

# AGRICULTURAL LAND CLASSIFICATION REPORT – LAND EAST OF AXMINSTER

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## **Background**

This report sets out the findings of the Agricultural Land Classification (ALC). It is based on a desktop study of relevant published information on climate, topography, geology and soil, in conjunction with a soil survey.

## **Methodology**

The work has been carried out by a Chartered Scientist, who is a Member of the Institute of Professional Soil Scientists (IPSS). The IPSS is the chartered and professional body of the British Society of Soil Science (BSSS). In addition, this ALC survey has been carried out by a soil scientist who meets the requirements of the IPSS Professional Competency Scheme for ALC (see IPSS PCSS Document 2 '*Agricultural Land Classification of England and Wales*', given as **Appendix A**). The IPSS Professional Competency Scheme is endorsed, amongst others, by the Department for Environment, Food and Rural Affairs (Defra), Natural England, the Science Council, and the Institute of Environmental Assessment and Management (IEMA) (see Appendix A also).

This assessment is based upon the findings of a study of published information on climate, geology and soil in combination with a soil investigation carried out in accordance with the Ministry of Agriculture, Fisheries and Food (MAFF)<sup>1</sup> '*Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land*', October, 1988 (henceforth referred to as the 'the ALC Guidelines').

The 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. The ALC system divides agricultural land into five grades (Grade 1 '*Excellent*' to Grade 5 '*Very Poor*'), with Grade 3 subdivided into Subgrade 3a '*Good*' and Subgrade 3b '*Moderate*'. Agricultural land classified as Grade 1, 2 and Subgrade 3a falls in the '*best and most versatile*' category in Paragraph 112 and Annex 2 of the National Planning Policy Framework (NPPF) of March 2012. Further details of the ALC system and national planning policy implications are set out by Natural England in its Technical Information Note 049, given as **Appendix B**.

A detailed ALC survey was completed on the 5<sup>th</sup> December 2014. The detailed survey involved examination of the soil's physical properties at twenty-four locations located on a 100m by 100m grid; where the auger locations fell close to a hedgerow, tree or

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<sup>1</sup> The Ministry of Agriculture, Fisheries and Food (MAFF) was incorporated within the Department for Environment, Food and Rural Affairs (Defra) in June 2001

gateway, the auger location was moved to at least 3m away, i.e. to avoid areas affected by tree roots or which maybe compacted. The auger locations of the detailed soil survey are shown on Figure 1.

The sample locations were located using a hand-held Garmin E-Trec Geographic Information System (GIS) to enable the sample locations to be relocated for verification, if necessary.

The soil profile was examined at each sample location to a maximum depth of approximately 1.2 m by hand with the use of a 5 cm diameter Dutch (Edleman) soil auger.

The soil profile at each sample location was described using the '*Soil Survey Field Handbook: Describing and Sampling Soil Profiles*' (Ed. J.M. Hodgson, Cranfield University, 1997). Each soil profile was ascribed a grade following the ALC Guidelines.

A sample of topsoil was collected at auger locations 2, 19 and 20 and all three samples were sent to an accredited laboratory for particle size analysis, i.e. the proportions of sand, silt and clay. This is to determine the definitive texture class of the topsoil, especially with regard to distinguishing between medium clay loams (i.e. <27% clay) and heavy clay loams (27% to 35% clay).

As described in the ALC Guidelines, the main physical factors influencing agricultural land quality are:

- climate;
- site;
- soil; and
- interactive limitations.

These factors are considered in turn below.

## **Climate**

Interpolated climate data relevant to the determination of the ALC grade of land at the Site is given in Table 2.1 below.

