



Awel y Môr Offshore Wind Farm

Agricultural Land Classification Report at the Onshore Substation Site

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**SOILS AND AGRICULTURAL QUALITY
OF LAND AT FAENOL-BROPOR FARM
ST ASAPH**

Report 2094/1

13th January, 2023



**SOILS AND AGRICULTURAL QUALITY
OF LAND AT FAENOL-BROPOR FARM, ST ASAPH**

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Report 2094/1
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13th January, 2023

SUMMARY

An agricultural land quality survey has been undertaken of 33.3 ha of land at Faenol-Bropor Farm, St Asaph in December 2022.

The soils of the site are fine loams over slowly permeable clay. Agricultural land quality is mainly limited to subgrade 3b by wetness/workability constraints, with a small area of subgrade 3a.

1.0 Introduction

- 1.1 This report provides information on the agricultural quality of 33.3 ha of land at Faenol-Bropor Farm, St Asaph, Denbighshire. The report is based on a survey of the land in December 2022.

SITE ENVIRONMENT

- 1.2 The survey area comprises eight fields and parts of two further fields in the north. The land is bordered to the south by Glascoed Road, to the north-west by woodland and on other sides by adjoining agricultural land.
- 1.3 The land slopes very gently from south to north, with an average elevation of approximately 35 m AOD.
- 1.4 At the time of survey the land was under grass in use as sheep grazing.

PUBLISHED INFORMATION

- 1.5 British Geological Survey 1:50,000 scale information records the underlying geology of the land as Devensian glacial till over Carboniferous mudstone, siltstone and sandstone (inter-bedded) of the Warwickshire Group.
- 1.6 The National Soil Map (published at 1:250,000 scale) records the land as Salop Association: mainly slowly permeable fine loams over clay and fine loams formed in reddish drift¹.
- 1.7 The Welsh Government Predictive Agricultural Land Classification Map shows the land as subgrade 3a agricultural quality in northern and central areas, and subgrade 3b in the south.

¹ Rudeforth, C. C., *et al.*, 1984. *Soils and their use in Wales*. Soil survey of England and Wales, Bulletin No. 11, Harpenden.

2.0 Soils

- 2.1 A soils and agricultural quality survey was carried out in December 2022 in accordance with MAFF (1988) Agricultural Land Classification guidelines². It was based on observations at intersects of a 100 m grid, giving a density of one observation per hectare. During the survey, soils were examined by hand augerings and pits to a maximum depth of approximately 1.2 m. A log of the sampling points and a map (Map 1) showing their location is in an appendix to this report.
- 2.2 The soils of the site were found to be relatively uniform, comprising fine loamy topsoil over slowly permeable (poorly structured) reddish clay or heavy clay loam. The subsoils show evidence of seasonal waterlogging (pale and greyish subsoil colours with ochreous mottles) to shallow depth. The soils typically have a thin permeable fine loamy upper subsoil above the slowly permeable layer, with the latter typically occurs between 40 and 50 cm below the land surface.
- 2.3 Minor variation in topsoil texture and drainage occurs across the site: the topsoils vary between medium or sandy clay loam and heavy clay loam. The land is mainly judged to be poorly-draining under the local climate (Soil Wetness Class IV) but in places a greater depth of permeable upper subsoil means the soils have slightly better drainage properties (Soil Wetness Class III).
- 2.4 Representative soil profiles are described from pits at observation points 8, 19 and 25 (see Map 1) in an appendix to this report.

²MAFF, (1988). *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

3.0 Agricultural land quality

3.1 To assist in assessing land quality, the Ministry of Agriculture, Fisheries and Food (MAFF) developed a method for classifying agricultural land by grade according to the extent to which physical or chemical characteristics impose long-term limitations on agricultural use for food production. The MAFF ALC system classifies land into five grades numbered 1 to 5, with grade 3 divided into two subgrades (3a and 3b). The system was devised and introduced in the 1960s and revised in 1988.

3.2 The agricultural climate is an important factor in assessing the agricultural quality of land and has been calculated using the Climatological Data for Agricultural Land Classification³. The relevant site data for a central point at grid reference SJ 0101,7431 and an average elevation of 35 m is given below.

