

**TECHNICAL APPENDIX 9:  
AGRICULTURAL QUALITY  
OF LAND AT GREAT HOUSE FARM  
PENPERGWYM**

Report 1797/1

26<sup>th</sup> March 2021

**AGRICULTURAL QUALITY  
OF LAND AT GREAT HOUSE FARM, PENPERGWYM**

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## **SUMMARY**

An agricultural land quality survey has been undertaken of 91.8 ha of land at Great House Farm, Penpergwym in March 2021.

The land has mainly deep fine loamy soils with variable wetness constraints: these give a mixture of subgrade 3a and 3b quality land: subgrade 3a is dominant in the east and subgrade 3b in the west.

Areas in the west have moderate to steep slopes, which limit land to subgrade 3b and grade 4 agricultural quality.

## 1.0 Introduction

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- 1.1 This report provides information on the agricultural quality of 91.8 ha of land at Great House Farm, Penpergwym, Monmouthshire.

### **SITE ENVIRONMENT**

- 1.2 The survey area is bordered to the west and south-west by country lanes, to the north by Ffrwd Brook, and on other sides by adjoining agricultural land.
- 1.3 The site comprises an elongate hill summit in the west, which slopes north, south and east, initially steeply, before grading to gentle footslopes with minor stream valleys.
- 1.4 At the time of survey the land was mainly under pasture grazed by sheep, with some fodder beet and maize in the north and south.

### **PUBLISHED INFORMATION**

- 1.5 1:50,000 scale BGS information records the solid geology of the land as inter-bedded Devonian mudstone and siltstone of the Raglan Mudstone Formation, with minor outcrops of Maughan Formation Sandstone and Bishops Frome Formation Limestone Member calcrete on steep slopes in the west. Drift cover is recorded to be absent on the higher ground in the west; Devensian glacial till cover is recorded in the east, with alluvium recorded along drainage lines.
- 1.6 The National Soil Map (published at 1:250,000 scale) records most of the land as Milford Association: mainly freely-draining reddish fine loamy soils over hard rock or stony Head, with similar wetter soils on footslopes. An area in the north-east is recorded as Lugwardine Association: mainly reddish fine and coarse silty soils with variable wetness formed in river alluvium<sup>1</sup>.
- 1.7 The Welsh Government predictive ALC map shows the land as a mixture of grade 2 and subgrade 3b, due to climatic, gradient and wetness limitations.

<sup>1</sup>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

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2.1 A detailed soils and agricultural quality survey was carried out in January 2021 in strict accordance with MAFF (1988) guidelines<sup>2</sup>. 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 location is in an appendix to this report. Soil description pit photographs are also appended.

2.2 The soils were found to vary principally in depth and drainage. The main soil types are described below.

### DEEP FINE LOAMY SOILS

2.1 These soils are dominant across the site, occurring over both argillaceous rock in the north and west, and glacial till and alluvial deposits in the south and east. They mainly comprise very slightly stony medium clay loam or silty clay loam topsoil, over moderately permeable reddish fine loamy subsoil. The reddish subsoils mainly display dull ped faces and greyish and ochreous mottles ('*gley*' colours), demonstrating some degree of seasonal waterlogging, although in some places this evidence is absent. In places the lower subsoil is dense and slowly permeable.

2.2 A typical example is described below from a pit at observation 67 (Map 1).

|          |  |
|----------|--|
| 0-26 cm  | Dark brown (7.5YR 3/2) medium clay loam to silty clay loam; slightly stony (medium and large tabular siltstone); moderately developed medium and coarse sub-angular blocky structure; friable; common fine fibrous roots; smooth gradual boundary to:  |
| 26-94 cm | Light reddish brown (5YR 6/3) medium clay loam with 3-4% distinct fine pale brown (10YR 6/3) and yellow (2.5Y 7/6) mottles slightly to moderately stony; moderately developed coarse sub-angular blocky structure; friable; porous; common fine fibrous roots; saturated at 70 cm; uneven diffuse boundary to: |
| 94 cm+   | Hard tabular slaty siltstone.  |

2.3 A freely drained example is described below from a pit at observation 22 (Map 1).

|         |  |
|---------|--|
| 0-25 cm | Reddish brown (5YR 4/3) medium clay loam; stoneless; moderately developed coarse to very coarse sub-angular blocky structure; firm; many fine fibrous roots; smooth gradual boundary to: |
|---------|--|

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

25-120 cm Reddish brown (2.5YR 5/3) medium clay loam; stoneless; moderately developed medium sub-angular blocky structure; friable; 1-2% very fine biopores; medium packing density; common fine fibrous roots.

2.4 An example with slowly permeable subsoil is described below from a pit at observation 47 (Map 1).

0-27 cm Brown (7.5YR 4/2) medium clay loam; very slightly stony (small and medium soft siltstone); well developed medium sub-angular blocky structure; friable; many fine fibrous roots; smooth gradual boundary to:

27-46 cm Reddish grey (5YR 5/2) medium clay loam with 2-3% fine distinct dark grey (5YR 4/1) ferri-manganiferous concentrations; stoneless; moderately developed medium sub-angular blocky structure; friable; porous; low packing density; common fine fibrous roots; smooth diffuse boundary to:

46-120 cm Grey (5YR 6/1) heavy clay loam with 40% medium and coarse reddish brown (2.5YR 5/3) mottles and 5% fine yellow (10YR 7/8) mottles; weakly developed very coarse angular blocky structure; firm and dense; no visible macro-pores; few roots; perched water table at 55 cm.