*Table 1: ALC Climate Data*

<b>Climate Parameter</b>	<b>SY 980</b>	<b>307</b>	<b>SY 312 990</b>	<b>SY 307 997</b>
Average Altitude (m)	99		70	46
Accumulated Temperature above 0°C (January – June)	1476		1508	1535
Average Annual Rainfall (mm)	1004		992	985
Field Capacity Days (FCD)	201		199	198
Moisture Deficit (mm) Wheat	91		94	97
Moisture Deficit (mm) Potatoes	80		83	87

With reference to Figure 1 '*Grade according to climate*' on page 6 of the ALC Guidelines, the quality of agricultural land at the Site is limited by climate to Grade 2. This means that agricultural land at the Site can be graded as high as Grade 1 in the absence of any other limiting factors (i.e. Site and soil).

Due to the average annual rainfall, agricultural land at the Site is predicted to be at field capacity (i.e. near saturation point) for between 198 and 201 days per year, mainly over the late autumn, winter and early spring. This will, in an interaction with topsoil texture, cause an 'interactive limitation' to agricultural land quality at the Site - namely soil wetness (see below).

### **Site**

The study area comprises of two parcels of land to the north-east (approximately 21.1 ha) and south-east of Axminster (Approximately 4.0 ha), respectively.

The larger parcel to the north-east of the town is bordered by Waycroft manor Farm and an industrial estate to the south-west, and Millwey Rise to the west. The Site is bordered by Evil Lane to the south, Manor House to the north and agricultural land to the north-east. The small parcel to the south-east of Axminster is bordered by Sector Lane to the north, the B3261 to the south and agricultural land to the south-east.

All of the land within the study area is under grass, with the fields in the north-east being grazed by sheep. The approximate centre of the study area is located at National Grid Reference SY 312 992. The location and boundary of the Site is shown on Figure 1.

With regard to the ALC Guidelines, agricultural land quality can be limited by one or more of three main site factors as follows:

- gradient;
- micro-relief (i.e. complex change in slope angle over short distances); and
- risk of flooding.

### **Gradient and Micro-Relief**

The north-eastern parcel is situated on a north-facing slope with an elevation of approximately 81m Above Ordnance Datum (AOD) at the highest point in the south, and 42m AOD in the north.

To the north of auger location 4 and 5, as well as at auger locations 7 and 8, the slope is more than 7° and are therefore limited by gradient to Subgrade 3b (re Table 1 of the ALC Guidelines).

In the south-eastern parcel, the elevation ranges from approximately 98m AOD at the highest point in the west, and 69m AOD at the lowest point in the east.

Micro-relief, i.e. complex changes in slope angle and direction over short distances, is present in parts of the south-eastern parcel and limits the agricultural land to Subgrade 3b.

### **Risk of Flooding**

From an Environment Agency (EA) Flood Risk Map<sup>2</sup>, none of the Site is at risk of flooding by rivers or the sea. Therefore, the risk of flooding is not limiting to agricultural land quality in terms of Table 2 'Grade according to flood risk in summer' and Table 3 'Grade according to flood risk in winter' of the ALC Guidelines.

### **Soil**

#### **Geology/Soil Parent Material**

British Geological Survey (BGS) information available online has been utilised to identify the Bedrock underlying the Site and to determine whether or not the bedrock is covered by any Superficial (Drift) Deposits<sup>3</sup>. This provides information on soil forming materials at the Site.

#### *North-Eastern Parcel*

The north-eastern parcel is underlain by bedrock geology described by the BGS (1:50,000) as mudstone and limestone of the Blue Lias Formation with mudstone of the Charmouth Mudstone Formation present in the south.

The BGS Superficial Deposit map (1:50,000) indicates that the north-eastern parcel is underlain by river terrace deposits comprising of sand and gravel in the north, with Head comprising of clay, silt, sand and gravel present in the south.

#### *South-Eastern Parcel*

The south-eastern parcel is underlain entirely by mudstone of the Charmouth Mudstone Formation.

The bedrock is covered by Head deposits (comprising clay, silt, sand and gravel).

