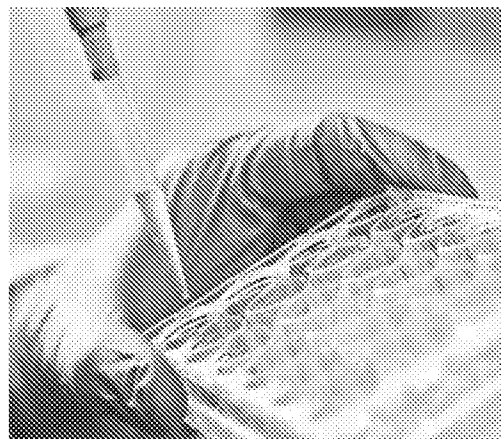
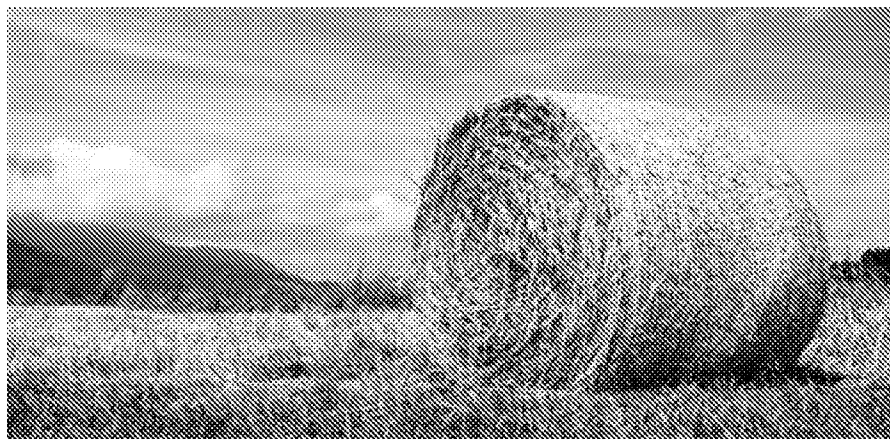
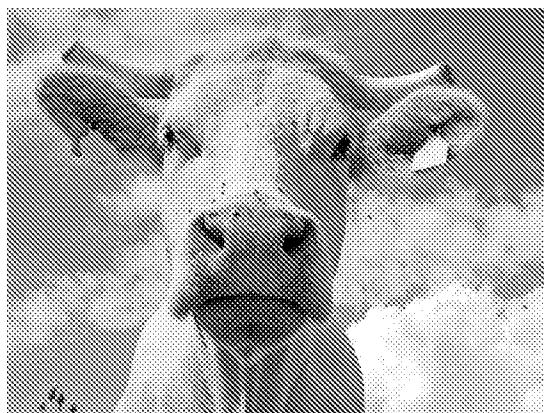




Redrow



Agricultural Land Classification

Land south of A259, Angmering

December 2020



ADAS GENERAL NOTES

Project No.: 1010658

Title: Agricultural Land Classification – Land south of A259, Angmering

Date: 08/12/2020

Office: ADAS Gleadthorpe, Meden Vale, Mansfield, Nottinghamshire. NG20 9PD

Status: Final

Author	<u>Martin Worsley</u>	Technical reviewer	<u>John Grylls</u>
Date:	<u>08/12/2020</u>	Date:	<u>09/12/2020</u>
Project manager	<u>Martin Worsley</u>		
Date:	<u>08/12/2020</u>		

RSK ADAS Ltd (ADAS) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and ADAS. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by ADAS for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of ADAS and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK ADAS Ltd.

EXECUTIVE SUMMARY

ADAS have been instructed by Redrow to undertake an agricultural land classification survey of 3.0 ha of land south of the A259 at Angmering, West Sussex.

The survey has identified freely-draining deep stoneless fine silty soils. These soils belong to Wetness Class I and have medium-textured topsoil. These soils form agricultural land of grade 2 quality. The principal limitation to agriculture is soil droughtiness. This is a minor limitation to agriculture.

