



March 2022

Bargate Homes Ltd

Agricultural Land Classification and Soil Resources

at

Bedhampton Phase 2

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

**01491 684 233
www.reading-ag.com**

Table of Contents

1 INTRODUCTION.....1

2 SITE AND CLIMATIC CONDITIONS 2

3 AGRICULTURAL LAND QUALITY 3

APPENDIX 1: LABORATORY DATA.....7

APPENDIX 2: SOIL PROFILE SUMMARIES AND DROUGHTINESS CALCULATIONS.....9

APPENDIX 3: PHOTOGRAPHS.....11

FIGURE RAC9502-1: OBSERVATIONS 13

FIGURE RAC9502-2: AGRICULTURAL LAND CLASSIFICATION.....14

1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Bargate Homes Ltd to investigate the Agricultural Land Classification (ALC) and soil resources of land to the south of Bedhampton, Havant, Hampshire, by means of a detailed survey of soil and site characteristics.
- 1.2 Guidance for assessing the quality of agricultural land in England and Wales is set out in the Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria for grading the quality of agricultural land (1988)¹, 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 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 very 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

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.

on an Ordnance Survey base at a scale of One Inch to One Mile (1:63,360). The Provisional ALC map shows the site as excellent quality Grade 1. 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 detailed methodology set out in the MAFF guidelines.

2 Site and climatic conditions

General features, land form and drainage

- 2.1 The site extends to 4.1ha primarily within one parcel of arable agricultural land. Parts of the site boundary traverse a second field where Phase 1 is currently under construction. The site is fully constrained by existing infrastructure: Lower Road, a yard and residential properties to the north; the Bedhampton Roundabout and A27 to the west; the Bedhampton to Cosham railway line to the south; and the construction compound associated with the Phase 1 construction to the east.
- 2.2 The land is level at 5m above Ordnance Datum (AOD). Drainage of the land is southward into Langstone Harbour.

Agro-climatic conditions

- 2.3 Agro-climatic data for the site have been interpolated from the Meteorological Office's standard 5km grid point data set at a representative altitude of 5m AOD and are given in Table 1. The site is warm and moist. Moisture deficits are large. The number of Field Capacity Days is slightly larger than is average for lowland England (150) and slightly unfavourable for providing opportunities for agricultural field work. There is however no overriding climatic limitation to agricultural land quality.

Table 1: Local agro-climatic conditions

Parameter	Value
Average Annual Rainfall	754mm
Accumulated Temperatures >0°C	1,547 day°
Field Capacity Days	156 days
Average Moisture Deficit, wheat	117mm
Average Moisture Deficit, potatoes	112mm

Soil parent material and soil type

- 2.4 The underlying geology mapped by the British Geological Survey³ comprises undifferentiated chalks of several formations within the White Chalk Subgroup. Superficial river terrace deposits of sand, silt and clay are mapped across the whole site.
- 2.5 The Soil Survey of England and Wales soil association mapping⁴ (1:250,000 scale) shows the site as urban. The closest mapped soil associations are the Upton 1 and Wickham 3 associations, both mapped to the west. The Upton 1 association is characterised by shallow, calcareous silty soils over chalk. The profiles are well drained in Wetness Class (WC) I.
- 2.6 The contrasting Wickham 3 association includes fine loamy or coarse loamy textures over clayey subsoils. The profiles are slowly permeable in the subsoil and are typically waterlogged for long periods in winter, in WC IV or V⁵.

3 Agricultural land quality

Soil survey methods

- 3.1 Five soil profiles were examined using an Edelman (Dutch) auger at an observation density of approximately one per hectare in accordance with the established recommendations for ALC surveys². One soil pit was also excavated to examine subsoil structures and stone content. The locations of observations are indicated on Figure RAC9502-1. 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;

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.

- 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 Wetness Class (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 agricultural land quality has been carried out according to the MAFF 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 Agricultural land quality across the site is limited by soil wetness. The site is classified as Subgrade 3a, although there are different grades present.
- 3.7 The topsoil is medium clay loam of 31cm average depth. Most of the topsoil is dark greyish brown (10YR4/2 in the Munsell soil colour charts⁷). The stone content is low. The topsoil has a weakly developed, medium subangular blocky structure, contains few roots and is non-calcareous.
- 3.8 There are three subsoil types: one in each pair of diagonally opposite corners of the site, and one in the centre. The better-drained variant is in the south-east and north-west where the pit was excavated. The upper subsoil is medium silty clay loam or heavy silty clay loam which is dark

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

greyish brown to dark yellowish brown (10YR4/2 to 10YR4/4). The pit revealed some compaction at the top of the upper subsoil horizon, however once excavated the structure was observed to be weakly developed with fine and medium subangular blocky peds. In the south-east the upper subsoil contains few, fine and very faint ochreous mottles and in the north-west there are common mottles but which remain faint. The upper subsoil is very slightly stony, non-calcareous and permeable.

