

M5 Junction 10 Improvements Scheme

Environmental Statement (ES)

Appendix 10.6 Agricultural Land Survey Report -

Additional Areas

TR010063 - APP 6.15

Regulation 5 (2) (a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Volume 6

December 2023

Infrastructure Planning Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M5 Junction 10 Improvements Scheme

Development Consent Order 202[x]

6.15 Environmental Statement (ES)

Appendix 10.6 Agricultural Land Survey Report - Additional Areas

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010063
Application Document Reference	TR010063/APP/6.15
Author:	M5 Junction 10 Improvements Scheme Project Team

Version	Date	Status of Version
Rev 0	December 2023	DCO Application



Agricultural Land Classification:

J10 M5 Gloucestershire

Prepared for:
Atkins

Prepared by:
Askew Land & Soil Limited

Date:
10th August 2022

Project Number:
C884

Our interpretation of the site characteristics is based on available data made during our desktop study and soil survey. This desktop study and soil survey has assessed the characteristics of the site in relation to the assessment of its Agricultural Land Classification. It should not be relied on for alternative end-uses or for other schemes. This report has been prepared solely for the benefit of Atkins.

CONTENTS

1	INTRODUCTION	1
1.1	Background	1
1.2	Competency	1
1.3	Methodology	1
1.4	Structure of the Remainder of this Report	2
2	PLANNING POLICY FRAMEWORK	3
2.1	Background	3
2.2	National Planning Policy Statement (NPPF) July 2021	3
2.3	Best Practice Guidance.....	3
3	AGRICULTURAL LAND CLASSIFICATION.....	4
3.1	Background	4
3.2	Climate	4
3.3	Site.....	5
3.4	Soil.....	5
3.5	Interactive Limitations	7
3.6	ALC Grading at the Site	9
4	ALC AT THE SITE IN A WIDER GEOGRAPHICAL CONTEXT.....	10
4.1	Introduction	10
4.2	Pre-1988 ALC Information.....	10
4.3	Post-1988 ALC Information	11
5	SUMMARY AND CONCLUSIONS.....	12

APPENDICES

Appendix 1:	Soil Profile Logs
Appendix 2:	Soil Pit Description
Appendix 3:	Topsoil Texture Analysis

1 INTRODUCTION

1.1 Background

1.1.1 This report was commissioned by Atkins to determine the quality of agricultural land proposed at Junction 10 of the M5, Cheltenham, Gloucestershire, GL51 0TH ('the Site'). The assessment was made in accordance with the Agricultural Land Classification (ALC) system for England and Wales (see 'Methodology' below). This ALC has involved a survey of approximately 7.8 hectare (ha) in three separate parcels (i.e., A to C), located north-west of Cheltenham, Gloucestershire, as shown on **Figure 1**. This is to complement an ALC survey of the wider J10/M5 scheme which is reported separately. The approximate centre of the current ALC Study Area is located at British National Grid (BNG) reference SO 90887 24782.

1.2 Competency

1.2.1 The work has been carried out by a Chartered Scientist (CSci), who is a Fellow (F.I. Soil Sci) of the British Society of Soil Science (BSSS). The soil surveyor meets the requirements of the BSSS Professional Competency Standard (PCS) scheme for ALC (see BSSS PCSS Document 2 '*Agricultural Land Classification of England and Wales*'¹). The BSSS PCS 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).

1.3 Methodology

1.3.1 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)² '*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').

1.3.2 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 Paragraphs 174 and 175 of the National Planning Policy Framework (NPPF) revised on 20th July

¹ British Society of Soil Science. Professional Competency Scheme Document 2 '*Agricultural Land Classification of England and Wales*'.

² The Ministry of Agriculture, Fisheries and Food (MAFF) was incorporated within the Department for Environment, Food and Rural Affairs (Defra) in June 2001.

2021. Further details of the ALC system and national planning policy implications are set out by Natural England in Technical Information Note 049³.

- 1.3.3 A detailed soil survey and ALC of the Site was carried out in May 2022. The ALC survey involved examination of the soil's physical properties at 8 auger-bore locations at a sampling density of approximately 1 auger bore per 1 ha. 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 5cm diameter Dutch (Edleman) soil auger. One soil pit, i.e., Pit 1 was excavated by hand with a spade in order to examine certain soil physical properties, such as stone content and the structural condition of the subsoil, more closely. The locations of the auger bores and the soil pit is shown on **Figure 1**.
- 1.3.4 The auger-bore 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. Where auger locations on a 100 m grid pattern fall on headland, tramlines, or within 3 m of a hedgerow or tree, they were relocated on agricultural land close by, i.e., to avoid compacted ground or land affected by tree roots, etc.
- 1.3.5 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 an Agricultural Land Classification (ALC) grade following the MAFF ALC Guidelines.
- 1.3.6 A sample of topsoil was collected at auger-bore locations 1 and 7, as shown on **Figure 1**. The 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).

1.4 Structure of the Remainder of this Report

- 1.4.1 The remainder of this report is structured as follows:
- Section 2 – Planning Policy Framework
 - Section 3 – Agricultural Land Classification;
 - Section 4 - ALC at the Site in a Wider Geographical Context;
 - Section 5 – Summary and Conclusions

³ Natural England (December, 2012). 'Agricultural Land Classification: protecting the best and most versatile agricultural land (TIN049)'. Available online @ <http://publications.naturalengland.org.uk/publication/35012> Last accessed August 2022

2 PLANNING POLICY FRAMEWORK

2.1 Background

2.1.1 This section of the report sets out the national and local planning framework in which to assess the opportunities and constraints to development at the Site in agricultural land quality terms.

2.2 National Planning Policy Statement (NPPF) July 2021

2.2.1 National planning policy guidance on development involving agricultural land is set out in National Planning Policy Framework (NPPF), which was revised on the 20th July 2021. The NPPF aims to provide a simplified planning framework which sets out the Government's economic, environmental and social planning policies for England. The NPPF includes policy guidance on '*Conserving and Enhancing the Natural Environment*' (Section 15). Paragraph 174 (a and b) (page 50) are of relevance to this assessment of agricultural land quality and soil and states that:

'174...Planning policies and decisions should contribute to and enhance the natural and local environment by:

a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;...'

