

Land at Wrexham Road, Abermoddu, Flintshire

LDP-EBD-HN1.9.1



Agricultural Land Classification

Reference No: 1010290/Abermorddu
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Submitted to:

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1 Executive Summary

The Agricultural Land Classification of approximately 3ha of land at Wrexham Road, Abermoddu, Flintshire was assessed in January 2019. The land was surveyed to provide information on the Agricultural Land Classification of the site.

At the time of the survey the land was under grass and not being grazed. There was evidence of dog walking on the land at the time of the survey. The land is classified as Grade 2 and Subgrade 3b

2 Introduction

ADAS was instructed by Fisher German LLP to undertake an Agricultural Land Classification (ALC) on an area of land lying to the north west of Wrexham and to the west of the A541 road at Abermoddu. The western boundary of the site adjoins woodland and agricultural land and a play area. The southern boundary adjoins a school and the eastern boundary is formed by the A541 road. The northern boundary adjoins agricultural land.

The land was classified using the system outlined in the Ministry of Agriculture, Fisheries and Food (MAFF now Defra) publication: 'Agricultural Land Classification of England and Wales - Revised guidelines and criteria for grading the quality of agricultural land' (October 1988).

3 Methodology

3.1 Fieldwork

A desk study of soils and climatic information was undertaken using reference material held by ADAS. Fieldwork was undertaken to study soil and site limitations.

Using a free survey due to the size of the site 6 auger borings were examined to determine the quality of the sample points (**Appendix 1**) and the findings are given in **Appendix 2**. One soil pit was dug to examine the subsoil characteristics. Fieldwork was undertaken with a hand held 50mm diameter "Dutch" auger to a depth of 1.2m where possible. Where auger penetration to 120cm was not possible the profile depth has been extended to 120cm using nearby profile information to enable soil droughtiness calculations to be made. One soil sample was taken for laboratory particle size analysis to confirm the soil textures (**Appendix 4**).

The fieldwork was carried out on 24th January 2019.

3.2 The Agricultural Land Classification System

The Agricultural Land Classification System (ALC) provides a framework for classifying land according to the extent 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 which can be grown
- the level of yield
- the consistency of yield
- the cost of obtaining the crop

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

The principal physical factors influencing agricultural production are climate, site (including relief) and soil. By assessing these factors, it is possible to assign land into one of five land classification grades, Grade 1 land being the highest quality and Grade 5 the lowest quality land. Grade 3 is sub-divided into Subgrades 3a and 3b, to identify good quality agricultural land from moderate quality land (see **Appendix 5** for a description of the grades used in the ALC system). By considering site specific climate, site and soil factors the land can be classified into 1 of 5 agricultural grades or certain non-agricultural grades.

4 Geology, Soils and Present Land Use

4.1 Geology

The geology map¹ shows that southern part of the site is underlain by mudstone, siltstone and sandstone of the Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation (undifferentiated), formed approximately 310 to 319 million years ago in the Carboniferous Period. In the northern part of the site there are sandstone and Argillaceous rocks of the Cefn-y-fedw Sandstone Formation, formed approximately 320 to 331 million year ago in the Carboniferous Period. The survey site is covered by Glacio fluvial sheet deposits of sand and gravel, deposited approximately 2million years ago in the Quarternary Period.

4.2 Soils

The soils of the site are mapped on the 1:250,000 soil map² of England and Wales as the Wick 1 Association. The Wick 1 Association is described as deep well drained coarse loamy and sandy soils locally over gravel. A typical profile is described as having a dark brown sandy loam or sandy silt loam topsoil overlying an upper subsoil of sandy loam or sandy silt loam over reddish brown clay loam and sand or loamy sand and is slightly stony throughout the profile. The soils are described as being permeable and well drained (Wetness Class 1).

4.3 Present Land Use

The land was under grass and at the time of the survey was not being grazed. There was evidence that the land is used for dog walking.

5 Previous Land Classification Surveys

There are no detailed surveys of the site. The Welsh Government's Predictive interactive Agricultural Land Classification³ model for Wales is based on the principles of the Agricultural Land Classification System of England & Wales, the Revised Guidelines & Criteria for Grading the Quality of Agricultural Land (MAFF 1988). The interactive map shows that the area around the site has predicted ALC grades of Grade 2 and Subgrade 3b land.

6 Results

The sections below illustrate the main considerations and limitations to the grading of the land.