### **Published Information on Soil**

Provisional information for soils at the Site was gathered from the Soil Survey of England and Wales (SSEW) soil map of South West England (Sheet 5) at a scale of 1:250,000 and accompanying Bulletin No. 14 'Soils and their Use in Wales' (D. C. Findlay *et al*, Harpenden, 1984). The information provided indicates that agricultural land at the Site (i.e. north-east and south-east parcels) is covered by soil grouped in

<sup>2</sup> Environment Agency Flood Risk Map. Available online @ <http://maps.environment-agency.gov.uk/wyby/wybyController?value=Axminster&submit.x=0&submit.y=0&submit=Search%09&lang=e&ep=map&topic=floodmap&layerGroups=default&scale=9&textonly=off#x=331474&y=98818&q=1.2.&scale=9> Last viewed 6<sup>th</sup> January 2015

<sup>3</sup> British Geological Survey 'Geology of Britain Viewer'. Available online @ <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> Last viewed 6<sup>th</sup> January 2015.

the Denchworth Association. The main physical characteristics of these soils are summarised below.

The Denchworth Association is extensive on the Jurassic and Cretaceous clays or clay shales in the Midlands and in South West England. Denchworth soils are stoneless, strongly mottled clayey soils that are usually waterlogged for long periods in the winter (Wetness Class IV). A typical profile comprises of dark greyish brown, slightly stony clay loam or clay over grey, mottled, stoneless clay.

### Soil Survey

From the detailed soil survey carried out on the 5<sup>th</sup> December 2014, it was determined that there are two main soil types across the Site (i.e. north-east and south-east parcels).

The soil profiles across the vast majority Site consist of a dark greyish brown (Munsell colour 10YR 4/2), very slightly stony (2% stones), heavy clay loam or clay topsoil. The subsoil consisted of a pale brown (Munsell colour 10YR 6/3), very slightly stony (2% stones), clay over a light brownish grey (Munsell colour 10YR 6/2), very slightly stony (2% stones), clay.

The profiles across the Site showed signs of gleying in the top 40cm and have been placed in Wetness Class IV where a slowly permeable layer was present shallower than 54cm and Wetness Class III where the slowly permeable layer was encountered deeper than 54cm.

The main difference occurs in the north-eastern parcel. In the far north (around auger locations 1 to 6), the soil profiles comprise of a brown (Munsell colour 10YR4/3), slightly stony (10% stones), medium clay loam topsoil. The subsoil consists of a yellowish brown (Munsell colour 10YR 5/4), moderately stony (20% stones), heavy clay loam over a yellowish brown (Munsell colour 10YR 5/6), moderately stony (25% stones) heavy clay loam. These soil profiles are gleyed in the top 40cm but do not contain a slowly permeable layer, and so are placed in Wetness Class II.

In order to substantiate topsoil texture determined during the ALC survey by hand-texturing, three samples of topsoil were collected over the Site (i.e. Auger Locations 2, 19 and 20). The topsoil samples were sent to an accredited laboratory for analysis of particle size distribution (PSD), based on the British Standard Institution particle size grades. The certificate of analysis is provided as **Appendix C**. The findings of the PSD analysis are shown in Table 2.2 below:

Table 2: Topsoil Texture (re Table 10, ALC Guidelines)

Topsoil Sample Location (See Fig. 1)	% sand 0.063- 2.0 mm	% silt 0.002- 0.063 mm	% clay <0.002 mm	ALC Soil Texture Class
2	48	30	22	Medium Clay Loam
19	11	37	52	Clay
20	38	31	31	Heavy Clay Loam

### Interactive Limitations

From the published above, together with the findings of the detailed soil survey, it has been determined that the quality of agricultural land at the Site is limited by soil wetness.

