

June 2022

Croudace Homes Ltd

Agricultural Land Classification and Soil Resources

at Land at Henfield Road, Albourne, West Sussex

> Beechwood Court, Long Toll, Woodcote, RG8 0RR

01491 684 233 www.reading-ag.com

Contents

| 1 | INTRODUCTION | 1 |
|---------------|---|-----|
| 2 | SITE AND CLIMATIC CONDITIONS | 2 |
| 3 | AGRICULTURAL LAND QUALITY | 4 |
| APPENDIX 1: L | ABORATORY DATA | . 7 |
| APPENDIX 2: S | OIL PROFILE SUMMARIES AND DROUGHTINESS CALCULATIONS | 9 |
| APPENDIX 3: S | ITE PHOTOGRAPHS | 12 |
| FIGURE RAC/9 | 549/1 OBSERVATIONS | 14 |
| FIGURE RAC/9 | 549/2 AGRICULTURAL LAND CLASSIFICATION | 15 |

1. Introduction

- 1.1. Reading Agricultural Consultants Ltd (RAC) is instructed by Croudace Homes Ltd to investigate the Agricultural Land Classification (ALC) and soil resources of land at Henfield Road, Albourne, West Sussex by means of a detailed survey of site and soil characteristics.
- 1.2. Guidance for assessing the quality of agricultural land in England and Wales is set out in the MAFF revised guidelines and criteria for grading the quality of agricultural land¹, and summarised in Natural England's Technical Information Note 049².
- 1.3. Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. The principal physical factors influencing grading are climate, site conditions and soil which, together with interactions between them, form the basis for classifying land into one of the five grades.
- 1.4. Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use. Grade 2 is very good quality agricultural land, with minor limitations which affect crop yield, cultivations or harvesting. Grade 3 land has moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield, and is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Grade 4 land is poor quality agricultural land with severe limitations which significantly restrict the range of crops and/or level of yields. Grade 5 is very poor quality land, with severe limitations which restrict use to permanent pasture or rough grazing.
- 1.5. Land which is classified as Grades 1, 2 and 3a in the ALC system is defined as best and most versatile (BMV) agricultural land.
- 1.6. As explained in Natural England's TIN049, the whole of England and Wales was mapped from reconnaissance field surveys in the late 1960s and early 1970s, to provide general strategic guidance on agricultural land quality for planners. This Provisional Series of maps was published on an Ordnance Survey base at a scale of One Inch to One Mile (1:63,360) and is now available at

¹ **MAFF (1988).** Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. MAFF Publications.

² **Natural England (2012).** *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land,* Second Edition.

1:250,000. The Provisional ALC map shows the site as Grade 2 with a small area of undifferentiated Grade 3. However, TIN049 explains that:

"These maps are not sufficiently accurate for use in assessment of individual fields or development sites, and should not be used other than as general guidance. They show only five grades: their preparation preceded the subdivision of Grade 3 and the refinement of criteria, which occurred after 1976. They have not been updated and are out of print. A 1:250 000 scale map series based on the same information is available. These are more appropriate for the strategic use originally intended ..."

1.7. TIN049 goes on to explain that a definitive ALC grading should be obtained by undertaking a detailed survey according to the published guidelines, at an observation density of one boring per hectare. This survey follows the established ALC guidelines and criteria.

2. Site and climatic conditions

General features and land form

- 2.1. The site extends to 11.3ha of agricultural grassland and arable land. Non-agricultural land within the site includes a pocket of woodland in the north and access tracks.
- 2.2. The site is bordered to the east by Albourne Church of England Primary school and residential properties off The Street, to the south by Church Lane, and to the north-east by Henfield Road. Other agricultural land borders to the west and north-west.
- 2.3. Topography across the site is gently undulating with a highest elevation of 40m above Ordnance Datum (AOD) and a lowest of 32m AOD.

Agro-climatic conditions

2.4. Agro-climatic data for the site have been interpolated from the Meteorological Office's standard 5km grid point dataset at representative altitude of 36m AOD. The data are given in Table 1. The site has a warm and wet climate, with moderately large moisture deficits. The number of Field Capacity Days (FCD) is higher than is average for lowland England (150) and is unfavourable for providing opportunities for agricultural field work. There is however no overriding climatic limitation to agricultural land quality at the site.