2.2.2 Paragraph 175 of the NPPF (2021) goes on to describe that:

'175. Plan should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework⁵³ ...'

2.2.3 Footnote number 58 states that:

'Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality.'

2.3 Best Practice Guidance

2.3.1 The Department for Environment, Food and Rural Affairs (Defra) has published a 'Code of Practice for the Sustainable Use of Soils on Construction Sites'⁴.

⁴ Department for Environment, Food and Rural Affairs (September, 2009) '*Code of Practice for the Sustainable Use of Soils on Construction Sites*'. Available online @ <https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites>. Last accessed August 2022

3 AGRICULTURAL LAND CLASSIFICATION

3.1 Background

3.1.1 This section of the 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.

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

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

3.1.3 These factors are considered in turn below.

3.2 Climate

3.2.1 Interpolated climate data relevant to the determination of the Agricultural Land Classification (ALC) grade of land within the current Study Area is given in Table 3.1 below.

Table 3.1: ALC Climate Data for J10 M5 Study Area	
Climate Parameter	Grid Ref: SO 909 249
Average Altitude (m)	27
Average Annual Rainfall (mm)	627
Accumulated Temperature above 0°C (January – June)	1489
Moisture Deficit (mm) Wheat	113
Moisture Deficit (mm) Potatoes	107
Field Capacity Days (FCD)	139
Grade According to Climate	1

3.2.2 With reference to Figure 1 ‘Grade according to climate’ on page 6 of the ALC Guidelines, there is no climatic limitation to the quality of agricultural land at the Site. This means that agricultural land at the Site would be determined as Grade 1, without any additional limitations.

3.2.3 Agricultural land at the Site is predicted to be at field capacity (i.e., the amount of soil moisture or water content held in soil after excess water has drained away and the rate of downward movement has materially decreased) for 139 Field Capacity Days (FCD) per year, mainly over the late autumn, winter and early spring. The combination of topsoil texture, drainage status (Wetness Class) of the profile, and number of FCD affects the degree to which agricultural land is limited by soil wetness.

3.3 Site

3.3.1 The approximately 7.8 ha ALC Study Area is located to the north-west of Cheltenham, Gloucestershire. The approximate centre Site parcel is located at British National Grid (BNG) reference SO 90887 24782. The location and boundaries of the Site are shown on **Figure 1**.

3.3.2 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.

I. Gradient and Micro-Relief

3.3.3 The land within the Study Area is broadly level at an elevation of between 28 metres (m) Above Ordnance Datum (AOD) in the central region, to 23 mAOD at the lowest elevation in the north. The quality of agricultural land at the Site is not limited by gradient, as the gradient of the slope does not exceed 7° (see Table 1 of the ALC Guidelines, 1988). Likewise, the quality of agricultural land at the Site is not limited by micro-relief, i.e., complex changes in slope angle and direction over short distances.

II. Risk of Flooding

3.3.4 From the Government Flood Map for Planning website⁵, the Site is mainly located in Flood Zones 1 with a low risk of flooding, whilst the central parcel located in Flood Zone 2 and 3 with a higher risk of flooding. However, there are no records/data which show the quality of the agricultural land is limited by a risk of flooding in accordance with criteria for frequency and duration set out in Table 2 '*Grade according to flood risk in summer*' and/or Table 3 '*Grade according to flood risk in winter*' in the ALC Guidelines.

3.4 Soil

I. Geology/Soil Parent Material

⁵ Government Flood Map for Planning. Available online @ <https://flood-map-for-planning.service.gov.uk/confirm-location?eastings=454700&northing=272400&nationalGridReference=SP547724> Last accessed August 2022

- 3.4.1 British Geological Survey (BGS) information available online⁶ has been utilised to identify the Bedrock underlying the Site and any Superficial (Drift) Deposits over the Bedrock. This information helps to determine the parent material⁷ from and within which a soil has formed. The BGS information (1:50,000) indicates the Study Area is underlain by mudstone in the Charmouth Mudstone Formation.
- 3.4.2 The BGS information (1:50,000) indicates the bedrock across most of the Study Area is not covered by any superficial deposits. However, there is some Alluvium (clay, silt, sand and gravel) in the central area (i.e., Parcel B), and Cheltenham Sand and Gravel in the north of the Site (i.e., Parcel A).

II. Published Information on Soil

- 3.4.3 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. 14⁸ reports that agricultural land at the Site is mainly covered by soils in the Evesham 2 Association, with soil in the Badsey 2 Association in the north (i.e., Parcel A).
- 3.4.4 As described by the SSEW, the Evesham 2 Association are developed in Jurassic and Cretaceous clay shales and associated thin drifts in the clay vales of lowland England. These soils are clayey and have slowly permeable subsoils which are generally seasonally waterlogged (Wetness Class III).
- 3.4.5 The Badsey 2 Association comprise mainly of fine loamy soils over calcareous gravel. The soils are moderately to very porous over extremely porous gravelly subsoils and are largely well drained (Wetness Class I), in which winter rainwater is readily absorbed.

III. Soil Survey

- 3.4.6 The ALC/soil survey determined two types of soil, as described below.

Type 1

- 3.4.7 The first type of soil occurs in the north in Parcel A, which is covered by Cheltenham Sand and Gravels. Here the topsoil is slightly calcareous, dark greyish brown (2.5Y4/2), very slightly stony (6% hard gravel), sandy clay loam. The upper subsoil is a slightly calcareous (1-5% calcium carbonate), light olive brown (2.5Y5/4), slightly stony (8% hard gravel), sandy clay

⁶ British Geological Survey 'Geology of Britain Viewer'. Available online @ <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> Last accessed August 2022

⁷ British Geological Survey. A 'parent material' is a soil-science name for a weathered rock or deposit from and within which a soil has formed. In the UK, parent materials provide the basic foundations and building blocks of the soil, influencing their texture, structure, drainage and chemistry. Available online @ [Soil Parent Material Model - British Geological Survey \(bgs.ac.uk\)](http://www.bgs.ac.uk/soilparentmaterial/) Last accessed August 2022

⁸ D.C. Findlay, G.J.N. Colborne, D.W. Cope, T.R. Harrod, D.V. Hogan, and S.J. Stains (1984) 'Soils and their use in Eastern England', Soil Survey of England and Wales Bulletin No.14, Harpenden

loam. These profiles do not have an SPL and are permeable (Wetness Class I). This type of soil fits SSEW's description of soils in the Badsey 2 Association.

