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4.01.4	6.1	Agricultural Land Quality Report

**AGRICULTURAL QUALITY
OF LAND SOUTH OF BONVILSTON**

Report 1886/1

9th November 2021

**AGRICULTURAL QUALITY
OF LAND SOUTH OF BONVILSTON**

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Report 1886/1
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SUMMARY

An agricultural land quality survey has been undertaken of 20.7 ha of land at Oaklands Farm, south of Bonvilston, Glamorgan in November 2021.

The land has a mixture of shallow and deeper fine loamy soils and fine loams over clays. Land quality is a mixture of subgrade 3b and grade 4 agricultural quality due to wetness constraints.

The surveyed area forms part of a wider (126.1 ha) site proposed for a solar installation. The remainder of the land was subject to a Welsh Government survey in 1990 and was also found to be a mixture of subgrade 3b and grade 4 quality.

1.0 Introduction

- 1.1 This report provides information on the soils and agricultural quality of 20.7 ha of land at Oaklands Farm, Bonvilston, Glamorgan. The report is based on a survey of the land in November 2021.
- 1.2 The surveyed area forms part of a wider (126.1 ha) site proposed for a solar installation. The remainder of the land was subject to a Welsh Government survey in 1990 (report reference 021-90). This document is included in an appendix to this report and the results included in grade calculations (see Table 1, and Map 2 of appendix).
- 1.3 The descriptions in the following sections refer only to the newly surveyed land.

SITE ENVIRONMENT

- 1.4 The survey area includes seven fields, bordered to the south, west and north-west by woodland and on other sides by adjoining grassland. The land is gently sloping, at an average elevation of approximately 80 m AOD.
- 1.5 The land is all in use as cattle and sheep pasture.

PUBLISHED INFORMATION

- 1.6 1:50,000 scale BGS information records the underlying geology of the land as inter-bedded limestone and mudstone of the Marys Well Member, with some outcrops of Lavernock Shale.
- 1.7 The National Soil Map (published at 1:250,000 scale) records the land as Denchworth Association: mainly heavy slowly permeable soils formed in mudstone and clayey drift¹.
- 1.8 The Predictive Agricultural Land Classification map of Wales estimates the land as grades 4 and 5 quality.

¹Rudeforth 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 detailed soils and agricultural quality survey was carried out in November 2021 in strict accordance with MAFF (1988) 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 a combination of pits and augerings to a maximum depth of 1.2 m. A log of the sampling points and a map (Map 1) showing their locations are in an appendix to this report.

2.2 The soils were mainly found to be silty clay or clay loams over clay, with some shallower clays over hard limestone in the east. Where subsoil is present, it shows evidence of seasonal waterlogging (greyish colours with ochreous mottles) at shallow depth. The deeper soils have slowly permeable subsoil, either immediately below the topsoil (Soil Wetness Class V) or at moderate depth below a permeable upper subsoil (Soil Wetness Class IV).

2.3 An example deeper profile is described below from a pit at observation 1

0-22 cm	Very dark greyish brown (10YR 3/2) heavy silty clay loam; stoneless; moderately developed coarse sub-angular blocky structure; firm; many fine fibrous roots; smooth clear boundary to:
22-79 cm	Grey (10YR 6/1) clay with 20% distinct fine and medium reddish yellow (7.5YR 6/8) mottles; stoneless; weakly developed very coarse prismatic structure to structureless (massive); very firm; high packing density; no macro-pores; few fibrous roots; smooth gradual boundary to:
79-97 cm	Grey (10YR 5/1) clay with 30% distinct fine strong brown (7.5YR 5/8) mottles; stoneless; structureless (massive); very firm; high packing density; no macro-pores; no roots; calcareous; uneven gradual boundary to:
97 cm+	Hard limestone.

