

A1 Birtley to Coal House

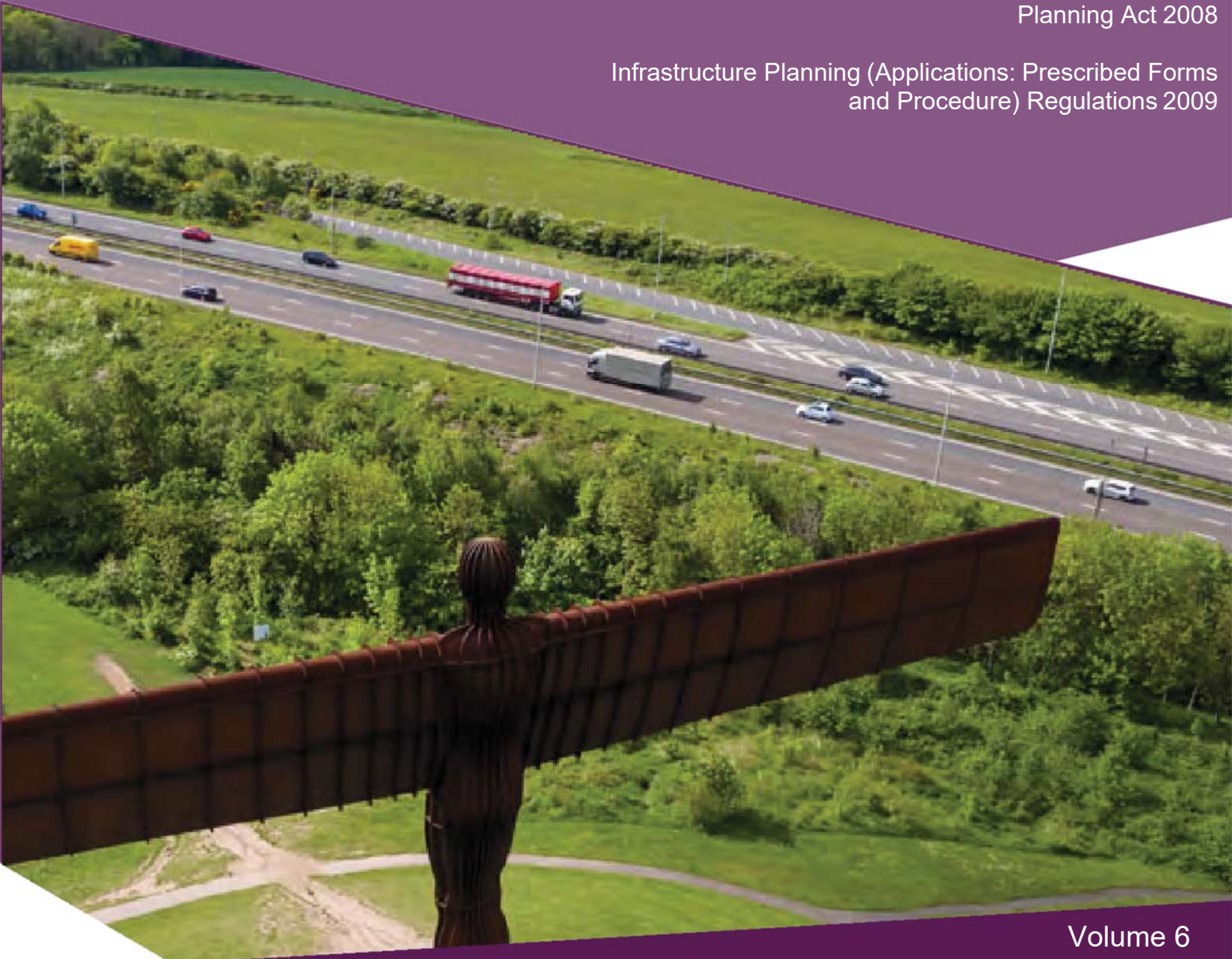
Scheme Number: TR010031

6.3 Environmental Statement – Appendix 9.1 Agricultural Land Assessment

APFP Regulation 5(2)(a)

Planning Act 2008

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



Infrastructure Planning

Planning Act 2008

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

**A1 Birtley to Coal House
Development Consent Order 20[xx]**

**Environmental Statement -
Appendix**

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A1 Birtley to Coalhouse

Agricultural Land Classification

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1 Executive Summary

The Agricultural Land Classification of two proposed junction improvements on the A1 Birtley to Coalhouse section, near Newcastle on Tyne was assessed by ADAS in June 2018. The junctions lie at the A1 intersection with the A167 in the east and with Kingsway South in the west.