### SHALLOW SOILS OVER BEDROCK

2.5 These soils occur on the steeper convex upper slopes in the west, where naturally eroded surfaces expose underlying mudstone or siltstone. The variable nature of the inter-bedded bedrock means these soils vary between medium-textured stony types of hard siltstone or sandstone, and heavy clays over mudstone.

2.6 An example over hard rock is described below from a pit at observation 38 (Map 1).

0-31 cm Weak red (2.5Y 4/2) medium clay loam; very slightly stony (small and medium soft tabular siltstone); well developed medium and fine sub-angular blocky structure; friable; common fine fibrous roots; smooth gradual boundary to:

31-41 cm Soft weathering siltstone; smooth sharp boundary to:

41 cm + Very hard slaty siltstone.

### 3.0 Agricultural land quality

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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<sup>3</sup>. The data for the geographic centre of the site, at an average elevation of 100 m is given below.

- Average annual rainfall: 1047 mm
- January-June accumulated temperature >0°C 1424 day°
- Field capacity period 221 days  
(when the soils are fully replete with water) early Oct-mid May
- Summer moisture deficits for: wheat: 80 mm  
potatoes: 66 mm

3.3 The elevation varies significantly across the site (from 146 m in the west to 60 m in the east). This has significant effects on interactive wetness limitations (climate and soil) and therefore the climatic data for the higher ground in the west has been calculated separately and is given below for an elevation of 127.5 m.

- Average annual rainfall: 1090 mm
- January-June accumulated temperature >0°C 1393 day°
- Field capacity period 226 days  
(when the soils are fully replete with water) late Sept-mid May
- Summer moisture deficits for: wheat: 74 mm  
potatoes: 58 mm

<sup>3</sup>Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

- 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<sup>4</sup>. The slightly wet local climate limits land quality within the site to a maximum of grade 2.

#### **RISK OF FLOODING**

- 3.5 Flood risk is largely absent, with the exception of potential minor flooding around drainage lines, which are judged too minor to map. A small low-lying area adjoining Ffrwd Brook in the north-east is judged likely to be subject to regular short duration winter floods, limiting land in these areas to subgrade 3b agricultural quality.

#### **SURVEY RESULTS**

- 3.6 The agricultural quality of the land is primarily limited by wetness or gradient. Land of grades 2, 3 and 4 has been identified.

#### **Grade 2**

- 3.7 This grade includes a small area in the north, where soils are deep, medium-textured and well structured, with no evidence of seasonal waterlogging. This land is limited to grade 2 by minor wetness caused by the moderately high topsoil clay content, which is likely to restrict winter access with machinery. The overriding climatic constraint (see paragraph 3.4) is an equally limiting factor.

#### **Subgrade 3a**

- 3.8 This subgrade includes land with medium-textured topsoils and minor to moderate drainage restrictions (Soil Wetness Class II or III). These combinations mean wetness limitations restrict machinery access for cultivation and harvest in winter and early spring.
- 3.9 Also included are very small areas with moderately shallow soils, which are limited by soil depth as well as by summer droughtiness caused by shallow rooting.
- 3.10 A small number of sample points were observed within the area with a lesser degree of wetness limitation, but this variation is judged a function of the mapping scale and these patches are judged to be limited by the degree of wetness limitation of the surrounding land.

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



### **Subgrade 3b**

3.11 This subgrade includes land with two principal limitations:

- Areas with significant wetness limitation, caused either by the combination of high topsoil clay content and minor drainage impedance (Soil Wetness Class II or III), or by moderately high topsoil clay content and significant drainage impedance (Soil Wetness Class III to IV). The latter includes areas on the highest ground in the west with over 225 annual field capacity days. All of this land is unsuitable for spring-sown cropping, although autumn-sown cereals can be grown on a regular basis.
- Large areas in the west of the site slopes at gradients between 7 and 11 degrees, which presents erosion risks under cultivation and makes the use of some cultivation machinery difficult.

### **Grade 4**

3.12 This land includes the steeper slopes (12-18 degrees) which are not suitable for cultivated agriculture. Also included is a small area of made ground in the south-east, where the high concentration of coarse rubble makes cultivation unrealistic.

3.13 Some minor areas on the higher ground in the west are too wet for cultivation, but cannot be mapped separately and therefore included as subgrade 3b as the average grade for this land.

### **Other land (non-agricultural)**

3.14 This land comprises farm tracks, buildings, minor wooded areas and water bodies.

### **Grade areas**

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

**Table 1: Areas occupied by the different land grades**

| <i><b>Grade/subgrade</b></i> | <i><b>Area (ha)</b></i> | <i><b>% of the land</b></i> |
|------------------------------|-------------------------|-----------------------------|
| <b>Grade 2</b>               | 1.95                    | 2                           |
| <b>Subgrade 3a</b>           | 47.45                   | 52                          |
| <b>Subgrade 3b</b>           | 35.67                   | 39                          |
| <b>Grade 4</b>               | 3.87                    | 4                           |
| <b>Other land</b>            | 2.90                    | 3                           |
| <b>Total</b>                 | 91.8                    | 100                         |