2.4 An example shallower profile is described below from a pit at observation 16 (Map 1).

0-19 cm	Very dark greyish brown (10YR 3/2) heavy silty clay loam; stoneless; moderately developed coarse sub-angular blocky structure; firm; many fine fibrous roots; smooth gradual boundary to:
19-28 cm	Greyish brown (10YR 6/2) silty clay with 10% faint fine yellowish brown (10YR 5/6) mottles; stoneless; moderately developed coarse sub-angular blocky structure; very firm; medium packing density; no macro-pores; common fibrous roots; smooth gradual boundary to:
28-44 cm	Grey (10YR 5/1) clay with 20% distinct fine yellowish brown (10YR 5/8) mottles; slightly stony (small soft limestone); weakly developed very coarse angular blocky structure; very firm; high packing density; no macro-pores; few fine fibrous roots; calcareous; smooth clear boundary to:
44 cm+	Hard jointed limestone.

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 an average elevation of 80 m is given below.

- Average annual rainfall: 1127 mm
- January-June accumulated temperature >0°C 1470 day°
- Field capacity period 227 days
(when the soils are fully replete with water) Late Sept-mid May
- Summer moisture deficits for: wheat: 75 mm
potatoes: 60 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. The slightly cool local climate limits land quality to a maximum of grade 2.

SURVEY RESULTS

3.4 This report describes the main limitations affecting ALC grades at this site. The agricultural quality of the land is primarily determined by. Other factors were assessed but did not affect the overall grading.

3.5 Land of grades 3 and 4 has been identified.

Subgrade 3b

3.6 This land typically has shallow soils (less than 45 cm) over limestone. Despite the relatively good drainage of this land, the topsoils have a high clay content

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*.

and given the wet local climate, they are rarely dry enough to be cultivated in spring; although autumn sown cereals could be grown on a regular basis.

- 3.7 Also included are areas in the east with medium-textured topsoil and poor drainage (Soil Wetness Class IV). This combination also causes wetness which precludes spring cropping, although early autumn cultivations for cereal sowing are possible.

Grade 4

- 3.8 The majority of the land has medium to heavy topsoils and poor drainage to very poor drainage (Soil Wetness Class IV to V). Under the wet local climate, such land is rarely dry enough to be cultivated with machinery in autumn or spring; land use is mainly limited to grassland farming.

Other land

- 3.9 This includes farm tracks, blocks of woodland and water bodies.

Grade areas

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

Table 1: Areas occupied by the different land grades (ha)

<i>Grade/subgrade</i>	<i>LRA survey</i>	<i>WG survey</i>	<i>Total</i>	<i>% of the land</i>
Subgrade 3b	6.5	52.2	58.7	46
Grade 4	12.1	53.2	65.3	52
Other land	2.1	0	2.1	2
Total	20.7	105.4	126.1	100

APPENDIX
DETAILS OF OBSERVATIONS
MAPS
WELSH GOVERNMENT REPORT

Land south of Bonvilston: 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	0-16	HZCL	0	<u>16</u> -90+	C	xxx				2	V	4	W
2	0-21	HZCL	0	<u>21</u> -40	HZCL	xxx	<u>40</u> -60+	C	xxx	2	V/IV	4	W
3	0-15	HZCL	0	<u>15</u> -25	HZCL	xxx	<u>25</u> -90+	C	xxx	3	IV/V	4	W
4	0-16	MZCL	0	16- <u>35</u>	HZCL	xxx	<u>35</u> -80+	C	xxx	1	IV	3b	W
5	0-23	HZCL	0	<u>23</u> -60+	C	xxx				2	V	4	W
6	0-16	MZCL	0	<u>16</u> -31	HZCL/ZC	xxx	<u>31</u> -80+	C	xxx	2	V	4	W
7	0-17	MZCL	0	<u>17</u> -28	HZCL	xxx	<u>28</u> -90+	C	xxx	2	V	4	W
8	0-26	MZCL	0	<u>28</u> -35	HZCL	xxx	<u>35</u> -90+	C	xxx	2	IV	3b	W
9	0-12	HZCL	0	<u>12</u> -80+	C	xxx				3	V	4	W
10	0-20	ZC	0	<u>20</u> -80+	C	xxx				2	V	4	W
11	0-9	HZCLorg	0	<u>9</u> -90+	C	xxx				3	V	4	W
12	0-17	HZCL	0	<u>17</u> -46	C(wet)	xxx	46+	LST/pipe?		3	V	4	W
13	0-17	HCL	0	<u>17</u> -39	C	xxx	39+	LST		1	IV	4	W
14	0-29	HCL	<5	29+	LST					2	I	3b	W
15	0-19	HZCL	0	19-28	HZCL	xxx	<u>28</u> -57 57+	C LST	xxx	2	IV	4	W
16	0-19	HZCL	0	<u>19</u> -28	ZC	xxx	<u>28</u> -44	C	xxx	4	V	4	W
17	0-26	ZC	5-10	26+	LST					6	I	3b	W
18	0-31	C	<5	31-42	LSTrubble	-	42+	LST		5	I	3b	W

