



February 2021

## **Richborough Estates**

# **Agricultural Land Classification and Soil Resources**

at

**Sandwich Road, Sholden**

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

**01491 684 233**

**[www.reading-ag.com](http://www.reading-ag.com)**

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# 1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Richborough Estates to investigate the Agricultural Land Classification (ALC) and soil resources of land at Sandwich Road, Sholden 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 Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria for grading the quality of agricultural land (1988)<sup>1</sup> and summarised in Natural England's TIN049<sup>2</sup>.
- 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. A very wide range of agricultural and horticultural crops can be grown, and yields are high and less variable than on land of lower quality.
- 1.5 Grade 2 is very good quality agricultural land, with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but there may be reduced flexibility due to difficulties with the production of the more demanding crops. The level of yield is generally high but may be lower or more variable than Grade 1.
- 1.6 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). Subgrade 3a land is capable of consistently producing moderate to high yields of a narrow range of arable crops or moderate yields of a wide range of crops. Subgrade 3b is land capable of producing moderate yields of a narrow range of crops or lower yields of a wider range of crops or high yields of grass.

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

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

- 1.7 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.
- 1.8 Land which is classified as Grades 1, 2 and 3a in the ALC system is defined in Annex 2 of the National Planning Policy Framework<sup>3</sup> (NPPF) as best and most versatile (BMV) agricultural land.
- 1.9 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). The Provisional ALC map shows the site as undifferentiated Grade 3 land. 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 ..."*

- 1.10 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.
- 1.11 This report sets out the findings of a detailed ALC survey undertaken in September 2020 in accordance with the detailed methodology set out in the ALC guidelines.

## **2 Site and climatic conditions**

### **General features, land form and drainage**

- 2.1 The site extends to 4.99ha of agricultural land, in a single arable field. At the time of survey, the field was ridged, with the remnants of a previous potato crop. The site lies to the south-west of Sandwich Road and Sholden, with agricultural land forming the other boundaries.

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<sup>3</sup> **Ministry of Housing, Communities and Local Government (2019).** *National Planning Policy Framework* <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

- 2.2 The site falls gently from the south-west at an altitude of approximately 22m above Ordnance Datum (AOD) to Sandwich Road at 18m AOD but drainage of the land is primarily facilitated through the soil profile.

### **Agro-climatic conditions**

- 2.3 Agro-climatic data for the site have been interpolated from the Meteorological Office’s standard 5km grid point dataset at a representative altitude of 20m AOD. The data are given in Table 1. The climate is warm and moderately moist with large moisture deficits. The number of Field Capacity Days (FCD) is about average for lowland England (150) and is favourable for providing opportunities for agricultural field work.

**Table 1:** Local agro-climatic conditions

<b>Parameter</b>	<b>Value</b>
National Grid Reference	TR 35425 52192
Average Annual Rainfall	717 mm
Accumulated Temperatures >0°C	1,472 day°
Field Capacity Days	148 days
Average Moisture Deficit, wheat	119 mm
Average Moisture Deficit, potatoes	116 mm

### **Soil parent material and soil type**

- 2.4 The underlying geology mapped by the British Geological Survey<sup>4</sup> across the site is the Seaford Chalk Formation which is a firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. There are no superficial geology records for this site.
- 2.5 The Soil Survey of England and Wales soil association mapping<sup>5</sup> (1:250,000 scale) shows the site as the Hamble 2 association. These soils are characterised by deep stoneless well drained silty soils, over gravel locally. Hamble soils are permeable, well drained and are of Wetness Class I.

## **3 Agricultural land quality**

### **Soil survey methods**

- 3.1 Six 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 survey. The locations of observations are indicated on RAC/8936/1. At each observation point the

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<sup>4</sup> **British Geological Survey (2021).** *Geology of Britain viewer*, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

<sup>5</sup> **Soil Survey of England and Wales (1984).** *Soils of South East England (1:250,000)*, Sheet 6

following characteristics were assessed for each soil horizon up to a maximum of 120 cm or any impenetrable layer:

- soil texture;
- significant stoniness;
- colour (including localised mottling);
- consistency;
- structural condition;
- free carbonate; and
- depth.

3.2 Two samples (topsoil and upper subsoil) were submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). The 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 land quality has been carried out according to the MAFF revised ALC guidelines (1988)<sup>1</sup>. Soil profiles have been described according to Hodgson (1997)<sup>6</sup> which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.

3.6 The site is classified as Grade 2 although one observation in the west if the site is classified as Subgrade 3a but does not form a mapping unit on its own. The Grade 2 profiles are generally

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

limited by a combination of soil droughtiness and wetness, whereas the Subgrade 3a profile is downgraded on a more severe droughtiness limitation only.

