AGRICULTURAL QUALITY
OF LAND OFF LLANBERIS ROAD
CAERNARFON

Report 2434/2

22nd September 2024

Land Research ASSOCIATES
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Report 2434/2
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SUMMARY

An agricultural land quality survey has been undertaken of 3.7 ha of land off Llanberis Road, Caernarfon in August 2024.

The land has stony fine loamy soils with drainage restrictions. Agricultural land quality is limited to Subgrades 3a and 3b by wetness and stoniness.

1.0 Introduction

1.1 This report provides information on the agricultural quality of 3.7 ha of land off Llanberis Road, Caernarfon. The report is based on a survey of the land in August 2024.

SITE ENVIRONMENT

1.2 The survey area comprises two small fields, with the smaller western field comprising the application area. The land is bordered to the north by Llanberis Road and to the south, east and west by development. The land is gently sloping, at an average elevation of approximately 47.5 m AOD.

1.3 The land is under permanent pasture, ungrazed at the time of survey. The wider holding is significantly rush-infested (see image below), suggesting no agricultural drainage measures are present, although no rushes were found within the Application Site.

PUBLISHED INFORMATION

1.4 British Geological Survey 1:50,000 scale information records the underlying geology as Devensian glacial till over Nant Francon Subgroup siltstone.

1.5 The National Soil Map (published at 1:250,000 scale) records the land as Wick 1 Association, mainly comprising coarse loams, formed in sand and gravel deposits[1]. Land to the east of the site is recorded as Brickfield 2 Association: manly fine loams with drainage restrictions formed in glacial till and Head deposits.

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

1.6 The Welsh Government Predictive Agricultural Land Classification map[2] shows the land as Grade 2, with a small area of Subgrade 3b in the north-west. Some areas on the margins are shown as Urban but this is an inaccuracy due to the low resolution / detail of this mapping.

[2] New map | DataMapWales (gov.wales)

2.0 Soils

2.1 A soils and agricultural land quality survey was carried out in August 2024 in accordance with MAFF (1988) Agricultural Land Classification guidelines[3]. It was based on observations at intersects of a 50 m grid, giving a density of four observations per hectare. One observation (point 5 of Map 1) was within inaccessible scrub and was relocated.

2.2 The wider site was surveyed in less detail (one observation per hectare – see Map 1). Full depth investigations at some of these points were not possible due to stoniness. The grading of this wider area should therefore be treated as indicative.

2.3 During the survey, soils were examined by hand augerings and pits to a maximum depth of 0.8 m (stopped by stoniness). A log of the sampling points and a map (Map 1) showing their location is in an appendix to this report.

2.4 The soils were found to be stony sandy clay loams with variable drainage. The subsoils show evidence of seasonal waterlogging (greyish or pale colours with ochreous mottles), usually to shallow depth. In the south of the site the lower layers are formed from heavy clay loam slowly permeable material.

2.5 Example soil profiles described from pit excavations at points 3 and 5 are attached to this report as an appendix.

ASSESSMENT OF DRAINAGE

2.6 The subsoils of most of the site are judged to be imperfectly to moderately freely-draining (Soil Wetness Class III to II). In the south where slowly permeable lower layers restrict the potential for drainage improvement the land is poorly-draining (Soil Wetness Class IV) under the local climate.

2.7 It should be noted that the wider site is often severely rush-infested (see paragraph 1.3) suggesting that artificial drainage measures may be ineffective or absent. The practicalities of managing drainage on a relatively small plot of land surrounded by development is considered beyond the considerations of this report however.

[3]MAFF, (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 Classification[4].

3.3 The relevant site data for an average elevation of 47.5 m and a central point at grid reference SH 492,628 is given below.

- Average annual rainfall: 1093 mm
- January-June accumulated temperature >0°C 1437 day°
- Field capacity period 220 days
- Summer moisture deficits for: wheat: 75 mm
potatoes: 60 mm

3.4 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 MAFF[5]. The wet slightly cool climate at this locality limits land quality to a maximum of Grade 2.

SURVEY RESULTS

3.5 The agricultural quality of the land is primarily determined by wetness and stoniness limitations. Other factors have been assessed but do not affect the land grade. Land of Grade 3 has been identified.

Subgrade 3a

3.6 This land has permeable medium loamy topsoils, with subsoils slightly affected by perched water. Land access with machinery is likely to be restricted in winter and early spring, although late spring as well as autumn sowing is theoretically possible.

[4]Meteorological Office, (1989).*Climatological Data for Agricultural Land Classification*.
[5]MAFF, (1988).*Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

3.7 The topsoils in places have common large hard stones. This presents a risk of increased machinery wear were the land to be cultivated.