CONTENTS

1	INTRODUCTION.....	3
1.1	Site Environment	3
1.2	Agricultural Use.....	3
1.3	Published Information	3
1.3.1	Geology.....	3
1.3.2	Soils	3
1.3.3	Previous Agricultural Land Classification.....	3
2	METHODOLOGY.....	5
3	SOILS.....	6
3.1	Soil Types	6
3.2	Laboratory Analysis.....	6
4	AGRICULTURAL LAND CLASSIFICATION	7
4.1	Climate	7
4.2	Results	8
4.3	Summary of grade areas.....	9
5	CONCLUSION	10

Appendices

APPENDIX 1 – MAP 1: LOCATION OF OBSERVATIONS	
APPENDIX 2 – MAP 2: AGRICULTURAL LAND CLASSIFICATION	
APPENDIX 3 – SOIL SURVEY DETAILS.....	
APPENDIX 4 – PSD TEXTURE ANALYSIS	
APPENDIX 5 – ALC GRADES SYSTEM	

1 INTRODUCTION

ADAS have been instructed by Redrow to undertake an agricultural land classification survey. This report provides information on the soils and agricultural quality of 3.0 ha of land south the A259 in Angmering, West Sussex. The report is based on a survey of the land undertaken in November 2020.

1.1 Site Environment

The land surveyed is located to the south of the A259 and north of a railway line. The site is bordered to the west by residential properties and to the east by adjoining agricultural land. The site forms one part of a larger agricultural field. A farm track runs east-west through the site. The land is level and has an average elevation of approximately 8m AOD.

1.2 Agricultural Use

At the time of survey the land was in an arable rotation.

1.3 Published Information

1.3.1 Geology

1:50,000 scale BGS information¹ records the basal geology of the survey area as chalk of the New Pit Chalk Formation. Surface geology is recorded as being river terrace deposits throughout, comprised of sand, silt and clay.

1.3.2 Soils

The national soil map, published at 1:250,000 scale, records the land as belonging to the Hamble 2 soil association. This is described as being an association of deep stoneless well drained silty soils, with some soils affected by groundwater, formed in Aeolian silty drift².

1.3.3 Previous Agricultural Land Classification

No detailed post-1988 agricultural land classification is publically available for this site. However, the provisional ALC map, published at 1:250,000 scale prior to the revision and subdivision of grade 3 in 1988, records the land as being of grade 1 quality throughout³.

¹ British Geological Survey, 2019. *Geology of Britain viewer*. Online resource: <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>

² Jarvis MG, et al.; 1984. *Soils and their use in South East England*. Soil Survey of Great Britain, England and Wales; Harpenden.

³ Defra, 2020. *Interactive map of Great Britain*. Online resource: <https://magic.defra.gov.uk/MagicMap.aspx>

1.3.4 Flood risk

The survey area is considered by the Environment Agency to be at low risk of flooding by multiple sources⁴. This is the combined risk of flooding by rivers, sea and surface water. Flood risk provides no limitation to agricultural grade.

⁴ Environment Agency, 2020. *Risk of Flooding from Multiple Sources*. Online resource: <https://environment.data.gov.uk/spatialdata/risk-of-flooding-from-multiple-sources-risk-band/wms>

2 METHODOLOGY

A detailed soil survey was carried out in November 2020. The survey was based on observations at alternate intersects of a 50 m grid, giving a sampling density of at least one observation per hectare. During the survey soils were examined via a combination of auger borings and a soil description pit to a maximum depth of 1.2 m. A log of the details of each observation point is attached to this report as Appendix 3. A map showing the location of each observation point is attached to this report as Appendix 1 (Map 1).

Soil samples were taken representative of the top 25 cm of the soil profile and these were submitted to NRM for laboratory particle size distribution (PSD) analysis. Full details of the analysis is included in Appendix 4.