**APPENDIX**  
**DETAILS OF OBSERVATIONS**  
**MAPS**  
**ADDITIONAL PIT DESCRIPTIONS**  
**SITE PHOTOGRAPHS**  
**LABORATORY ANALYSIS (PSD)**

**Land at Great House 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   | 0-30         | MCL        | <5      | 30-90+             | HCL(r)     | xxx     |                             |                   |           |          | 8       | III                  | 3b    | SI              |
| 2   | 0-28         | MCL        | <5      | 28-43              | HCL(r)     | xxx     | 43-80+                      | HCL(r)            | xx        |          | 4       | III                  | 3a/3b | W               |
| 3   | 0-26         | MCL        | 0       | 26-74              | MCL(r)     | xx      | <del>74</del> -90+          | HCL(r)            | xxx       |          | 9       | III                  | 3b    | SI              |
| 4   | 0-28         | MCL        | 0       | 28-65              | MCL(r)     | xx      | 65+                         | stopped on stones |           |          | 4       | II?                  | 3a    | W               |
| 5   | 0-25         | MCL        | <5      | 25-120             | MCL(r)     | x       |                             |                   |           |          | 2       | I                    | 2     | W/C             |
| 6   | 0-32         | MCL        | 0       | 32-90+             | MCL(r)     | x       |                             |                   |           |          | 1       | I                    | 2     | W/C             |
| 7   | 0-28         | MCL        | <5      | 28-53              | MSZL(r)    | xxx     | 53+                         | stopped on stones |           |          | 0       | III                  | 3b    | FI              |
| 8   | 0-29         | MCL        | 0       | <del>29</del> -90+ | C(r)       | xxx     |                             |                   |           |          | 4       | IV                   | 3b    | W               |
| 9   | 0-24         | MCL        | <5      | 24-47              | MCL(r)     | xxx     | <del>47</del> -90+          | HCL(r)            | xxx       |          | 5       | III/IV               | 3b    | W               |
| 10  | 0-24         | MCL        | 0       | 24-68              | MCL(r)     | x       | 68-90+                      | MCL(r)            | xx        |          | 8       | I                    | 3b    | SI              |
| 11  | 0-28         | MCL        | 0       | 28-52              | MCL(r)     | xx      |                             |                   |           |          | 3       | I/II                 | 3a    | W               |
| 12  | 0-24         | MCL        | 0       | 24-65              | MCL(r)     | xx      | 65-90+                      | MCL(r)            | xxx       |          | 4       | II                   | 3a    | W               |
| 13  | 0-26         | MCL        | <5      | 26-53              | MCL/SCL(r) | xxx     | 58-90+                      | MCL(r)            | xxx       |          | 4       | III                  | 3a    | W               |
| 14  | 0-23         | MCL        | <5      | 23-45              | MCL(r)     | xxx     | <del>45</del> -120          | HCL(r)            | o         |          | 4       | IV                   | 3b    | W               |
| 15  | 0-28         | MCL        | 0       | 28-60              | MCL(r)     | o       | 60-90+                      | MCL(r)            | xxx       |          | 3       | II                   | 3a    | W               |
| 16  | 0-24         | HCL        | 0       | <del>24</del> -80+ | HCL(r)     | xxx     |                             |                   |           |          | 7       | III                  | 3b    | W(SI)           |
| 17  | 0-25         | MCL/SCL    | <5      | 25-70              | MCL/SCL(r) | xxx     | <del>70</del> -90+          | HCL(r)            | xx(x)     |          | 3       | III                  | 3a    | W               |
| 18  | 0-28         | MCL        | 0       | 28-40              | MCL(r)     | o       | 40-62<br><del>62</del> -90+ | HCL(r)<br>HCL(r)  | o<br>xxx  |          | 2       | III/IV               | 3a/3b | W               |
| 19  | 0-29         | MCL        | <5      | 29-51              | mstMCL     | xx(x)   | 51+                         | R                 |           |          | 13      | II                   | 4     | SI              |
| 20  | 0-24         | HCL        | <5      | 24-41              | SCL/rubble | xxx     | 41+                         | R                 |           |          | 12      | III                  | 4     | SI              |
| 21  | Not surveyed |            |         |                    |            |         |                             |                   |           |          | 13      | -                    | 4     | SI              |
| 22  | 0-25         | MCL        | <5      | 25-45              | MCL(r)     | xx(x)   | 45-100+                     | MCL               | xxx       |          | 4       | II                   | 3a    | W               |
| 23  | 0-27         | HZCL       | 0       | <del>27</del> -80+ | C(r)       | xxx     |                             |                   |           |          | 7       | IV/V                 | 4     | W               |
| 24  | 0-24         | MCL        | <5      | 24-52              | MCL(r)     | xx(x)   | 52+                         | R                 |           |          | 1       | II                   | 3b    | W               |
| 25  | 0-25         | MCL        | <5      | 25-68              | MCL(r)     | xx(x)   | <del>68</del> -90+          | HCL(r)            | xxx       |          | 3       | III/IV               | 3b    | W               |
| 26  | 0-32         | MCL        | 0       | 32-60              | MCL(r)     | xx      | <del>60</del> -90+          | HCL(r)            | xxx       |          | 5       | IV                   | 3b    | W               |
| 27  | 0-23         | MCL        | <5      | 23+                | R          |         |                             |                   |           |          | 6       | I?                   | 4     | De              |
| 28  | 0-23         | MCL        | 0       | 23-44              | MCL(r)     | xxx     | <del>44</del> -80+          | HCL(r)            | xxx       |          | 4       | IV                   | 3b    | W               |
| 29  | 0-30         | MCL        | <5      | 30-47              | HCL(r)     | xxx     | 47+                         | R?                |           |          | 12      | III                  | 4     | SI              |
| 30  | 0-27         | MCL        | 0       | 27-90+             | MCL(r)     | o       |                             |                   |           |          | 3       | I/II                 | 3a    | W               |
| 31  | 0-26         | HCL        | 0       | 26-39              | HCL(r)     | xxx     | 39-60<br>60-90+             | HCL(r)<br>MCL(r)  | xxx<br>xx |          | 1       | III                  | 3b    | W               |
| 32  | 0-31         | MCL        | <5      | 31-63              | MCL        | xxx     | <del>63</del> -90+          | C                 |           |          | 1       | III                  | 3a    | W               |
| 33  | 0-28         | MCL        | <5      | 28-80+             | MCL(r)     | o       |                             |                   |           |          | 2       | I/II                 | 2/3a  | W               |
| 34  | 0-27         | MCL        | 0       | 27-62              | MCL(r)     | xxx     | 62-90+                      | HCL               | xxx       |          | 4       | III                  | 3a/3b | W               |
| 35  | 0-28         | MCL        | 0       | 28-58              | MCL(r)     | xx      | 58-90+                      | MCL(r)            | xx(x)     |          | 4       | II                   | 3a    | W               |
| 36  | 0-26         | MZCL       | 0       | 26-90+             | MZCL(r)    | o       |                             |                   |           |          | 9       | I/II                 | 3a    | W               |
| 37  | 0-26         | MCL        | <5      | 26-90+             | MZCL(r)    | xx      |                             |                   |           |          | 4       | II                   | 3b    | W               |
| 38  | 0-31         | MCL        | <5      | 31-41              | MCL(r)     | xxx     | 41+                         | R                 |           |          | 4       | III                  | 3a/3b | W               |
| 39  | 0-29         | HZCL       | 0       | <del>29</del> -90+ | C          | xxx     |                             |                   |           |          | 6       | IV                   | 4     | W               |
| 40  | 0-27         | HZCL       | 0       | 27-90+             | MCL(r)     | xx      |                             |                   |           |          | 5       | II                   | 3a    | W               |
| 41  | 0-22         | MCL        | <5      | 22-52              | MCL(r)     | xx      | 52-90+                      | HCL(r)            | xxx       |          | 13      | II                   | 4     | SI              |