Table 1: Local agro-climatic conditions

| Parameter | Value |
|------------------------------------|------------|
| Average Annual Rainfall | 841mm |
| Accumulated Temperatures >0°C | 1,495 day° |
| Field Capacity Days | 177 days |
| Average Moisture Deficit, wheat | 108mm |
| Average Moisture Deficit, potatoes | 102mm |

Soil parent material and soil type

- 2.5. The underlying geological units mapped by the British Geological Survey³ within the site are the Weald Clay Formation in the north and the Lower Greensand Group in the south.
- 2.6. The Weald Clay Formation comprises dark grey, thinly bedded mudstone with some subordinate siltstones, sandstones, limestones and clay ironstones.
- 2.7. The Lower Greensand Group comprises mainly sands and sandstones with silts and clays in some intervals.
- 2.8. There are no superficial deposits mapped across the site.
- 2.9. The Soil Survey of England and Wales soil association mapping⁴ (1:250,000 scale) shows the Kingston association across the southern and central areas. This association contains fine loamy over clayey soils, with some fine and coarse loamy soils. Soil profiles are typically assessed as Wetness Class (WC) III-IV⁵. Soils of the Fyfield and Dundale series within the association are permeable and well drained in WC I.
- 2.10. The Wickham 1 association is mapped across the northern part of the site and comprises slowly permeable, fine silty over clayey, fine loamy over clayey and clayey soils. Soil profiles are typically assessed as WC IV.

³ British Geological Survey (2022). Geology of Britain viewer, http://mapapps.bgs.ac.uk/geologyofbritain/home.html

⁴ Soil Survey of England and Wales (1984). Soils of South East England (1:250,000), Sheet 6.

⁵ Jarvis et al (1984). Soils and Their Use in South East England. Soil Survey of England and Wales Bulletin 15, Harpenden.

3. Agricultural land quality

Soil survey methods

- 3.1. Eleven soil profiles were examined across the site using an Edelman (Dutch) auger at an observation density of one per hectare in accordance with the established recommendations for ALC surveys. Two observation pits were also excavated to examine subsoil structures. The locations of observations are shown on Figure RAC/9549/1. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 120cm or any impenetrable layer:
 - soil texture;
 - significant stoniness;
 - colour (including localised mottling);
 - consistency;
 - structural condition;
 - free carbonate; and
 - depth.
- 3.2. One topsoil sample was submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are presented in Appendix 1.
- 3.3. Soil WC was determined from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling, and slowly permeable subsoil layers at least 15cm thick, in relation to the number of Field Capacity Days at the location.
- 3.4. Soil droughtiness was investigated by the calculation of moisture balance equations (given in Appendix 2). Crop-adjusted Available Profile Water (AP) is estimated from texture, stoniness and depth, and then compared to a calculated moisture deficit (MD) for the standard crops wheat and potatoes. The MD is a function of potential evapotranspiration and rainfall. Grading of the land can be affected if the AP is insufficient to balance the MD and droughtiness occurs.

Agricultural land classification and site limitations

- 3.5. Assessment of land quality has been carried out according to the revised ALC guidelines¹. Soil profiles have been described according to Hodgson⁶ which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.
- 3.6. There are two main soil types at the site.

Soil Type 1 – Heavy silty clay loams over clay

- 3.7. The first soil type is present across the north of the site. The topsoil comprises dark greyish brown (2.5Y4/2 in the Munsell soil colour charts⁷) heavy silty clay loam. Stone content is very slightly stony, up to 5% by volume. The topsoil has a medium to coarse subangular blocky structure and is friable to firm.
- 3.8. The upper subsoil is grey, greyish brown or light brownish grey (10YR5/1 or 10YR5/2, 2.5Y5/2 or 2.5Y6/2) clay, with one recording of heavy silty clay loam. The upper subsoil is predominantly stoneless, with one recording of 10% stone by volume. It has a coarse prismatic structure, is firm to very firm and contains many ochreous mottles indicating prolonged periods of wetness.
- 3.9. The lower subsoil comprises grey (10YR6/1) stoneless clay. The structure is coarse prismatic and the consistency is very firm. Ochreous mottling continues within this horizon.
- 3.10. Soils with these characteristics are assessed as WC IV and are limited to Grade 4 by soil wetness.