Type 2

- 3.4.8 The second type of soil occurs in the central and southern parts of the Study Area, i.e., Parcel B and C. The soil has very slightly calcareous (% calcium carbonate) and stoneless olive brown (2.5Y4/3) clay topsoil. The upper subsoil is a moderately calcareous (5-10% calcium carbonate), stoneless light olive brown (2.5Y5/3) clay. The lower subsoil is a moderately calcareous (1-5% calcium carbonate), stoneless olive (5Y5/3) clay. The top of a SPL was recorded at approximately 60cm and the profiles are placed in Wetness Class III.
- 3.4.9 A log of the soil profiles recorded on Site (see Figure 1) is given as **Appendix 1**. A description of one soil pit (soil Pit 1) is given as **Appendix 2**.

Topsoil Texture

- 3.4.10 The texture of the topsoil was determined on Site by hand-texturing, as described in Natural England's Technical Information Note 037 'Soil Texture'⁹. To substantiate topsoil texture determined during the ALC survey by hand-texturing, two samples of topsoil were collected over the Site (i.e., auger bore locations 1 and 7, **Figure 1**). The samples of topsoil 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 3**. The findings of the PSD analysis are shown in Table 3.2 below:

Table 3.2: 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
AB1	13	32	55	Clay
AB7	63	18	19	Sandy Clay Loam

3.5 Interactive Limitations

- 3.5.1 From the published information 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 mainly by soil wetness during the autumn and winter, and by soil droughtiness during the growing season (spring and summer).

⁹ Natural England's Technical Information Note 037 'Soil Texture'. Available online at <http://publications.naturalengland.org.uk/publication/32016>

I. Soil Wetness

- 3.5.2 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'*. Agricultural land quality at the Site is limited by soil wetness as per Table 3.3 below (based on Table 6 'Grade According to Soil Wetness – Mineral Soils' in the ALC Guidelines):

Wetness Class	Texture of the Top 25 cm	126 - 150 Field Capacity Days
I	Sandy Loam, Sandy Silt Loam	1
	Medium Clay Loam*, Sandy Clay Loam	1
	Heavy Silty Clay Loam**, Heavy Clay Loam**	2
	Sandy Clay, Silty Clay, Clay	3a (2)
II	Sandy Loam, Sandy Silt Loam	1
	Medium Clay Loam*, Sandy Clay Loam	2
	Heavy Silty Clay Loam**, Heavy Clay Loam**	3a (2)
	Sandy Clay, Silty Clay, Clay	3b (3a)
III	Sandy Loam, Sandy Silt Loam	2
	Medium Clay Loam*, Sandy Clay Loam	3a (2)
	Heavy Silty Clay Loam**, Heavy Clay Loam**	3b (3a)
	Sandy Clay, Silty Clay, Clay	3b (3a)
Key		
* <27% clay; and ** >27% clay		
() bracket denote a grade uplift for naturally calcareous soils with more than 1% calcium carbonate and between 18% and 50% clay		

- 3.5.3 In a climate area with 139 FCD, soil profiles in Wetness Class III with clay topsoil (i.e., Parcels B and C) are limited by soil wetness to Subgrade 3b.

II. Soil Droughtiness

- 3.5.4 From the ALC Guidelines, a soil droughtiness limitation exists *'in areas with relatively low rainfall or high evapotranspiration, or where the soil holds only small reserves of moisture available to plant roots.'* The ALC grade according to soil droughtiness is shown in Table 3.4 below (based on Table 8 'Grade According to Droughtiness' in the ALC Guidelines). To be eligible for Grades 1 to 3b the moisture balances (MBs) must be equal to, or exceed, the stated minimum values for *both* wheat and potatoes. If the MB for *either* crop is less (i.e., more negative) than that shown for Subgrade 3b, the soil is Grade 4 on droughtiness):

Grade/Subgrade	Moisture Balance (MB) Limits (mm)	
	Wheat	Potatoes
1	+30	+10
2	+5	-10

3a	-20	-30
3b	-50	-55
4	<-50	<-55

3.5.5 As determined by MB calculations given in **Appendix 1**, the sandy clay loam soil profiles in the northern region of the Site (i.e., site parcel A) are limited by soil droughtiness to Subgrade 3a, i.e., a shortage of water in the soil for crops during the growing season.

3.6 ALC Grading at the Site

3.6.1 The area of land in each ALC grade has been measured from **Figure 2** and the area (ha) and proportion (% of Site) is given in Table 3.5.

ALC Grade	Area (Ha)	Area (%)
Grade 1 (Excellent)	0	0
Grade 2 (Very Good)	0	0
Subgrade 3a (Good)	1.8	23.1
Subgrade 3b (Moderate)	6.0	76.9
Grade 4 (Poor)	0	0
Grade 5 (Very Poor)	0	0
Other Land / Non-agricultural	0	0
Total	7.8	100

4 ALC AT THE SITE IN A WIDER GEOGRAPHICAL CONTEXT

4.1 Introduction

4.1.1 The aim of this section is to examine agricultural land quality at the Site in a national, regional, county and local context.

4.2 Pre-1988 ALC Information

4.2.1 During the 1960's and 1970's MAFF produced a series of maps to show the provisional ALC grade of agricultural land over the whole of England and Wales at a scale of 1:250,000. These provisional ALC maps are suitable for strategic land use planning only, i.e., they appropriate for land areas greater than 80 ha. The provisional MAFF ALC map of Eastern England (1:250,000, 1984) indicates that the quality of agricultural land at the Site is Grade 3 (not differentiated into Subgrade 3a or Subgrade 3a).