Subgrade 3b

3.8 This land in the south has moderately high topsoil clay content and poor drainage (Soil Wetness Class IV). Under the local climate this means that the land is usually too wet for spring machinery land access, and arable cropping is therefore limited to autumn sowings.

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 (ha)

Grade/subgrade	*Application area (ha)*	*Total survey area (ha)*
Subgrade 3a	0.92	2.83
Subgrade 3b	0.43	0.87
Total	1.35	3.70

APPENDIX

DETAILS OF OBSERVATIONS

MAPS

Land off Llanberis Road, Caernarfon: 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	0-25	slstSCL	5-10	25-56	slstSCL	x	56-80+	mstSCL	xxx	3	II	3a	W
2	0-25	slstSCL	5-10	25-56	mstSCL	xxx	56+	Stopped on stones		3	III	3a	W
3	0-25	slstSCL	5-10 (>60 mm)	25-48	mstSCL	xxx	48-68 68+	vstSCL Stopped on stones	xxx	3	III	3a	W/St
4	0-26	mstSCL	5-10	26-43	mstSCL	xxx	43-50 50+	HCL Stopped on stones	xxx	1	IV	3b	W
5	0-25	slstSCL	5-10	25-40	mstSCL	xxx	40-65 65+	HCL Stopped on stones	xxx	2	IV	3b	W
6	0-31	slstMCL	<5	31-40	mstMCL	xxx	40+	Stopped on stones		2	?	3a	W
7	0-25	slstMCL	<5	25-35	mstSCL	xxx	35+	Stopped on stones		3	?	3a	W
8	0-23	slstSCL	<5	23-35	mstSCL	xxx	35-76 76-90+	SCL HCL	xxx xxx	1	III	3a	W
9	0-23	slstMCL/SCL	<5	23-33	SCLfmn	xxx	33-62 62+	mstHCL Stopped on stones	xxx	2	IV	3b	W

Soil log key

Gley indicators[1]

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 fmn concentrations (gleyed horizon)
xxxx	dominantly blueish/greenish matrix, often with some reddish mottles (gleyed horizon)

Texture[2]

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

Limitations:

W - wetness/workability
D - droughtiness
De - depth
F - flooding
St – stoniness
G - gradient
T – topography/microrelief
C - Climate

Suffixes & prefixes:

o - organic

(vsl, sl, m, v, x)**st** – (very slightly, slightly, moderately, very, extremely) **stony**[6]

(vsl, sl, m, v, x)**ca**
(very slightly, slightly, moderately, very, extremely) **calcareous**[7]

Slowly permeable layers[4]

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

Wetness Class[5]

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

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

[1]Gley indicators in accordance with Hodgson, J.M., 1997. Soil Survey Field Handbook (third edition). Soil survey technical monograph No. 5
[2]Texture in accordance with particle size classes in Hodgson (1997)
[3] Occasionally recorded in the texture box
[4]Permeability 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)
[5]Soil Wetness Classes are defined in Hodgson (1997)
[6]stoniness classes as defined in Hodgson (1997)
[7]calcareous classes as defined in Hodgson (1997)

Grades shown as intergrade e.g. **3a**/3b are close to the grade boundary. The estimate of which side of the boundary the grading falls is the shown first (in bold here)
grades in brackets eg. (3a) raised by one grade due to calcareous topsoil