The land is gently sloping in the east varying in altitude from 95m A.O.D in the north to 80m in the south, whilst the western block of land is almost level at an altitude of 15m. At the time of the survey the site supported arable crops i.e. oilseed rape and cereals in the east and permanent grass grazed by horses in the west.

The land is underlain by Carboniferous sandstone and the Middle Coal Measure deposits in the eastern block which have a thin cover of unsorted Glacial Till. The lower lying ground in the west is underlain by Middle Coal Measure deposits covered by Glaciolacustrine deposits and alluvium.

The resulting soils are medium textured and slightly wet in the east, resulting in good quality (Grade 3a) land but in the west the soils are heavy textured and wet and as a consequence the land is of moderate quality (Grade 3b).

2 Introduction

ADAS was instructed by WSP Ltd to undertake an Agricultural Land Classification (ALC) survey on land affected by two road junction improvements along the proposed A1 Birtley to Coalhouse Improvement Scheme, near Newcastle on Tyne. The junctions lie at the A1 intersection with the A167 in the east and with Kingsway South in the west.

The land was classified using the system outlined in the Ministry of Agriculture, Fisheries and Food (MAFF, now Defra) publication: 'Agricultural Land Classification of England and Wales - Revised guidelines and criteria for grading the quality of agricultural land' (October 1988).

3 Methodology

3.1 Fieldwork

A desk study of soils and climatic information was undertaken using reference material held by ADAS, followed by detailed fieldwork to study soil and site limitations.

Fieldwork was undertaken with a hand held 50mm diameter "Dutch" auger and/or spade to a depth of up to 1m. In addition, soil pits were excavated to determine subsoil characteristics which could not be identified from the auger samples.

The location of 20 auger borings (numbered 1-20) and 2 soil pits were examined, to determine the quality of the agricultural land; the location of the auger borings and pits and the ALC grading of the land are shown on the plans at **Appendix 1**. A brief description of the soil pits and auger profiles are given in **Appendix 2**. The results of laboratory analysis for topsoil particle size distribution are shown at **Appendix 3**.

The site preparation and fieldwork were carried out in June 2018 when the soils were drying.

3.2 The Agricultural Land Classification System

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 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 yield;
- the consistency of yield; and
- the cost of obtaining the crop.

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

The principal physical factors influencing agricultural production are climate, site (including relief) and soil. By assessing these factors, it is possible to assign land into one of five land classification grades, Grade 1 land being the highest quality and Grade 5 the lowest quality land. Grade 3 is sub-divided into Grades 3a and 3b, to identify good quality agricultural land from moderate quality land (see **Appendix 4** for a description of the grades used in the ALC system). By considering site specific climate, site and soil factors the land can be classified into 1 of 5 agricultural grades or certain non-agricultural grades, the results of which are detailed in Sections 5.4 and 5.5.

4 Geology, Soils and Present Land Use

4.1 Geology

The geology map¹ shows the area to be underlain by a solid geology of the High Main Post Member Sandstone under the majority of the eastern block. This deposit is a sedimentary bedrock laid down in swamps, deltas and estuaries 315 – 318 million years ago in the Carboniferous Period. In addition areas of Pennine Middle Coal Measure Formation deposits occur under the western block of land and at the northern end of the eastern block.

The solid geology is overlain by a superficial deposit of Glacial Till in the eastern block; a Diamicton (unsorted) deposit which was laid down two million years ago in the Quaternary Period and consists of material from glacial outwash. The majority of the western block has a superficial cover of Glaciolacustrine deposits and a narrow band of alluvium over the valley floor. The resulting soils vary from medium textured and imperfectly drained on the eastern block to heavy textured and poorly drained on the western block.

4.2 Soils

The soils are mapped on the soil maps² of the area as Rivington 2 Association in the east and as Foggerthorpe 1 Association in the west.

Rivington Association: These soils have developed mainly from sandstone with some shale. The Association typically consists of soils which are either coarse loamy over sandstone (Rivington and Withnall Series, accounting for 50% and 25% of the Association respectively) or fine loamy soils (Heapey Series, accounting for 15% of the association). The soils located on site where more typical of the Heapey

¹ <http://www.bgs.ac.uk/data/mapViewers/>

² SSEW 1983 Soils of Northern England

Series having a slowly permeable layer in the profile and they typically fell into Wetness Class (WC) 3. Wetness classes provide an indication of how wet a soil is, WC 1 is well drained and WC 5 is poorly drained.