Survey 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)

*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

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

*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

*Wetness Class*⁵

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

Limitations:

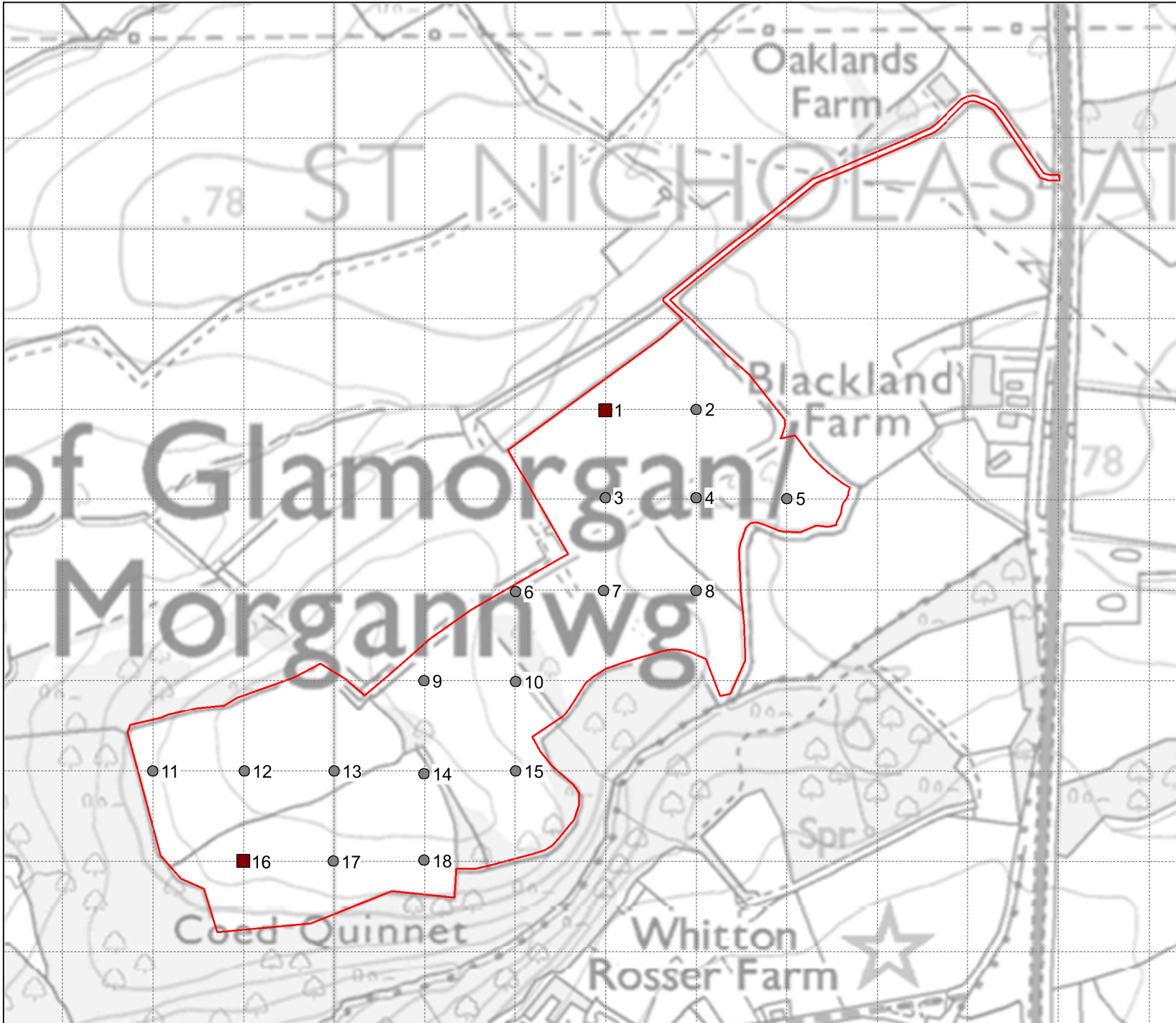
- W - wetness/workability
- D - droughtiness
- De - depth
- F - flooding
- St – stoniness
- SI – slope
- T – topography/microrelief