#### *Soil Wetness*

From the ALC Guidelines, a soil wetness limitation exists where *'the soil water regime adversely affects plant growth or imposes restrictions on cultivations or grazing by livestock'*. The ALC grade according to soil wetness is shown in Table 2.3 below (based on Table 6 'Grade According to Soil Wetness – Mineral Soils' in the ALC Guidelines):

Table 3: Predicted ALC Grade According to Soil Wetness

<b>Table 2.3 ALC Grade According to Soil Wetness (re Table 6 of the MAFF ALC Guidelines)</b>		
<b>Wetness Class</b>	<b>Texture of the Top 25 cm</b>	<b>176-225 Field Capacity Days</b>
<b>II</b>	<b>Medium Clay Loam*</b> , Sandy Clay Loam	<b>3a</b>
	Heavy Silty Clay Loam**, Heavy Clay Loam**	3a
	Clay, Sandy Clay	3b
<b>III</b>	Medium Clay Loam*, Sandy Clay Loam	3a
	Heavy Silty Clay Loam**, <b>Heavy Clay Loam**</b>	<b>3b</b>
	Clay, Sandy Clay	4
<b>IV</b>	Medium Clay Loam*, Sandy Clay Loam	3b
	Heavy Silty Clay Loam**, Heavy Clay Loam**	4
	<b>Clay</b> , Sandy Clay	<b>4</b>
Key * <27% clay; and ** >27% clay		

Therefore, soil profiles which experience slight seasonal waterlogging (Wetness Class II) and have a medium clay loam topsoil, are limited by soil wetness to Subgrade 3a in this climate area (176- 225 field capacity days).

Soil profiles which are seasonally waterlogged (Wetness Class III) and have a medium clay loam topsoil are limited to Subgrade 3b.

Soil profiles at the Site that are waterlogged for long periods in winter (Wetness Class IV) and comprise of a heavy clay loam or clay topsoil are limited to Grade 4.

### **Previous ALC**

Provisional ALC data (pre-1988) shows that the agricultural land at the Site is Grade 3 (not differentiated between Subgrade 3a and 3b) and Grade 4. The scale of the provisional ALC survey means that the grades should be treated as indicative, rather than definitive. There is no detailed (post 1988) ALC data available for the Site<sup>4</sup> or for any site within 5km.

### **ALC Grading at the Site**

#### *Subgrade 3a*

The land in the north west of the Site has been graded as Subgrade 3a due to a wetness limitation; this is caused by an interaction of medium clay loam topsoil over a slightly seasonally waterlogged subsoil (Wetness Class II) in a climate area with between 176 and 225 field capacity days (FCD).

#### *Subgrade 3b*

Some of the slopes in the north of the Site around auger locations 4 and 5 are more than 7°, but less than 11°, and are therefore limited to Subgrade 3b (re Table 1 in the ALC Guidelines).

The land around auger locations 7 and 8 is seasonally waterlogged (Wetness Class III), with the profiles comprising of a heavy clay loam topsoil are limited to Subgrade 3b as a result.

#### *Grade 4*

The majority of the Site is limited to Grade 4 due to a wetness limitation caused by the profiles that are waterlogged for long periods in winter (Wetness Class IV) coupled with the heavy clay loam or clay topsoil.

The area and proportion of agricultural land in each ALC grade has been measured from an ALC map given as Figure 2. The findings are reported in Table 2.4 below.