| 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 |
| 42  | 0-32         | MCL        | 0                 | 32-54         | MCL         | x        | 54-90+          | MCL                         | xxx        | 1     | II      | 3a                   | W               |
| 43  | 0-31         | MCL        | 0                 | 31-66         | MCL         | xxx      | 66-90+          | MCL(r)                      | xxx        | 1     | III     | 3a                   | W               |
| 44  | 0-30         | MCL        | 0                 | 30-48         | MCL         | xxx      | 48-76<br>76+    | HCL(r)<br>Wet (stopped)     | xxx        | 1     | III/IV  | 3a/3b                | W               |
| 45  | 0-27         | MCL        | 0                 | 27-90+        | MCL         | xxx      |                 |                             |            | 2     | III     | 3a                   | W               |
| 46  | 0-25         | MCL        | 0                 | 25-53         | MCL(r)      | o        | 53-90+          | HCL(r)                      | xxx        | 3     | III/IV  | 3b                   | W               |
| 47  | 0-27         | MCL        | <5                | 27-46         | MCL(r)      | xx       | 46-120+         | HCL(r)                      | xxx        | 2     | IV      | 3b                   | W               |
| 48  | 0-30         | MCL        | <5                | 30-48         | MCL(r)      | xxx      | 48-81<br>81+    | HCL(r)<br>R                 | xxx        | 1     | III     | 3a                   | W               |
| 49  | 0-25         | MCL        | <5                | 25-41         | MCLgrn      | xx       | 41+             | R                           |            | 3     | II?     | 3a                   | De              |
| 50  | 0-27         | HCL        | <5                | 27-62         | MCL/HCL(r)  | xx       | 62-80+          | HCL(r)                      | xxx        | 6     | III     | 3b                   | W               |
| 51  | 0-80+        | MCL(dist)  | <5                |               |             |          |                 |                             |            | 8     | -       | 3b                   | SI              |
| 52  | Track        |            |                   |               |             |          |                 |                             |            |       |         |                      |                 |
| 53  | 0-27         | MCL        | <5                | 27-100+       | MCL(r)      | xxx      |                 |                             |            | 4     | III     | 3a                   | W               |
| 54  | 0-31         | MCL        | 0                 | 31-54         | MCL         | xx       | 54-90+          | MCL                         | xxx        | 3     | II      | 3a                   | W               |
| 55  | 0-27         | MCL        | <5                | 27-90+        | MCL/SCL     | xxx      |                 |                             |            | 2     | III     | 3a                   | W               |
| 56  | 0-22         | MCL        | <5                | 22-42         | MCL         | xxx      | 42-90+          | SCL(r)                      | xxx        | 2     | III     | 3a                   | W               |
| 57  | 0-24         | MCL        | <5                | 24-49         | MCL         | xxx      | 49-61<br>61+    | SCL(r)<br>stopped on stones | xxx        | 2     | III     | 3a                   | W               |
| 58  | 0-22         | SCL        | <5                | 22-53         | SCL(r)      | xx(x)    | 53-100+         | SCL(r)                      | xxx        | 1     | III     | 3a                   | W               |
| 59  | 0-32         | MZCL       | 0                 | 32-43         | M/HZCL(r)   | xx       | 43-70+          | ZC                          | xxx        | 1     | IV      | 3b                   | W               |
| 60  | 0-26         | MCL        | 0                 | 26-55         | HCL(r)      | xx(x)    | 55+             | MST                         |            | 6     | III/IV  | 3a/3b                | W               |
| 61  | 0-23         | MZCL       | 0                 | 23-45         | HZCL(r)     | xxx      | 45-90+          | C(r)                        | xxx        | 13    | IV      | 4                    | SI              |
| 62  | 0-26         | MCL        | 0                 | 26-57         | MCL(r)      | xxx      | 57-90+          | MCL(r)                      | xxx        | 9     | III     | 3b                   | SI              |
| 63  | 0-27         | MCL        | <5                | 27-43         | MCL(r)      | xx       | 43-90+          | MCL(r)                      | xxx        | 8     | II      | 3b                   | SI              |
| 64  | 0-24         | MCL        | <5                | 24-62         | MCL(r)      | xx       | 62-90+          | MCL(r)                      | xxx        | 8     | II      | 3b                   | SI              |
| 65  | 0-29         | MCL        | <5                | 29-90+        | MCL(r)      | o        |                 |                             |            | 3     | I/II    | 3a                   | W               |