- 3.7 The topsoil is primarily of heavy silty clay loam which is dark greyish brown (10YR4/2 in the Munsell soil colour charts<sup>7</sup>). The average depth is 28cm. The topsoil is stoneless, slightly calcareous with a fine to medium, weak subangular blocky structure and very friable to friable consistency.
- 3.8 The upper subsoil is medium and heavy silty clay loam and is slightly to moderately calcareous. The upper subsoil is mostly yellowish brown (10YR5/4) with varying depths to bedded chalk, which is found at a depth of 67-70cm, although shallower at 25cm in the west. Small, angular pieces of hard flint are also evident in some of the profiles. The consistency of the upper subsoil is friable, and the structure is weakly to moderately developed with medium subangular blocky to angular blocky peds.
- 3.9 The lower subsoil is primarily strong brown (7.5YR5/6) heavy silty clay loam and is moderately calcareous. The consistency is very friable to friable, and the structure is weakly developed with fine to medium angular blocky peds.
- 3.10 The site is all classified as Grade 2 as shown in Figure RAC/8936/2.

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<sup>7</sup> **Munsell Color (2009).** *Munsell Soil Color Book*. Grand Rapids, MI, USA

## Appendix 1: Laboratory Data

Determinand	5 Topsoil	5 Upper Subsoil	Units
Sand 2.00-0.063 mm	11	8	% w/w
Silt 0.063-0.002 mm	63	63	% w/w
Clay <0.002 mm	26	29	% w/w
Organic Matter	1.8	1.2	% w/w
Texture	Medium silty clay loam	Heavy silty clay loam	

Determinand	5 Topsoil	5 Upper Subsoil	Units
Soil pH	8.3	7.9	
Phosphorus (P)	15.6	9.6	Mg/l (av)
Potassium (K)	194	83.0	Mg/l (av)
Magnesium (Mg)	60.5	33.0	Mg/l (av)

Determinand	5 Topsoil	5 Upper Subsoil	Units
Phosphorus (P)	2	1	ADAS Index
Potassium (K)	2+	1	ADAS Index
Magnesium (Mg)	2	1	ADAS Index

## Appendix 2: Soil Profile Summaries and Droughtiness Calculations

Wetness calculations are made 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.

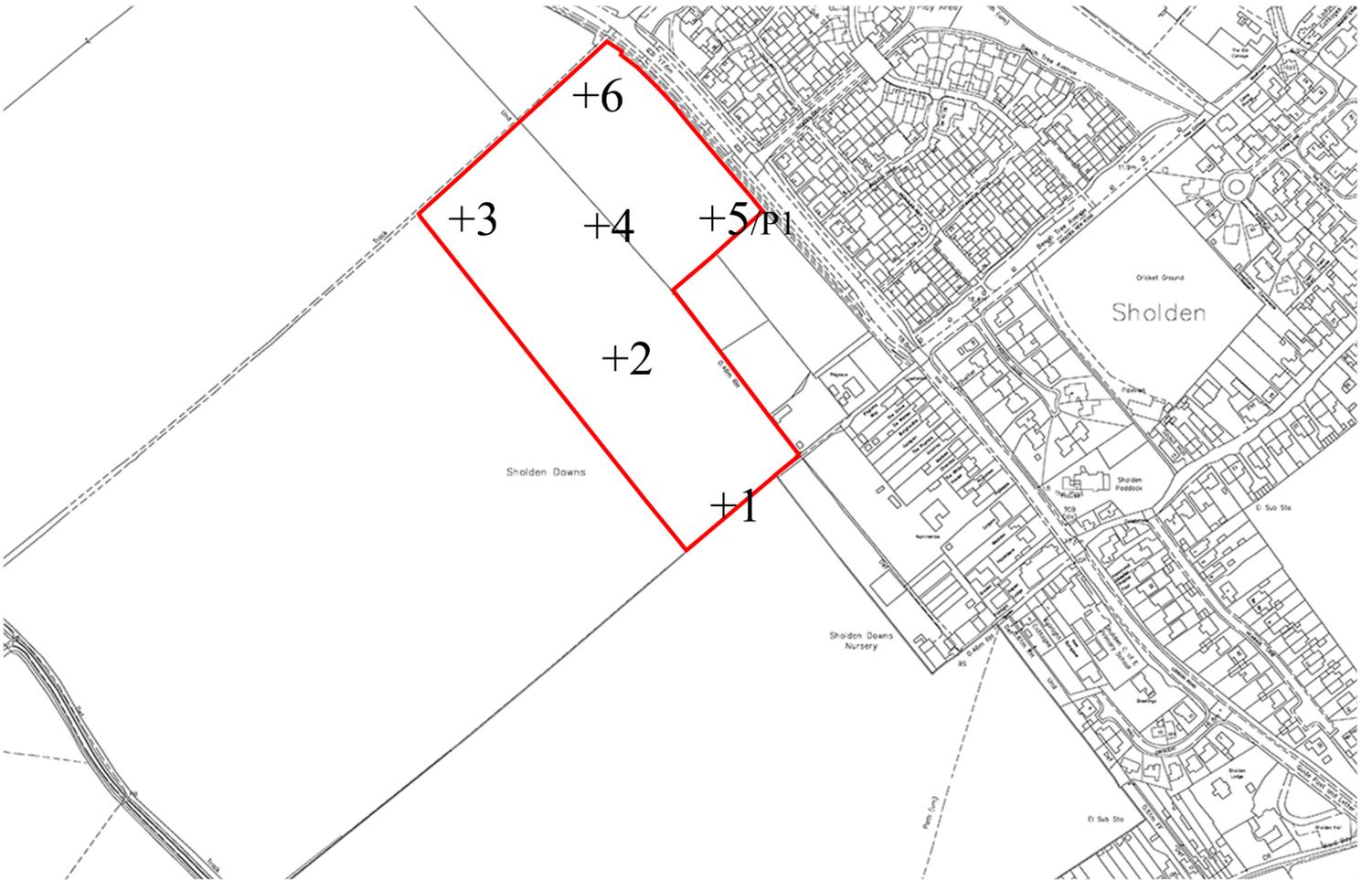
Stone types		
%	TAv	EAv
hard	1	0.5
chalk	10	7