3 SOILS

3.1 Soil Types

Soils are similar across the site. They are comprised of deep stoneless silty clay loams. The topsoils is a medium silty clay loam. The subsoil is moderately structured and these soils are moderately permeable to at least 70 cm depth. Some soils are gleyed⁵ below 40 cm depth, however, this is likely to be caused by fluctuating groundwater rather than surface water perched above a slowly permeable horizon.

An example soil profile is described below from the pit at observation 3 (see Map 1).

0-30 cm	Dark greyish brown (10YR 4/3) medium silty clay loam; stoneless; weakly developed medium subangular blocky structure; friable; a few fine fibrous roots; smooth clear boundary to:
30-47 cm	Greyish brown (10YR 5/2) and yellowish brown (10YR 5/4) medium silty clay loam; stoneless; moderately developed coarse angular blocky structure; firm; c. 0.5% macropores; a few fine fibrous roots; smooth clear boundary to:
47-85+ cm	Brown (7.5YR 5/3) and light brown (7.5YR 6/4) heavy silty clay loam with common fine reddish yellow (7.5YR 5/6) and strong brown (7.5YR 6/6) mottles; stoneless; moderately developed coarse subangular blocky to angular blocky structure; friable; c. 1% macropores, including medium and coarse macropores; no roots.

These soils are freely-draining and belong to Wetness Class I. They have a high capacity to absorb excess winter rainfall.

3.2 Laboratory Analysis

Samples representative of the top 25 cm of the soil profile were taken from observations at 1 & 3 (see Map 1). These soils were submitted to NRM Laboratories for particle size distribution analysis. The textures were confirmed as given in the table below.

Table 3.4: PSD analysis result

Observation	PSD Analysis
1	medium silty clay loam (MZCL)
3	medium silty clay loam (MZCL)

⁵ Gleying is a greyish and ochreous colouring of the soil caused by periodic or permanent waterlogging.

4 AGRICULTURAL LAND CLASSIFICATION

The Agricultural Land Classification (ALC) system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use for food production. The limitations can operate in one or more of four principal ways; they may affect the range of crops which can be grown, the level of crop yield, the consistency of crop yield, and the cost of obtaining a crop.

The classification system gives considerable weight to flexibility of cropping, whether actual or potential, however the ability of some land to produce consistently high yields of a narrower range of crops is also taken into account.

The Agricultural Land Classification (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 by the then Ministry of Agriculture, Fisheries and Food (MAFF) in the 1960s and revised in 1988. A description of the grades used in the ALC system is attached to this report as Appendix 5.

4.1 Climate

The agricultural climate is an important factor in assessing the agricultural quality of land, and the agricultural climate of this site has been calculated using the Climatological Data for Agricultural Land Classification⁶. The relevant site data for an average elevation of 8 m AOD is given below.

Table 4.1: Agro-climatic variables

Average Annual Rainfall (AAR)	744 mm
January-June Accumulated Temperature (AT0)	1537 day °C
Field Capacity Days (FCD)	155
Field Capacity Period	early Nov-mid Apr
Moisture Deficit Wheat (MDW)	121 mm
Moisture Deficit Potatoes (MWP)	119 mm
Climate (upper grade limit)	1

The site is located in South East England and there is no agro-climatic limitation to agriculture.

⁶ Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

4.2 Results

The results of the soil survey described in section 3 were used in conjunction with the agro-climatic data above to classify the land according to the revised guidelines for Agricultural Land Classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food (now Defra)⁷.

This report has identified agricultural land of grade 2 quality. The principal limitation to agricultural use is soil droughtiness.

Grade 1

No land of this quality has been mapped.

Grade 2

There are 2.95 ha of grade 2 land at this site. This land is formed on freely-draining deep stoneless fine silty soils such as those described in section 3.1. These soils belong to Wetness Class I and have medium-textured topsoil.

The principal limitation to agricultural is soil droughtiness. This is a result of moderately structured subsoil and a relatively dry local climate. This is a minor limitation to agricultural which only affects shallow rooting crops such as potatoes. It does not affect deeper rooting crops such as wheat. Such land can produce a wide range of agricultural and horticultural crops but yields of shallower rooting crops may be more variable than those achievable on grade 1 land.

