

AGRICULTURAL LAND CLASSIFICATION

Hawk Developments (UK) Ltd

**Land to the west of Top Road
Wrexham**



Our Ref: SES/HD/TR/#1

Date: 1st April 2016

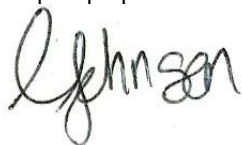
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AGRICULTURAL LAND CLASSIFICATION

**Land to the west of Top Road
Wrexham**

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



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Soil Environment Services

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1. INTRODUCTION

An Agricultural Land Classification (ALC)^{1,2} has been carried out on 5.2 ha of land to the west of Top Road, Summerhill, Wrexham (Drawing ALC/1). The site is centred on OS Grid Ref. 331063, 353348.

Agricultural land is classified into the following grades according to the 1988 guidelines¹ and the 1996 draft guidelines²:

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	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.
3b	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 survey was conducted in accordance with the current guidelines on the 22nd March 2016 and classifies the land into one or more of the above grades.

2. METHODOLOGY

The classification includes an initial desktop investigation to examine previously mapped soil types and to note the drift and solid geology. This included consultation from:

Soil Survey of England and Wales 1:625 000
British Geological Survey 1:50 000 solid and drift map.

The field survey consisted of a number of hand auger borings to a depth of 1.2 m (where possible) to examine soil profiles, using standard soil survey methods³. Pit excavations were conducted to determine sub soil structure where necessary. This data was used to map the principal soil types for determining the ALC. The soil removed during augering and pit excavations was examined in accordance with:

Soil Survey Field Handbook
Describing and Sampling Soil Profiles
Soil Survey of England and Wales, Technical Monograph No. 5, 1976

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

Climatological data⁴ was used to determine the overriding site limitation and for interaction with soil parameters (Appendix A). The above information was cross referenced with geological surveys⁸, previous soil surveys⁶ and the national 1:625 000 series ALC survey⁷ relevant for this site to substantiate the findings. The ALC grade was then determined for this site and for the current survey, and is detailed on Drawing ALC/2.

Other factors used for ALC grading, but which give no limitation at this site, are not discussed.

3. BASELINE CONDITIONS

3.1. Climate and flooding

The climatological data (Table 1) indicates slightly below average temperature, slightly above average rainfall and an average number of field capacity days for the region.

Table 1		
Climatological information⁴		
Factor	Units	Value
Altitude AOD	m	145.24
Accumulated temperature	day°C (Jan-June)	1310.6
Average Annual Rainfall	mm	902.3
Field Capacity Days	days	202.4
Moisture Deficit Wheat	mm	80.5
Moisture Deficit Potatoes	mm	64.2

Climatic factors which affect ALC grading are listed in Table 4.

The site is assessed not to be at any significant flood risk which would affect ALC grade⁹.

3.2. Soils, geology and topography

The site has previously been mapped as having soils of the *Wick 1 Association*^{5,6}.

This survey has identified the soils to be generally medium sandy silt loams. These overlay sandstone bedrock.

Texture of the topsoil does not vary significantly across the site.

Two general soil types were noted for the purposes of ALC grading.

In-field wetness assessments were conducted on Type 1 and 2 soils (Table 2).

Table 2. Determination of soil Wetness Class (WC)				
Soil Type	Method	Parameters	Results	WC
Type 1	In-field assessment	Undisturbed/Disturbed	Undisturbed	I
		FCD	202.4	
		Depth to Slowly Permeable Layer (cm)	>80	
		Colour	Greyish	
		Depth to gleying (cm)	23	
		Figure reference ²	6	
Type 2	In-field assessment	Undisturbed/Disturbed	Undisturbed	III
		FCD	202.4	
		Depth to Slowly Permeable Layer (cm)	25	
		Colour	Reddish	
		Depth to gleying (cm)	25	
		Figure reference ²	8	

Geology⁸

Superficial Geology

None recorded.