Climate Data	
MDwheat	119
MDpotato	116
FCD	148

Wetness Class Guidelines	//	///	IV	V
SPL within 80cm, gleying within 40cm	>68cm	40-68cm	<40cm	
SPL within 80cm, gleying at 40-70cm	>52cm	<52cm		
No SPL but gleying within 40cm	coarse subsoil		/ other cases	//
Maximum depth of auger penetration is <u>underlined</u>				

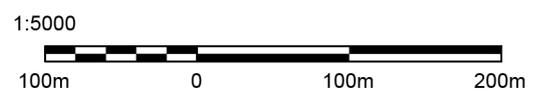
Log	Depth cm	Texture	CaCO <sub>3</sub>	Colour	Mottle colour	abund- ance	stone% hard	stone% chalk	Struct- ure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)		
1	0	25	hZCL	slight	10YR4/2					48	48	n	n	/	2	2	WE/DR		
	25	55	mZCL	slight	10YR4/4					47	50	n	n						
	55	67	hZCL	mod	10YR7/2		2	10		12	18	n	n						
	67	120	C	mod	7.5YR5/4		5	25		43	3	n	n						
											Total	149	119	Bedded chalk @ 67 cm					
											MD	30	3						
										<b>Droughtiness grade (DR)</b>		1	2						
2	0	25	hZCL	slight	10YR4/2					48	48	n	n	/	2	2	WE/DR		
	25	50	mZCL	slight	10YR4/4					42	42	n	n						
	50	70	hZCL	mod	10YR7/2		2	10		20	30	n	n						
	70	120	hZCL	mod	7.5YR5/6		5	25		48	0	n	n						
											Total	157	119	Bedded chalk @ 67 cm					
											MD	38	3						
										<b>Droughtiness grade (DR)</b>		1	2						
3	0	25	hZCL	n	10YR4/2					48	48	n	n	/	2	3a	DR		
	25	120	hZCL	slight	10YR5/4	Mn	few	5	35	92	46	n	n						
											Total	140	93	Bedded chalk @ 25 cm					
											MD	21	-23						
											<b>Droughtiness grade (DR)</b>		2	3a					

4	T	0	32	hZCL	slight	10YR4/2			61	61	n	n	/	2	<b>2</b>	WE/DR	
		32	67	hZCL	slight	10YR5/3	2	10	44	52	n	n					
		67	120	hZCL	mod	7.5YR5/6	2	25	52	4	n	n					
									Total	<b>156</b>	<b>117</b>	Bedded chalk @ 67 cm					
								MD	37	1							
								<b>Droughtiness grade (DR)</b>	1	2							
5	T	0	30	mZCL	slight	10YR4/2			57	57	n	n	/	1	<b>2</b>	DR	
		30	68	hZCL	slight	7.5YR5/3		5	50	61	n	n					
		68	120	ZCL	slight	7.5YR5/6		20	52	3	n	n					
									Total	<b>159</b>	<b>121</b>	Bedded chalk @ 68 cm					
								MD	40	5							
								<b>Droughtiness grade (DR)</b>	1	2							
6	T	0	32	mZCL	slight	10YR4/2			61	61	n	n	/	1	<b>2</b>	DR	
		33	70	mZCL	slight	7.5YR5/3	2	10	50	60	n	n					
		70	120	hZCL	mod	7.5YR5/6		25	50	0	n	n					
									Total	<b>160</b>	<b>121</b>	Bedded chalk @ 70 cm					
								MD	41	5							
								<b>Droughtiness grade (DR)</b>	1	2							