6.1 Climate

The site climatic variables have been interpolated from grid point data surrounding the site, as follows:

Table 1: Climatic Variables

Grid Reference (mid-point of site)	SJ307567
Altitude (m)	89
Accumulated Temperature (day °C)	1373
Average Annual Rainfall (mm)	850
Overall Climatic Grade	1
Field Capacity Days	194
Moisture deficit (mm): Wheat	88
Moisture deficit (mm): Potatoes	75

The combination of Annual Average Rainfall (AAR) and Accumulated temperature (AT0) are used to assess the overall climate limitation. Annual Average Rainfall (AAR) is a measure of overall wetness and the Accumulated temperature (AT0) is the excess of daily air temperatures above a selected threshold temperature summed over a specified period. Based on experimental studies the temperature of 0° is adopted for the ALC system and the period used is January to June as this is considered the critical growth period for most crops. The overall climatic limitation at the site is considered to be Grade 1.

6.2 Site Limitations

Gradient: The survey area is generally level at an altitude of around 20m A.O.D (Above Ordnance Datum) and rises gently towards the eastern boundary to about 30m A.O.D. Gradient is not a limiting factor in classifying the land.

Flooding: there is no known flood risk at the survey site.

6.3 Soil and Interactive Limitations

Many of the soil profiles show no signs of seasonal wetness in the form of greyish soil colours and mottling above 70cm depth and do not have a slowly permeable layer starting above 80cm depth. With 194 Field Capacity Days (FCDs) these soil profiles are placed in Wetness Class 1. Where there are signs of seasonal wetness below 40cm depth but within 70cm depth and there is no slowly permeable layer above 80cm depth the profile is placed in Wetness Class 1.

With 194 FCDs where there are signs of seasonal wetness in the form of greyish soils colours and mottling above 40cm depth and there is a slowly permeable layer starting above 52cm depth the profile is placed in Wetness Class 4.

The combination of the topsoil texture, the Wetness Class and Field Capacity Day figure of 194 influence the ALC grade.

Soil droughtiness is not a limitation at the site. The available water in the profile is influenced by soil texture and structure. The combination of the available water in the profile and the moisture deficit for wheat and potatoes give resultant moisture balances for these crops, which influences the ALC grade.

The main factors affecting agricultural land quality are:

- Soil texture and wetness class, which mainly affect the ALC grade due to a soil wetness limitation.

6.4 Land Quality

A brief description of the findings is given below.

6.4.1 Grade 1

No land has been placed in this grade.

6.4.2 Grade 2

The soil profile typically has a medium clay loam topsoil to a depth of 30cm overlying an upper subsoil of medium clay loam and a lower subsoil of sandy clay loam. With 194 FCDs the soil profile is placed in Wetness Class 1 as there are no signs of seasonal wetness in the form of greyish or pale soil colours and mottling above 70cm and no slowly permeable layer starting within 80cm depth. The combination of the topsoil texture, the Wetness Class and FCD figure

of 194 places the land in Grade 2. The main limitation to the agricultural use of the land is soil wetness.

6.4.3 Grade 3, Subgrade 3a

No land has been placed in this grade.

6.4.4 Grade 3, Subgrade 3b

The soil profile typically has medium clay loam topsoil to a depth of 33cm overlying a subsoil of clay. With 194 FCDs the soil profile is placed in Wetness Class 4 where there are signs of seasonal wetness in the form of greyish colours and mottling above 40cm depth and a slowly permeable layer at 33cm depth. The combination of the topsoil texture, the Wetness Class and FCD figure of 194 places the land in Subgrade 3b. The main limitation to the agricultural use of the land is soil wetness

6.4.5 Grade 4

No land has been placed in this grade.

6.4.6 Grade 5

No land has been placed in this grade.

6.4.7 Other land

Other land includes a wooded area.

6.5 Summary of Land Quality in the Survey Area

Table 2: Agricultural Land Classification Measurements

Grade	Area (ha)	% of Total Area
1	-	-
2	2.74	78.3
3a	-	-
3b	0.68	19.4
4	-	-
5	-	-
Other land	0.08	2.3
Total	3.5	100

7 Conclusions

- There are no recorded existing detailed ALC maps of the site.
- The Welsh Government's Predictive interactive Agricultural Land Classification³ model for Wales shows the area around the site has predicted ALC grades of Grade 2 and Subgrade 3b land.
- The agricultural land is limited by soil wetness to Grade 2 – very good quality agricultural land and Subgrade 3b-moderate quality agricultural land.
- If the land is developed surplus soil should be kept on site or used to restore other sites which are short of soil, to preserve the soil and retain soil functions such as water and carbon storage.