Bedrock Geology

1:50 000 scale bedrock geology description: Cefn Rock - Sandstone. Sedimentary Bedrock formed approximately 309 to 310 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries and deltas.

The site slopes down slightly to the south east but not severely enough to affect the ALC grading.

A summary of the features of the dominant soil type/s are listed in Table 3.

Table 3. Soil Type descriptions			
Profile description	Soil types		
	Type 1	Type 2	
Horizon 1 (topsoil)	0-23cm Very dark greyish brown (10YR 3/2) stoneless medium sandy silt loam, no mottles; fine subangular blocky structure	0-25cm Very dark greyish brown (10YR 3/2) stoneless medium sandy silt loam, no mottles; fine subangular blocky structure	
Horizon 2 (subsoil 1)	23-65cm Dark yellowish brown (10YR 3/4) very slightly stony sandy clay loam, few fine faint ochreous mottles; fine subangular blocky structure	25-80cm Strong brown (7.5YR 5/6) very slightly stony sandy clay, numerous fine ochreous mottles; coarse prismatic structure	
Horizon 3 (subsoil 2)	65-85cm Dark yellowish brown (10YR 4/6) very slightly stony medium sandy loam, numerous fine greyish mottles; fine subangular blocky structure	80-85cm Strong brown (7.5YR 5/6) very slightly stony sandy clay, numerous moderate ochreous and greyish mottles; coarse prismatic structure	
Horizon 4 (subsoil 3)	At 85cm Sandstone	At 85cm Sandstone	
Survey points (Drawing ALC/1) and soil types: BHs Type 1 soil = 1-2, 4, 6 Type 2 soil = 3, 5, 7			

Photo 1. Borehole location 2 – Soil Type 1



Photo 2. Borehole location 3 – Soil Type 2



NB Photographs are included for an illustration of horizons, to verify profile depth and provide an indication of colour but are not intended to verify any structure.

3.3. Agriculture

On the survey date the fields were in grass for pasture.

4. AGRICULTURAL LAND CLASSIFICATION

4.1. National 1:625 000 map grading

Grading on the MAFF (1983) 1: 625 000 map⁷ indicated the site was on the border between **ALC Grade 2 and 3** land.

4.2. Current grading

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

Table 4. ALC gradings and limitations		
Grade	Area (ha)	Limitation
1		
2	2.7	Climatic factors – Type 1 soil
3a	2.5	Wetness – Type 2 soil
3b		
4		
5		
Non-agricultural land		

Type 1 soils – Climatic factors

The combination of the soil textures and climatic factors results in **ALC Grade 2** for Type 1 soils.

Type 2 soils – Wetness limitation

The combination of the topsoil texture (medium sandy silt loam), Wetness Class (III) and the number of Field Capacity Days (202.4) results in **ALC Grade 3a** for Type 2 soils.

INFORMATION SOURCES

1. ***Agricultural Land Classification of England and Wales.*** Guidance and criteria for grading the quality of agricultural land. MAFF. 1988.
2. ***Agricultural Land Classification of England and Wales.*** Guidance and criteria for grading the quality of agricultural land. Second Revision MAFF. DRAFT May 1996.
3. ***Soil Survey Field Handbook.*** Technical Monograph No.5. Soil Survey of England and Wales.1976.
4. ***Climatological Data for Agricultural Land Classification,*** The Met. Office 1989.
5. ***Soil Map of England and Wales: 1:625 000.*** Soil Survey of England and Wales, Harpenden.
6. ***Soils and Their Use in Wales.*** Soil Survey of England and Wales, Harpenden.
7. ***Agricultural Land Classification Map*** 1:625 000. MAFF 1983.
8. ***British Geological Survey*** 1:50 000 national map.
9. ***Risk of Flooding from Rivers and Sea:*** 1:2 400 000 Natural Resources Wales