Foggerthorpe 1 Association: These soils have developed in glaciolacustrine deposits formed in ice age lakes and deltas. Soils in this association typically include stoneless clay and silt soils on level ground. They are poorly drained and fall into WC 4.

4.3 Present Land Use

The land covered by the eastern block straddles the A1 and both fields support a crop of oilseed rape. A smaller field of winter cereals lies to the east of the main block and small grass fields occur to the south of the cereal field; the grass is grazed by horses.

In the west the land supports permanent pasture and is grazed by horses with foals. A small area of non-agricultural land lies within the survey area where woodland has been planted between two roads.

4.4 Previous Agricultural Land Classification Surveys

The Provisional ALC maps show the site as an area of Grade 3 land. The Provisional maps only give an indication of land quality over larger areas and should not be relied on for site specific assessment of land quality. In addition, they do not classify land into Subgrades 3a and Subgrade 3b to differentiate between better quality (Grade 3a) and lower quality (Grade 3b) land.

The Magic website³ indicates that the extreme northern tip of the eastern block of land has been classified by Natural England as Grade 3a whilst the western block has a strip of mainly Grade 3b mapped across the site, with a smaller strip of Grade 3a land by the railway; this grading is mainly consistent with the finding of the ADAS survey described in this report.

³ magic.defra.gov.uk/

5 Results

The sections below illustrate the main considerations and limitations to the grading of the land.

5.1 Climate

The site climatic variables have been interpolated from grid point data surrounding locations along the route, as follows:

Table 1: Climatic Variables

Grid Reference	NZ252584 Western block	NZ269575 Eastern block
Altitude (m)	15	85
Accumulated Temperature (day °C)	1347	1267
Average Annual Rainfall (mm)	678	691
Overall Climatic Grade	1	2
Field Capacity Days	169	170
Moisture deficit (mm): Wheat	98	89
Moisture deficit (mm): Potatoes	86	75

The route lies in the lowlands of north east England and so has a cool moist climate. Accumulated Temperature (January–June), a measure of the relative warmth of the area, ranges from 1267 °C on the higher ground in the east to 1347°C on the western block and the average annual rainfall is 678-691mm.

This combination of rainfall and temperature indicates that the area is cool and moist, so the soils need to be well drained to support good crop growth, and a climatic limitation on the higher ground prevents land being graded higher than Grade 2, even if the soils had been of a higher quality.

5.2 Site Limitations

Slope: The land in the east lies at an altitude of around 95m in the north falling to 80m on the lower ground by the A1 and gradient is a neutral factor in the classification of the site because gradients are less than 7°.

The land in the west lies at an altitude of 15m and is almost level overall but parts of the field have been embanked and the ground disturbed.

Flooding: The majority of both sites is unaffected by flooding from rivers or sea⁴, but the River Team lies to the west of the western site and the ground between North Farm and the Issues on the western boundary of the field have a low risk of flooding (Flood Zone 2). Surface water flows

⁴ <http://www.environment-agency.gov.uk/homeandleisure/37793.aspx>

towards the east and appears to be trapped by the embankment making small parts of the ground at this end of the site waterlogged for long periods.

5.3 Soil and Interactive Limitations

The limitations of soil wetness and soil drought are determined by the interaction between soil depth, wetness, structure and texture, all of which influence how easy the land is to work, and so they have an effect on land quality. On these sites the soils are mainly imperfectly to poorly drained (WC 3 and WC 4); they are moderately well structured and permeable in the topsoil but the subsoil is similar or heavier textured and often poorly structured immediately below the topsoil and into the lower subsoil (WC 4). In the east the soils are medium textured i.e. sandy clay loam but overlie similar and heavier subsoils which are gleyed within 400mm and slowly permeable at depths below 460mm and so fall into WC 3. Drought is generally not an overriding limitation to land quality in this area.

The main factor affecting land quality in this area is:

- Depth to a slowly permeable layer coupled with soil texture, which affects the workability of the soils.

5.4 Land Quality

The land quality of the site is shown on the attached plan (**Appendix 1**).

Grade 1

No land has been placed in this grade.