Subgrade 3a

No land of this quality has been mapped.

Subgrade 3b

No land of this quality has been mapped.

Grade 4

No land of this quality has been mapped.

Grade 5

No land of this quality has been mapped.

Non-agricultural

There are 0.05 ha of non-agricultural land at this site. This area accounts for the farm track which runs through the site.

⁷ MAFF, (1988). *Agricultural Land Classification for England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land*.

Urban

No land of this quality has been mapped.

4.3 Summary of grade areas

The boundaries between the different grades of land are shown on Map 2, attached to this report as Appendix 2. The area occupied by each grade is shown below.

Table 4.3: Grade areas

Grade / subgrade	Area (ha)	Area (%)
Grade 1	-	-
Grade 2	2.95	98
Subgrade 3a	-	-
Subgrade 3b	-	-
Grade 4	-	-
Grade 5	-	-
Non-agricultural	0.05	2
Urban	-	-
Total	3.0	100

5 CONCLUSION

ADAS have been instructed by Redrow to undertake an agricultural land classification survey of 3.0 ha on land south of the A259 at Angmering, West Sussex.

The survey has identified freely-draining deep stoneless fine silty soils. These soils belong to Wetness Class I and have medium-textured topsoil. These soils form agricultural land of grade 2 quality. The principal limitation to agriculture is soil droughtiness. This is a minor limitation to agriculture.

6 APPENDICES

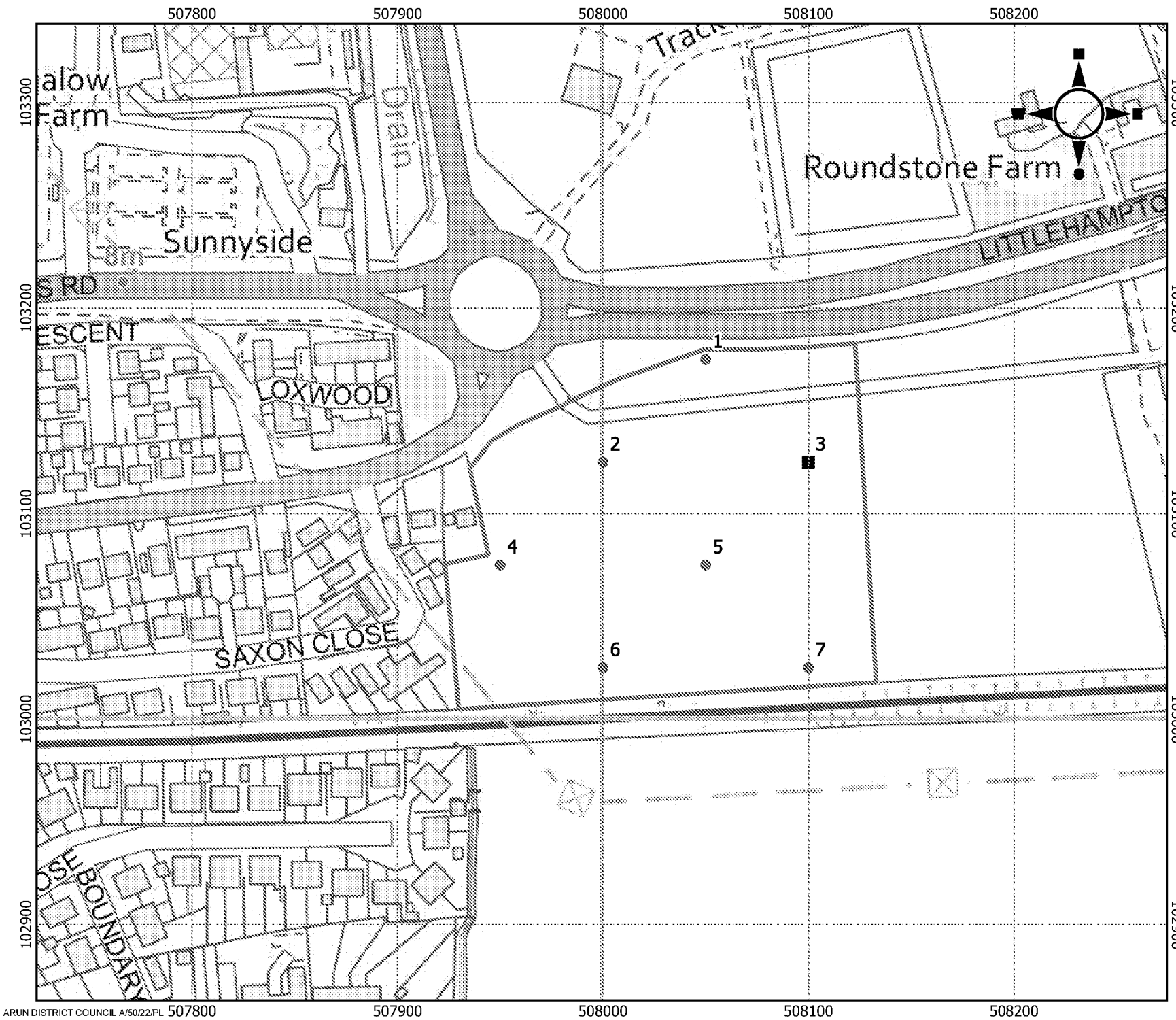
Appendix 1 – Map 1: Location of Observations