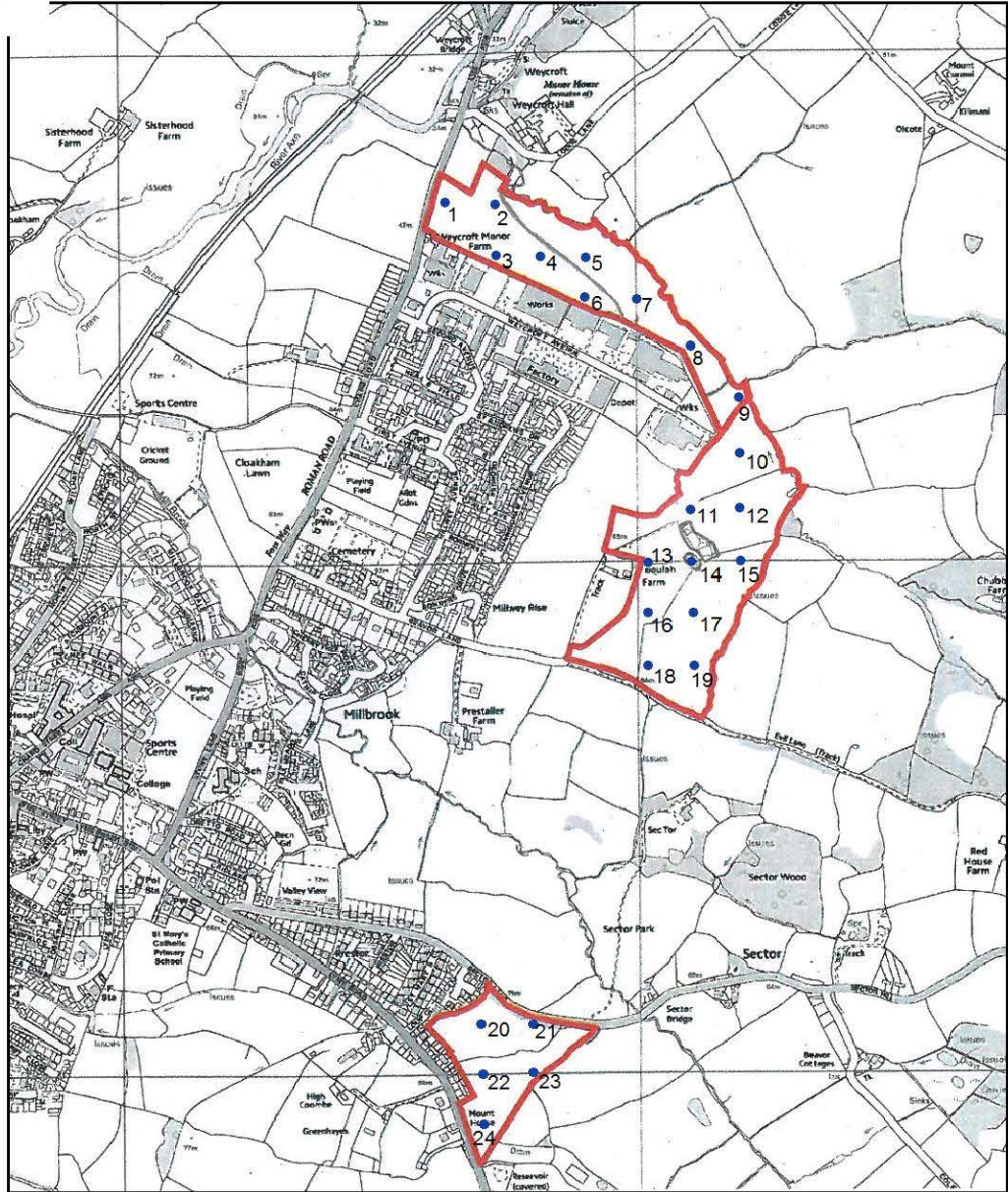
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<sup>4</sup> MAGIC.gov.uk. Last viewed 6<sup>th</sup> January 2016

*Table 4: Agricultural Land Classification – Land to the East of Axminster (North-East and South-East Parcels)*

<b>ALC Grade</b>	<b>Area (Ha)</b>	<b>Area (% of Total Site)</b>
Grade 1 (Excellent)	0	0
Grade 2 (Very Good)	0	0
Subgrade 3a (Good)	2.4	9.5
Subgrade 3b (Moderate)	4.4	17.5
Grade 4 (Poor)	18.1	72
Grade 5 (Very Poor)	0	0
Other / Non-agricultural	0.2	1
<b>Total</b>	<b>25.1</b>	<b>100</b>

