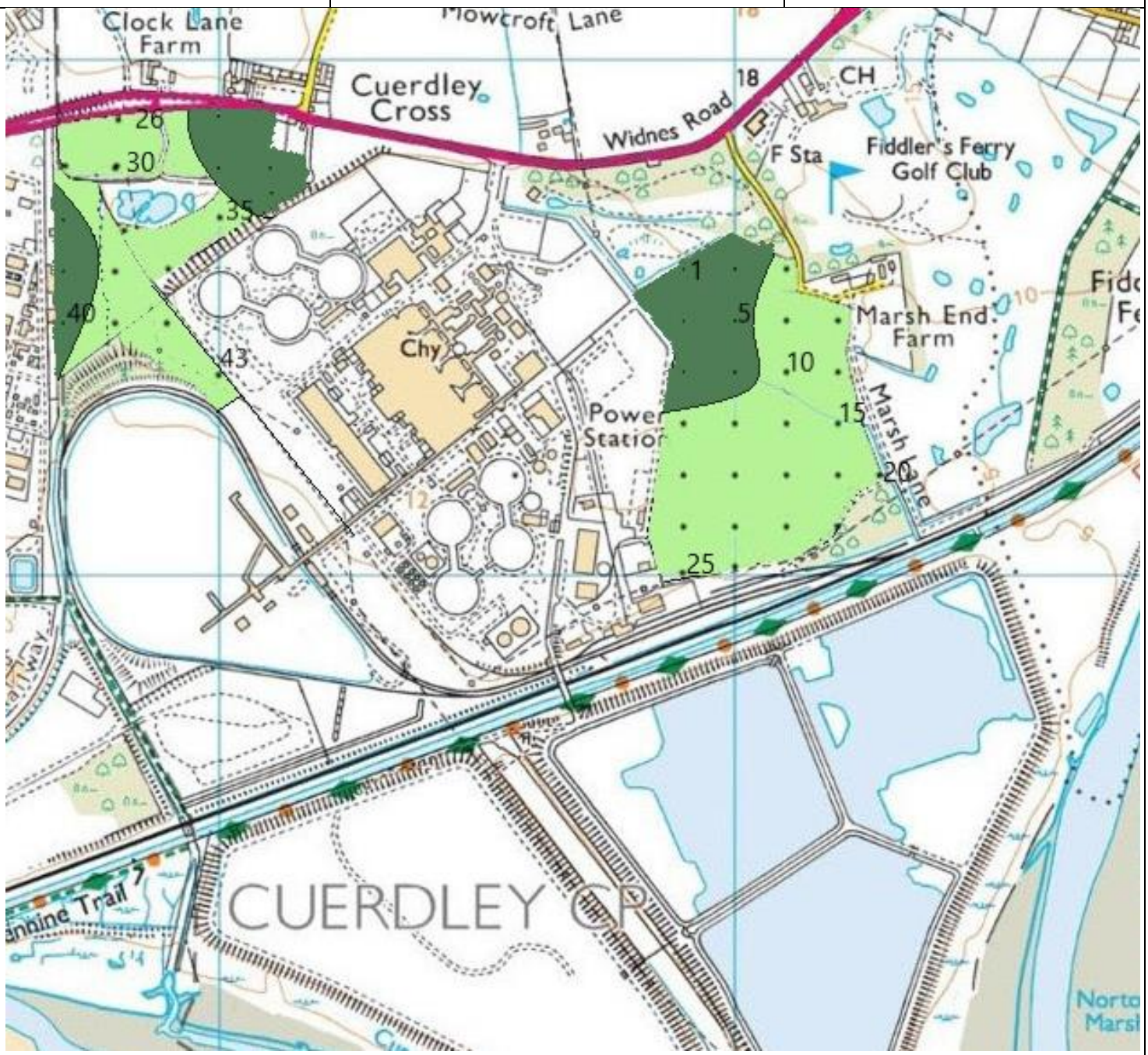
Key

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: 05/04/2023



Ordnance Survey copy licence PMR0046161

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	15		MCL	N	10YR41				0					65	15	III	3a	18		1		55.98	1	31.14	1
				65		HCL		10YR42	10/15	10YR56		5	HR	P	MSAB	MD					16	10	1	0.5				
				120		SCL		10YR43	20/65	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
2		B	≤7	15		MCL	N	10YR41				5	HR				75	15	III	3a	18		1		51.38	1	25.12	1
				75		SCL		10YR42	25/15	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SCL		10YR41	15/75	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
3		B	≤7	25		SCL	N	7.5YR42				5	HR				50	25	IV	3b	17		1		51.86	1	25.59	1
				50		SCL		7.5YR43	10/25	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SCL		7.5YR53	10/50	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
4		B	≤7	25		SCL	N	7.5YR42				0					55	25	III	3a	17		1		53.86	1	27.59	1
				55		SCL		7.5YR43	5/25	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SCL		7.5YR53	10/55	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
5		B	≤7	25		SCL	N	7.5YR42				0					55	25	III	3a	17		1		61.43	1	33.74	1
				55		HCL		7.5YR43	5/25	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		SCL		7.5YR53	10/55	10YR56		0		P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
6		B	≤7	25		MCL	N	7.5YR43				0					50	25	IV	3b	18		1		60.61	1	36.24	1
				50		HCL		7.5YR43	5/25	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		HCL		7.5YR53	10/50	10YR56		5	HR	P	CPR	MD					16	10	1	0.5				
				120																	0	0	0	0				
7		B	≤7	25		MCL	N	7.5YR42				5	HR				50	25	IV	3b	18		1		56.61	1	32.24	1
				50		MCL		7.5YR43	10/25	10YR56		5	HR	P	MSAB	MD					16	10	1	0.5				
				120		HCL		7.5YR53	10/50	10YR56		5	HR	P	CPR	MD					16	10	1	0.5				
				120																	0	0	0	0				
8		B	≤7	25		SCL	N	7.5YR43				0					58	25	III	3a	17		1		61.43	1	34.04	1
				58		MCL		7.5YR43	5/25	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		SCL		7.5YR53	5/58	10YR56		0		P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
9		B	≤7	30		MZCL	N	10YR42				0					55	30	III	3a	19		1		51.24	1	38.89	1
				55		HCL		10YR53				5	HR	P	MSAB	MD					16	10	1	0.5				
				120		C		10YR53	5/55	10YR56		5	HR	P	CPR	MD					16	8	3	2				
				120																	0	0	0	0				
10		B	≤7	28		MCL	N	10YR42				0					50	28	IV	3b	18		1		48.33	1	34.14	1
				50		SCL		7.5YR53	10/28	10YR46		0		P	MSAB	MD					15	10	1	0.5				
				120		SC		10YR42	15/50	10YR56		0		P	CPR	MD					15	8	1	0.5				
																					0	0	0	0				
11		B	≤7	25		MCL	N	10YR42				0					50	25	IV	3b	18		1		49.93	1	35.74	1