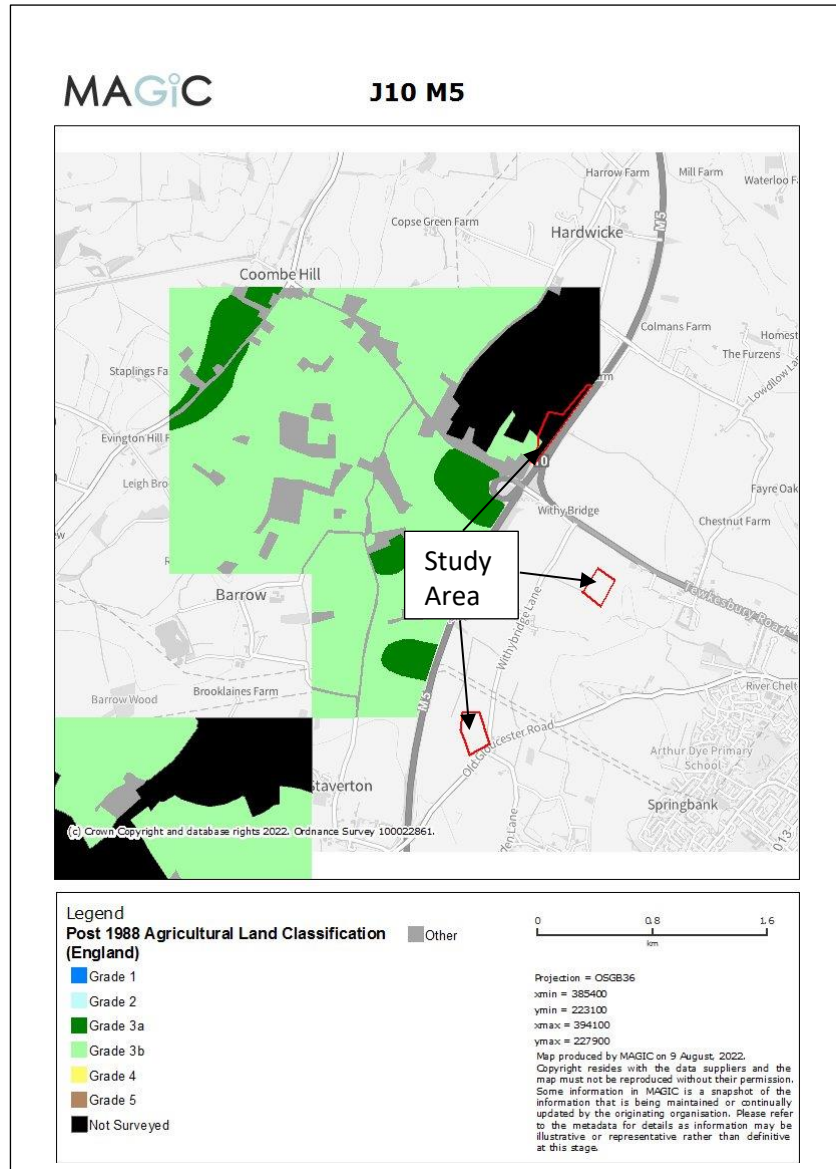
ALC Grade	England	South West Office	Gloucestershire County	Tewkesbury District
1 (excellent)	2.7	1.5	1.1	1.7
2 (very good)	14.2	7.6	5.4	5.4
3 (good to moderate)	48.2	58.9	70.2	69.9
4 (poor)	14.1	18.4	12.4	19.0
5 (very poor)	8.4	5.5	0.5	0.4
Non-Agricultural	5.0	4.6	6.6	1.1
Urban	7.3	3.6	3.8	2.5

3.4.8 Of note, the provisional (Pre 1988) ALC information shows that Tewkesbury District has a high proportion of agricultural land in Grade 3, i.e., 69.9% compared with 48.2% in England as a whole.

¹⁰ Ministry of Agriculture, Fisheries and Food, Land and Water Service, Technical Notes, Resource Planning (February 1983) 'Agricultural Land Classification of England and Wales – The Distribution of the Grades' (TN/RP/01 TFS 846)

4.3 Post-1988 ALC Information

4.3.1 The former MAFF has not carried a Post-1988 ALC survey of agricultural land covering the Site. An extract from the Post-1988 Agricultural Land Classification map online¹¹ surrounding the Site is given below.