**FIGURE 1**  
**Auger Locations**



**KEY**

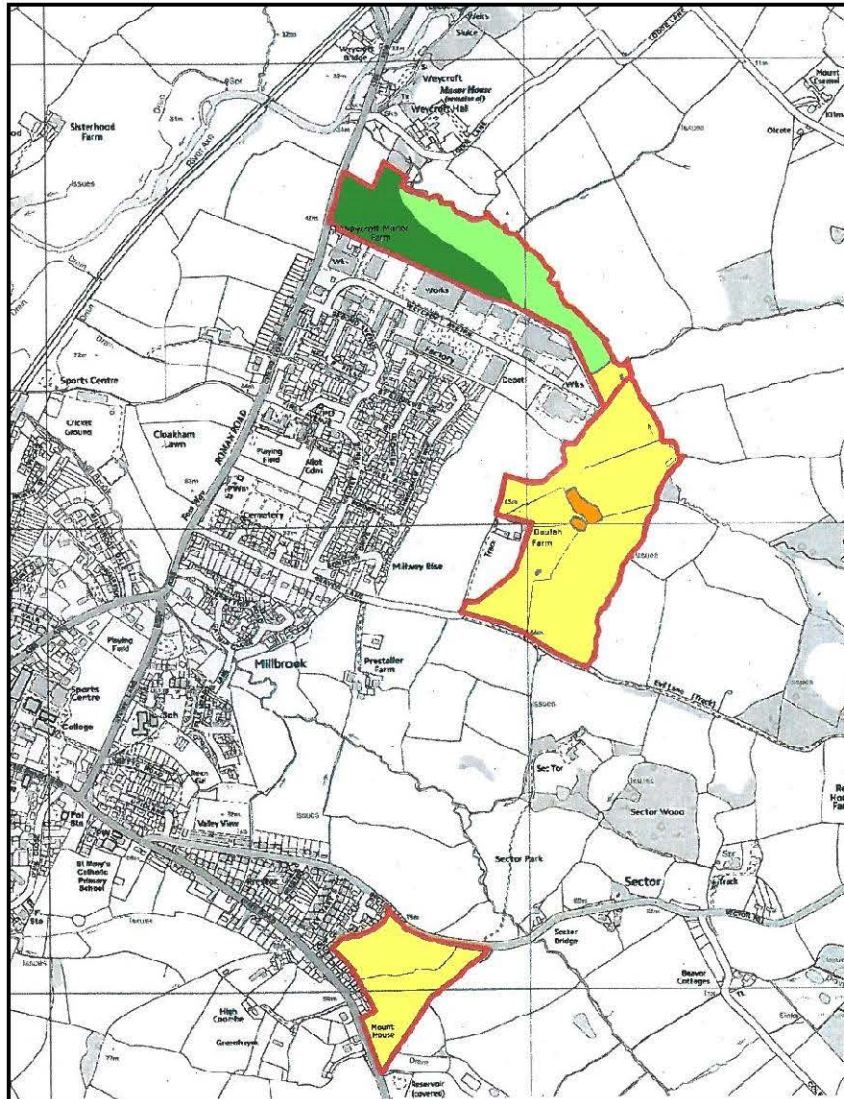
● Auger sample location


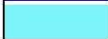

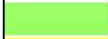





<b>PLAN</b>	<b>KCC 2</b>		
<b>TITLE</b>	<b>Auger Point Locations</b>		
<b>SITE</b>	Land East of Axminster		
<b>CLIENT</b>	Stratford District Council		
<b>NUMBER</b>	<b>KCC1861/01 01/15/ffi</b>		
<b>DATE</b>	January 2015	<b>SCALE</b>	<b>NTS</b>

**KERNON COUNTRYSIDE CONSULTANTS LTD  
GREENACRES BARN, PURTON STOKE, SWINDON,  
WILTSHIRE SN5 4LL**

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**FIGURE 2**  
**ALC Results**