| 66  | 0-36         | MCL        | <5                | 36-100+       | MCL(r)      | o        |                 |                             |            | 2     | I/II    | 3a                   | W               |
| 67  | 0-26         | MCL        | <5                | 26-94         | MCL(r)      | xxx      | 94+             | R                           | xxx        | 3     | III     | 3a                   | W               |
| 68  | 0-29         | MCL        | 0                 | 29-70         | MCL(r)      | xx(x)    | 70-90+          | MCL(r)                      | xxx        | 2     | III     | 3a                   | W               |
| 69  | 0-30         | MCL        | 0                 | 30-73         | MCL         | xxx      | 73-90+          | SCL(r)                      | xxx        | 2     | III     | 3a                   | W               |
| 70  | 0-48         | SCL (dist) | 20+ l             |               |             |          |                 |                             |            | 0     | -       | 4                    | St              |
| 71  | 0-26         | MCL        | <5                | 26-90+        | MCL(r)      | xx       |                 |                             |            | 2     | II      | 3a                   | W               |
| 72  | Not accessed |            |                   |               |             |          |                 |                             |            |       |         |                      |                 |
| 73  | 0-27         | MZCL       | 0                 | 27-76         | HCL(r)      | xxx      | 76-90+          | C(r)                        | xxx        | 9     | III/IV  | 3b                   | SI              |
| 74  | 0-23         | MCL        | <5                | 23-48         | MCL(r)      | xx       | 48-90+          | MCL(r)                      | xxx        | 4     | II      | 3a                   | W               |
| 75  | 0-24         | MCL        | <5                | 24-63         | MCL(r)      | xxx      | 63-90+          | MCL(r)                      | xxx        | 3     | III     | 3a                   | W               |
| 76  | 0-25         | MZCL       | 0                 | 25-90+        | MZCL(r)     | o        |                 |                             |            | 3     | I/II    | 2/3a                 | W               |
| 77  | 0-32         | MZCL       | 0                 | 32-60         | MZCL(r)     | xxx      | 50-83<br>83-120 | HZCL<br>HZCL                | xxx<br>xxx | 1     | III/IV  | 3a/3b                | W               |
| 78  | 0-28         | MZCL       | 0                 | 28-38         | MZCL(r)     | xx       | 38-57<br>57-90+ | MZCL<br>MZCL                | xxx<br>xxx | 0     | III/IV  | 3a/3b                | W               |
| 79  | 0-25         | MZCL/MCL   | 0                 | 25-45         | MZCL/MCL(r) | xxx      | 45-90+          | MZCL                        | xxx        | 0     | III     | 3a                   | W               |
| 80  | 0-28         | MCL        | 0                 | 28-100+       | MCL(r)      | xxx      |                 |                             |            | 0     | III     | 3a                   | W               |
| 81  | 0-26         | MCL        | <5                | 26-53         | MCL(r)      | xx       | 53-90+          | MCL(r)                      | xxx        | 3     | II      | 3a                   | 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 |
| 82  | 0-25       | MCL     | <5                | 25-43         | MCL(r)     | xx       | <u>43-60</u><br>60-90+        | HCL(r)<br>SCL(r) | xxx<br>xx(x) | 4     | III     | 3a                   | W               |
| 83  | 0-27       | MZCL    | 0                 | 27-48         | MZCL(r)    | xx(x)    | 48-90+                        | MZCL(r)          | xxx          | 2     | II/III  | 3a                   | W               |
| 84  | 0-25       | MCL     | <5                | 25-53         | MCL        | xxx      | 53-90+                        | SCL              | xxx          | 0     | III     | 3a                   | W               |
| 85  | 0-32       | SCL     | <5                | 32-100+       | SCL(r)     | xxx      |                               |                  |              | 1     | III     | 3a                   | W               |
| 86  | 0-30       | MCL     | <5                | 30-60         | MCL(r)     | xxx      | <u>60-90+</u>                 | SCL              | xxx          | 2     | III     | 3a                   | W               |
| 87  | 0-29       | MCL     | <5                | 29-90+        | MCL(r)     | xxx      |                               |                  |              | 3     | III     | 3a                   | W               |
| 88  | 0-23       | MCL     | <5                | 23-53         | MCL/SCL(r) | xx       | 53-90+                        | MCL/SCL(r)       | xxx          | 3     | II      | 3a                   | W               |
| 89  | 0-23       | MCL     | <5                | 23-43         | MCL(r)     | xxx      | <u>43-68</u><br><u>68-90+</u> | SCL<br>HCL(r)    | xxx<br>xxx   | 1     | IV/III  | 3b/3a                | W               |