APPENDIX 1:

Agricultural Land Classification Map and Location of Soil investigation points

(see following page)



AGRICULTURAL LAND CLASSIFICATION

- × 1-6 Auger Boring
- × p1 Pit Location
- Grade 1
- Grade 2
- Grade 3a
- Grade 3b
- Grade 4
- Grade 5
- Land predominantly in urban use.
- Other land primarily in non-agricultural use
- Survey boundary

13.2.19	DI	RM	A	AGRICULTURAL LAND CLASSIFICATION
DATE	DRWN	CHKD	REVD	ISSUE

LAND AT ABERMORDDU AGRICULTURAL LAND CLASSIFICATION

SCALE	1/2500	MASTER SIZE	A3
DRAWING NO.	1010290/ALC 01	ISSUE	A



APPENDIX 2: Soil Profile Descriptions

Pit at location 6		Soil				
	Depth to horizon base (cm)	Texture	Colour	Mottling	Structure	Porosity (biopores >0.5mm diam)
Topsoil	30	MCL (medium clay loam)	7.5YR3/3 (dark brown)		n/a	n/a
Subsoil 1	40	MCL (medium clay loam)	7.5YR4/2 (brown)		Weakly developed fine/medium sub angular blocky; Consistency friable; many roots present	>0.5%
Subsoil 2	45	SCL (sandy clay loam)	5YR4/3 (reddish brown)		Weakly developed fine/medium subangular blocky; Consistency friable; many roots present	>0.5%
Subsoil 3	60	SCL (sandy clay loam)	5YR4/3 (reddish brown)		Moderately developed coarse subangular blocky, Consistency firm, many roots	>0.5%
Subsoil 4	120	SCL (sandy clay loam)				
			Augered 60-75 cm stones present			
Stone content: Topsoil total stone content 2%; >2cm in size 2%; hard stones; 25-40cm total stone content 8%; >40cm occasional small rounded quartz pebble (<2cm in length)						
Gleyed at: >70cm			Slowly Permeable Layer (SPL) at: >80cm			
Wetness Class: 1			Wetness grade: 2			
AP Wheat: 146mm			MB +58mm			
AP Potatoes: 109mm			MB +34mm			
Droughtiness grade: 1						
Main limitation: soil wetness			Grade 2			

Auger Boring 1		Soil			
	Depth to horizon base (cm)	Texture	Colour	Mottling	% Stone content
Topsoil	28	MCL (medium clay loam)	10YR3/3 (dark brown)		0
Subsoil 1	60	MCL (medium clay loam)	7.5YR3/4 (dark brown)		1
Subsoil 2	80	MCL (medium clay loam)	10YR5/3 (brown)	Ochreous common	1
Subsoil 3	100	MCL (medium clay loam)	5YR5/3 (reddish brown)		1
Gleyed at: 60 cm			SPL at: >80cm		
Wetness Class: 1			Wetness grade: 2		
AP Wheat: 155mm			MB +67mm		
AP Potatoes: 117mm			MB +42mm		
Droughtiness grade: 1					
Main limitation: soil wetness			Grade 2		

Auger Boring 2		Soil			
	Depth to horizon base (cm)	Texture	Colour	Mottling	% Stone content
Topsoil	35	MCL (medium clay loam)	10YR3/3 (dark brown)		1
Subsoil 1	40	MCL (medium clay loam)	10YR4/3 (brown)	Ferri-manganiferous concretions common	1
Subsoil 2	70	MCL (medium clay loam)	7.5YR4/3 (brown)		0
		Difficult to auger 70cm+ possibly small stones			
Gleyed at: >70cm			SPL at: >70cm		
Wetness Class: 1			Wetness grade: 2		
AP Wheat: 153mm			MB +65mm		
AP Potatoes: 118mm			MB +43mm		
Droughtiness grade: 1					
Main limitation: soil wetness			Grade 2		

Auger Boring 3		Soil			
	Depth to horizon base (cm)	Texture	Colour	Mottling	% Stone content
Topsoil	30	MCL(medium clay loam)	7.5YR3/2 (dark brown)		1
Subsoil 1	38	MCL(medium clay loam)	7.5YR3/2 (dark brown)		1
Subsoil 2	70	MCL(medium clay loam)	5YR4/3 (reddish brown)		5
		Difficult to auger 70cm stone?			
Gleyed at: >70cm			SPL at: >80cm		
Wetness Class: 1			Wetness grade: 2		
AP Wheat: 151mm			MB +63mm		
AP Potatoes: 115mm			MB +40mm		
Droughtiness grade: 1					
Main limitation: soil wetness			ALC Grade 2		