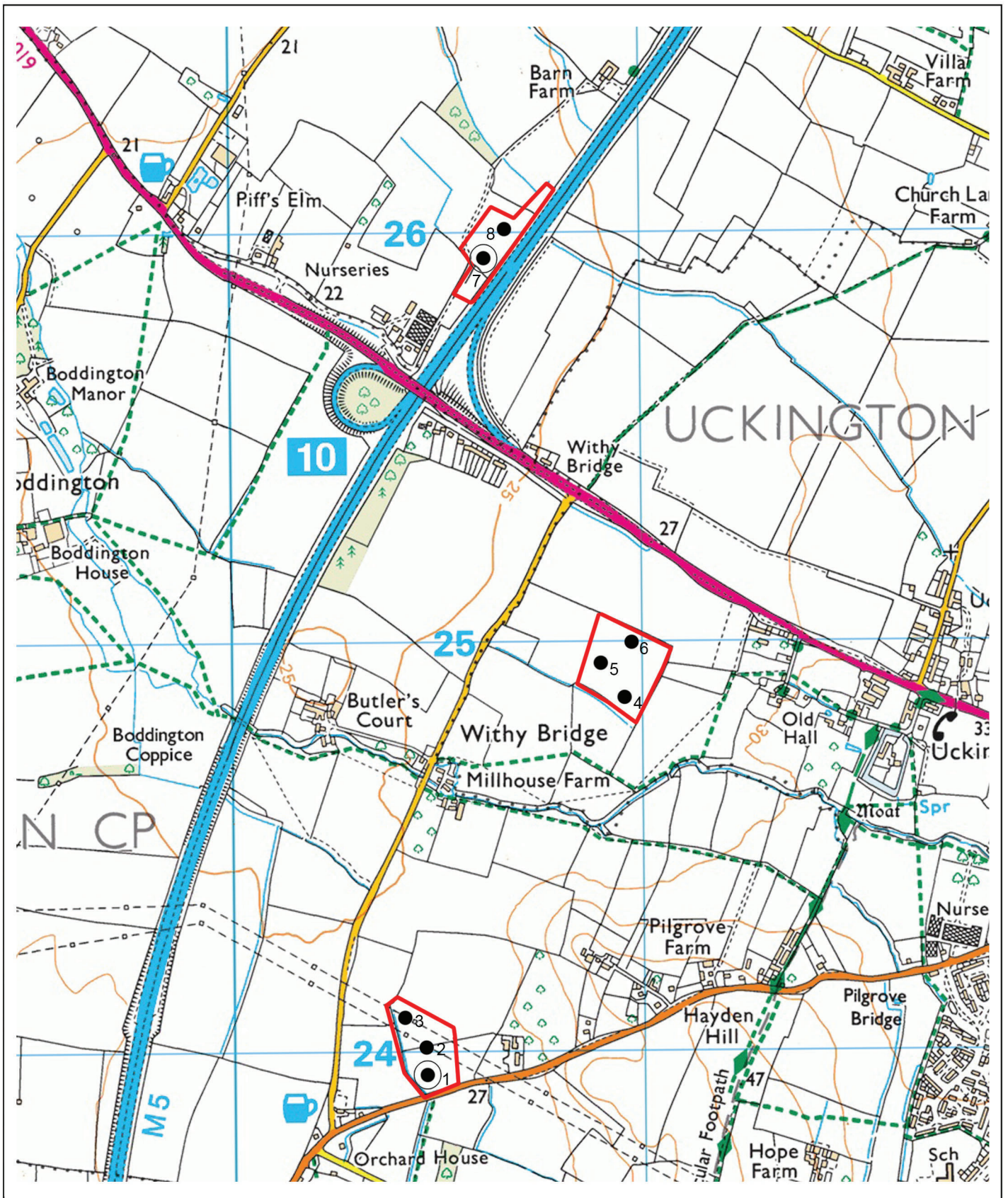
4.3.2 As shown on the Post-1988 ALC survey above, MAFF has classified agricultural land close to the Site, to the west of the M5, as predominantly Subgrade 3b with pockets of Subgrade 3a. Therefore, the grading at the Site is consistent with MAFF Post 1988 ALC in the vicinity.

¹¹ Multi Agency Geographic Information for the Countryside. Post 1988 Agricultural Land Classification. Available online @ www.MAGiC.gov.uk Last accessed August 2022