- 3.9 In the south-east, the subsoil was observable to 58cm depth before becoming moist and compressible. The lower subsoil observed in the pit location is non-calcareous, brown to yellowish brown (10YR5/3 to 10YR5/4) clay which is free of stones. The mottling is very faint. The clay was dry, firm and dense and difficult to excavate in the north-west of the site. There is no gleying in the profiles but the clay is slowly permeable. On the assumption that the clay is present at depth in the south-east, that area is classified as WC II and limited by wetness and droughtiness to Grade 2. In the pit location, as there is no gleying, the profile is assessed as WC III and limited by wetness to Subgrade 3a.
- 3.10 In the south-west and north-east of the site, the upper subsoil is clay or silty clay which is brown (10YR4/3 to 10YR5/3) and non-calcareous. There are very few stones. In the south-west, the clay is firm, dense and slowly permeable, and although similar to other profiles is only very faintly mottled. Due to the lack of gleying, the profile is assessed as borderline WC III to IV resulting in a wetness limitation bordering Subgrade 3a and Subgrade 3b. In the north-east of the site, the silty clay upper subsoil is mostly firm, although pockets of more friable material result in moderate permeability. The dense clay lower subsoil identified in the west is present beneath the silty clay. This profile is also assessed as WC III as the upper subsoil is not considered fully slowly permeable and is limited to Subgrade 3a.
- 3.11 A fifth profile was observed in the centre of the site in order to determine which of the diagonal sets should take precedence when classifying the site as a whole. Unexpectedly, a third discrete subsoil type was found. The upper subsoil comprises dense clay similar to other observations, being dark yellowish brown to brown (10YR4/4 to 10YR5/3) and faintly mottled, which is therefore not gleyed but is slowly permeable. At 77cm depth, a lower subsoil horizon of yellowish brown (10YR5/4) heavy clay loam is present, containing around 15% chalk and which is very calcareous and not slowly permeable. This profile is also assessed as WC III and is limited by wetness to Subgrade 3a.
- 3.12 Overall, the site is of variable quality, including Grade 2, Subgrade 3a and Subgrade 3b, generally better quality in the south-east and worse in the south-west. However, due to the variation over

a small area and the ambiguity of the subsoils, it is considered appropriate to classify all the agricultural land at the site as Subgrade 3a, as shown in Figure RAC9502-2. Photographs taken at the site are given in Appendix 3.

