AGRICULTURAL QUALITY OF LAND TO THE NORTH OF BRONWYLFA ROAD

Report 2104/3

30th October, 2023

Land Research ASSOCIATES
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OF LAND TO THE NORTH OF BRONWYLFA ROAD

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Report 2104/3
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SUMMARY

An agricultural land quality survey has been undertaken of 5.5 ha of land to the north of Bronwylfa Road, Bersham in December 2022.

The land has a mixture of gravel soils with droughtiness and stoniness limitations, and fine loamy soils with wetness/workability limitations. The land is of Grade 2 agricultural quality.

1.0 Introduction

1.1 This report provides information on the agricultural quality of 5.5 ha of land to the north of Bronwylfa Road, Bersham, Wrexham. The report is based on a survey of the land in December 2022.

SITE ENVIRONMENT

1.2 The survey area comprises a single field, bordered to the south by the B5097, to the north by a railway line, to the east by an embankment and to west by a lane.

1.3 The land is gently undulating, at an average elevation of approximately 112.5 m AOD.

PUBLISHED INFORMATION

1.4 British Geological Survey 1:50,000 scale information records the solid geology of the land in as Pennine Lower Coal Measures (inter-bedded mudstone, siltstone and sandstone). Drift cover of glacio-fluvial sand and gravel is recorded in the west, with Devensian glacial till in the east.

1.5 The National Soil Map (published at 1:250,000 scale) records the land as Wick 1 Association: mainly freely-draining coarse loams and sands formed in sand and gravel deposits[1].

1.6 The Welsh Government Predictive Agricultural Land Classification Map shows the land as Grade 2 agricultural quality.

[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 guidelines[2]. 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 main variation in soil types is described below.

LOAMY SOILS FORMED IN SAND AND GRAVEL

2.3 These soils occur predominantly in the west of the site. They comprise sightly to moderately stony sandy loam or sandy clay loam topsoil over very stony sandy loam/gravel material. These soils are judged to be freely-draining (Soil Wetness Class I).

2.4 An example profile is described from a pit at observation point 2 (see Map 1) in an appendix to this report.

FINE LOAMY SOILS

2.5 These soils occur in patches in the east. They typically comprise slightly stony sandy clay loam topsoil and subsoil, in places with a moderately high subsoil stone content. Most profiles are freely-draining (Soil Wetness Class I) with evidence of seasonal waterlogging (pale and greyish subsoil colours with ochreous mottles) only occurring below 40 cm depth.

[2]MAFF, (1988).*Agricultural Land Classification for England and Wales: Guidelies 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[3]. The relevant site data for a central point at grid reference SJ 305,486 at an average elevation of 112.5 m is given below.

• Average annual rainfall:	851 mm
• January-June accumulated temperature >0°C	1350 day°
• Field capacity period (when the soils are fully replete with water)	197 days mid Oct-late Apr
• Summer moisture deficits for:	wheat: 86 mm potatoes: 71 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 MAFF[4]. The slightly cool moist climate means the overriding climatic limitation is on the borderline between Grade 1 (no limitation) and Grade 2.

SURVEY RESULTS

3.4 The agricultural quality of the land is primarily determined by wetness/workability or droughtiness and stoniness. Other factors have been assessed but do not affect the land grade. Land of Grade 2 has been identified.

Grade 2

3.5 This grade accounts for all of the land. It includes areas with coarse loamy soils over gravel, which are limited by slight droughtiness: the gravelly subsoil holds limited moisture reserves and arable crops are likely to experience some moisture stress, affecting yields

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

in drier than average summers. In places slight topsoil stoniness (which is likely to impair the quality of roots crops) is an equally limiting factor.

3.6 Also included are areas with moderately high topsoil clay content (sandy clay loam or medium clay loam) and free drainage (Soil Wetness Class I). Under the local climate this combination is likely to cause some wetness/workability limitations for agricultural machinery, although mainly restricted to winter.

Grade areas

3.7 The land grade is shown on Map 2 and the area occupied shown below.

Table 1: Areas occupied by the land grade.