Appendix 2 – Map 2: Agricultural Land Classification

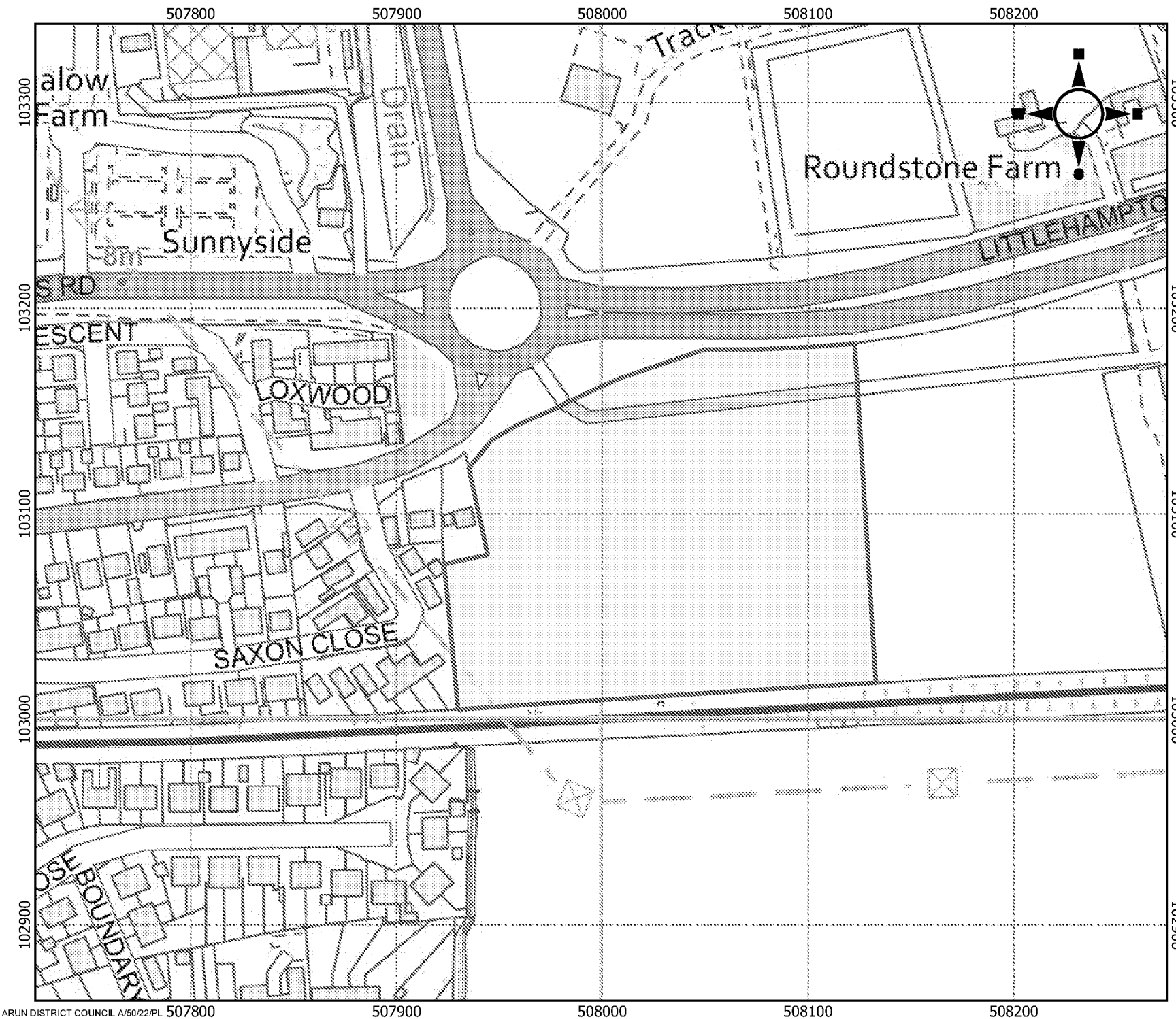
Appendix 3 – Soil Survey Details

Appendix 4 – PSD Texture Analysis

Appendix 5 – ALC Grades System



Title Appendix 1: Map 1 Location of Observations	
Project Land south of A259, Angmering	
Client REDROW PLC	
Key - Survey area - Soil auger - Soil description pit	
Date: 08 / 12 / 2020 Scale: 1 : 2,500 at A4	
ADAS www.adas.uk	



Title
Appendix 2: Map 2
Agricultural Land Classification

Project
Land south of A259, Angmering

Client
REDROW PLC

Key

- Survey area
- Grade 2
- Non-agricultural

Date: 08 / 12 / 2020

Scale: 1 : 2,500 at A4

www.adas.uk

Appendix 3: Land south of A259, Angmering - Survey Details

Auger	Depth (cm)	Colour	Texture	Soil Profile							Notes	Agricultural Land Classification					
				Mottling	SPL	CaCO ₃	Stones (%)			pH		WC	WE grade	DR grade	Overall grade	Limit(s)	