Suffixes & prefixes:

- r-reddish, gn – greenish
- o - organic
- (m, v, x)st – (moderately, very, extremely) stony, chky-chalky
- (vsl, sl, m, v, x)(very slightly, slightly, moderately very, extremely) calcareous

Other abbreviations

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



KEY

- Auger observations
- Pits
- Site boundary

Site:

Oaklands

Map title:

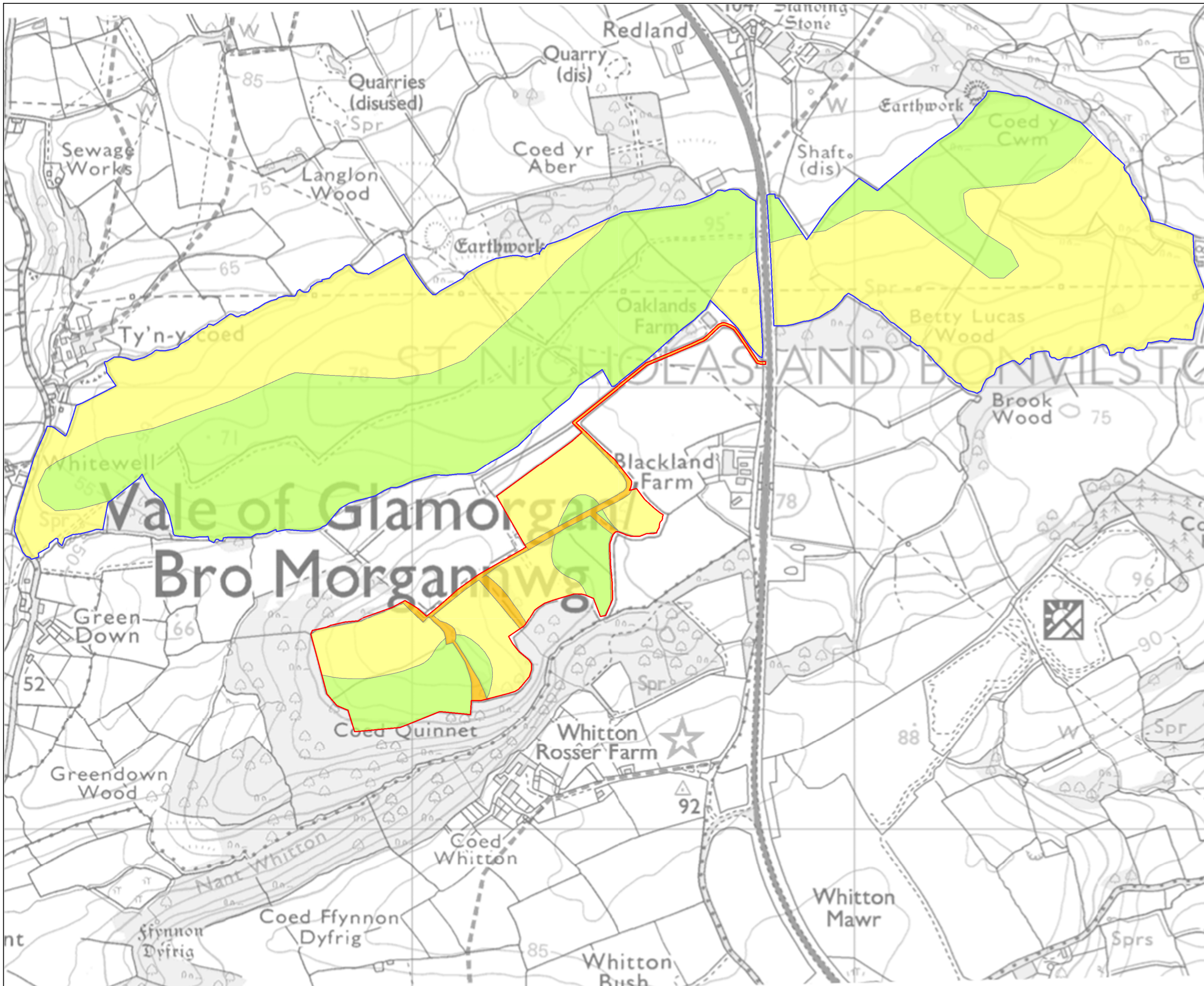
MAP 1
Observations

Land
Research
ASSOCIATES

Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date: 10/11/2021

Scale: 1:6,000



KEY	
	Subgrade 3b
	Grade 4
	Other land
	Survey boundary
	WG survey boundary (021-90)

Site:
Oaklands

Map title:
MAP 2
Agricultural Land
Classification

 Lockington Hall Lockington Derby DE74 2RH www.lra.co.uk	Date: 10/11/2021
	Scale: 1:8,000@A3

AGRICULTURAL LAND CLASSIFICATION
REDLANDS FARM
BONVILSTON, SOUTH GLAMORGAN

INTRODUCTION

The original Agricultural Land Classification Map Sheet 154 covering the South Glamorgan area was published in 1966 at a scale of 1:63360. The Redlands Farm area was classified as partly grade 2 and partly grade 4. The Bonvilston Nicholas area was resurveyed in detail in 1979 for local planning purposes, in order to revise the original gradings where necessary and to provide a sub division of land classified as grade 3. This local plan survey covered about 1800 ha of land and included Redlands Farm. It confirmed a large area of grade 2 and smaller area of subgrade 3a at Redlands Farm, to the south of and adjacent to the A48. The remainder of the farm was classified as subgrade 3c, grade 4 and non-agricultural. The different gradings largely reflected differences in soil types over the farm.