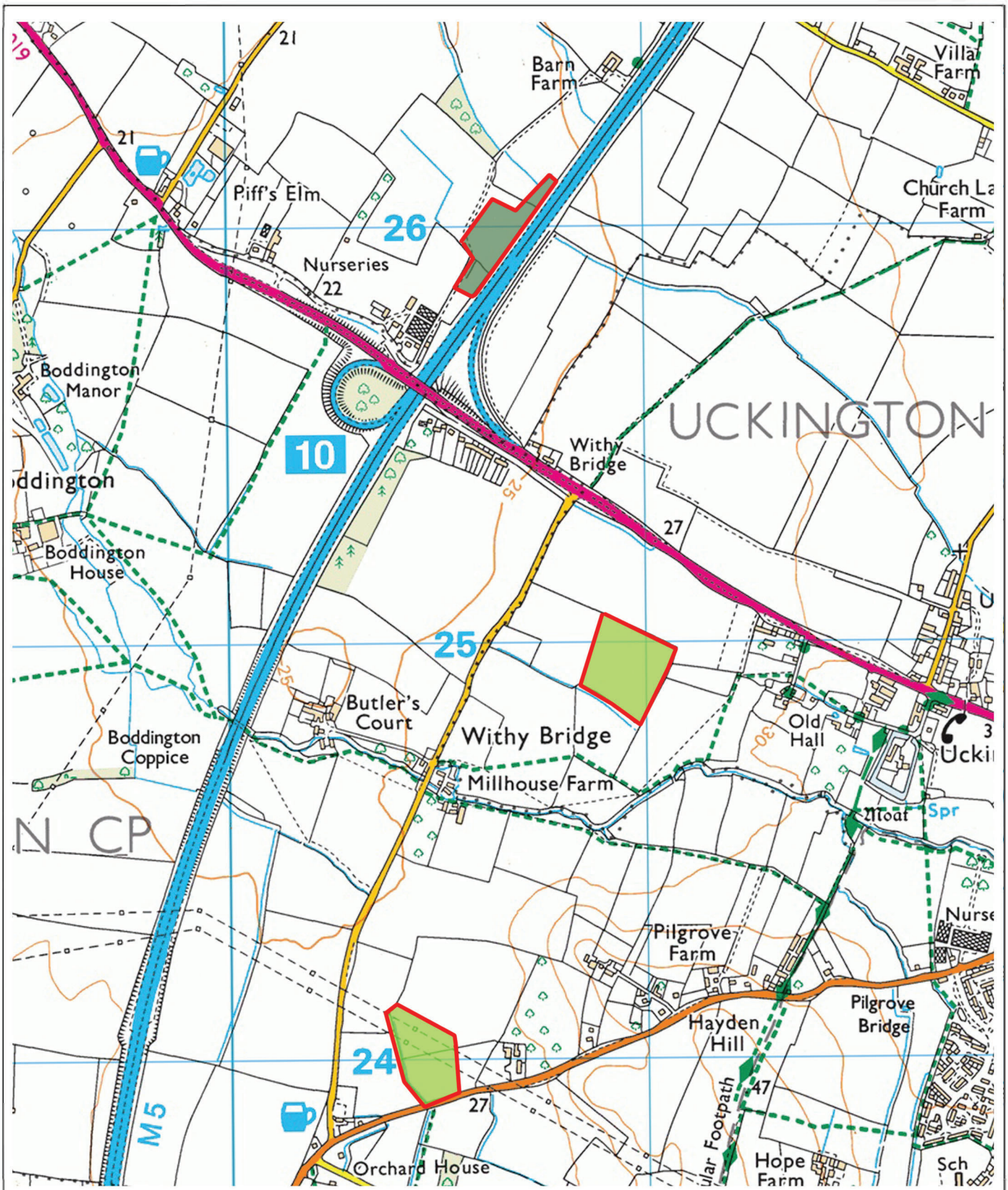
5 SUMMARY AND CONCLUSIONS

- 5.1.1 This report was commissioned by Atkins to determine the quality of agricultural land at Junction 10 of the M5, Cheltenham, Gloucestershire, GL51 0TH ('the Site'). The assessment was made in accordance with the Agricultural Land Classification (ALC) system for England and Wales. The approximately 7.8 hectare (ha) Study Area comprises of three parcels (i.e., Parcels A-C), located north-west of Cheltenham, Gloucestershire (see Figure 1). This is to complement an ALC survey of the wider J10/M5 scheme which is reported separately. The approximate centre of the Study Area is located at British National Grid (BNG) reference SO 90887 24782.
- 5.1.2 British Geological Survey (BGS) information (1:50,000) indicates that the Study Area is underlain by mudstone in the Charmouth Mudstone Formation. The bedrock across most of the Study Area is not covered by any superficial deposits, apart from Cheltenham Sand and Gravel in Parcel A and some Alluvium (Clay, Silt, Sand, And Gravel) in Parcel B.
- 5.1.3 The National Soil Map (1:250,000) shows the Study Area is covered by soils mainly in the Evesham 2 Association (i.e., Parcels B and C) with soil in the Badsey 2 Association in Parcel A. The Evesham 2 Association comprises clayey soils that are slowly permeable (Wetness Class III), whilst the Badsey 2 Association comprises mainly of fine loamy soils over calcareous gravel which is well drained (Wetness Class I).
- 5.1.4 A detailed ALC/soil survey carried out in May 2022 determined two types of soil. The sand clay loam soils that are developed Cheltenham Sand and Gravels are limited by soil droughtiness to Subgrade 3a (i.e., 1.8ha or 23.1% of the Study Area) in the northern region (i.e., site parcel A). Whilst, the clay soils that are developed in Charmouth Mudstone and some Alluvium are limited by soil wetness to Subgrade 3b (i.e., 6ha or 76.9% of the Site) in the south of the Site (i.e. site parcel B and C).
- 5.1.5 MAFF has classified agricultural land close to the Site, to the west of the M5, as predominantly Subgrade 3b with pockets of Subgrade 3a. Therefore, the grading within the Study Area is consistent with MAFF Post 1988 ALC in the vicinity.

Figures



		Client	Atkins	Figure 1	Sample Locations
		Project No	C884	Project Name	J10 M5 Gloucestershire
		Dwg. No	01	R W Askew BSc(Hons) MISOilSci MSc CSCi The Old Stables, Upexe, Exeter, EX5 5ND Tel: 07753 227 224 Email: rw.askew@btinternet.com	
		Scale	NTS		
		Date	09/08/2022		
		Drawn By	ELA		



<p>ALC Grade</p> <ul style="list-style-type: none"> Grade 1 Grade 2 Subgrade 3a Subgrade 3b Grade 4 Grade 5 Non-agricultural 	<p> Site boundary</p>	<p>Client Atkins</p>	<p>Figure 2: Agricultural Land Classification</p>
		<p>Project No C884 Dwg. No 02 Scale NTS Date 09/08/2022 Drawn By ELA</p>	<p>Project Name J10 M5 Gloucestershire</p>
		<p>R W Askew BSc(Hons) MSc CSCi The Old Stables, Upexe, Exeter, EX5 5ND Tel: 07753 227 224 Email: rw.askew@btinternet.com</p>	

Appendix 1: Soil Profile Logs

Project Number	Project Name	Parcel
C884	J10 M5 Additional ALC 17May22	

Date of Survey	Survey Type	Surveyor(s)	Company
17/05/2022	Detailed ALC	RWA	Askew Land and Soil

Weather	Relief	Land use and vegetation
Dry, sunny	Level	PGR (Permanent Pasture)

Grid Reference	Postcode	Altitude	Area
SO909249	GL510SW	27	10

MAFF prov	MAFF detailed	Flooding
All Grade 3	Subgrade 3b to west	Flood Zones 2 and 3

AAR	AT0	MDw	MDp	FCD	Climate grade
627	1489	113	107	139	1

Bedrock	Superficial deposits
Charmouth Mudstone Formation	Cheltenham Sand And Gravel to NW of J10 M5

Soil association(s) 1:250,000	Detailed soil information
Evesham 2; Badsey 2 to NW of J10 M5	None

Revision Number	Date Revised
1	07/07/2022

Mottle form

FF - Few Faint
 FD - Few Distinct
 FP - Few Prominent
 CF - Common Faint
 CD - Common Distinct
 CP - Common Prominent
 MF - Many Faint
 MD - Many Distinct
 MP - Many Prominent
 VF - Very many Faint
 VD - Very many Distinct
 VP - Very many Prominent

Texture

C - Clay
 CHK - Chalk
 CS - Coarse Sand
 CSL - Coarse sandy loam
 CSZL - Coarse sandy silt loam
 FP - Fibrous and semifibrous peats
 FS - Fine Sand
 FSL - Fine sandy loam
 FSZL - Fine sandy silt loam
 HCL - Clay loam (heavy)
 HP - Humified peats
 HZCL - Silty clay loam (heavy)
 IMP - Impenetrable to roots
 LCS - Loamy Coarse Sand
 LFS - Loamy fine sand
 LMS - Loamy medium sand
 LP - Loamy peats
 MCL - Clay loam (medium)
 MS - Medium Sand
 MSL - Medium sandy loam
 MSZL - Medium sandy silt loam
 MZ - Marine Light Silts
 MZCL - Silty clay loam (medium)
 OC - Organic clays
 OL - Organic loams
 OS - Organic sands
 PL - Peaty loams
 PS - Peaty sands
 SC - Sandy clay
 SCL - Sandy clay loam
 SP - Sandy peats
 ZC - Silty clay
 ZL - Silt loam