Soil Type 2 – Heavy clay loams

- 3.11. The second soil type is present across the central and southern areas. The topsoil comprises dark greyish brown (10YR4/2), heavy clay loam which is stoneless to very slightly stony, with up to 3% by volume. The topsoil has a medium subangular blocky structure and a friable consistency.
- 3.12. The upper subsoil is greyish brown, light brownish grey or brown (10YR5/2, 10YR6/2 or 10YR5/3) heavy clay loam, with one recording of clay. The upper subsoil is predominantly stoneless with one recording of 3% by volume. It has a medium subangular blocky structure, a friable consistency and ochreous mottling.

⁶ Hodgson, J. M. (Ed.) (1997). Soil survey field handbook. Soil Survey Technical Monograph No. 5, Silsoe.

⁷ Munsell Color (2009). Munsell Soil Color Book. Grand Rapids, MI, USA

^{9549 –} Albourne

- 3.13. The lower subsoil comprises grey, greyish brown, light greyish brown or pale brown (10YR5/1, 10YR5/2, 10YR6/2, 10YR6/3) stoneless, heavy clay loam or clay. The structure is medium subangular blocky to medium angular blocky and the consistency is firm. This horizon contains ochreous mottling.
- 3.14. Soils with these characteristics are restricted by soil wetness. Where there is no slowly permeable layer, profiles are assessed as WC II and are limited to Subgrade 3a. Where profiles contain a slowly permeable clay lower subsoil, profiles are assessed as WC III and are limited to Subgrade 3b by soil wetness.
- 3.15. The ALC distribution within the site is shown in Figure RAC/9549/2 and the areas of each grade are given in Table 2.

| Grade | Description | Area (ha) | % of agricultural land |
|--------------------|------------------|-----------|------------------------|
| Subgrade 3a | Good quality | 2.7 | 24 |
| Subgrade 3b | Moderate quality | 4.9 | 43 |
| Grade 4 | Poor quality | 3.7 | 33 |
| Total Agricultural | | 11.3 | 100 |
| Non-Agricultural | | <0.1 | - |

Table 2: ALC areas

Appendix 1: Laboratory Data

| PILZ | Units |
|-----------------|--|
| 41 | % w/w |
| 29 | % w/w |
| 30 | % w/w |
| 3.9 | % w/w |
| Heavy clay loam | |
| _ | 41 29 30 3.9 Heavy clay loam |

| Determinand | Pit 2 | Units |
|----------------|-------|-----------|
| Soil pH | 6.2 | |
| Phosphorus (P) | 76.4 | Mg/l (av) |
| Potassium (K) | 228 | Mg/l (av) |
| Magnesium (Mg) | 114 | Mg/l (av) |

| Determinand | Pit 2 | Units |
|----------------|-------|------------|
| Phosphorus (P) | 5 | ADAS Index |
| Potassium (K) | 2+ | ADAS Index |
| Magnesium (Mg) | 3 | ADAS Index |



¹Less than 50% sand in the mineral fraction ² 50% sand or more in the mineral fraction

Appendix 2: Soil Profile Summaries and Droughtiness Calculations

Wetness / workability limitations are determined according to the methodology given in Appendix 3 of the ALC guidelines, MAFF 1988 Droughtiness calculations are made according to the methodology given in Appendix 4 of the ALC guidelines, MAFF 1988.

Grades are shown for drought, wetness and any other soil or site factors which are relevant. The overall Grade is set by the most limiting factor and shown on the right.