KEY		Ha		PLAN	KCC 3		
	Grade 1			TITLE	Agricultural Land Classification		
	Grade 2			SITE	Land East of Axminster		
	Grade 3a	2.4	9.5	CLIENT	Stratford Distirct Council		
	Grade 3b	4.4	17.5	NUMBER	KCC1861/02 01/2015		
	Grade 4	18.1	72	DATE	January 2015	SCALE	NTS
	Grade 5			<b>KERNON COUNTRYSIDE CONSULTANTS LTD</b> <b>GREENACRES BARN, STOKE COMMON LANE,</b> <b>PURTON STOKE, SWINDON, WILTSHIRE, SN5 4LL</b> Tel 01793 771 333 <a href="mailto:Info@kernon.co.uk">Info@kernon.co.uk</a> This plan is reproduced from the Ordnance Survey under copyright license 100015226			
	Non-agricultural	0.2	1				
	Urban						
	Not surveyed						

**APPENDIX A**

IPSS Professional Competency

Scheme Document 2 –

Agricultural Land Classification

# Agricultural Land Classification (England and Wales)



## Background

The evaluation of land for its agricultural potential in England and Wales<sup>1</sup> is accomplished by application of the Agricultural Land Classification<sup>2</sup> (ALC). Professional competence in Agricultural Land Classification builds upon foundation skills in field soil investigation, description and interpretation (IPSS PCSS Document 1). This system of professional competence is based upon a detailed written procedures document developed by the Farming and Rural Conservation Agency<sup>3</sup>.

## Qualifications

Professional soil scientists with competence in Agricultural Land Classification will have graduated in a relevant science subject. They will also have a number of years of relevant field experience and will have, or be adequately qualified for, membership of a relevant professional body such as the Institute of Professional Soil Scientists.

## Minimum competencies

### Skills and Knowledge:

These are described under a number of subheadings that relate to different tasks. A professionally competent contractor should have the skills and knowledge identified under the **General heading** and **all other headings that are relevant** to the tasks required.

#### General

- 1 A general knowledge and understanding of natural soil development and of world, European and national soil taxonomy
- 2 A detailed knowledge and understanding of the Agricultural Land Classification system relevant to the site and of the classification of land according to the current published Guidelines and other documents<sup>1,2</sup> and the ability to apply it accurately and consistently in the classification of an area of land

<sup>1</sup> Similar systems are employed in Scotland and Northern Ireland

<sup>2</sup> ALC Revised Guidelines and Criteria for the Grading the Quality of Agricultural Land (MAFF, 1988) and Climatological Datasets for ALC (Met. Office, 1989)

<sup>3</sup> A former Executive Agency of the Ministry of Agriculture, Fisheries and Food (now Defra)

# Agricultural Land classification (England and Wales)



- 3 An awareness and knowledge of existing published and unpublished, paper-based and digital ALC information and sources
- 4 A knowledge of paper and digital topographic, geology and soil maps, mineral assessment reports and memoirs and other technical sources of reference; and of their role in ALC work
- 5 An understanding of map scales and of the Ordnance Survey National Grid
- 6 The ability to investigate, sample, describe and interpret soils in the field in a consistent manner and to professional standards (IPSS PCSS Document 1)
- 7 Knowledge of relevant European and national regulations and policies including national and local land use planning policy and guidance, and soil protection policy
- 8 The ability to effectively communicate soil information in a simple and relevant form to developers, planners and other relevant professionals with clear statements as to the reliability and certainty of the results
- 9 The ability to write accurate, concise reports in clear English and in line with best practice examples of ALC survey that communicate the relevant information to all relevant communicants
- 10 An awareness of the importance of systems of quality assurance and control in all aspects of professional work

## Preparations prior to field survey

- 1 The ability to compile background site physical data (e.g. relief, geology, soils, climate, flood-risk, exposure and grade from published and unpublished sources) and understanding of the limitations of the data obtained
- 2 An understanding of scale and of how different survey sampling densities may impact on the certainty of results obtained. A knowledge of how to tailor survey density appropriately to the requirements of the client, and understanding of the limitations that might impose

- 3 The ability to compute gradients from map contours
- 4 A thorough knowledge of climatic data interpolation procedures (and any available associated bespoke computer software), and the ability to obtain representative site values
- 5 An understanding of soil maps, the concepts of soil associations and soil series and their limitations as a background to ALC grading
- 6 A knowledge of GPS and data logger technology and its uses and limitations for field survey work
- 7 A knowledge and understanding of relevant Health and Safety legislation requirements for work in the field
- 8 An understanding of basic biosecurity requirements and any animal or plant health restrictions which may be in force