- Average annual rainfall: 730 mm
- January-June accumulated temperature >0°C 1434 day°
- Field capacity period 174 days
(when the soils are fully replete with water) late Oct-late Apr
- Summer moisture deficits for: wheat: 102 mm
potatoes: 92 mm

3.3 The survey described in the previous section was used in conjunction with the agro-climatic data above to classify the site using the revised guidelines for ALC issued in 1988 by MAFF⁴. There are no overriding climatic limitations at this locality.

SURVEY RESULTS

3.4 The agricultural quality of the land is primarily determined by wetness/workability. Other factors have been assessed but do not affect the land grade. Land of grade 3 has been identified.

Subgrade 3a

3.5 This subgrade comprises an area in the south-east of the site with moderately high topsoil clay content and imperfect drainage (Soil Wetness Class III). This combination means machinery access for cultivations is usually restricted in winter and early spring under the local climate, although late spring (as well as autumn) sowings are usually possible.

³Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

⁴MAFF, (1988). *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

Subgrade 3b

- 3.6 Most of the land is poorly-draining (Soil Wetness Class IV) with moderately high to high topsoil clay content. Under the local climate this combination means machinery land access for spring sowings is rarely possible and arable cropping potential is mainly limited to autumn sown cereal-based rotations.
- 3.7 Other than the area mapped in the south-east of the site, some patches of land with slightly higher potential (medium topsoil and imperfect drainage: Soil Wetness Class III) were observed across the site. However, these patches could not realistically be mapped or managed separately from the surrounding wetter land and are therefore judged to be limited to subgrade 3b by the average degree of limitation.

Other land (non-agricultural)

- 3.8 This comprises a block of woodland in the north and two small ponds.

Grade areas

- 3.9 The land grades are shown on Map 2 and the areas occupied shown below.

Table 1: Areas occupied by the different land grades

<i>Grade/subgrade</i>	<i>Area (ha)</i>	<i>% of the land</i>
Subgrade 3a	1.5	5
Subgrade 3b	30.6	92
Other land	1.2	3
Total	33.3	100

APPENDIX
DETAILS OF OBSERVATIONS
MAPS
LABORATORY ANALYSIS

Land at Faenol-Bropor Farm: Soils and ALC survey – Details of observations at each sampling point

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope	Wetness	Agricultural quality	
No	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	(°)	Class	Grade	Main limitation
1	0-32	MCL/HCL	0	32-90+	C(r)	xxx				1	IV	3b	W
2	0-25	SCL	0	25-43	SCL	xxx	43-90+	HCL/ C(r)	xxx	0	IV	3b	W
3	0-50+	MCL(dist)	0							1	-	-	-
4	Woodland												
5	0-28	MCL	0	28-46	MCL/HCL	xxx	46-64 64-90+	HCL C(r)	xxx xxx	0	IV/III	3b/3a	W
6	0-40	MCL	0	40-70+	SCL(dist?)	xxx				1	II	2?	W?
7	0-31	MCL/HCL	0	31-47	MCL	xxx	47-90+	C(r)	xxx	1	III/IV	3a/3b	W
8	0-29	MCL/HCL	0	25-34	HCL	xxx	34-120	C(r)	xxx	0	IV	3b	W
9	0-31	MCL/HCL	0	31-42	HCL	xxx	42-71 71+	C(r) Stopped on stones	xxx	2	IV	3b	W
10	0-27	MCL	0	27-34	MCL	xxx	34-90+	C(r)	xxx	2	IV	3b	W
11	0-35	HCL	0	35-45	C	xxx	45-72 72+	C Stopped on stones	xxx xxx	1	IV	3b	W
12	0-31	MCL/HCL	0	31-42	HCL	xxx	42-90+	HCL/ C(r)	xxx	0	IV	3b	W
13	0-30	SCL	0	30-90+	HCL(r)	xxx				0	IV	3b	W
14	0-27	MCL	0	26-43	HCL	xxx	43-90+	C(r)	xxx	1	IV	3b	W
15	0-27	HCL	0	27-54	C(r)	xxx	54+	Stopped on stones		2	IV	3b	W
16	0-26	HCL	0	26-37	HCL	xxx	37-90+	C(r)	xxx	0	IV	3b	W
17	0-27	HCL	0	29-41	HCL	xxx	41-90+	C(r)	xxx	0	IV	3b	W
18	0-26	MCL	0	28-38	MCL	xxx	38-64 64-90+	C C(r)	xxx xxx	1	IV	3b	W
19	0-31	HCL	0	31-40	HCL	xxx	40-90+	C(r)	xxx	2	IV	3b	W
20	0-30	MCL	0	30-40	MCL	xxx	40-90+	C(r)	xxx	2	IV	3b	W
21	0-32	MCL	0	32-59	MCL(r)	xxx	59-90+	C(r)	xxx	1	III	3a	W
22	0-30	SCL	0	30-41	SCL	xxx	41-90+	C(r)	xxx	1	IV	3b	W
23	0-33	MCL	0	33-53	MCL	xxx	53-90+	HCL	xxx	1	III	3a	W
24	0-26	HCL	0	26-55	C(r)	xxx	55+			2	IV	3b	W
25	0-27	HCL	0	27-51	HCL	xxx	51-90+	C(r)	xxx	1	III	3b	W
26	0-32	MCL	0	32-48	HCL	xxx	48-60 60-90+	HCL C(r)	xxx xxx	2	III/IV	3a/3b	W
27	0-30	MCL	0	30-42	HCL	xxx	42-90+	HCL(r)	xxx	3	IV	3b	W
28	0-27	SCL	0	27-40	SCL	xxx	40-90+	HCL(r)	xxx	3	IV	3b	W
29	0-31	HCL	0	31-40	HCL(r)	xxx	40-90+	C(r)	xxx	3	IV	3b	W