Grade 2

No land has been placed in this grade but isolated profiles of Grade 2 were located in the east where lighter textured or slightly better drained soils occur. The areas involved are too small to map separately and the land has been mapped with adjacent Grade 3a land.

This land is capable of producing a wide range of agricultural and horticultural crops but there may be problems with winter harvesting.

Grade 3a

This Grade has been mapped over 32.5 % of the site to include the better drained soils. The soils have:

- A sandy clay loam topsoil and overlie sandy clay loam, with heavy clay loam in the lower subsoil in some profiles. The soils are gleyed within 400mm and are slowly permeable starting at depths between 460 – 720mm; they fall into WC 3 and so cannot be graded higher.

Medium textured topsoils over imperfectly drained subsoils limit land quality to Grade 3a. Isolated profiles of Grade 3b also occur on the eastern block of land where the soils were heavy textured and slowly permeable within 460mm of the surface, but these have been mapped with the surrounding Subgrade 3a land.

This land is capable of producing moderate to high yields of a narrow range of crops.

Grade 3b

This Grade has been mapped over 53% of the route to include the heavy textured poorly drained soils which have:

- Slightly organic clay topsoil over clay subsoils which contain pockets of silt and fine sand. The profiles are gleyed within 400mm and are slowly permeable within 460mm, and so fall into WC 4.

Isolated profiles of Grade 3b have been mapped with Grade 3a in the east where clay loam subsoils make the profiles wetter than is typical in the area. The areas involved were too small to map separately.

This land is capable of producing moderate yields of a narrow range of crops.

Grade 4

No land has been placed in this grade.

Grade 5

No land has been placed in this grade.

Other land

This grade has been mapped over 11.2% of the site to include a small woodland between the slip road and the A1.

5.5 Summary of Land Quality in the Survey Area

Table 2: Agricultural Land Classification Measurements

Grade	Area (ha)	% of Total Area
1	-	-
2	-	-
3a	5.31	32.5
3b	8.65	53
4	-	-
5	-	-
Other land	1.83	11.2
Not surveyed	0.53	3.3
Total	16.32	100