## Field survey for Agricultural Land Classification

- 1 The ability to determine, lay out and work to a relevant sampling strategy
- 2 Competency in the Foundation Skills (field soil investigation, sampling, description and interpretation) as per IPSS PCSS Document 1
- 3 The ability to accurately and consistently apply the ALC system to soil and other data collected during the field survey

## Reporting

- 1 The knowledge and ability to compile an ALC map from background information and data collected during the field survey
- 2 The ability to write an ALC survey report according to an agreed format
- 3 Understanding of the principles of quality assurance and the ability to apply these as required by the client
- 4 The ability to convey the findings of the survey verbally such that they are understood by the client

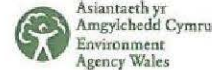
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The following organisations have given their support to the Institute of Professional Soil Scientist's Working with Soils Professional Competency Initiative:



'Defra welcomes initiatives, such as the IPSS Working with Soils Competency Statements, that aim to improve the quality of professional soils advice'



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**APPENDIX B**

Certificate of Laboratory Analysis



Report Number		54184-14		P248		SARAH KERNON		Client EAST AXMINSTER	
Date Received		09-DEC-2014		KERNON COUNTRYSIDE		CONSULTANTS LTD			
Date Reported		17-DEC-2014		GREENACRES BARN		PURTON STOKE			
Project		SOILS		EAST AXMINSTER		WILTSHIRE 6N5 4LL			
Reference									
Order Number									
Laboratory Reference		SOIL2485256	SOIL265257	SOIL265258					
Sample Reference		A2	A19	A20					
Determinand	Unit	SOIL	SOIL	SOIL					
Sand 2.00-0.063mm	% w/w	48	11	38					
Silt 0.063-0.002mm	% w/w	30	37	31					
Clay <0.002mm	% w/w	22	52	31					
Textural Class **		1	7 (Organic)	1					
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.									
This test report shall not be reproduced, except in full, without the written approval of the laboratory.									
Document Control									
Reported by									
<p><i>Andy Chase</i>            Natural Resource Management, a trading division of Cawood Scientific Ltd.            Coopers Bridge, Breziers Lane, Bracknell, Berkshire, RG42 6NS            Tel: 01344 866338            Fax: 01344 890972            email: enquiries@nrm.uk.com</p>									

## Textural Class Definitions

<b>Code</b>	<b>Textural Class</b>
1	Clay Loam
2	Clay Loam/Sandy Clay Loam/Sandy Clay
3	Clay Loam/Sandy Clay
4	Clay Loam/Sandy Silt Loam
5	Clay Loam/Sandy Silt Loam/Sandy Loam/Sandy Clay Loam
6	Clay Loam/Silty Clay Loam
7	Clay
8	Clay/Clay Loam
9	Clay/Clay Loam/Sandy Clay
10	Clay/Sandy Clay
11	Clay/Silty Clay
12	Clay/Silty Clay/Silty Clay Loam/Clay Loam
13	Loamy Sand
14	Loamy Sand/Sandy Loam
15	Sand
16	Sand/Loamy Sand
17	Sandy Clay Loam
18	Sandy Clay Loam/Clay Loam
19	Sandy Clay Loam/Sandy Loam
20	Sandy Clay
21	Sandy Clay/Sandy Clay Loam
22	Sandy Loam
23	Sandy Silt Loam
24	Sandy Silt Loam/Sandy Loam
25	Sandy Silt Loam/Silt Loam
26	Silt Loam
27	Silty Clay Loam
28	Silty Clay Loam/Silt Loam
29	Silty Clay Loam/Silt Loam/Sandy Silt Loam/Clay Loam
30	Silty Clay
31	Silty Clay/Silty Clay Loam