DRAWING ALC/1

Borehole locations and soil type

Soil Type

Type 1 soil

Type 2 soil

Non-agricultural land

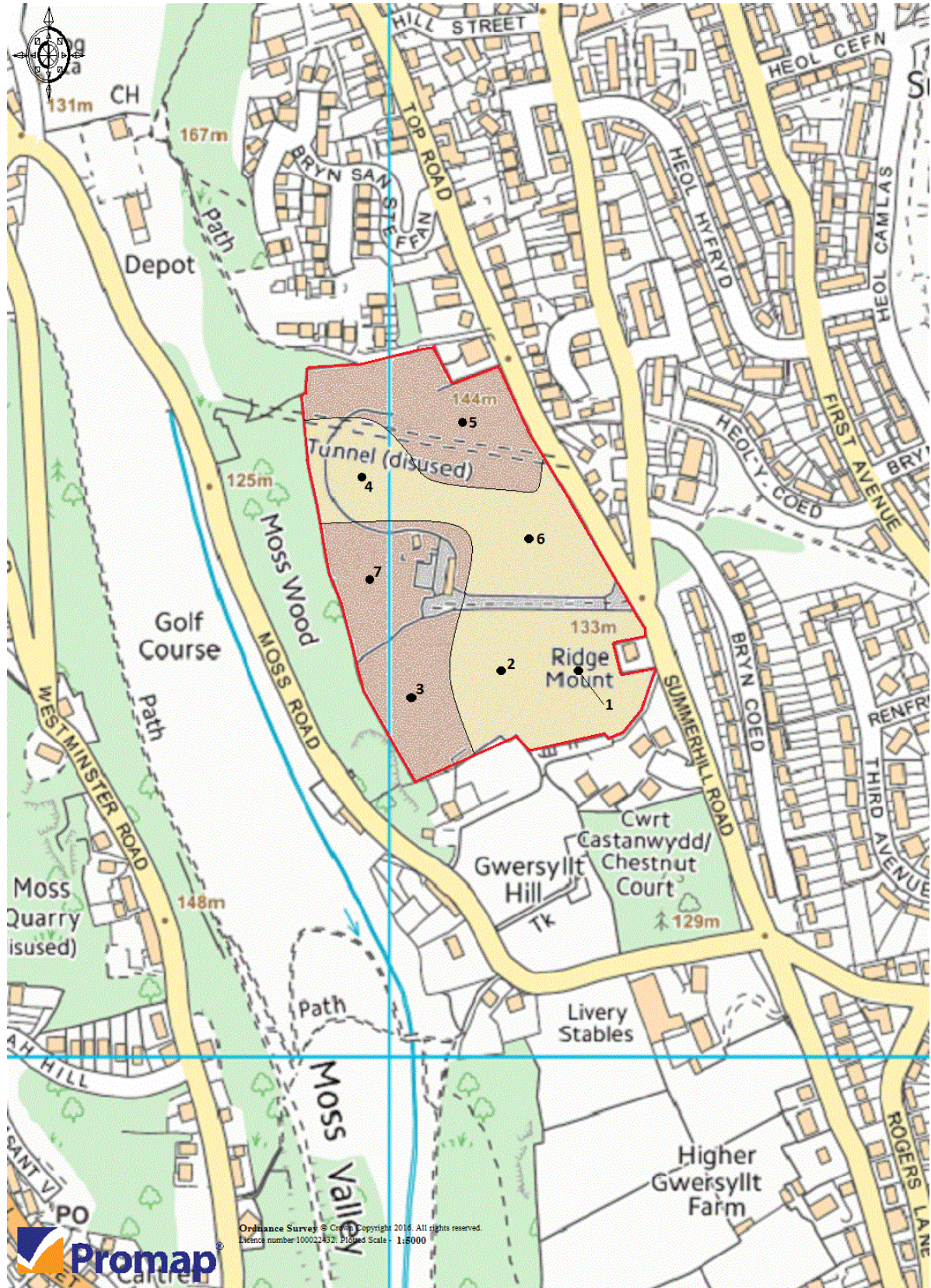
Soil Environment Services

Drawing Title: Borehole locations and soil type

Drawing No.: ALC/1

Scale: 1:7500

Date: 01/04/2016



DRAWING ALC/2

ALC grade

Soil Environment Services

ALC Grade

2 – Very good quality

3a – Good quality

Non-agricultural land

Drawing Title: ALC grade

Drawing No.: ALC/2

Scale: 1:7500

Date: 01/04/2016



APPENDIX A

Climatological data for
Agricultural Land Classification

Agricultural Land Classification

- Met. Information & droughtiness

Data and adjustment calculations from: The Met. Office, *Climatological Data for Agricultural Land Classification* 1989.
Input data in box cells only, results in shaded cells.

Site name	Summerhill
Site altitude =	145.24 m
Site GR	3310 3533

Meteorological information for surrounding national grid reference points

	Easting	Northing	ALT	AAR	LR AAR	ATO	MDMWHT	MDMPOT	FCD
NW	3300	3550	112	903	0.8	1348	83	68	204
NE	3350	3550	61	751	1	1405	100	89	173
SW	3300	3500	137	880	0.9	1322	81	65	202
SE	3350	3500	65	754	1.1	1403	100	89	175

Altitude adjustment of surrounding meteorological information with respect to site.

Adjusted surrounding points

	AAR	ATO	FCD
NW	929.6	1310.1	207.8
NE	835.2	1309.0	185.2