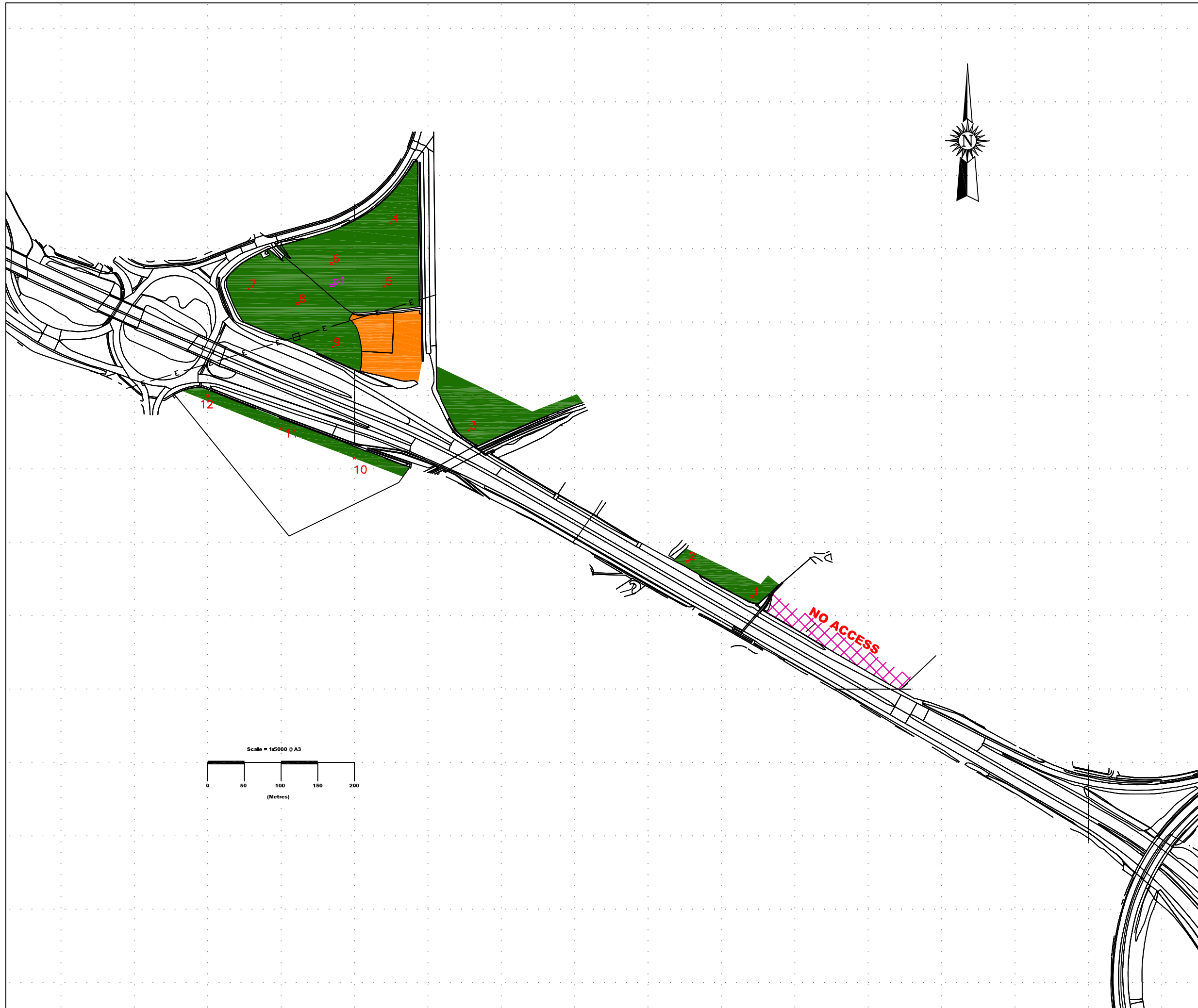
6 Conclusions

- The Provisional ALC maps, produced in the 1970s, classified the land along the route as Grade 3 land. However, the provisional mapping exercise was not meant to give a detailed grading of small parcels of land and so the site has been classified again, using the current ALC guidelines.
- The detailed survey undertaken for this report has classified the land as Grade 3a on the eastern block and Grade 3b land on the western block, due to a soil wetness limitation. Grade 3b land is not included in the 'Best and Most Versatile Land' category (Grade 1-3a) and so is afforded less protection from development under Government policy.
- A suitable soil handling strategy should be developed to help preserve land quality on the temporary land take areas and to make effective use of the soils from the areas of permanent land take. The strategy should help to preserve the soil and retain soil functions such as water and carbon storage.

Appendix 1

Agricultural Land Classification Maps and Auger Boring Location Plans

(See following page)



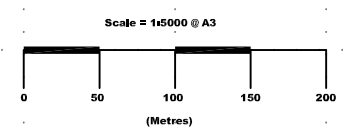
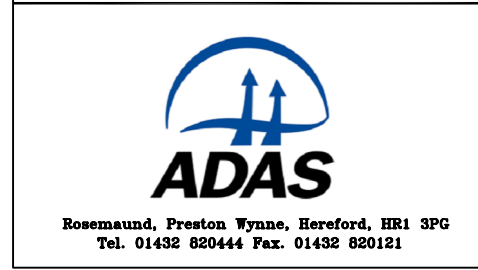
AGRICULTURAL LAND CLASSIFICATION