Since 1 January 1990 revised guidelines and criteria have been used for assessing the quality of agricultural land, taking advantage of the availability of new knowledge and data, in order to improve the objectivity and consistency of assessments of land quality. Because of the continuing planning interest and interest in land quality around the Redlands Farm area, this smaller area of 310ha has been briefly re-examined and resurveyed in terms of the revised ALC system.

CLIMATE

More extensive and objective climatic data are an important part of the revised ALC.

Interpolated values for the climate parameters, as calculated for Redlands Farm area, at a height of approximately 100m AOD are as follows.

Average Annual Rainfall (AAR)	- 1172 mm
Median Accumulated Temperature above 0°C January to June (ATO)	- 1447 day °C
Median Duration of Field Capacity Days (FCD)	- 234 days
Average Summer Rainfall, April to September (ASR)	- 534 mm
Median Accumulated Temperature above 0°C April to September (ATS)	- 2346 day °C
Moisture Deficit (Winter Wheat)	- 71 mm
Moisture Deficit (Potatoes)	- 55 mm

The area has a high rainfall (AAR) with high accumulated temperatures (ATO). It is relatively sheltered. Overall climate provides only a minor limitation to agricultural productivity.

SOILS

Soils in the north of the farm alongside the A48 were confirmed as brown coarse loamy topsoil textures, over coarse loamy or fine loamy subsoils. Such soils were found to be well drained, and deep, but with gravelly subsoil horizon restricting augering depth in places. Topsoil stone content was no more than slightly stoney. Such soils would provide only minor limitation to agriculture. South of Redlands Farm itself, the soil type changes to a heavier fine loamy over clayey, the clayey subsoil providing a moderately severe or severe soil wetness limitation.

