



AGRICULTURAL LAND CLASSIFICATION LAND TO THE NORTH OF MAELOR GASWORKS

CLIENT: NOVUS RENEWABLE SERVICES LTD
PROJECT: LAND TO THE NORTH OF MAELOR GASWORKS
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1. EXECUTIVE SUMMARY

- 1.1 This report assesses the Agricultural Land Classification (ALC) grading of 7.9Ha, of land to the north of Maelor Gasworks, Wrexham.
- 1.2 The limiting factor is found to be variously soil wetness, soil droughtiness and soil depth. The limitations of the land have been significantly affected by the previous use of the site as part of ROF Wrexham.
- 1.3 The land is graded as follows:

Grade 3b:	6.0Ha
Grade 4:	0.8Ha
Grade 5:	1.1Ha

2. INTRODUCTION

- 2.1 Amet Property Ltd have been instructed by Novus Renewable Services Ltd to produce an Agricultural Land Classification (ALC) report on a 7.9-hectare site to the north of Maelor Gasworks in support of a planning application for a solar farm with associated infrastructure
- 2.2 The report's author is James Fulton BSc (Hons) MRICS FAAV who has worked as a chartered surveyor, agricultural valuer, and agricultural consultant since 2004, has a degree in agriculture which included modules on soils and over 10 years' experience in advising farmers on soil structure and cultivation methods and in producing agricultural land classification reports.
- 2.3 The report is based on a site visit conducted on the 10th of August 2022. During the site visit conditions were dry and sunny. During the inspection trial pits were dug to a depth of 120cm (where possible). In addition to the trial pits an augur was used to take approximately one sample per hectare on the proposed development site to a depth of 120cm (where possible) with smaller trial pits at some of these locations to confirm soil structure and colour where it was not clear from the augur samples. A plan of augur points and trial pits can be found at **appendix 1**. The trial pit locations were selected as they were representative of the soils found on site. Descriptions of soils have been recorded based on the soil survey field handbook¹. Colours are described using Munsell Colours².
- 2.4 During the sampling conditions were difficult with the subsoil state described as dry making removal and examination of samples difficult. The topsoils were generally dry and so a lot of water had to be added to hand texture samples and samples sent for lab analysis to confirm texture.
- 2.5 The site extends 7.9Ha across 3 fields/part fields all down to permanent pasture and used for grazing. The sample points range from 26m – 35m AOD with the land generally sloping down from south to north with a gentle slope. The site formed part of the munitions storage facility associated with Royal Ordnance Factory (ROF) Wrexham during WW2. There is still substantial above ground and below ground evidence of this former use.
- 2.6 Further information has been obtained from the MAGIC website, the Soil Survey of England and Wales, the British Geological Survey, the Meteorological Office and the Welsh Assembly Government predictive ALC tool
- 2.7 The collected information has been judged against the Ministry of Agriculture Fisheries and Food Agricultural Land Classification of England and Wales revised guidelines and criteria for grading the quality of agricultural land.

¹ Hodgson, JM (1997) Soil Survey Field Handbook

² Munsell Color (2009) Munsell Soil Color Charts

- 2.8 The principal factors influencing agricultural production are climate, site and soil and the interaction between them MAFF (1988) & Natural England (2012)³.

3. PUBLISHED INFORMATION

- 3.1 The British Geological Survey 1:50,000 scale map shows the bedrock geology to be Kinnerton Sandstone Formation – Sandstone. The superficial geology is described as Till, Devensian – Diamicton.
- 3.2 The national soils map shows most of the site to be Salop Association – Slowly permeable, seasonally waterlogged reddish fine loamy over clayey soils with the area nearest to the watercourse to the north described as Compton Association – Stoneless mostly reddish clayey soils affected by groundwater.
- 3.3 The Welsh Assembly Government Predictive ALC map predicts the land identified as Salop Association to be Grade 3a and the land identified as Compton Association as Grade 3b.

³ MAFF (1988) - *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land*. MAFF Publications

Natural England (2012) - *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land*, Second Edition

4. CLIMATE

- 4.1 Climate has a major, and in places overriding, influence on land quality affecting both the range of potential agricultural uses and the cost and level of production.
- 4.2 There is published agro-climatic data for England and Wales provided by the Meteorological Office, such data for the subject site is listed in the table below.