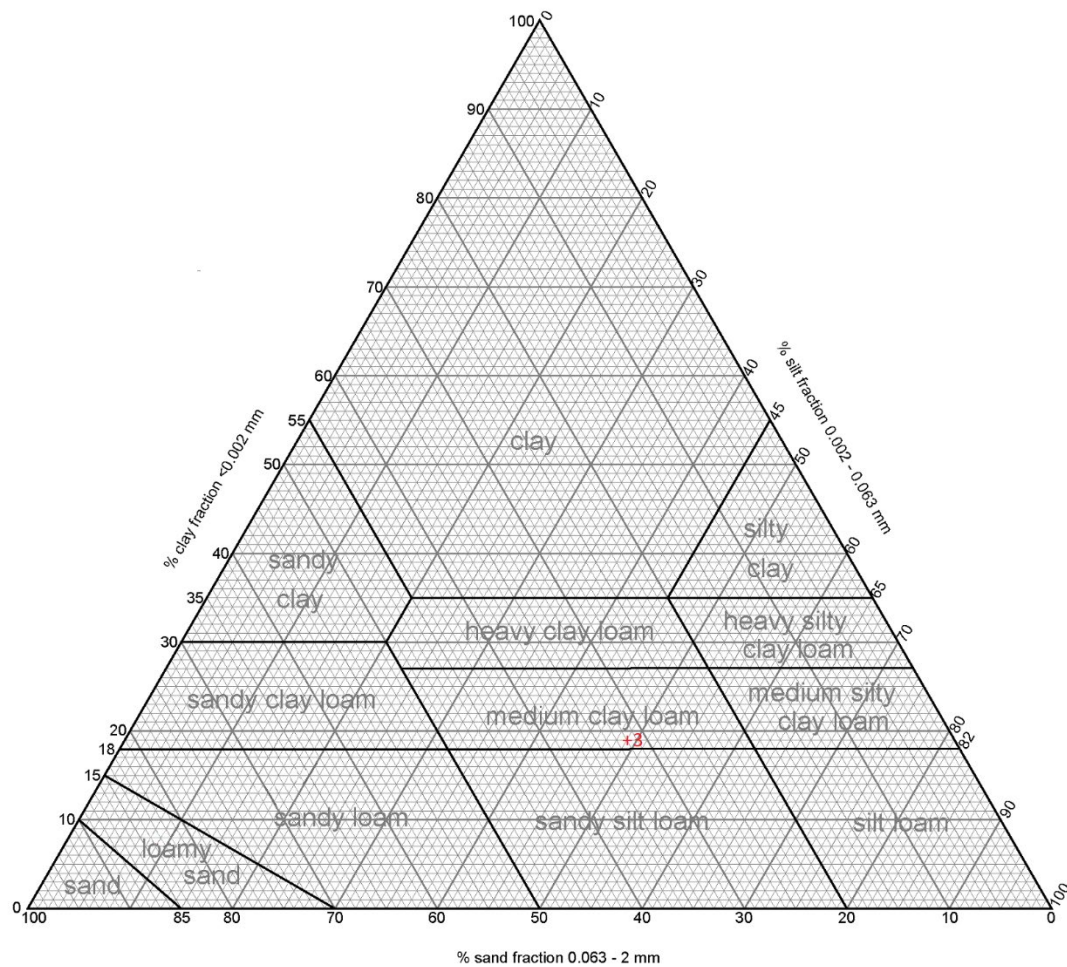
Appendix 1: Laboratory Data

Determinand	Site 3	Units
Sand 2.00-0.063 mm	32	% w/w
Silt 0.063-0.002 mm	49	% w/w
Clay <0.002 mm	19	% w/w
Organic Matter	2.1	% w/w
Texture	Medium Clay Loam	

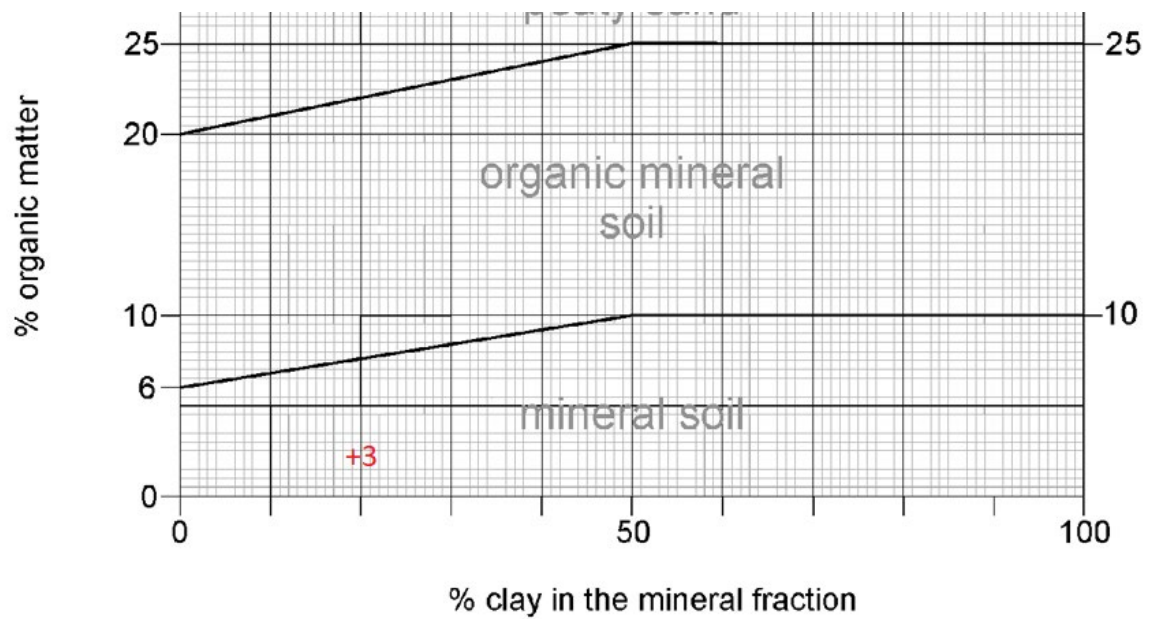
Determinand	Site 3	Units
Soil pH	7.4	
Phosphorus (P)	22.2	mg/l (av)
Potassium (K)	120	mg/l (av)
Magnesium (Mg)	70.4	mg/l (av)

Determinand	Site 3	Units
Phosphorus (P)	2	ADAS Index
Potassium (K)	1	ADAS Index
Magnesium (Mg)	2	ADAS Index

Soil Texture by Particle Size Analysis



Organic Matter Class



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.