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope	Wetness	Agricultural quality	
No	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	(°)	Class	Grade	Main limitation
30	0-28	HCL	0	28 -90+	C(r)	xxx				2	IV	3b	W
31	0-26	MCL	0	26-55	MCL	xxx	56 -80+	HCL/SCL	xxx	1	III	3a	W

Soil log key

Gley indicators¹

o	unmottled
x	1-2% ochreous mottles and brownish matrix (or a few to common root mottles (topsoils)) ³
xx	>2% ochreous mottles and brownish matrix and/or dull structure faces (slightly gleyed horizon)
xxx	>2% ochreous mottles and greyish or pale matrix (gleyed horizon) or reddish matrix and >2% greyish, brownish or ochreous mottles and pale ped faces mottles or f-m concentrations (gleyed horizon)
xxxx	dominantly blueish matrix, often with some ochreous mottles (gleyed horizon)

Slowly permeable layers⁴

a depth underlined (e.g. 50) indicates
the top of a slowly permeable layer

A wavy underline (e.g. 50) indicates
the top of a layer borderline to slowly permeable

¹Gley indicators in accordance with Hodgson, J.M., 1997. Soil Survey Field Handbook (third edition). Soil survey technical monograph No. 5

²Texture in accordance with particle size classes in Hodgson (1997)

³ Occasionally recorded in the texture box

⁴Permeability is estimated for auger borings and must be confirmed by full pit observations in accordance with the definitions in:
Revised Guidelines for grading the quality of Agricultural Land (Maff 1988)

⁵Soil Wetness Classes are defined in Hodgson (1997)

⁷calcareous classes as defined in Hodgson (1997)

Grades in brackets eg. (3a) raised by one grade due to calcareous topsoil

Observations close to or on grade boundaries are sometimes recorded as borderline e.g. 3a/3b. In these cases the former grade shows the estimated grading according to the criteria

Texture²

C	clay
ZC	silty clay
SC	sandy clay
CL	clay loam (H-heavy, M-medium)
ZCL	silty clay loam (H-heavy, M-medium)
SZL	sandy silt loam (F-fine, M-medium, C-coarse)
LS	loamy sand (F-fine, M-medium, C-coarse)
SL	sandy loam (F-fine, M-medium, C-coarse)
S	sand (F-fine, M-medium, C-coarse)
SCL	sandy clay loam
P	peat (H-humified, SF-semi-fibrous, F-fibrous)
LP	loamy peat; PL - peaty loam

Wetness Class⁵

I (freely drained) to VI (very poorly drained)

Limitations:

W	wetness/workability
D	droughtiness
De	depth
F	flooding
St	stoniness
SI	slope
T	topography/microrelief
C	Climate

Suffixes & prefixes:

o - organic

(vsl, sl, m, v, x)st – (very slightly, slightly,
moderately, very, extremely) stony⁶

(vsl, sl, m, v, x)
(very slightly, slightly,
moderately, very, extremely) calcareous⁷

Other abbreviations

fmn - ferri-manganiferous concentrations
dist - disturbed soil layer; chky - chalky
R – bedrock (CH – chalk, SST – sandstone
LST – limestone, MST – Mudstone)
r-reddish, gn – greenish

Soil pit descriptions

Pit 8 (see Map 1)

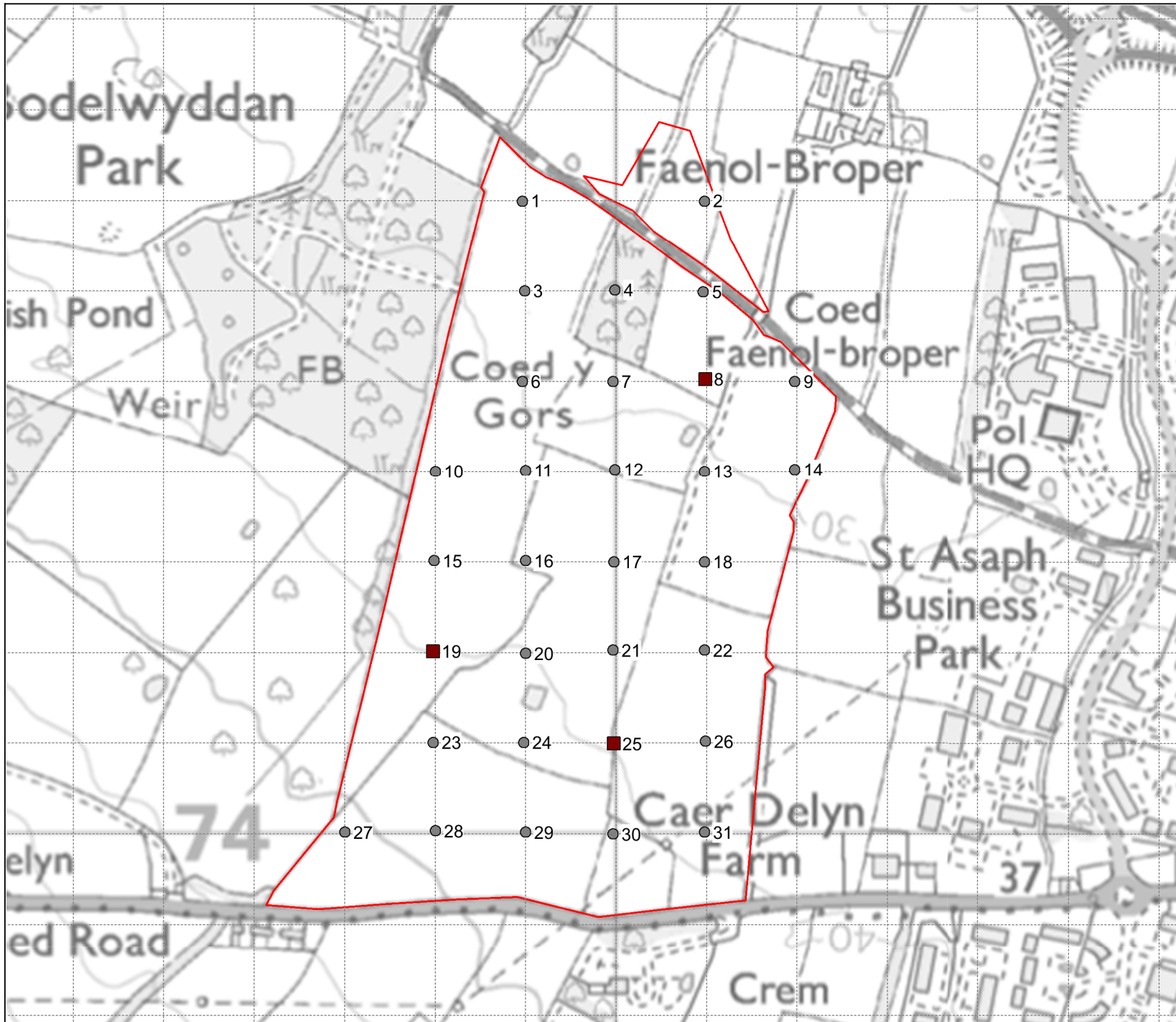
0-29 cm	Very dark greyish brown (10YR 3/2) medium clay loam; <1% mixed hard stones; moderately developed coarse and very coarse sub-angular blocky structure; friable; abundant fine fibrous roots; smooth clear boundary to:
29-34 cm	Pinkish grey (7.5YR 6/2) heavy clay loam with 5% distinct fine strong brown (7.5YR 5/8) mottles; stoneless; moderately developed coarse sub-angular blocky structure; friable; porous; medium packing density; common fine fibrous roots; smooth gradual boundary to:
34-120 cm	Reddish brown (5YR 5/3) clay with pinkish grey (5YR 6/2) ped faces and 10% faint yellowish red (5YR 5/6) mottles; stoneless; weakly developed very coarse angular blocky structure; firm; <0.5% macropores; high packing density; few fine fibrous roots.