Stone Type

CH - Chalk or chalk stones
 FSST - Soft fine grained sandstones
 GH - Gravel with non-porous (hard) stones
 GS - Gravel with porous stones (mainly soft stone types listed above)
 HR - All hard rocks or stones (i.e. those which cannot be scratched with a finger nail)
 MSST - Soft, medium or coarse grained sandstones
 SI - Soft 'weathered' igneous or metamorphic rocks or stones
 SLST - Soft oolitic or dolomitic limestones
 ZR - Soft, argillaceous or silty rocks or stones

Ped. Shape

SG - Single grain
 GRA - Granular
 SAB - Subangular Blocky
 AB - Angular Blocky
 PRIS - Prismatic
 PLAT - Platy
 MASS - Massive
 NA - N/A

Subsoil Structure Condition

Not Applicable
 Good
 Moderate
 Poor

Soil or Ped. Strength

Loose
 Very friable
 Friable
 Firm
 Very firm
 Extremely firm
 Extremely hard
 N/A

Calcareousness

NON - Non-calcareous (<0.5% CaCO₃)
 VSC - Very slightly calcareous (0.5 - 1% CaCO₃)
 SC - Slightly calcareous (1 - 5% CaCO₃)
 MC - Moderately calcareous (5 - 10% CaCO₃)
 VC - Very calcareous (>10% CaCO₃)

Ped. Size

VF - Very Fine
 F - Fine
 M - Medium
 C - Coarse
 VC - Very Coarse
 NA - N/A

Degree of Ped. Development

W - Weak
 M - Moderate
 S - Strong
 NA - Not applicable

Wetness Class

WC I
 WC II
 WC III
 WC IV
 WC V
 WC VI

ALC Grades

1
 2
 3a
 3b
 4
 5
 Non-Ag

Gley

None
 Gley
 N/A

Appendix 2: Soil Pit Description

Soil Survey				Surveyor	RWA
Easting (X)	390474	Northing (Y)	224035	Alt (m)	27
Land Use	PGR	Reference	2 (GR305280) Pit 1	Slope °	<7°
Bedrock	Superficial	None Recorded	Aspect	N/A	
				Grid Reference	SO 90474 24035
				Date	17/05/2022

Layer	Topsoil	2	3	4	5	6	7
Lower Depth (cm)	18	42	60	120			
Texture	C - Clay	C - Clay	C - Clay	C - Clay			
Matrix Colour	2.5Y4/3	2.5Y5/3	5Y4/3	5Y5/3			
Gley (Y/N)	No	Yes	Yes	Yes			
Ochreous Mottles	Form						
	Munsell Colour						
Grey Mottles	Form						
	Munsell Colour						
Manganese (Y/N)	No	No	Yes	Yes			
% Stones (type 1)	0	0	0	0			
Stones > 2cm							
Stones > 6cm							
Stone Type							
% Stones (type 2)							
Stones > 2cm							
Stones > 6cm							
Stone Type							
CaCO3	VSC - Very slight	SC - Slightly calcareous (1	SC - Slightly calca	MC - Moderately calcareous (5 - 10% CaCO3)			
Shape of Peds.	SAB - Subangular	AB - Angular Blocky	PRIS - Prismatic	PRIS - Prismatic			
Size of Peds.	M - Medium	C - Coarse	C - Coarse	C - Coarse			
Subsoil Structure	Not Applicable	Moderate	Poor	Poor			
Soil or Ped. Strength	Firm	Firm	Firm	Firm			
Degree of Ped. Development	M - Moderate	M - Moderate	W - Weak	W - Weak			
Slowly Permeable Layer (Y/N)	No	No	Yes	Yes			

MDw	MDp	FCD
113	107	139

Wetness	Class (WC)	WC III
	Grade (WE)	3b


Notes	
-------	--

Appendix 3: Topsoil Texture Analysis



TEST REPORT
ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 10/06/2022



Contract	J10 M5 Agricultural Land Classification	
Serial No.	40801_1	
Client:	Askew Land and Soil Ltd The Old Stables Upexe Exeter EX5 5ND	Soil Property Testing Ltd 15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG Tel: 01480 455579 Email: enquiries@soilpropertytesting.com Website: www.soilpropertytesting.com
Samples Submitted By:	Askew Land and Soil Ltd	Approved Signatories:
Samples Labelled:	J10 M5 Agricultural Land Classification	<input checked="" type="checkbox"/> J.C. Garner B.Eng (Hons) FGS Technical Director & Quality Manager <input type="checkbox"/> W. Johnstone Materials Lab Manager 
Date Received:	19/05/2022	Samples Tested Between: 19/05/2022 and 10/06/2022
Remarks:	For the attention of Robert Askew Your Reference No: C884	
Notes:	<ol style="list-style-type: none">1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.2 Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.5 The results within this report only relate to the items tested or sampled.	