Stone types			Climate Data		Wetness Class Guidelines					Climate	
%	TA _v	EA _v	MDwheat	117	SPL within 80cm, gleying within 40cm	<i>II</i> >70cm	<i>III</i> 42-70cm	<i>IV</i> <42cm	<i>V</i>	1547 D° Limitation Grade 1	
hard	1	0.5	MDpotato	112	SPL within 80cm, gleying at 40-70cm	>54cm	<54cm				
Lstone	4	3	FCD	156	No SPL but gleying within 40cm	coarse subsoil	<i>I</i> other cases	<i>II</i>			
hard	flint & pebble		AAR	754	Maximum depth of auger penetration is <u>underlined</u>						

Site No.		Depth cm		Texture	CaCO ₃	Colour	Mottle colour	abundance	stone% hard	stone% Lstone	Structure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)
1	T	0	27	mCL		10YR3/3			1	0		48	48	n	n	II	2	2	WE DR
		27	58	mZCL		10YR4/2	Fe	few	2	0		46	52	n	n				
		58	65	mZCL		10YR4/3	Fe	few	2	0		7	12	n	n				
		65	120	C		10YR5/3-5/4	Fe	com	1	0	poor	38	6	n	y				
		Total										139	118						
MB										22	6								
Droughtiness grade (DR)												2	2						
2	T	0	32	mCL		10YR4/2	Fe	few	1	0	-	57	57	n	n	III-IV	3a/3b	3b	WE
		32	120	C		10YR4/3-5/3	Fe	com	2	0	poor	71	48	n	y				
		Total										128	106						
		MB										11	-6						
		Droughtiness grade (DR)												2	2				
3 Pit	T	0	32	mCL		10YR4/3			1	0	-	57	57	n	n	III	3a	3a	WE
		32	52	hZCL		10YR4/4	Fe	com	1	0		32	34	n	n				
		52	120	C		10YR5/3-5/4	Fe	com	1	0	poor	47	23	n	y				
		Total										137	114						
		MB										20	2						
Droughtiness grade (DR)												2	2						
4	T	0	34	mCL		10YR4/2			1	0	-	61	61	n	n	III	3a	3a	WE

34	60	ZC		10YR4/3	Fe	com	1	0	m/poor	29	35	n	n
60	120	C		10YR5/3-5/4	Fe	com	1	0	poor	42	13	n	y

Total	131	108
-------	-----	-----

MB	14	-4
----	----	----

Droughtiness grade (DR)	2	2
-------------------------	---	---

5	T	0	29	mCL		10YR4/2		1	0	-	52	52	n	n	///	3a	3a	WE
		29	77	C		10YR5/3-4/4	Fe	com	1	0	poor	46	53	n	y			
		77	120	hCL	very	10YR5/4	Fe	com	1	15		38	0	n	n			

Total	136	105
-------	-----	-----

MB	19	-7
----	----	----

Droughtiness grade (DR)	2	2
-------------------------	---	---

Appendix 3: Photographs



Pit 1



Pit 1 topsoil



Pit 1 compaction at the top of the upper subsoil



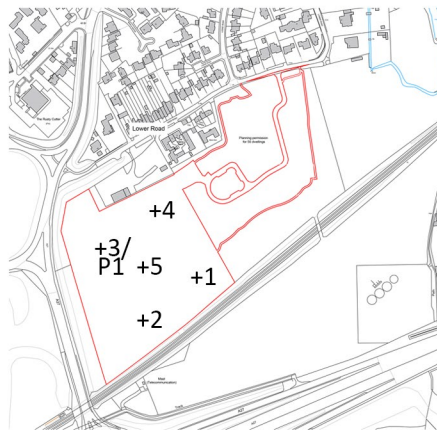
Pit 1 upper subsoil



Pit 1 lower subsoil



Observation 2 – slowly permeable clay throughout



- Survey Area
- +1 Auger Observation
- .P1 Pit Observation



Plan reproduced from Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright Reserved.
Ordnance Survey Copyright License Number: 100005584

Scale 1:10,000@A4 Mar/2022

Figure RAC9502-1: Observations

Site: Bedhampton Phase 2

Client: Bargate Homes Ltd



**READING
AGRICULTURAL
CONSULTANTS**

© Copyright Reading Agricultural Consultants, 2022. Beechwood Court, Long Toll, Woodcote, Reading, RG8 0RR. Tel: 01491 684233. www.reading-ag.com



Plan reproduced from Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright Reserved.
Ordnance Survey Copyright License Number: 100005584



Scale 1:10,000@A4 Mar/2022

Figure RAC9502-2: Agricultural Land Classification

Site: Bedhampton Phase 2

Client: Bargate Homes Ltd



**READING
AGRICULTURAL
CONSULTANTS**

© Copyright Reading Agricultural Consultants, 2022. Beechwood Court, Long Toll, Woodcote, Reading, RG8 0RR. Tel: 01491 684233. www.reading-ag.com