Grade/subgrade	*Area (ha)*	*% of the land*
Grade 2	5.5	100
Total	5.5	100

APPENDIX

DETAILS OF OBSERVATIONS

MAPS

SELECTED DROUGHTINESS CALCULATIONS

Land to the north of Bronwylfa Road: 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	0-30	MSL	<5	30-60	MSL/Gravel	o	60+	Stopped on stones		0	I	2	D
2	0-30	MSL/SCL	5-10	30-82	CSL/Gravel	o	82-110+	LCS/Gravel	o	1	I	2	D/St
3	0-29	SCL/MSL	<5	29-48	SCL	o	48-100+	SCL	xxx	2	I	2/1	W
4	0-33	SCL	<5	33-100+	SCL	xx				3	I	2	W
5	0-26	slstMSL	<5	26-60	CSL/Gravel	xx	60+	Stopped on stones		2	I	2	D

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 f-m concentrations (gleyed horizon)
xxxx	dominantly blueish matrix, often with some ochreous 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
Sl – slope
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)
(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)

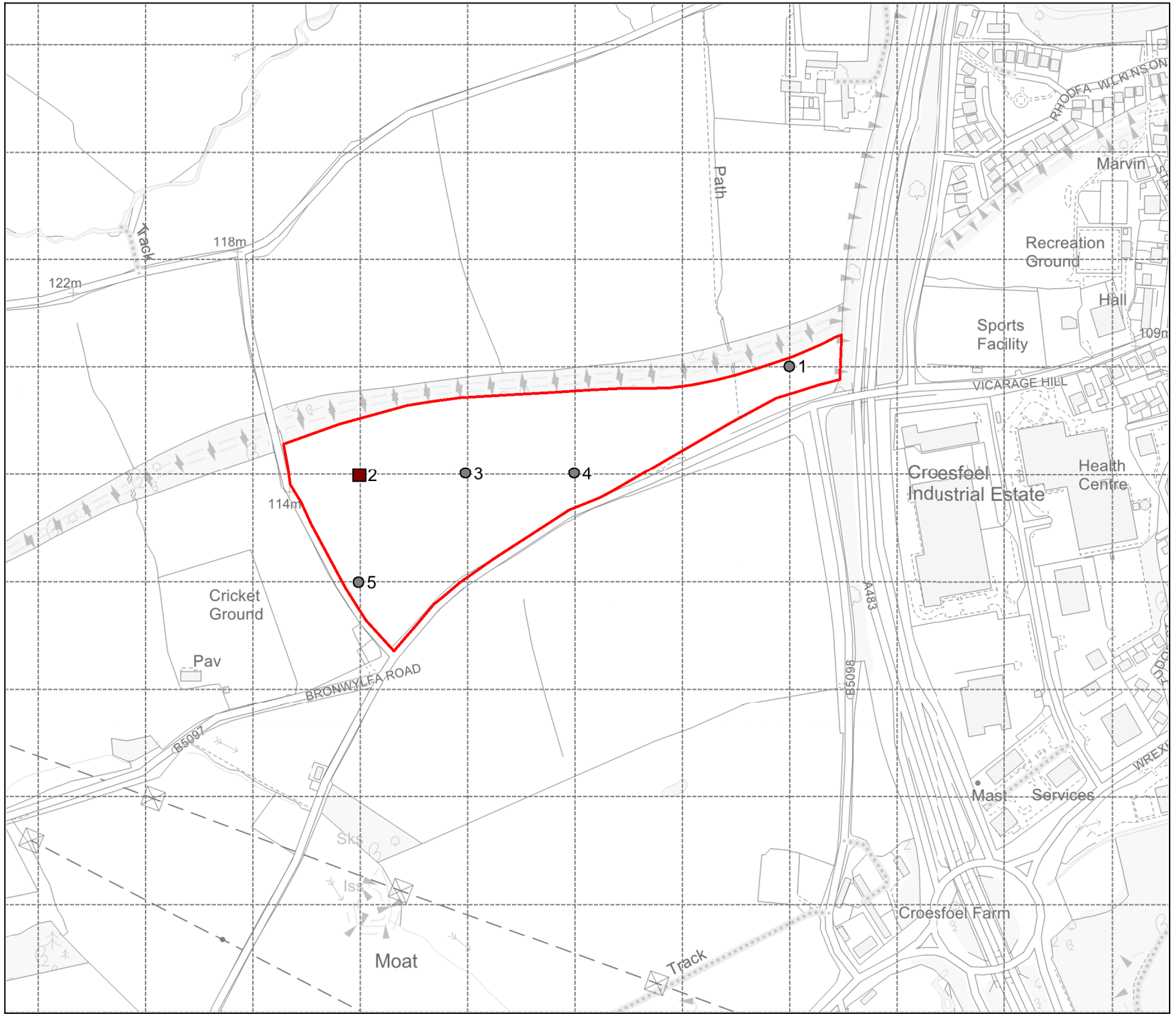
grades in brackets eg. (3a) raised by one grade due to calcareous topsoil

Soil pit descriptions

Pit 2 (see Map 1)

0-30 cm	Very dark greyish brown (10YR 3/2) medium sandy loam; 15% small and medium mixed hard stones (5-10% >20 mm); moderately developed fine sub-angular blocky structure; very friable; uneven gradual boundary to:
30-82 cm	Yellowish brown (10YR 5/4) coarse sandy loam; 50-60% small to large mixed hard stones; weakly developed fine sub-angular blocky structure; very friable; smooth diffuse boundary to:
82-110 cm+	Light yellowish brown (10YR 6/4) loamy coarse sand; 50-60% small to large mixed hard stones; weakly developed fine sub-angular blocky structure; very friable to loose.