| | Stor | ne typ | es | | | Climate Da | ita | | Wetness | Class Guid | delines | | 11 | <i>III</i> | | IV | | V | AT0 |
|------|------|--------|---------|---------|-------------------|----------------------|--------|--------|------------|--------------|--------------|---------|-------------|---------------|-----|-------|----------|-------|------------|
| | % | | TAv | EAv | | MDwheat | 108 | | SPL within | n 80cm, gle | ying within | 40cm | >76cm | 48-76cm <48cm | | | n | | 1,495 |
| | hard | ł | 1 | 0.5 | | MDpotato | 102 | | SPL within | n 80cm, gle | ying at 40-7 | ′0cm | >63cm | <63cm | ı | | | | Limitation |
| | | | | | | FCD | 177 | | No SPL b | ut gleying w | /ithin 40cm | | coarse subs | oil | 1 | other | cases | 11 | Grade 1 |
| | hard | ł | flint & | pebble | 1 | AAR | 841 | I | Maximum | depth of au | ned | | | | | | Oldde 1 | | |
| Site | | De | oth | Texture | CaCO ₃ | Colour | Mottle | abund- | stone% | stone% | Struct- | APwheat | AP potato | Glev | SPL | wc | Wetness | Final | Limiting |
| No. | | c | m | | | | colour | ance | hard | 01011070 | ure | mm | mm | 0.0) | | | grade WE | Grade | Factor(s) |
| 1 | Т | 0 | 30 | hZCL | n | 2.5YR4/2 | Fe | few | 5 | 0 | | 53 | 53 | n | n | IV | 4 | 4 | WE |
| | | 30 | 47 | hZCL | n | 2.5Y5/2 | Femn | com | 0 | 0 | | 37 | 41 | y | n | | | | |
| | | 47 | 70 | С | n | 10YR6/1 | Femn | many | 0 | 0 | poor | 29 | 15 | y | у | | | | |
| | | 70 | 120 | С | n | 10YR6/1 | Fe | v.many | 0 | 0 | poor | 29 | 15 | у | у | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness grade | (DR) | 1 | 2 | | | | | | |
| 2/P1 | Т | 0 | 25 | hZCL | n | 2.5Y4/2 | Fe | com | 2 | 0 | | 53 | 53 | У | n | IV | 4 | 4 | WE |
| | | 25 | 32 | С | n | 10YR5/2, 7.5YR5/4 | Fe | many | 0 | 0 | | 37 | 41 | у | n | | | | |
| | | 32 | 70 | С | n | 10YR6/1 | Fe | many | 0 | 0 | poor | 29 | 15 | у | у | | | | |
| | | 70 | 120 | С | n | 10YR6/1 | Fe | few | 0 | 0 | poor | 29 | 15 | . у | у | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness grade | (DR) | 1 | 2 | | | | | | |
| 3 | Т | 0 | 28 | hZCL | n | 2.5Y4/2 10YR5/1 | | | 5 | 0 | | 53 | 53 | n | n | IV | 4 | 4 | WE |
| | | 28 | 71 | С | n | 7.5YR5/4 | Fe | v.many | 10 | 0 | poor | 37 | 41 | У | У | | | | |
| | | 71 | 120 | С | n | 10YR6/1 | Fe | many | 0 | 0 | poor | 29 | 15 | у | У | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness grade | (DR) | 1 | 2 | | | | | | |

| 4 | Т | 0 | 27 | hZCL | n | 2.5Y4/2 | | | 5 | 0 | | 53 | 53 | n | n | IV | 4 | 4 | WE |
|-------|------|------|-----|------|---|---------|------|--------|----------|-----------|---------|-----|-----|-----|-------------|------------|-------------|-------------|----|
| | | 27 | 50 | С | n | 2.5Y6/2 | Fe | many | 0 | 0 | poor | 37 | 41 | у | у | | | | |
| | | 50 | 120 | С | n | 10YR6/1 | Fe | many | 0 | 0 | poor | 29 | 15 | . у | . у | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | LSS-2 | ZC/C | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness gra | de (DR) | 1 | 2 | | | | | | |
| 5 | Т | 0 | 30 | hCL | n | 10YR4/2 | | | 3 | 0 | | 53 | 53 | n | n | 11 | 3a | 3a | WE |
| | | 30 | 65 | hCL | n | 10YR5/2 | Fe | com | 3 | 0 | | 37 | 41 | У | n | | | | |
| | | 65 | 120 | hCL | n | 10YR5/2 | Femn | com | 0 | 0 | | 29 | 15 | . у | n | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness gra | de (DR) | 1 | 2 | | | | | | |
| 6 | Т | 0 | 38 | hCL | n | 10YR4/2 | | | 0 | 0 | | 53 | 53 | n | n | <i>III</i> | 3b | 3b | WE |
| | | 38 | 68 | hCL | n | 10YR5/2 | Fe | com | 0 | 0 | | 37 | 41 | У | n | | | | |
| | | 68 | 120 | С | n | 10YR6/2 | Femn | com | 0 | 0 | poor | 29 | 15 | . у | у | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | TS- mCL/ | hCL | | | |
| | | | | | | | | | | | MB | 41 | 7 | | Large | bare pat | ch/ poor cr | rop growth. | |
| | | | | | | | | | Droughti | ness gra | de (DR) | 1 | 2 | | <u>.</u> | | | | |
| | | | | | | | | | | | . , | | | | | | | | |
| 7 | Т | 0 | 30 | hCL | n | 10YR4/2 | | | 2 | 0 | | 53 | 53 | n | n | 111 | 3b | 3b | WE |
| | | 30 | 58 | С | n | 10YR5/3 | Fe | many | 0 | 0 | | 37 | 41 | у | n | | | | |
| | | 58 | 120 | С | n | 10YR6/3 | Femn | v.many | 0 | 0 | poor | 29 | 15 | у | у | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | LSS | heavy mo | ottling | | |
| | | | | | | | | | | | MB | 41 | 7 | | Dry s | oil | | | |
| | | | | | | | | | Droughti | ness grad | de (DR) | 1 | 2 | | | | | | |
| 8 | Т | 0 | 32 | hCL | n | 10YR4/2 | | | 2 | 0 | | 53 | 53 | n | n | 111 | 3b | 3b | WE |
| | | 32 | 67 | hCL | n | 10YR6/2 | Fe | many | 0 | 0 | | 37 | 41 | У | n | | | | |
| | | 67 | 120 | С | n | 10YR6/3 | Fe | v.many | 0 | 0 | poor | 29 | 15 | . у | у | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness grad | de (DR) | 1 | 2 | | | | | | |
| 9 | Т | 0 | 28 | hCL | n | 10YR4/2 | | | 2 | 0 | | 53 | 53 | n | n | 11 | 3a | 3a | WE |
| | | 28 | 65 | hCL | n | 10YR5/2 | Fe | com | 0 | 0 | | 37 | 41 | у | n | | | | |
| | | 65 | 98 | hCL | n | 10YR5/2 | Fe | com | 0 | 0 | | 29 | 15 | у | n | | | | |
| 549 - | Albo | urne | | | | | 1 | LO | | | | | | | | | | | |