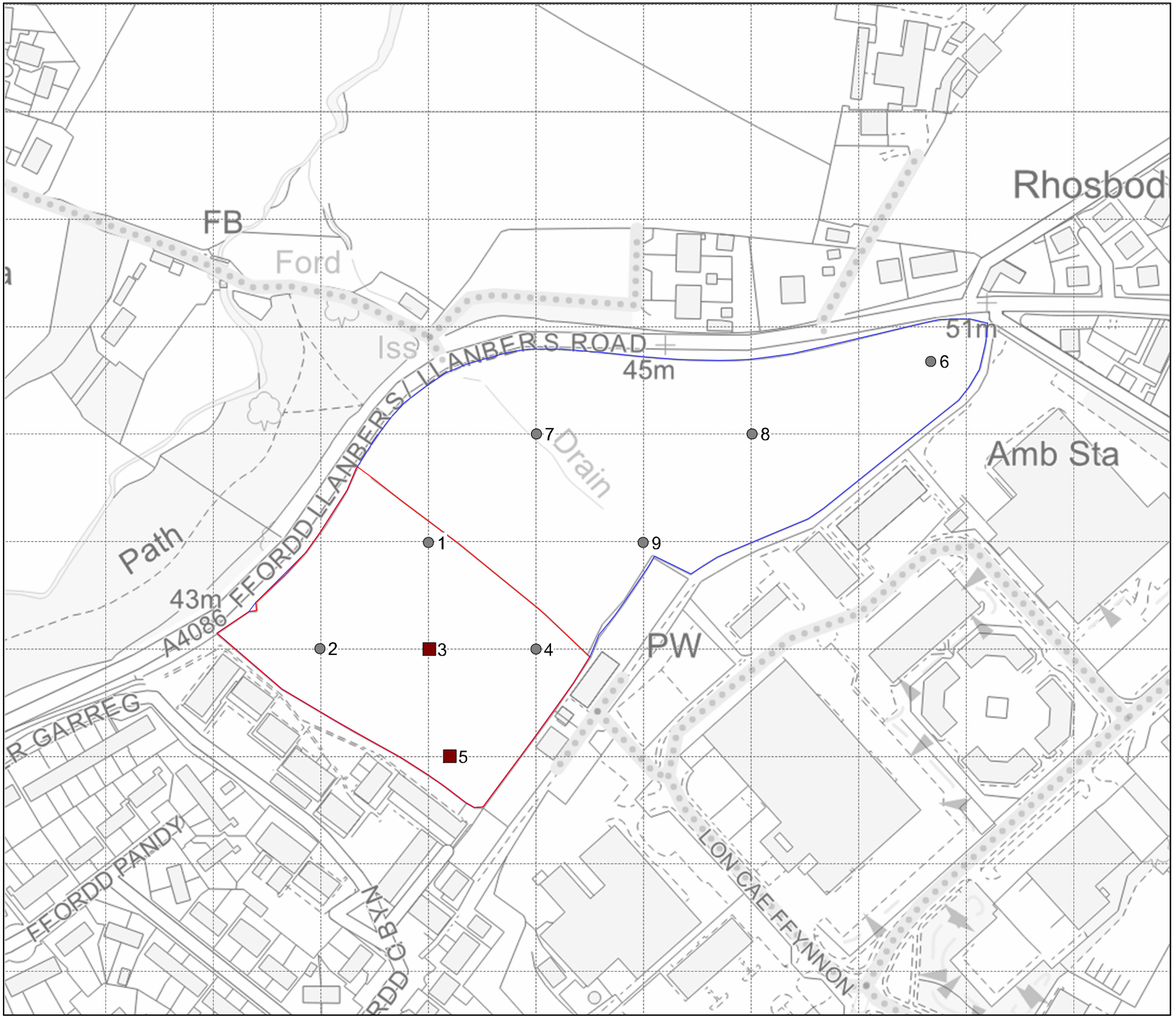
SOIL PIT DESCRIPTIONS

Observation 3

0-25 cm	Very dark greyish brown (10YR 3/2) sandy clay loam; 5-10% hard mixed stones (>60 mm); moderately developed coarse sub-angular blocky structure; friable; common fine fibrous roots; gradual smooth boundary to:
25-48 cm	Pinkish grey (7.5YR 6/2) sandy clay loam with 2-3% distinct fine strong brown (7.5YR 5/8) mottles; 20% hard stones; moderately developed medium sub-angular blocky structure; friable; few fine fibrous roots; gradual smooth boundary to:
48-68 cm	Light brown (7.5YR 6/3) sandy clay loam with 5% distinct strong brown (7.5YR 5/6 & 5/8) mottles and dark reddish grey (5YR 3/1) ferri-manganiferous concentrations; very stony; moderately developed medium sub-angular blocky structure; friable; few fine fibrous roots;
68 cm +	Impenetrable with hand tools.

Observation 5

0-25 cm	Very dark greyish brown (10YR 3/2) sandy clay loam with common; 10% hard mixed stones (5-10% >20 mm); moderately developed coarse sub-angular blocky structure; friable; common many fine fibrous roots; gradual smooth boundary to:
25-40 cm	Pale brown (10YR 6/2) sandy clay loam with 25% distinct fine and medium brownish yellow (10YR 6/8) mottles; 20% hard very coarse stones; moderately developed coarse sub-angular blocky structure; friable; common fine fibrous roots; gradual smooth boundary to:
40-65 cm	Light grey (10YR 7/1) heavy clay loam with 40% prominent reddish yellow (7.5YR 6/8) mottles and dark reddish grey (5YR 3/1) ferri-manganiferous concentrations; moderately stony; weakly developed coarse angular blocky structure; firm; <0.5% macropores; few fine fibrous roots;
65 cm +	Impenetrable with hand tools.