				50		HCL		7.5YR53	15/25	10YR46		0		P	MSAB	MD					16	10	1	0.5				
				120		SC		10YR42	15/50	10YR56		0		P	CPR	MD					15	8	1	0.5				
																					0	0	0	0				
12		B	≤7	28		MCL	N	7.5YR42				0					50	28	IV	3b	18		1		55.33	2	34.14	1
				50		SCL		10YR41	10/28	10YR56		0		P	MSAB	MD					15	10	1	0.5				
				120		SC		10YR41	15/50	10YR56		0		P	CPR	MD					15	8	1	0.5				
				120																	0	0	0	0				
13		P	≤7	28		MCL	N	10YR32				0					50	28	IV	3b	18		1		50.53	1	36.34	1
				50		HCL		10YR53	5/28	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		SC		7.5YR53	15/50	10YR56		0		P	CPR	MD					15	8	1	0.5				
				120																	0	0	0	0				
14		B	≤7	20		MCL	N	7.5YR44				0					35	20	IV	3b	18		1		48.93	1	36.74	1
				35		HCL		7.5YR53	15/20	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		C		10YR53	15/35	10YR56		0		P	CPR	MD					16	8	1	0.5				
																					0	0	0	0				
15		B	≤7	25		MCL	N	10YR43				0					50	25	IV	3b	18		1		49.93	1	35.74	1
				50		HCL		7.5YR53	10/25	10YR46		0		P	MSAB	MD					16	10	1	0.5				
				120		SC		7.5YR42	15/50	10YR56		0		P	CPR	MD					15	8	1	0.5				
																					0	0	0	0				
16		B	≤7	28		MCL	N	7.5YR42				0					50	28	IV	3b	18		1		62.33	1	34.14	1
				50		SCL		10YR42	10/28	10YR56		0		P	MSAB	MD					15	10	1	0.5				
				120		SCL		10YR41	10/50	10YR56		0		P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
17		B	≤7	25		HZCL	N	10YR32				0					55	25	III	3b	19		1		52.43	1	38.24	1
				50		HCL		10YR53	10/25	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		SC		7.5YR53	15/50	10YR56		0		P	CPR	MD					15	8	1	0.5				
				120																	0	0	0	0				
18		B	≤7	25		MZCL	N	10YR31				0					50	25	IV	3b	19		1		49.93	1	37.74	1
				50		SCL		10YR42	5/25	10YR56		0		P	MSAB	MD					15	10	1	0.5				
				120		C		5YR43	5/50	10YR56		0		P	CPR	MD					16	8	1	0.5				
				120																	0	0	0	0				
19		B	≤7	25		MZCL	N	10YR32				0					50	25	IV	3b	19		1		49.93	1	37.74	1
				50		SCL		10YR53	5/25	10YR56		0		P	MSAB	MD					15	10	1	0.5				
				120		C		5YR43	5/50	10YR56		0		P	CPR	MD					16	8	1	0.5				
				120																	0	0	0	0				
20		B	≤7	25		MZCL	N	10YR32				0					50	25	IV	3b	19		1		52.43	1	40.24	1
				50		HCL		10YR53	5/25	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		C		5YR43	10/50	10YR56		0		P	CPR	MD					16	8	1	0.5				
				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	20		MZCL	N	7.5YR42				0					50	20	IV	3b	19		1		47.93	1	35.74	1
				50		SCL		7.5YR42	5/25	10YR56		0		P	MSAB	MD					15	10	1	0.5				
				120		SCL		5YR43	10/50	10YR56		0		P	CPR	MD					16	8	1	0.5				
				120																	0	0	0	0				
22		B	≤7	22		MCL	N	7.5YR43				0					50	22	IV	3b	18		1		60.53	1	32.34	1