### Survey log key

#### Gley indicators<sup>1</sup>

- o unmottled
- x 1-2% ochreous mottles and brownish matrix (or a few to common root mottles (topsoils))<sup>3</sup>
- 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
- xxxx mottles or f-m concentrations (gleyed horizon) dominantly blueish matrix often with some ochreous mottles (gleyed horizon)

#### Slowly permeable layers<sup>4</sup>

- 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

#### Texture<sup>2</sup>

- 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<sup>5</sup>

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

#### Limitations:

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

#### Suffixes & prefixes:

- r-reddish, gn - greenish
- o - organic
- (m, v, x)st - (moderately, very, extremely)

- (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)

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

<sup>2</sup>Texture in accordance with particle size classes in Hodgson (1997)

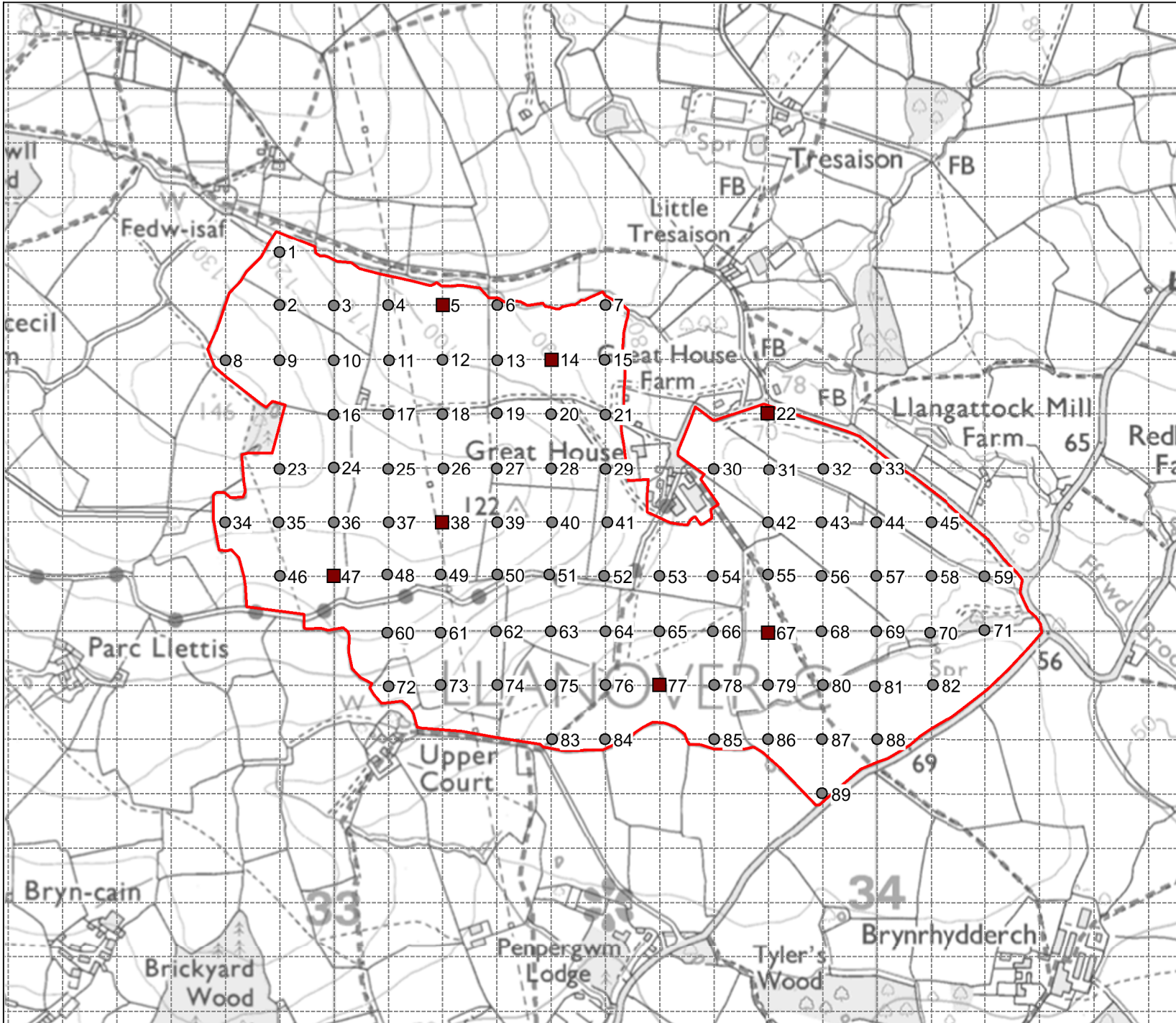
<sup>3</sup>Occasionally recorded in the texture box