KEY

- Auger observations
- Pits
- Site boundary
- Survey boundary

Site:

Llanberis Road
Caernarfon

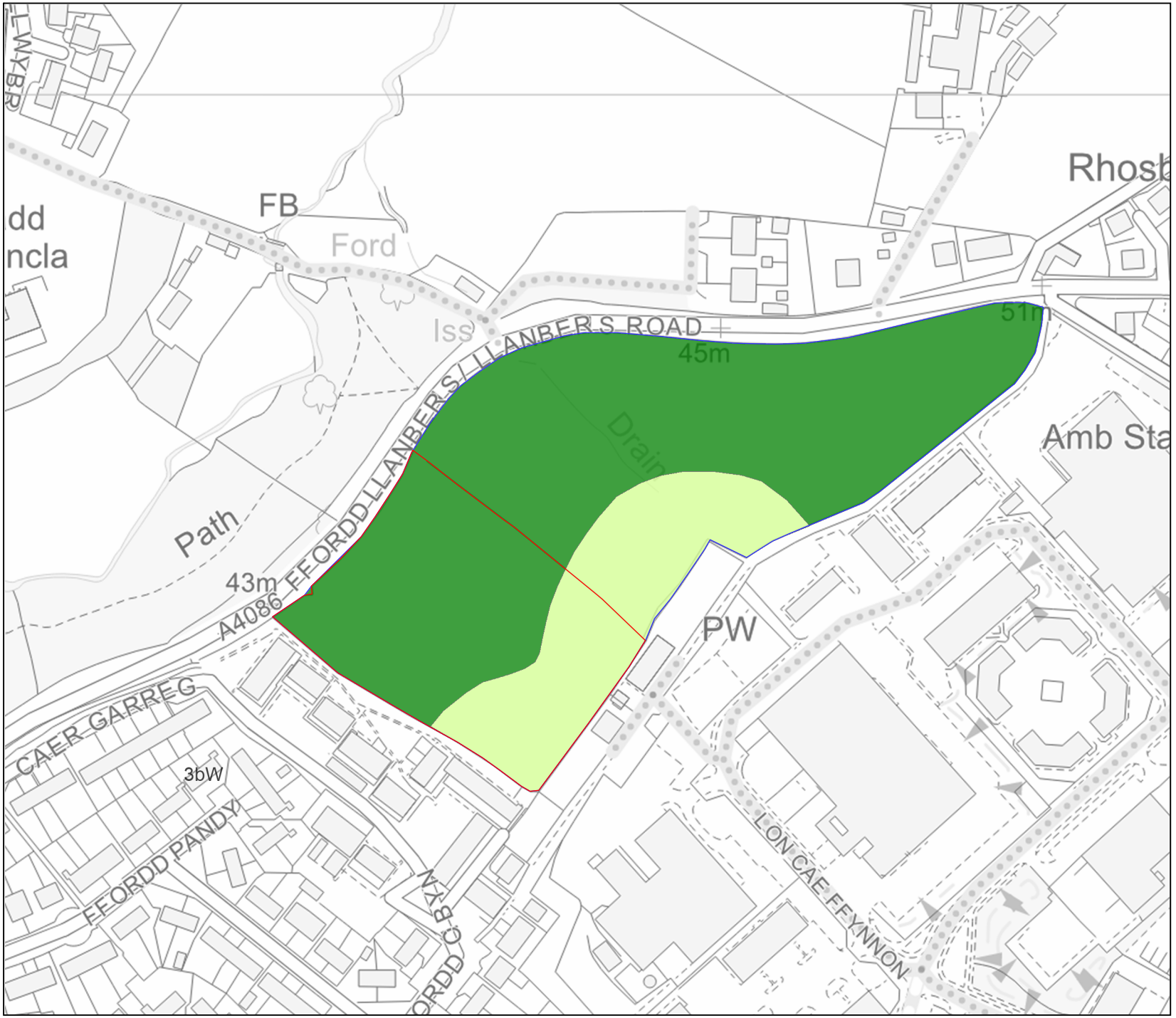
Map title:

MAP 1
Observations

Land Research Associates
Tapton Innovation Centre
Brimington Road
Chesterfield
S41 0TZ
www.lra.co.uk

Date:22/09/2024

Scale: 2:,500



KEY

- Subgrade 3a
- Subgrade 3b
- Site boundary
- Survey boundary

Site:

Llanberis Road
Caernarfon

Map title:

MAP 2
Agricultural Land
Classification

Land Research Associates
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Chesterfield
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www.lra.co.uk

Date:22/09/2024

Scale: 2:,500