				50		SCL		10YR42	5/22	10YR56		0		P	MSAB	MD					15	10	1	0.5				
				120		SCL		10YR41	10/50	10YR56		0		P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
23		B	≤7	25		MZCL	N	10YR32				0					50	25	IV	3b	19		1		66.43	1	40.24	1
				50		HCL		7.5YR53	5/25	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		HCL		5YR43	15/50	10YR56		0		P	CPR	MD					16	10	1	0.5				
				120																	0	0	0	0				
24		B	≤7	25		MZCL	N	10YR32				0					50	25	IV	3b	19		1		66.43	1	40.24	1
				50		HCL		10YR53	5/25	10YR56		0		P	MSAB	MD					16	10	1	0.5				
				120		HCL		5YR43	10/50	10YR56		0		P	CPR	MD					16	10	1	0.5				
				120																	0	0	0	0				
25		B	≤7	20		MZCL	N	7.5YR42				0					50	20	IV	3b	19		1		53.93	1	41.74	1
				50		HZCL		7.5YR53	5/25	10YR56		0		P	MSAB	MD					17	10	1	0.5				
				120		SCL		5YR43	10/50	10YR56		0		P	CPR	MD					16	8	1	0.5				
				120																	0	0	0	0				
26		B	≤7	22		MZCL	N	7.5YR42				0					50	22	IV	3b	19		1		54.33	1	42.14	1
				50		HZCL		7.5YR53	10/22	10YR56		0		P	MSAB	MD					17	10	1	0.5				
				120		SCL		5YR43	15/50	10YR56		0		P	CPR	MD					16	8	1	0.5				
				120																	0	0	0	0				
27		B	≤7	25		MCL	N	10YR41				0					45	25	IV	3b	18		1		57.44	1	31.42	1
				45		SCL		10YR53	25/25	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		5YR43	30/45	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
28		B	≤7	25		MCL	N	10YR42				5	HR				55	25	III	3a	18		1		55.32	1	29.30	1
				55		SCL		10YR53	20/25	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		5YR43	20/55	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
29		B	≤7	25		HZCL	N	7.5YR31				0					55	25	IV	3b	19		1		56.86	1	32.87	1
				55		SC		7.5YR32	20/25	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		5YR43	25/55	10YR56		10	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
30		B	≤7	30		HCL	N	7.5YR32				5	HR				60	30	III	3b	18		1		57.59	1	31.42	1
				60		SCL		7.5YR42	5/30	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				70		SC		7.5YR51	15/60	10YR56		0		P	CPR	MD					15	10	1	0.5				
				120		C		10YR41	25/70	10YR56		0		P	CPR	MD					16	8	1	0.5				
31		B	≤7	28		MCL	N	10YR41				0					55	28	III	3a	18		1		58.55	1	32.53	1
				55		SCL		10YR53	15/28	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		5YR43	20/55	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
32		B	≤7	28		MCL	N	7.5YR32				5	HR				60	28	III	3a	18		1		51.41	1	33.19	1
				60		HCL		7.5YR53	10/28	10YR56		5	HR	P	MSAB	MD					16	10	1	0.5				
				120		SCL		5YR43	10/60	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
33		B	≤7	30		MCL	N	7.5YR32				5	HR				60	30	III	3a	18		1		48.99	1	27.67	1
				60		MCL		7.5YR53	5/30	10YR51		15	HR	P	MSAB	MD					16	10	1	0.5				