<sup>4</sup>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)

<sup>5</sup>Soil Wetness Classes are defined in Hodgson (1997)

<sup>6</sup>stoniness classes as defined in Hodgson (1997)

<sup>7</sup>calcareous classes as defined in Hodgson (1997)



KEY

- Auger observations
- Pits
- Site boundary

Site:

Great House Farm

Map title:

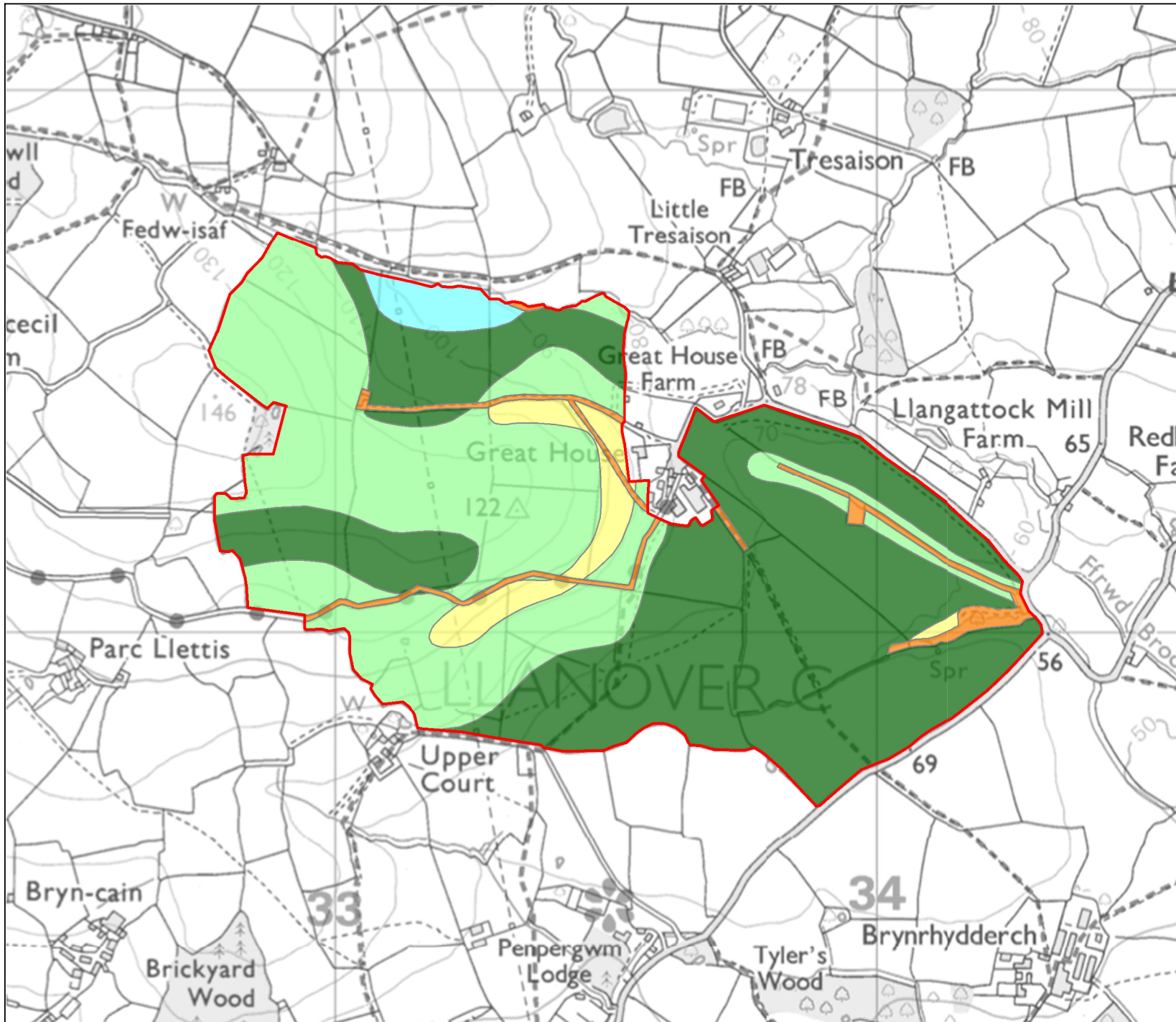
MAP 1  
Observations



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

Date: 29/03/2021

Scale: 1:10,000



KEY

- Grade 2
- Subgrade 3a
- Subgrade 3b
- Grade 4
- Other land
- Site boundary

Site:

Great House Farm

Map title:

MAP 2  
Agricultural Land  
Classification

**Land**  
*Research*  
ASSOCIATES

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

Date: 29/03/2021

Scale: 1:10,000

## Additional pit descriptions

### Pit 14 (see Map 1)

|           |   |
|-----------|---|
| 0-23 cm   | Weak red (2.5YR 4/2) medium clay loam; stoneless; moderately developed coarse sub-angular blocky structure; friable; common fine fibrous roots; smooth gradual boundary to:   |
| 23-45 cm  | Reddish brown (2.5YR 5/4) medium clay loam with 10% diffuse fine and medium dark reddish grey (2.5YR 4/1) ferri-manganiferous concentrations and (2.5YR 5/2) ped faces; stoneless; moderately developed coarse to very coarse sub-angular blocky structure; friable; porous; medium packing density; few fine fibrous roots; smooth gradual boundary to:                          |
| 45-120 cm | Reddish brown (2.5YR 5/3) heavy clay loam with 10% distinct fine and medium grey (2.5YR 6/1) and yellowish brown (10YR 5/6) mottles and 20% dark reddish grey (2.5YR 3/1) fine and medium ferri-manganiferous concentration; weakly developed very coarse sub-angular blocky structure; very firm and dense; no visible macro-pores high packing density; few fine fibrous roots. |

### Pit 22 (see Map 1)

|            |  |
|------------|--|
| 0-25 cm    | Dark greyish brown (10YR 4/2) medium clay loam with common distinct very fine reddish brown (5YR 4/4) mottles; stoneless; moderately developed medium and coarse sub-angular blocky structure; friable; smooth gradual boundary to:  |
| 25-45 cm   | Brown (7.5YR 5/3) medium clay loam with 2-3% distinct fine yellowish brown (10YR 5/6) mottles; stoneless; moderately developed medium and coarse sub-angular blocky structure; friable; porous; medium packing density; many fine fibrous roots; smooth diffuse boundary to: |
| 45-100 cm+ | Greyish brown (10YR 5/2) medium clay loam with 10% faint fine yellowish brown (10YR 5/6) mottles stoneless; moderately developed coarse sub-angular blocky structure; friable; 3-4% fine biopores; medium packing density; few fine fibrous roots.                           |

### Pit 77 (see Map 1)

|           |   |
|-----------|---|
| 0-25 cm   | Dark reddish grey (5YR 4/2) medium silty clay loam; stoneless; well developed medium and coarse sub-angular blocky structure; friable; many fine fibrous roots; smooth gradual boundary to:   |
| 25-50 cm  | Light reddish brown (5YR 6/3) medium silty clay loam with 2-3% distinct fine brownish yellow (10YR 6/8) mottles and very dark grey (10YR 3/1) ferri-manganiferous concentrations; stoneless; moderately developed coarse sub-angular blocky structure; friable; porous; medium packing density; many fine fibrous roots; smooth gradual boundary to:                    |
| 50-83 cm  | Light reddish brown (5YR 6/3) heavy silty clay loam with 5% distinct fine and medium very dark grey (10YR 3/1) ferri-manganiferous concentrations and pinkish grey (5YR 6/2) ped faces; stoneless; weakly developed coarse coarse angular blocky structure; firm; medium to high packing density; few fine fibrous roots and worm channels; smooth gradual boundary to: |
| 83-120 cm | Grey (5Y 6/1) heavy silty clay loam with 5% distinct fine olive yellow (5Y 6/8) mottles; stoneless; structureless (massive); very firm and dense; no visible macro-pores high packing density; no roots.  |



## Site photographs (05/03/2021)

Pit 5



Pit 14



**Pit 38**



**Pit 47**



**Pit 67**



**Pit 77**





**ANALYTICAL REPORT**

|                      |                       |             |                                 |                              |
|----------------------|-----------------------|-------------|---------------------------------|------------------------------|
| <b>Report Number</b> | 44861-21              | <b>H579</b> | <b>MR MIKE PALMER</b>           | <b>Client MR MIKE PALMER</b> |
| <b>Date Received</b> | 12-MAR-2021           |             | <b>LAND RESEARCH ASSOCIATES</b> | <b>PENPEREWYM</b>            |
| <b>Date Reported</b> | 23-MAR-2021           |             | <b>LOCKINGTON HALL</b>          |                              |
| <b>Project</b>       | <b>SOIL</b>           |             | <b>LOCKINGTON</b>               |                              |
| <b>Reference</b>     | <b>MR MIKE PALMER</b> |             | <b>DERBY</b>                    |                              |
| <b>Order Number</b>  |                       |             | <b>DE74 2RH</b>                 |                              |

| Laboratory Reference |       | SOIL507758 | SOIL507759 | SOIL507760 | SOIL507761 | SOIL507762 |  |  |  |  |
|----------------------|-------|------------|------------|------------|------------|------------|--|--|--|--|
| Sample Reference     |       | TOPSOIL 5  | TOPSOIL 14 | TOPSOIL 47 | TOPSOIL 67 | TOPSOIL 77 |  |  |  |  |
| Determinand          | Unit  | SOIL       | SOIL       | SOIL       | SOIL       | SOIL       |  |  |  |  |
| Sand 2.00-0.063mm    | % w/w | 32         | 24         | 34         | 34         | 12         |  |  |  |  |
| Silt 0.063-0.002mm   | % w/w | 46         | 53         | 49         | 47         | 62         |  |  |  |  |
| Clay <0.002mm        | % w/w | 22         | 23         | 17         | 19         | 26         |  |  |  |  |
| Textural Class **    |       | MCL        | MCL        | SZL        | MCL        | MZCL       |  |  |  |  |

**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.**

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

## 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.