.



Site:

Land to the north of Bronwylfa Road

Map title:

MAP 1
Observations

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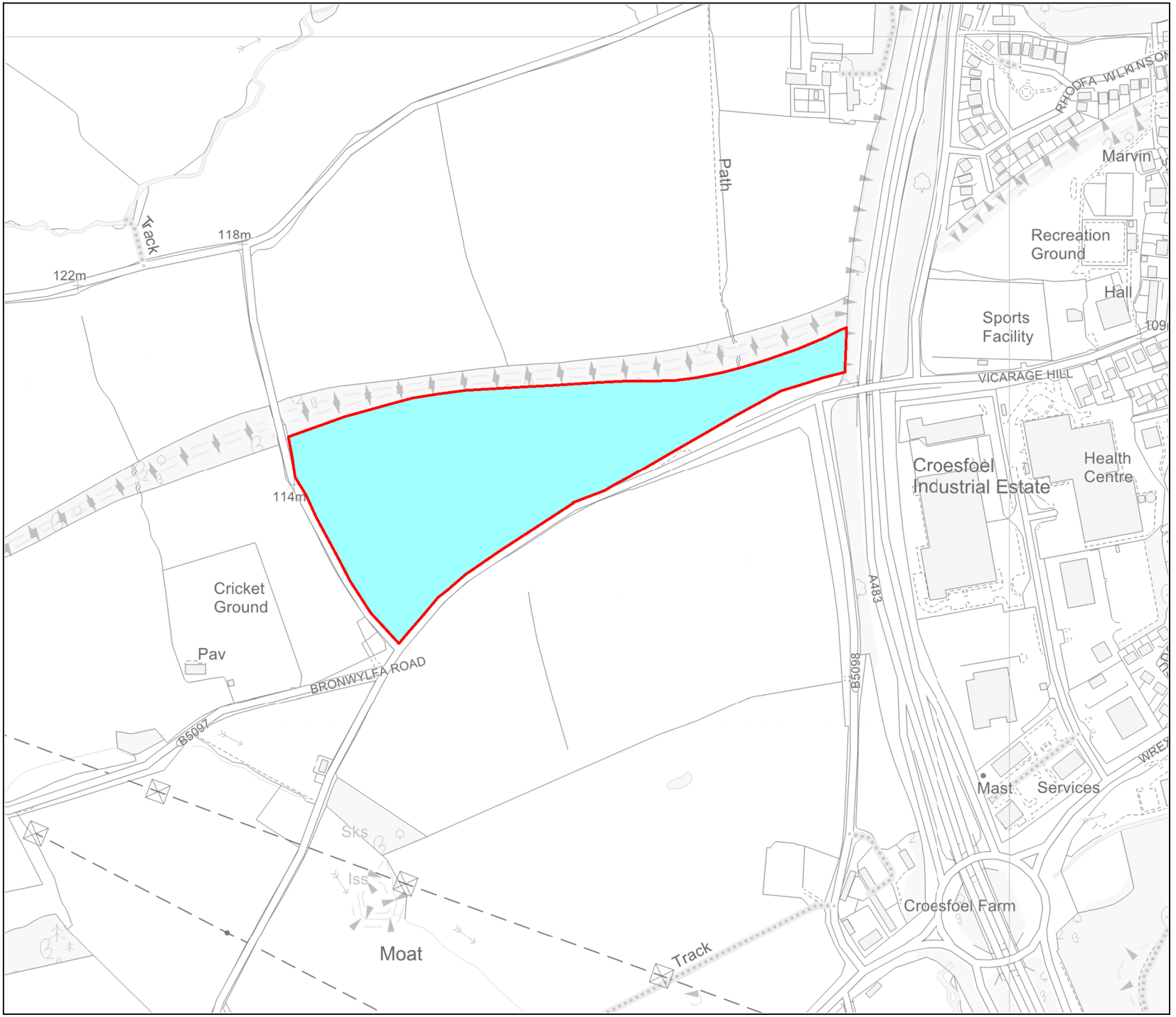
DE74 2RH
www.lra.co.uk

Date: 30/10/2023

Scale: 1:5,000



KEY

Grade 2

Site boundary

Site:

Land to the north of Bronwylfa Road

Map title:

MAP 2
Agricultural Land Classification

Land Research ASSOCIATES
Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date:30/10/2023

Scale: 1:5,000