AGRICULTURAL LAND CLASSIFICATION

This brief re-examination of the Redlands Farm area in terms of the revised ALC largely confirmed the classification of the land made during the detailed survey in 1979. In particular it confirmed a large area of grade 2 and smaller area of sub-grade 3a alongside the A48 in the north of the survey area. Land classified as subgrade 3c in 1979 would now be incorporated into subgrade 3b in the revised ALC system.

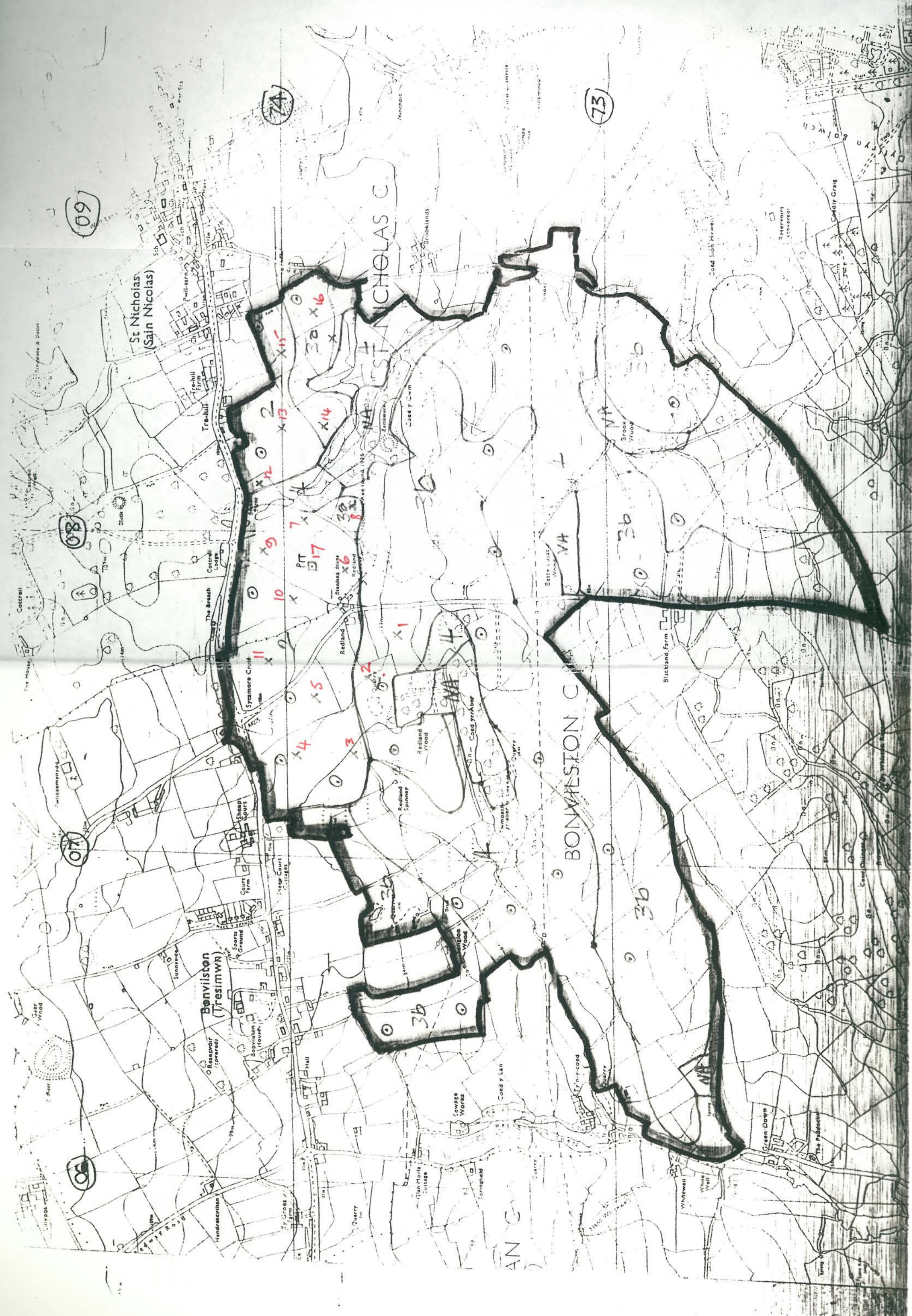
SUMMARY

Grade 1	-
Grade 2	46 ha
Subgrade 3a	8 ha
Subgrade 3b	140 ha
Grade 4	109 ha
Grade 5	-
Non agricultural	22 ha
Total	325 ha