SW	887.4	1312.6	203.1
SE	842.3	1311.5	187.8

Site adjusted meteorological information

	1 Dsg	2 Wg	Wp
NW	19.72308	0.002571	0.596033
NE	43.46263	0.000529	0.122741
SW	34.48188	0.000841	0.195002
SE	51.85557	0.000372	0.086224
Sum		0.004313	

Site	AAR	ATO	FCD
	902.3	1310.6	202.4

ALC according to climate

Grade 2

Soil wetness class (drained)

Type 1 I
Type 2 III
Type 3

ALC according to wetness/climate/
texture

Type 1 1
Type 2 3a
Type 3

Soil moisture deficit of surrounding points

	Cw	Cp	Adjusted	
NW	-1.3645	-1.7947	79.6355	63.21
NE	-14.540	-19.1056	85.4602	69.89
SW	-5.272	-6.941	77.7281	61.06
SE	-14.4111	-18.9206	85.5889	70.08

Site results for soil moisture
deficit

MDMW	MDMPOT
80.5	64.2

Adjustment data for stone type and content

	Soil Type 1			Soil Type 2			Soil Type 3		
	Top	Sub1	Sub2	Top	Sub1	Sub2	Top	Sub1	Sub2
% volume	0	5	5	0	5	5	na	na	na
TAv for stone type	0	3	3	0	3	3	na	na	na
EAv for stone type	0	2	2	0	2	2	na	na	na
	Sub 3			Sub 3			Sub 3		
% volume	100	na	na	100	na	na	na	na	na
TAv for stone type	3	na	na	3	na	na	na	na	na
EAv for stone type	2	na	na	2	na	na	na	na	na

Droughtiness (moisture balance) determination for each soil type and restored profile

Moisture availability data for each texture from MAFF ALC Guidelines 1988

Moisture Balance (MB) = AP - MD for wheat and potatoes (adjusted for stones)