Agro-Climatic Data – Full details can be found at **appendix 2**

Grid Reference	338282 348497
Altitude (ALT)	29.89
Average Annual Rainfall (AAR)	730.93
Accumulated Temperature - Jan to June (ATO)	1446.60
Duration of Field Capacity (FCD)	170.03
Moisture Deficit Wheat	104.26
Moisture Deficit Potatoes	95.78

- 4.3 The main parameters used in assessing the climatic limitation are average annual rainfall (AAR), as a measure of overall wetness; and accumulated temperature (ATO), as a measure of the relative warmth of a locality.
- 4.4 The AAR and ATO provide no climatic limitation to grade.
- 4.5 Most of the site is identified as flood risk Zone A – Considered to be at little or no risk of fluvial or coastal/tidal flooding. Small areas to the north (alongside the river) are identified as Zone C2 – floodplain without significant flood defence infrastructure and Zone B – Areas known to have flooded in the past. There was no evidence of significant flood events on site, and it is not considered that flooding is the limiting factor to land grade

5. STONINESS

- 5.1 There were virtually no naturally occurring stones on site and no stones of any sort in the topsoil. Stoniness is not considered to be a limiting factor to land grade.

6. GRADIENT

- 6.1 The steepest areas of the site are only a gentle slope with gradient never representing the most limiting factor to land grade.

7. SOILS

- 7.1 The whole site appears to have been previously disturbed and restored as part of the works associated with ROF Wrexham. In places this manifests as extremely shallow soils over concrete and in others it is grey (10YR 5/2) heavy clay loam with a coarse angular blocky structure from the surface to 120cm and a variety of combinations in between.
- 7.2 Topsoils found on site ranged from medium sandy loam through medium clay loam to heavy clay loam, some of which appeared to be genuine topsoil and others subsoil that had been used as topsoil during restoration work.
- 7.3 Where soils were very shallow over what appeared to be concrete from previous land use, soil depth was a limiting factor, an assessment can be found at **appendix 4**.

INTERACTIVE FACTORS

8. WETNESS

- 8.1 An assessment of the wetness class of each sample point was made based on the flow chart at Figure 6 in the MAFF guidance. The wetness class and topsoil texture were then assessed against Table 6 of the MAFF guidance to determine the ALC grade according to wetness. The wetness assessment can be found at **appendix 4**.
- 8.2 Where soils were shallow there was no slowly permeable layer or gleyed horizon and so no real wetness limitation.
- 8.3 Where soils were deeper and had a higher proportion of clay in both topsoils and subsoils there was a slowly permeable layer and gleyed horizon from around 35cm which results in an assessment of wetness class IV and where the topsoil is either medium or heavy clay loam a limit of Grade 3b.
- 8.4 Wetness was found to be the limiting factor across 6 of the 9 sample points.

9. DROUGHTINESS

- 9.1 Droughtiness limits are defined in terms of moisture balance for wheat and potatoes using the formula:

$$MB \text{ (Wheat)} = AP \text{ (Wheat)} - MD \text{ (Wheat)}$$

and

$$MB \text{ (Potatoes)} = AP \text{ (Potatoes)} - MD \text{ (Potatoes)}$$

Where:

MB = Moisture Balance

AP = Crop Adjusted available water capacity

MD = Moisture deficit

- 9.2 Moisture deficit for wheat and potatoes can be found in the agro-climatic data and are as follows:

$$MD \text{ (Wheat)} = 104.26$$

$$MD \text{ (Potatoes)} = 95.78$$

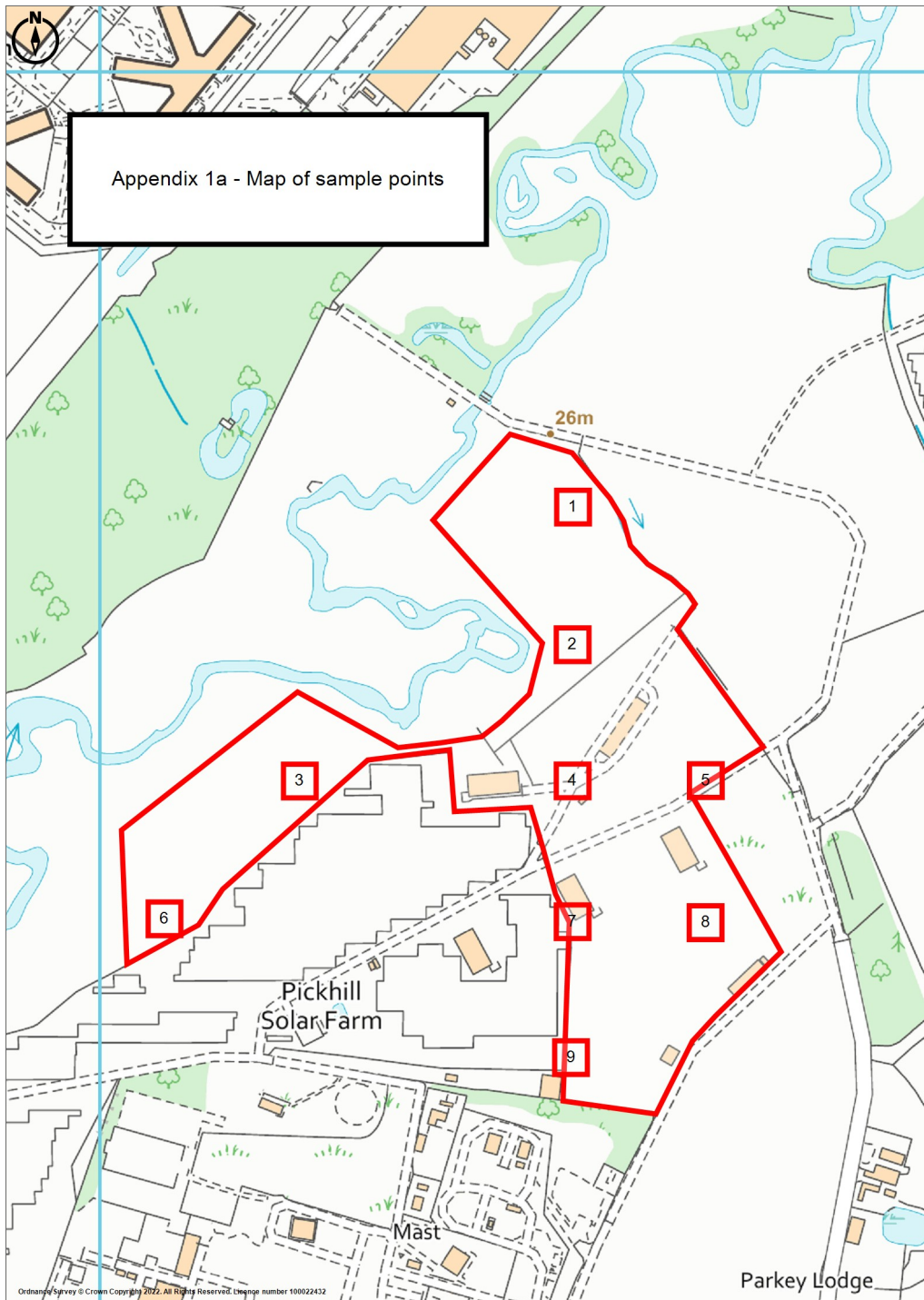
- 9.3 Crop adjusted available water is calculated by reference to the total available water and easily available water which is calculated by reference to soil texture and structural condition and the stone content.
- 9.4 The moisture balance was calculated for all sample points. Where the soils were deep there was no limitation caused by droughtiness. Where the soils

were shallow the land was limited by droughtiness to Grade 3a, 3b or grade 4. Where the droughtiness limit was Grade 3a it was not the most limiting factor.

- 9.5 The wetness assessment can be found at **appendix 4**.

10. AGRICULTURAL LAND CLASSIFICATION

- 10.1 The Agricultural Land Classification provides a framework for classifying land according to which its physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can operate in one or more of four principal ways: they may affect the range of crops that can be grown, the level of yield, the consistency of yield and the cost of obtaining it.
- 10.2 The principle physical factors influencing agricultural production are climate, site and soil and the interactions between them which together form the basis for classifying land into one of 5 grades; grade 1 being of excellent quality and grade 5 being land of very poor quality. Grade 3 land, which constitutes approximately half of all agricultural land in England and Wales is divided into 2 subgrades – 3a and 3b. A full definition of all of the grades can be found at **appendix 5**.
- 10.3 This assessment sets out that the site is limited in different areas by droughtiness, wetness and soil depth.
- 10.4 The breakdown of land by classification is:
- | | |
|-----------|-------|
| Grade 3b: | 6.0Ha |
| Grade 4: | 0.8Ha |
| Grade 5: | 1.1Ha |
- 10.5 A plan of the land grading can be found at **appendix 6**.