Auger Boring 4		Soil			
	Depth to horizon base (cm)	Texture	Colour	Mottling	% Stone content
Topsoil	33	MCL (medium clay loam)	10YR3/1 (very dark grey)		0
Subsoil 1	90	C (clay)	2.5Y5/1 (grey)	Ochreous many	0
		Subsoil structure assessed moderately developed coarse platy and low porosity			0
Gleyed at: 33cm			SPL at: 33cm		
Wetness Class: 4			Wetness grade: 3b		
AP Wheat: 129mm			MB +41mm		
AP Potatoes: 107mm			MB +31mm		
Droughtiness grade: 1					
Main limitation: soil wetness			ALC Subgrade 3b		

Auger Boring 5		Soil			
	Depth to horizon base (cm)	Texture	Colour	Mottling	% Stone content
Topsoil	30	MCL (medium clay loam)	10YR3/2 Very (dark grayish brown)		1
Subsoil 1	40	SCL (sandy clay loam)	10YR4/3 (brown)		1
Subsoil 2	70	SCL (sandy clay loam)	7.5YR4/2 (brown)	Soil wet at 60cm no mottles seen <700cm	0
Gleyed at: >70cm			SPL at: >70cm		
Wetness Class: 1			Wetness grade: 2		
AP Wheat: 152mm			MB +64mm		
AP Potatoes: 111mm			MB +36mm		
Droughtiness grade: 1					
Main limitation: soil wetness			ALC Grade 2		

Auger Boring 6		Soil			
	Depth to horizon base (cm)	Texture	Colour	Mottling	% Stone content
Topsoil	35	MCL (medium clay loam)	10YR3/2 (very dark greyish brown)		1
Subsoil 1	40	MCL (medium clay loam)	10YR3/3 (dark brown)		8
Subsoil 2	55	SCL (sandy clay loam)	7.5YR4/3 (brown)		5
Subsoil 3	90	SCL (sandy clay loam)	7.5YR4/4 (brown)		5
Gleyed at: >70cm			SPL at: >80cm		
Wetness Class: 1			Wetness grade: 2		
AP Wheat: 149mm			MB +61mm		
AP Potatoes: 111mm			MB +36mm		
Droughtiness grade: 1					
Main limitation: soil wetness			ALC Grade 2		

APPENDIX 3: Photograph



Topsoil 0-30cm

Soil pit at auger boring 6

Subsoil and small stones

APPENDIX 4:

Laboratory Results

(see following page)



ANALYTICAL REPORT

Report Number	41251-19	K740	DARREN INGRAM	Client DARREN INGRAM
Date Received	29-JAN-2019		RSK ADAS LTD	
Date Reported	05-FEB-2019		PRESTON WYNNE	
Project	1010290 SOIL 24 01 19		HEREFORD	
Reference	ABERMORDDU		HR1 3PG	
Order Number	P69102D10911			

Laboratory Reference		SOIL420558									
Sample Reference		1 ABERMORDDU PIT 1									
Determinand	Unit	SOIL									
Sand 2.00-0.063mm	% w/w	40									
Silt 0.063-0.002mm	% w/w	42									
Clay <0.002mm	% w/w	18									
Organic Matter LOI	% w/w	8.5									
Textural Class **		MCL/SZL									

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.

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Reported by ***Darren Whitbread***
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** Please see the attached document for the definition of textural classes.

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 5: Description of the Grades and Sub-grades

The ALC grades and Sub-grades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. In practice, the grades are defined by reference to the land's physical characteristics, for which the cut-offs are described in Section 3 of Ministry of Agriculture, Fisheries and Food (MAFF now Defra) publication: 'Agricultural Land Classification of England and Wales - Revised guidelines and criteria for grading the quality of agricultural land' (October 1988). The most productive and flexible land falls into Grades 1, 2 and Sub-grade 3a and collectively comprises about one-third of the agricultural land in England and Wales. About half the land is either of moderate quality (Sub-grade 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.

Descriptions are also given of other land categories which may be used on ALC maps.

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 on Grade 1 land.

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.

Sub-grade 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.

Sub-grade 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.

Descriptions of other land categories used on ALC maps**Urban**

Built-up or 'hard uses with relatively little potential for a return to agriculture including housing, industry, commerce, education, transport, religious buildings, cemeteries.

Non-agricultural

'Soft' uses where most of the land could be returned relatively easily to agriculture, including golf courses, private parkland, public open spaces, sports fields, allotments and soft-unsurfaced areas on airport/airfields.

Open water

Includes lakes, ponds and river as map scale permits.

APPENDIX 6: References

- 1) British Geological Society: <http://www.bgs.ac.uk/data/mapViewers/>
- 2) Soils of England and Wales Sheet 3 Midland and Western England
- 3) Welsh Government Predictive Agricultural Land Classification Map (Wales)
The Hollington Map Guidance Note November 2017.

<https://beta.gov.wales/sites/default/files/publications/2018-02/agricultural-land-classification-predictive-map-guidance.pdf>