	Horizon	Type 1		Type 2		Type 3			
		texture	water	texture	water	texture	water		
TAvt - Topsoil water available (mm)		MSZL	19.00	MSZL	19.00	0	0.00		
LTt - Topsoil thickness (cm)		0	23.00	0	25.00	0	0.00		
TAVs - Subsoil total available	1	SCL	14.40	SC	14.40	0	0.00		
	2	MSL	14.40	SC	14.40	0	0.00		
	3	R	3.00	R	3.00	0	0.00		
EAvs - Subsoil (SS) easily available	1	SCL	9.60	SC	9.60	0	0.00		
	2	MSL	10.55	SC	9.60	0	0.00		
	3	R	2.00	R	2.00	0	0.00		
LT50 - Thickness ss layers to 50cm	1	SCL	27.00	SC	25.00	0	0.00		
	2	MSL	0.00	SC	0.00	0	0.00		
	3	R	0.00	R	0.00	0	0.00		
LT120 - Thickness ss layers 50 to 120cm	1	SCL	15.00	SC	30.00	0	0.00		
	2	MSL	20.00	SC	5.00	0	0.00		
	3	R	35.00	R	35.00	0	0.00		
LT0 - Thickness ss layers to 70cm	1	SCL	42.00	SC	45.00	0	0.00		
	2	MSL	5.00	SC	0.00	0	0.00		
	3	R	0.00	R	0.00	0	0.00		
Total profile thickness for soil type cm		0	120		120	0	0		

SOIL Droughtiness (moisture balance) results

Type 1

Grade

Results

AP wheat = 125.1

Moisture balance wheat = 44.6 1

AP potatoes = 111.4

Moisture balance potatoes = 47.2 1

Type 2

Results

AP wheat = 124.1

Moisture balance wheat = 43.6 1

AP potatoes = 112.3

Moisture balance potatoes = 48.1 1

Notes

ALC Grade	Moisture Balance Limits	
	wheat	potatoes
1	30	10
2	5	-10
3a	-20	-30
3b	-50	-55
4	<-50	<-55

APPENDIX B

Site Survey Field Notes

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ALC Survey Profile Data Sheet

Site: Summerhill

	Topsoil						Subsoil 1						Subsoil 2						Subsoil 3					
BH no.	Depth (cm)	Texture	Colour (Munsell)	Stoniness (%)	Mottles	Structure	Depth (cm)	Texture	Colour (Munsell)	Stoniness (%)	Mottles	Structure	Depth (cm)	Texture	Colour (Munsell)	Stoniness (%)	Mottles	Structure	Depth (cm)	Texture	Colour (Munsell)	Stoniness (%)	Mottles	Structure
1	0-25	MSZL	10YR 3/2	0	No	FSAB	25-45	SCL	10YR 3/4	5	FFFO	FSAB	45-120	R	na	100	na	na						
2	0-23	MSZL	10YR 3/2	0	No	FSAB	23-65	SCL	10YR 3/4	5	FFFO	FSAB	65-85	MSL	10YR 4/6	5	NFG	FSAB	85-120	R	na	100	na	na
3	0-25	MSZL	10YR 3/2	0	No	FSAB	25-80	SC	7.5YR 5/6	5	NFO	CP	80-85	SC	7.5YR 5/6	5	NMOG	CP	85-120	R	na	100	na	na
4	0-23	MSZL	10YR 3/2	0	No	FSAB	23-65	SCL	10YR 3/4	5	FFFO	FSAB	65-85	MSL	10YR 4/6	5	NFG	FSAB	85-120	R	na	100	na	na
5	0-25	MSZL	10YR 3/2	15	No	FSAB	25-80	SC	7.5YR 5/6	5	NFO	CP	80-85	SC	7.5YR 5/6	5	NMOG	CP	85-120	R	na	100	na	na
6	0-23	MSZL	10YR 3/2	0	No	FSAB	23-65	SCL	10YR 3/4	5	FFFO	FSAB	65-85	MSL	10YR 4/6	5	NFG	FSAB	85-120	R	na	100	na	na
7	0-20	MSZL	10YR 3/2	0	No	FSAB	20-35	SC	7.5YR 5/6	5	NFO	CP	35-120	R	na	100	na	na						

Key:
MSZL = medium sandy silt loam
SCL = sandy clay loam
SC = sandy clay
R = rock
MSL = medium sandy loam

FFFO = few fine faint ochreous
NFO = numerous fine ochreous
FFOG = few fine ochreous and greyish
NMOG = numerous medium ochreous and greyish
NFG = numerous fine greyish

FSAB = fine subangular blocky
CP = coarse prismatic