Pit 19 (see Map 1)

0-31 cm	Dark greyish brown (10YR 4/2) heavy clay loam; 1-2% mixed hard rounded stones; moderately developed medium sub-angular blocky structure; friable; common fine fibrous roots; smooth gradual boundary to:
31-40 cm	Pinkish grey (7.5YR 6/2) heavy clay loam with 5% distinct fine strong brown (7.5YR 5/8) mottles; very slightly stony; moderately developed coarse sub-angular blocky structure; friable; porous; few fine fibrous roots; medium packing density; wavy diffuse boundary to:
40-110 cm+	Reddish brown (5YR 5/3) clay with pinkish grey (5YR 6/2) ped faces and very dark grey (7.5YR 3/1) ferri-manganiferous concentrations; very slightly stony; weakly developed very coarse angular blocky structure; firm; <0.5% macropores; high packing density; few fine fibrous roots.

Pit 25 (see Map 1)

0-24 cm	Very dark greyish brown (10YR 3/2) heavy clay loam with 5% strong brown (7.5YR 5/8) root channel mottles; 1% mixed hard stones; moderately developed coarse and very medium and fine sub-angular blocky structure; friable; common medium fibrous roots; uneven gradual boundary to:
24-35 cm	Light brownish grey (10YR 6/2) sandy clay loam with 30% distinct fine yellowish brown and brownish yellow (10YR 5/8 & 6/8) mottles; very slightly stony; moderately developed coarse sub-angular blocky structure; friable; low packing density (porous); common fine fibrous roots; wavy gradual boundary to:
34-120 cm	Pinkish grey (7.5YR 6/2) clay with 25% diffuse strong brown (7.5YR 5/6) mottles and 1-2% fine very dark grey (7.5YR 3/1) ferri-manganiferous concentrations; very slightly stony; weakly developed very coarse angular blocky structure; very firm; <0.5% macropores; few fine fibrous roots.



KEY

- Auger observations
- Pits
- Site boundary

Site:

Faenol-Bropor
St Asaph

Map title:

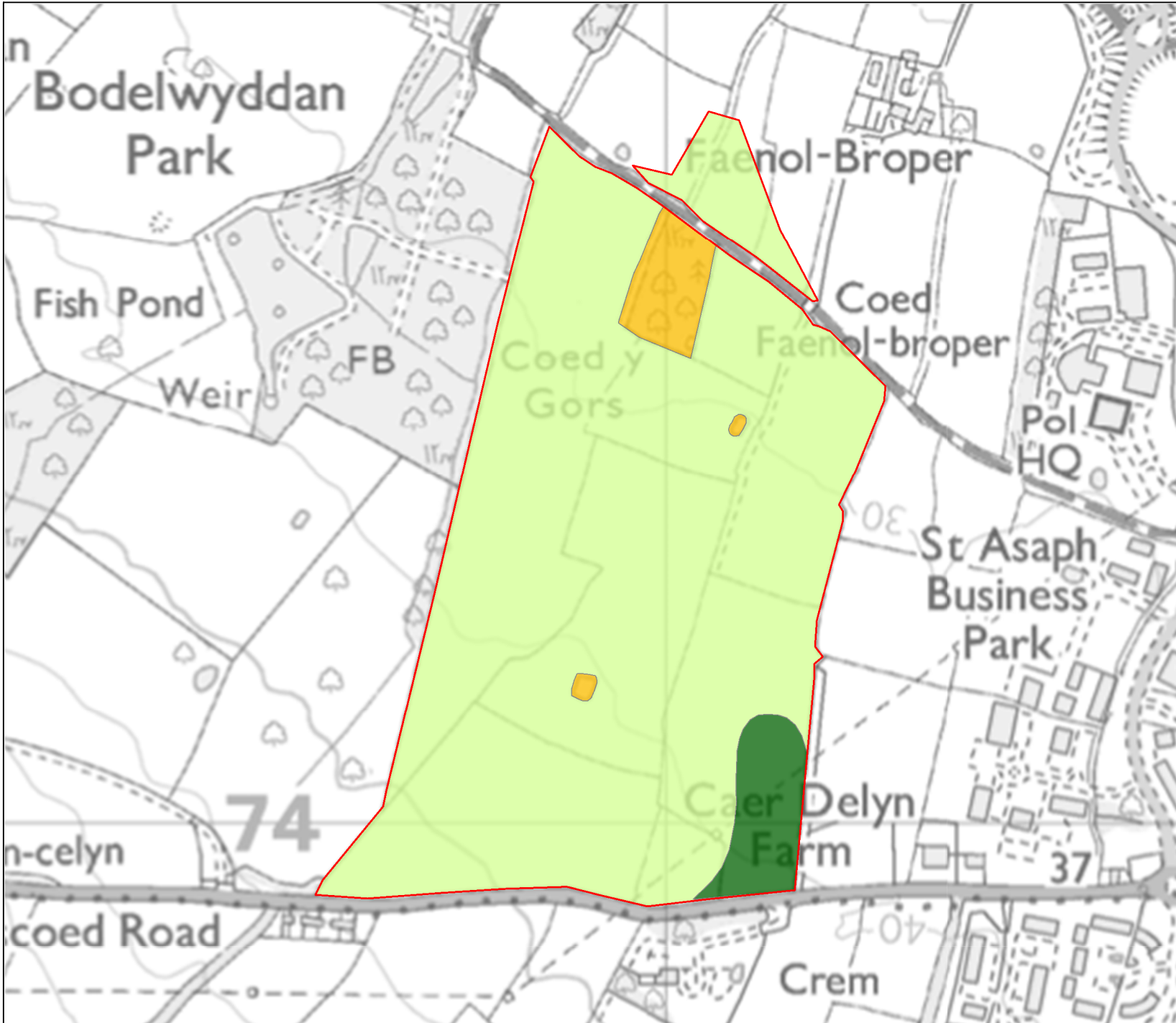
MAP 1
Observations

Land
Research
ASSOCIATES

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Date: 13/01/2023

Scale: 1:6,000



KEY

- Subgrade 3a
- Subgrade 3b
- Other land
- Site boundary

Site:

Faenol-Bropor
St Asaph

Map title:

MAP 1
Observations

Land
Research
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Date: 13/01/2023

Scale: 1:6,000

ANALYTICAL REPORT

Report Number	50662-23	H579	MR MIKE PALMER
Date Received	04-JAN-2023		LAND RESEARCH ASSOCIATES
Date Reported	11-JAN-2023		LOCKINGTON HALL
Project	SOIL		LOCKINGTON
Reference	AWEL Y MOR		DERBY
Order Number			DE74 2RH

Laboratory Reference		SOIL601260	SOIL601261	SOIL601262						
Sample Reference		8	25	19						
Determinand	Unit	SOIL	SOIL	SOIL						
Sand 2.00-0.063mm	% w/w	39	33	28						
Silt 0.063-0.002mm	% w/w	35	37	38						
Clay <0.002mm	% w/w	26	30	34						
Textural Class **		MCL	HCL	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.

** Please see the attached document for the definition of textural classes.

Reported by ***Myles Nicholson***
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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.



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