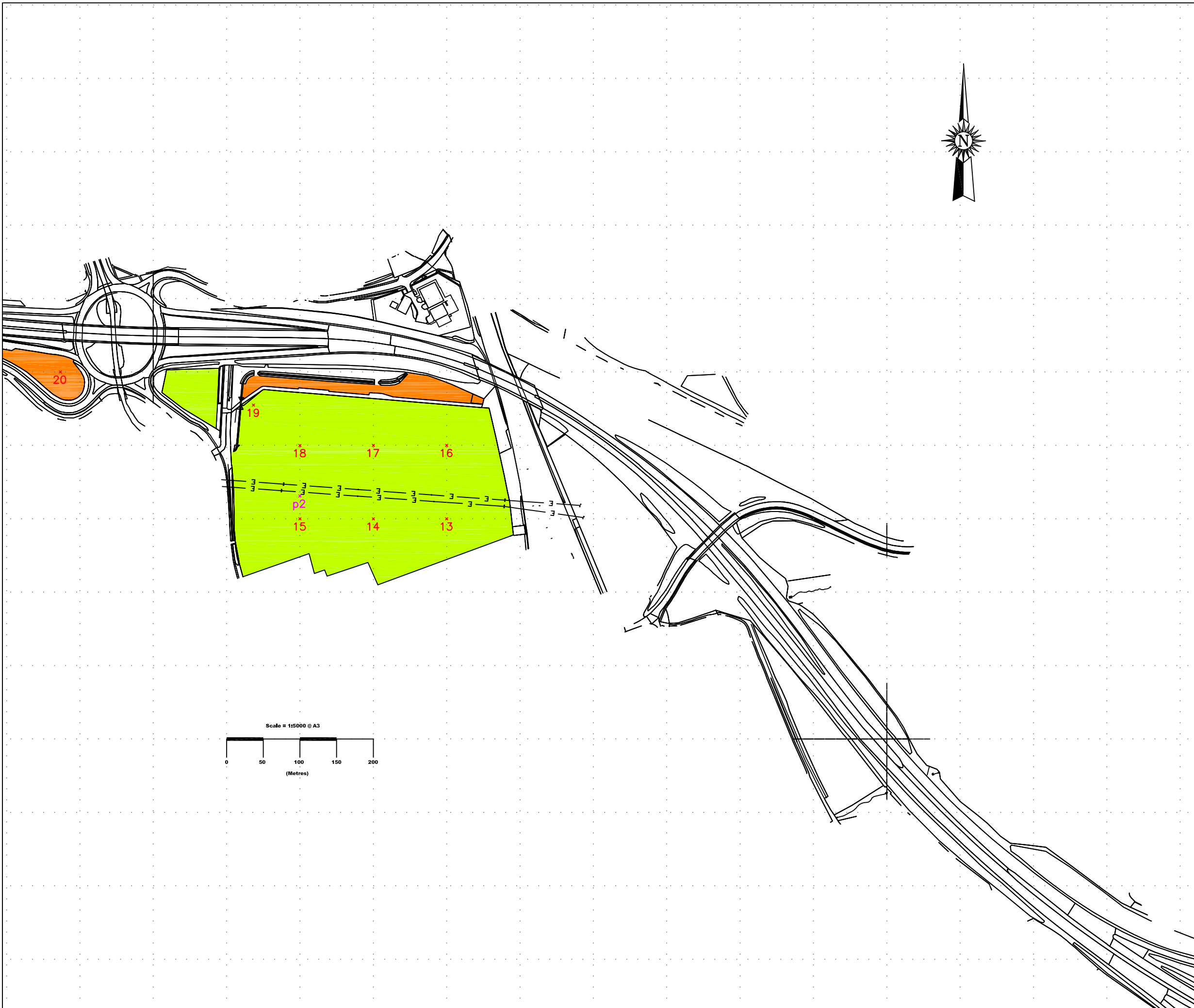
- × 1-12 Auger Boring
- × p1 Pit Location
- Grade 1
- Grade 2
- Grade 3a
- Grade 3b
- Grade 4
- Grade 5
- Land predominantly in urban use.
- Other land primarily in non-agricultural use
- Not Surveyed
- Survey boundary

18.6.18	DI	RP	A	AGRICULTURAL LAND CLASSIFICATION
DATE	DRWN	CHKD	REVD	ISSUE

A1 BIRTLEY to COALHOUSE AGRICULTURAL LAND CLASSIFICATION

SCALE	1/5000	MASTER SIZE	A3
DRAWING NO.	WSP9001/1010277/ALC 01		
ISSUE	A		





AGRICULTURAL LAND CLASSIFICATION

- × 13-20 Auger Boring
- × p2 Pit Location
- Grade 1
- Grade 2
- Grade 3a
- Grade 3b
- Grade 4
- Grade 5
- Land predominantly in urban use.
- Other land primarily in non-agricultural use
- Not Surveyed

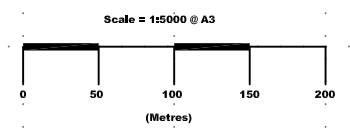
18.6.18	DI	RP	A	AGRICULTURAL LAND CLASSIFICATION
DATE	DRWN	CHKD	REVD	ISSUE

A1 BIRTLEY to COALHOUSE AGRICULTURAL LAND CLASSIFICATION

SCALE	1/5000	MASTER SIZE	A3
DRAWING NO.	WSP9001/1010277/ALC 02	ISSUE	A



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Appendix 2: Soil Descriptions

Keys common to all tables

Texture Key

S = sand
Z = silt
C = clay
L(y) = loam(y)

F = fine
M = medium
C = coarse
Pt(y) = peat(y)