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 10/06/2022



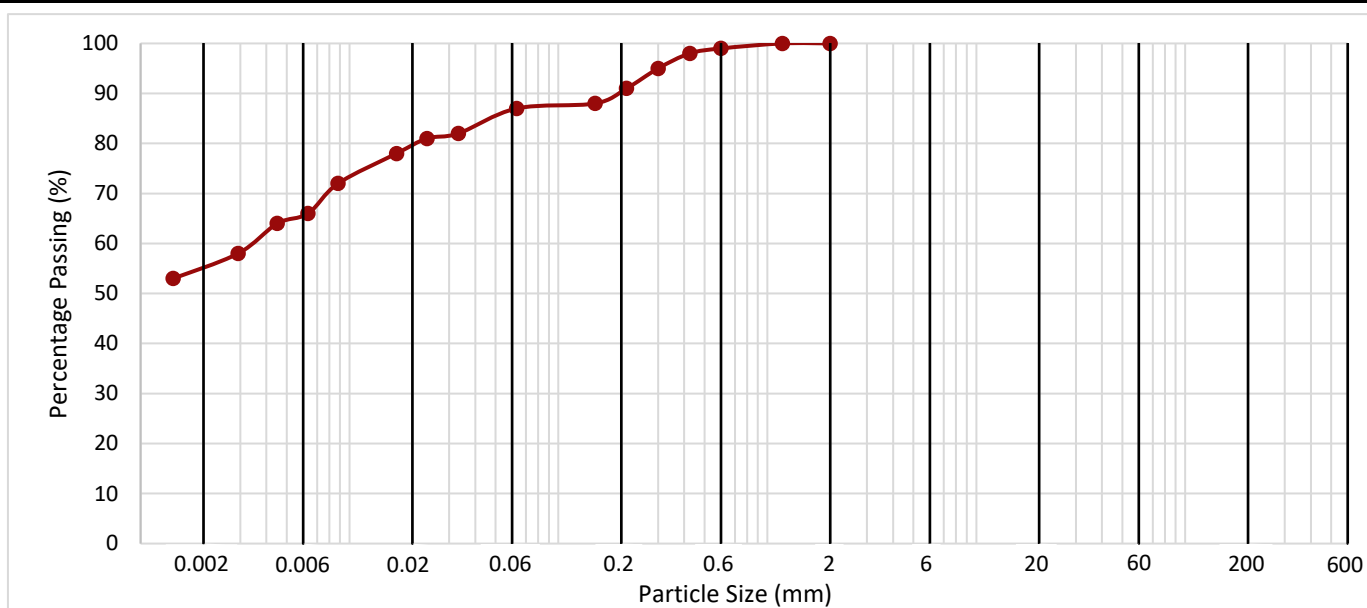
0998

Contract	J10 M5 Agricultural Land Classification
Serial No.	40801_1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
GR305280	0.00 - 0.25	A	1	Light olive brown slightly sandy silty CLAY with occasional olive yellow mottling, decayed roots and rare gravel	Material greater than 2mm removed before test

Method of Test: **Hydrometer + Pre-sieve** Method of Pretreatment: **Not required**



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0332	82	32
	0.0235	81	
	0.0168	78	
	0.0088	72	Clay by Dry Mass (%)
	0.0063	66	
	0.0045	64	
	0.0029	58	
0.0014	53	55	

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	13
1.18	100	
0.600	99	
0.425	98	
0.300	95	
0.212	91	
0.150	88	
0.063	87	

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5		

Fines By Dry Mass (%)	
<0.063mm	87

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
 Method of test: BS1377: Part 2: 1990: 9.2,9.5
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 10/06/2022



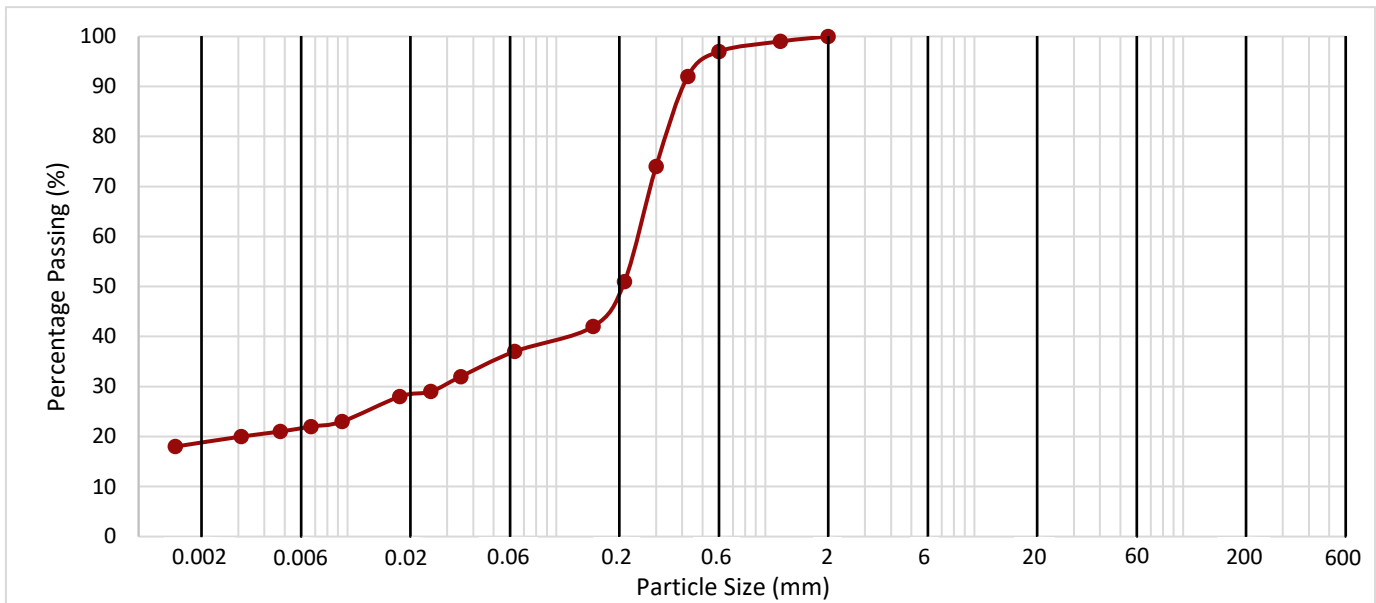
0998

Contract	J10 M5 Agricultural Land Classification
Serial No.	40801_1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
GR429408	0.00 - 0.25	C	7	Light olive brown slightly gravelly sandy silty CLAY with occasional yellowish brown mottling and decayed roots. Gravel is white, brown and grey fine and medium subangular and subrounded	Material greater than 2mm removed before test

Method of Test: **Hydrometer + Pre-sieve** Method of Pretreatment: **Not required**



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0349	32	18
	0.0250	29	
	0.0178	28	
	0.0094	23	Clay by Dry Mass (%)
	0.0067	22	
	0.0048	21	
	0.0031	20	
	0.0015	18	19

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	63
1.18	99	
0.600	97	
0.425	92	
0.300	74	
0.212	51	
0.150	42	
0.063	37	

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5		

Fines By Dry Mass (%)	
<0.063mm	37

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
 Method of test: BS1377: Part 2: 1990: 9.2,9.5
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:

ATKINS

Member of the SNC-Lavalin Group

5th Floor, Block 5
Shire Hall
Bearland
Gloucester
GL1 2TH

Tel: +44 (0) 8000 514 514