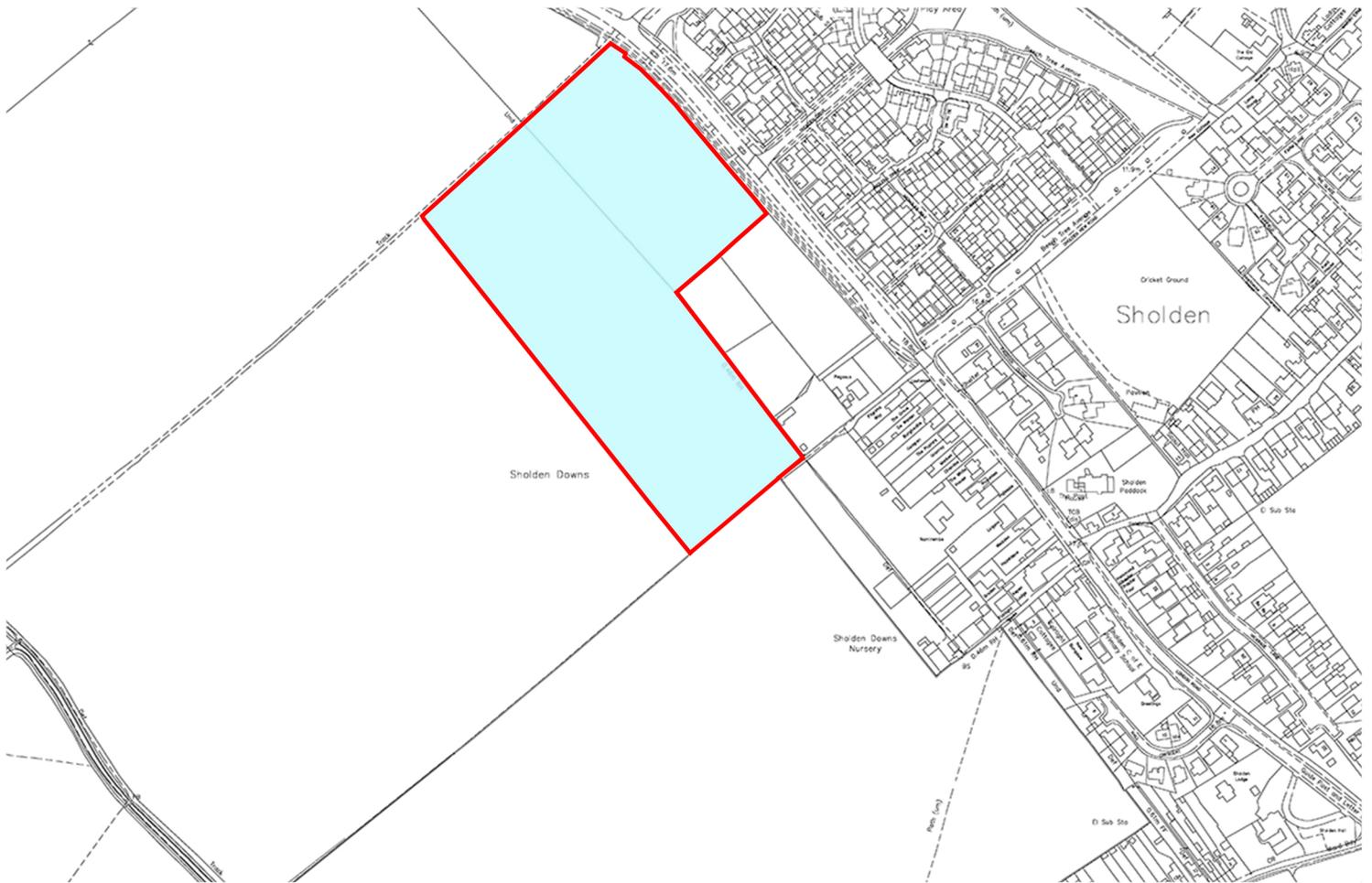
**KEY**

- Survey area
- +1 Observations
- +P Pit



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**KEY: ALC GRADES**

- |  |                             |                                |  |                                |
|--|-----------------------------|--------------------------------|--|--------------------------------|
|  | Grade 1 - excellent quality | } Best and most versatile land |  | Subgrade 3b - moderate quality |
|  | Grade 2 - very good quality |                                |  | Grade 4 - poor quality         |
|  | Subgrade 3a - good quality  |                                |  | Grade 5 - very poor quality    |
|  | Not Present                 |                                |  |                                |

1:5000



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