							Total	>2cm	>6cm								
1	0-30 30-50 50-120	Gr Br Br Br	MZCL MZCL HZCL	- o x	- no no	- - -	0 0 0				<1	I	1	2	2	DR	
2	0-30 30-50 50-120	Dk Gr Br Br Br	MZCL MZCL MZCL	- xx xx(x)	- no no	- - -	0 0 0			FMCs	1	I	1	2	2	DR	
3	0-30 30-47 47-120	Dk Gr Br Gr Br + Yl Br Br + Li Br	MZCL MZCL HZCL	- x(x) xxx	- no no	- - -	0 0 0				<1	I	1	2	2	DR	
4	0-30 30-45 45-120	Dk Gr Br Gr Br Br + Yl Br	MZCL MZCL M↓HZCL	- xx xxx	- no no	- - -	0 0 0			FMCs	1	I	1	2	2	DR	
5	0-30 30-45 45-60 60-120	Dk Gr Br Gr Br Li Br Li Br	MZCL MZCL MZCL MZCL	- xx xx(x) xx(x)	- no no no	- - - -	0 0 0 0			FMCs FMCs	1	I	1	2	2	DR	
6	0-30 30-63 63-120	Dk Gr Br Gr Br Li Yl Br	MZCL MZCL HZCL	- xx xxx	- no borderline	- - -	0 0 0				1	I/II	1/2	2	2	DR	
7	0-30 30-55 55-120	Dk Gr Br Gr Br Yl Br	MZCL MCL MZCL	- xx x	- no no	- - -	0 0 0				<1	I	1	2	2	DR	