| | | 98 | 120 | hCL | n | 10YR6/3 | Fe | few | 0 | 0 | | 29 | 15 | n | n | | | | |
|----|---|----|-----|-----|---|---------|------|------|----------|-----------|---------|-----|-----|-----|---|------------|----|----|----|
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness grad | de (DR) | 1 | 2 | | | | | | |
| P2 | Т | 0 | 30 | hCL | n | 10YR4/2 | | | 2 | 0 | | 53 | 53 | n | n | 11 | 3a | 3a | WE |
| | | 30 | 65 | hCL | n | 10YR5/2 | Fe | many | 0 | 0 | | 37 | 41 | у | n | | | | |
| | | 65 | 120 | hCL | n | 10YR5/2 | Fe | many | 0 | 0 | | 29 | 15 | . у | n | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness grad | de (DR) | 1 | 2 | | | | | | |
| 10 | Т | 0 | 32 | hCL | n | 10YR4/2 | | | 2 | 0 | | 53 | 53 | n | n | 11 | 3a | 3a | WE |
| | | 32 | 60 | С | n | 10YR6/2 | Fe | many | 0 | 0 | | 37 | 41 | у | n | | | | |
| | | 60 | 95 | hCL | n | 10YR6/3 | Fe | com | 0 | 0 | | 29 | 15 | у | n | | | | |
| | | 95 | 120 | hCL | n | 10YR6/3 | | | 0 | 0 | | 29 | 15 | _ n | n | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness grad | de (DR) | 1 | 2 | | | | | | |
| 11 | Т | 0 | 32 | hCL | n | 10YR4/2 | | | 2 | 0 | | 53 | 53 | n | n | <i>III</i> | 3b | 3b | WE |
| | | 32 | 56 | hCL | n | 10YR5/2 | Femn | com | 0 | 0 | | 37 | 41 | у | n | | | | |
| | | 56 | 120 | С | n | 10YR5/1 | Fe | many | 0 | 0 | poor | 29 | 15 | . у | У | | | | |
| | | | | | | | | | | | Total | 149 | 109 | | | | | | |
| | | | | | | | | | | | MB | 41 | 7 | | | | | | |
| | | | | | | | | | Droughti | ness grad | de (DR) | 1 | 2 | | | | | | |

Appendix 3: Site Photographs





Pit 1: Pit wall



Pit 1: Topsoil

Pit 1: Clay pit base



Pit 1: Upper subsoil

9549 – Albourne





Pit 2: Pit wall

Pit 2: Topsoil



Pit 2: Upper subsoil photo 1



Pit 2: Upper subsoil photo 2

9549 – Albourne