Appendix 2 – Climatic Data

Site Details: Maelor

Grid reference (centre of site): 338282 348497

Altitude: Mean 29.89m AOD

Climatic data from surrounding locations:

Grid Reference	ALT	AAR	LR_AAR	ASR	ATO	ATS	MDW	MDP	FCD
3350 3450	80	771	1.1	360	1422	2330	97	87	181
3350 3500	65	754	1.1	340	1403	2309	100	89	175
3400 3450	29	734	0.6	340	1445	2358	104	95	169
3400 3500	21	740	0	340	1452	2366	104	96	170

Altitude Adjusted

Grid Reference	AAR	ATO	FCD	MDW	MDP	Proximity Adjustment
3350 3450	715.88	1479.13	173.03	106.00	98.82	10.96%
3350 3500	715.38	1443.03	169.42	106.31	97.28	21.99%
3400 3450	734.53	1443.99	169.08	103.87	94.83	18.52%
3400 3500	740.00	1441.87	170.00	103.09	94.78	48.54%

Appendix 3a - Sample point data

[illegible]

Appendix 3b – Trial Pit Descriptions

Sample Point No. 6		
Horizon 1	0-45cm (Brown 10YR 4/3) medium sandy loam stoneless topsoil with weak fine sub angular blocky structure.	
Horizon 2	45cm Impenetrable due to concrete infill from previous land uses, broken pieces can be removed but solid underneath	
Horizon 3	N/A	
Pictures		
Horizon 1	Horizon 2	Horizon 2
		

Sample Point No. 4		
Horizon 1	0-5cm (Brown 10YR 4/3) heavy clay loam stoneless topsoil with weak fine sub angular blocky structure	
Horizon 2	5cm Impenetrable due to rubble infill from previous land uses, broken pieces can be removed but solid underneath	
Horizon 3	N/A	
Pictures		
Horizon 1	Horizon 2	Horizon 2
		

ANALYTICAL REPORT

Report Number	28975-22	W250	AMET PROPERTY
Date Received	11-AUG-2022		HENWICK BARN
Date Reported	22-AUG-2022		BULWICK
Project	SOIL		CORBY
Reference	AMET PROPERTY		NORTHANTS
Order Number			NN17 3DU

Laboratory Reference		SOIL573524	SOIL573525	SOIL573526						
Sample Reference		WREX TS1	WREX TS6	WREX TS8						
Determinand	Unit	SOIL	SOIL	SOIL						
Coarse Sand 2.00-0.63mm	% w/w	4	14	3						
Medium Sand 0.63-0.212mm	% w/w	6	20	15						
Fine Sand 0.212-0.063mm	% w/w	15	26	16						
Silt 0.063-0.002mm	% w/w	48	25	34						
Clay <0.002mm	% w/w	27	15	32						
Stones >50mm	% w/w	0.0	0.0	0.0						
Stones 20-50mm	% w/w	1.5	0.0	0.0						
Stones 2-20mm	% w/w	1.6	1.6	0.3						
Organic Matter LOI	% w/w	7.6	5.7	7.6						
Neutralising Value as CaCO3 eq.	% w/w	1.3	2.6	<1						
Neutralising Value as CaO eq.	% w/w	<1	1.5	<1						
Textural Class **		HCL	mSL	HCL						

Notes	
Analysis Notes	The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated.
Document Control	This test report shall not be reproduced, except in full, without the written approval of the laboratory.

ANALYTICAL NOTES		
Report Number	28975-22	W250 AMET PROPERTY
Date Received	11-AUG-2022	HENWICK BARN
Date Reported	22-AUG-2022	BULWICK
Project	SOIL	CORBY
Reference	AMET PROPERTY	NORTHANTS
Order Number		NN17 3DU
Notes		
Reported by	** Please see the attached document for the definition of textural classes. <i>Linaben Patel</i> Natural Resource Management, a trading division of Cawood Scientific Ltd. Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS Tel: 01344 886338 Fax: 01344 890972 email: enquiries@nrm.uk.com	

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 4 - Assessment of limiting factors

Sample No	Wetness Assesment			Grade	Droughtiness Assessment		Grade	Grade	Grade
	Depth to		Wetness	According to	MB Wheat	MB Potato	according to	according to	according to
	SPL	Gley	Class	Wetness			Droughtiness	Soil Depth	most limiting Factor
1	35	<40	IV	3b	52.74	23.22	1	1	3b
2	35	<40	IV	3b	52.74	23.22	1	1	3b
3	35	<40	IV	3b	52.74	23.22	1	1	3b
4			I	1	-95.76	-87.28	4	5	5
5			I	1	-53.26	-44.78	4	3a	4
6			I	1	-27.76	-19.28	3b	2	3b
7	35	<40	IV	3b	-17.26	-8.78	3a	1	3b
8	35	<40	IV	3b	52.74	23.22	1	1	3b
9	35	<40	IV	3b	-17.26	-8.78	3a	2	3b

APPENDIX 5 - DESCRIPTION OF ALC GRADES

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