Structure Key

(V)Wk = (very)weak
F = fine
SG = single grain

M = moderate
M = medium
GR = Granular
AB = angular blocky

S = strong
C = coarse
SAB = subangular blocky
PR = prismatic

Colour key

Br = brown
Rd = red
Ol = olive
Lt = light

Bl = black
Or = orange
Pk = pink

Yl = yellow
pl = pale
Gr = grey

Main Limitation

DR = Drought
GR = Gradient

WE = Wetness
MR = Microrelief

CL = Climate
TX = Texture

Land use

Wht = wheat

Bar = barley
Wc = winter cereals

Pp = permanent pasture

r&f = ridge and furrow
pot = potatoes

(W)osr = (winter) oil seed
rape
fal = fallow


Others abbreviations

ab = abundant
MB = moisture balance
occ = occasional/ly
sat = saturated
SPL = slowly permeable layer
GS = gentle slope

cons = concretions
Mn = manganese
och = ochreous
sl org = slightly organic
na = not applicable

imp = impenetrable
mot = mottles
pok = pockets
rrm = rusty root mottles
OM = organic matter

PIT DESCRIPTIONS

Pit	Depth (mm)	Colour	Texture	Structure	Drainage /Porosity (0.5% pores)	Total Stone %
1	310	10YR3/2 brown	MSL/SCL	M,M,SAB	-	<2
	500	10YR6/6 yl br	SCL, pockets of topsoil mixed in	Platy, firm and dry	Och com / >	<2 Sst. Coal frags com.
	650+	10YR5/1 gr and 10YR5/4 br	SCL	Massive to PR	Och many /<	<2
Slightly Gleyed at: 310	Gleyed at: 500	SPL at: 500	Wetness class: 3	Wetness grade: 3a	Comments: Disturbed layer at 310-500mm	
		MB wheat: MB pot:	DR Grade:	Main limitation. WE		ALC grade 2/3a
			<p>Over deep topsoil with coal fragments to 500mm</p>			

Pit	Depth (mm)	Colour	Texture	Structure	Drainage /Porosity (0.5% pores)	Total Stone %
2	120	10YR3/2 brown	C sl org	M,M,SAB	-	<2
	240	10YR6/3 yl br 10YR 4/1 ped faces	C	S,VC,AB to massive with depth; firm	Faint och com / >	<2 Sst. Coal frags com.
	600+	Gley1/4N	C poks ZCL and FS in part of pit	Massive to PR	Och many /<	<2

Slightly Gleyed at: 310	Gleyed at: 500	SPL at: 500	Wetness class: 4	Wetness grade: 3b	Comments: Disturbed layer at 310-500mm	
		MB wheat: MB pot:	DR Grade:	Main limitation. WE		ALC grade 3b



Heavy clay soil with pockets of silty clay loam and fine sand at one end of the pit



General view over main field (borings 13-19)



Small field adjacent, access unavailable



Location of point 20. Non agricultural use ie woodland.

AUGER BORING DESCRIPTIONS

No / land use/ gradient	Bottom Depth of horizon	Texture	Colour	Gleyed / spl	% Stone >2cm /total	Wetness Class	Main Limitation	Grade
1	230	SCL	V dk br	-	3			
Grass	650	SCL	Gr br	Och - com	<2			
GS hill top	880	MCL	Br, Gr br	Och - com	<2			
	1010	SCL	Dk gr br	Och - com	<2	3	WE	3a
Disturbed ground. Stone chippings on surface. 2 other borings away from field edge stopped by stone <450mm. Sandstone pockets 230-650mm.								
2	280	SCL	V dk br	-	<2			
Grass	570	SCL	Gr br	Och - com by 350	<2			
GS/Valley bottom	700	SCL	Br, Gr br	Och - many + Mn cons	<2			
	820	MSL	Yl Br + gr	Och com + Fe cons	Soft Sst?			
	820+	Imp Sst	Dk gr br	Och - com	<2	3	WE/ MR	3a
5-7° slope								
3	300	MSL	V dk br	-	<2			
WC/	460	MSL	Yl br	-	<2			
VGS, valley	700	LMS	Yl br + gr	Och - com + Fe cons	<2			
	800	SCL	Yl br + gr	Och - many	<2	2	WE/ CL	2
	1000	SCL + LMS	Yl br + gr	Och - many	<2			
4	300	SCL	V dk gr	-	<2			
WOSR	360	SCL	Bl	-	<2			
	580	SCL	Yl br	Och - com	<2			
	910	SCL	Dk yl br, V dk gr br	Och - com, Mn cons - few	<2	3	WE	3a
Coal fragments 300-360mm. Disturbed soil to 360mm. Sandstone pockets 580-910mm.								
5	270	SCL	V dk br	-	<2			
WOSR	330	C	Gr br	Och - com	<2			
	420	SCL	Gr br	Och - com, v firm	<2			
	1000	HCL	Dk gr br + yl br	Och - many	<2	4	WE	3b
Slightly disturbed								
6	280	SCL	V dk br	-	<2			
WOSR	420	SCL	Br	-	<2			
	600	MSL	Br more yl br with depth	Och - com, Mn cons - few	<2	2	WE	2