				120		SCL		5YR43	10/60	10YR56		15	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
34		B	≤7	30		HZCL	N	7.5YR32				5	HR				60	30	III	3b	19		1		51.84	1	30.10	1
				55		MCL		7.5YR42	5/30	10YR51		15	HR	P	MSAB	MD					16	10	1	0.5				
				120		SCL		5YR43	15/55	10YR56		15	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
35		B	≤7	30		HCL	N	7.5YR32				5	HR				55	30	III	3b	18		1		53.83	1	31.77	1
				55		SCL		7.5YR42	2/30	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				70		SC		7.5YR51	20/55	10YR56		0		P	CPR	MD					15	10	1	0.5				
				120		C		10YR41	25/70	10YR56		0		P	CPR	MD					16	8	1	0.5				
36		B	≤7	28		MCL	N	10YR41				5	HR				50	28	IV	3b	18		1		56.17	1	30.15	1
				50		MZCL		7.5YR53	15/28	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		5YR43	20/50	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
37		B	≤7	25		MCL	N	7.5YR32				5	HR				60	25	III	3a	19		1		49.17	1	30.27	1
				60		HCL		7.5YR52	10/25	10YR56		10	HR	P	MSAB	MD					16	10	1	0.5				
				120		SCL		7.5YR43	20/60	10YR56		20	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
38		B	≤7	28		MCL	N	10YR42				5	HR				45	28	IV	3b	18		1		56.17	1	30.15	1
				45		MZCL		10YR53	15/28	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		5YR43	15/45	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
39		B	≤7	28		MCL	N	10YR41				5	HR				50	28	IV	3b	18		1		56.17	1	30.15	1
				50		MZCL		7.5YR53	15/28	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		5YR43	20/50	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
40		B	≤7	25		MZCL	N	7.5YR32				5	HR				60	25	III	3a	19		1		46.82	1	27.65	1
				60		HCL		7.5YR53	10/25	10YR56		15	HR	P	MSAB	MD					16	10	1	0.5				
				120		SCL		7.5YR42	10/60	10YR56		20	HR	P	CPR	MD					15	10	1	0.5				
				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)
41		B	≤7	25		HCL	N	7.5YR32				5	HR				60	25	III	3b	18		1		46.79	1	27.90	1
				60		HCL		7.5YR52	10/25	10YR56		10	HR	P	MSAB	MD					16	10	1	0.5				
				120		SCL		7.5YR53	20/60	10YR56		20	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
42		B	≤7	28		SCL	N	10YR41				5	HR				50	28	IV	3b	17		1		53.51	1	27.49	1
				50		MZCL		7.5YR42	15/28	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		5YR42	20/50	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				120																	0	0	0	0				
43		B	≤7	28		SCL	N	10YR41				5	HR				50	28	IV	3b	17		1		53.51	1	27.49	1
				50		MZCL		7.5YR42	15/28	10YR56		5	HR	P	MSAB	MD					15	10	1	0.5				
				120		SC		7.5YR42	20/50	10YR56		5	HR	P	CPR	MD					15	10	1	0.5				
				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 North-Western 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.