Appendix 3: Land south of A259, Angmering - Survey Details

Soil Profile											Agricultural Land Classification					
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	pH	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							

Key to Survey Notes:

Colour	Texture	Mottling	CaCO ₃
Bk - black Br - brown(ish) Bu – blue(ish) Dk - dark Du - dusky Gn - green(ish) Gr - grey(ish) Li - light OI - olive Pi - pink(ish) Pl - pale Rd - red(dish) St - strong V - very Wk - weak Yl - yellow(ish)	C - clay ZC - silty clay SC - sandy clay CL - clay loam (H-heavy, M-medium) ZCL - silty clay loam (H-heavy, M-medium) SCL - sandy clay loam SZL - sandy silt loam (F-fine, M-medium, C-coarse) ZL - silt loam SL - sandy loam (F-fine, M-medium, C-coarse) LS - loamy sand (F-fine, M-medium, C-coarse) S - sand (F-fine, M-medium, C-coarse) Org - organic (S-sand, L-loam, C-clay) Pty - peaty (S-sand, L-loam) Pt - peat (S-sandy, L-loamy, H-humified, SF-semi-fibrous, F-fibrous) R - bedrock	o – unmottled soil; x – a few (<2%) ochreous mottles; xx –common (2-20%) to many (20-40%) ochreous mottles <u>OR</u> greyish or pale soil, typically with a few ochreous mottles; xxx – greyish or pale colours dominant in matrix and/or ped faces and common to very many (>40%) ochreous mottles (gleyed horizon); xxxx – dominantly grey soil, often with some ochreous mottles (gleyed horizon).	non - non-calcareous v sl ca - very slightly calcareous sl ca - slightly calcareous ca - calcareous v ca - very calcareous
		SPL	Notes
		yes - a slowly permeable layer borderline - a borderline slowly permeable layer no - not a slowly permeable layer	FMCs – ferrimanganiferous concentrations
Principal Limitation(s) to Agriculture			
CL - climate GR - gradient	DE - depth MR - microrelief	DR - droughtiness ST - stoniness	ER - erosion TX - texture FL - flooding WE - wetness



ANALYTICAL REPORT										
Report Number	30928-20	W195	MARTIN WORSLEY	Client MARTIN WORSLEY						
Date Received	17-NOV-2020		ADAS GLEADTHORPE							
Date Reported	24-NOV-2020		MEDEN VALE							
Project	1010658 SOIL		MANSFIELD							
Reference	MARTIN WORSLEY		NOTTINGHAMSHIRE							
Order Number	P69101MW11/11		NG20 9PD							
Laboratory Reference		SOIL497145	SOIL497146							
Sample Reference		SAMPLE 1	SAMPLE 3							
Determinand	Unit	SOIL	SOIL							
Sand 2.00-0.063mm	% w/w	7	5							
Silt 0.063-0.002mm	% w/w	67	73							
Clay <0.002mm	% w/w	26	22							
Textural Class **		MZCL	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.								
Reported by		** Please see the attached document for the definition of textural classes. ██████████ Natural Resource Management, a trading division of Cawood Scientific Ltd. Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS ██████████								

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.

APPENDIX 5 – DESCRIPTION OF ALC GRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. The 'best and most versatile agricultural land' falls into grades 1, 2 and subgrade 3a – which collectively comprises about one-third of the agricultural land in England and Wales. About half the land in England and Wales is either of moderate quality (subgrade 3b) or poor quality (grade 4). Although less significant on a national scale, such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in grade 5, which mostly occurs in the uplands.

Grade 1 – excellent quality agricultural land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 - very good quality agricultural land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 - good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a - good quality agricultural land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b - moderate quality agricultural land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4 - poor quality agricultural land

Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 - very poor quality agriculture land

Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.