RPG
Trawsgoed
July 1990

REFERENCES

1. MAFF (1984) The Agricultural Climate of England and Wales Reference Book 435 HMSO, London
2. Met Office 1989 Climatological Data-sets for Agricultural Land Classification. Meteorological Office, Bracknell
3. Geological Survey of Gt Britain, Sheets 261 and 262, Bridgend
4. Soil Survey of England and Wales (1983), 1:250,000 Soil Map Series, Sheet 2: Wales
5. MAFF/Soil Survey of England and Wales (1984) Soil Texture Leaflet 894
6. MAFF (1988) Agricultural Land Classification of England & Wales. Revised guidelines and criteria of grading the quality of agricultural land.



PROF.NO	DEPTH[CM]	TEXTURE	COLOUR	WEITNESS	STONE	RELIEF	ALC
1	30 50+	[M]/[H]CL C	10YR 3/3 DK BROWN 10YR 4/1 BRNSH GREY	IV	<5%, 2-6CM	<3 S	3b
2	30 90+	SL SL/[M]CL	10YR 3/4 DK BROWN 7.5YR 4/4 BROWN	I	<5%	<2 SW	2
3	25 70 70+	SL SL IMPEN	7.5YR 4/4 7.5YR 5/6 BRT BROWN	I	<5%	4-5 W	2
4	25 60 60+	SL [C]SL IMPEN	7.5YR 4/4 7.5YR 4/6	I	5-10%, 2-6	4-5 W	2
5	25 60 60+	SL [C]SL IMPEN	7.5YR 4/4 7.5YR 4/6	I	5-10%, 2-6	<2	2
6	35 60 60+	S[Z]L SL IMPEN	7.5YR 4/4 7.5YR 5/4-5/6	I	<5%	3 E	2
7	30 50 50+	SL SL IMPEN	7.5YR 4/4 7.5YR 4/6	I	5-10%, 2-6	3 E	2
8	25 40 40+	SL SL ROCK?	7.5YR 4/4 7.5YR 4/6	I	10%, 2-6CM	2 SE	3a
9	35 60 60+	SL [M]CL IMPEN	7.5YR 4/4 7/5YR 4/6	I	5-10%, 2-6	3 E	2
10	25 55 80+	SL [M]CL [M]SCL	7.5YR 4/4 7.5YR 5/6 7.5YR 4/6	I-II	5%, 2-6CM	2 SE	2-3a
11	35 70 80+	SL/[M]CL SL/[M]CL SCL	7.5YR 4/4 7.5YR 4/6 7.5YR 4/6	I	5%, 2-6CM	<2	2-3a
12	25 50 50+	SL [M]CL IMPEN	7.5YR 4/4 7.5YR 4/6	I	5-10%, 2-6	3 W	2
13	25 70 80+	SL [M]CL S[C]L	7.5YR 4/3 7.5YR 4/6 7.5YR 5/6-6/4	I-II	<5%, 2-6CM	<2	2-3a
14	25 50	SL SL/[M]CL	7.5YR 4/4 7.5YR 4/6	I	10-15%, 2-6	5 SE	3a

PROF.NO	DEPTH[CM]	TEXTURE	COLOUR	WEINNESS	STONE	RELIEF	ALC
	50+	IMPEN					
15	30	SL	7.5YR 4/3	I	<5%,2-6CM	<2	2
	50	SL	7.5YR 4/4				
	50+	IMPEN					
16	25	SL	7.5YR 4/3	I	<5%,2-6CM	4 S	2-3a
	40	S[C]L	7.5YR 4/4				
	40+	IMPEN					
17	25	SL	7.5YR 4/4	I	<5%,2-6CM	<2	2
	45	SL/[M]CL	7.5YR 5/6				
	80+	[C]SL	7.5YR 4/6				