7	230	SCL	Dk br	-	<3			
WOSR	400	SCL/HCL	Yl br + gr	Och – com + Fe cons	<2			
	700	HCL	Dk yl br, V dk gr br	Och – com, Mn cons - few	<2			
	700+	Imp stone or rock			<2	4	WE	3b
8	260	SCL	V dk gr	-	<2			
WOSR	350	SCL	Yl br	-	<2			
	470	MCL	Br	Och - com	<2			
	1000	MCL	Dk yl br, Gr br	Och – com, Mn cons - few	<2	3	WE	3a
Sandstone pockets 260-1000mm.								
9	270	MSL	V dk gr	-	<2			
WOSR	400	MSL	Br	Och few by 370	<2			
	490	MSL	Lt br	Och - many	<2			
	580	SCL	Dk yl br, Gr br	Och – many	<2			
	1000	HCL	Yl br + gr	Och many	<2	3	WE	2
10	250	SCL	V dk br	-	<2			
WOSR	310	SCL	Gr br, Yl br	-	<2			
	460	SCL	Gr, Dk yl br	Och - com	<2	3	WE	3a
Sandstone pockets 260-1000mm.								
11	270	SCL	Bl br	-	<2			
WOSR	430	SCL	Yl br	Och – com	<2			
/GS	430+							
12	350	SCL	V dk br	-	<2			
WOSR	450	MCL	Dk yl br	-	<2			
	680	HCL	Gr	Och - com	<2			
	750	SL	Dk yl br, Gr	Och - ab				
	900	SCL+ZCL	Dk yl br, Gr	Och - ab	<2	3	WE	3a
Disturbed ground. Few coal fragments 0-350mm								
13	140	C	V dk gr br	-	<2			
Grass	530	C	V dk gr	Och - few	<2			
	900	C	Br, Dk gr	Och - com	<2			
	1160	C	Dk gr	Och - com	<2	3	WE	3b
Disturbed soil to 530mm								
14	150	C sl org	V dk gr br	-	<2			
Grass/ AL	420	C	V dk gr	Och - com	<2			
	1000	C, poks FS	Gr	Och - many	<2	4	WE	3b

15	220	C	V dk gr br	-	<2			
Grass	380	C	Dk gr	Och – few, coal frags few	<2			
	470	C	Yl br, Dk gr	Och – few, Sst frags few	<2			
	1150	C	Dk gr	Och - com	<2	3	WE	3b
Disturbed soil to 470mm.								
16	120	C sl org	V dk gr br	-	<2			
Grass /AL	300	C + pok subsoil	Dk gr br	Och - few	<2			
	500+	C pok FS	Pl br, more gr with depth	Och - many	<2			
	1150	C	Dk gr	Och - com	<2	3	WE	3b
Disturbed ground								
17	200	C sl org	V dk gr br	-	<2			
Grass /AL	360	C	Dk gr	Och - many	<2			
	700+	C	gr	Och - many	<2	3	WE	3b
Disturbed ground								
18	220	C	V dk gr	-	<2			
Grass	540	C	Dk gr	Och - com	<2			
	840	C	Dk yl br, Dk gr	Och - ab	<2			
	1160	C	Dk gr	Och - com	<2	4	WE	3b
Disturbed								
19	100	ZC	Bl br	-	<2			
Grass	250	ZC	Dk gr br	Och - few	<2			
	1000	ZC + thin ZL horizons	Dk gr	Och - many	<2	3	WE	3b
Moved from adjacent field, access unavailable. Disturbed ground close to utilities.								
20	Woodland between roads, not surveyed							NA

Appendix 3

Laboratory Analysis

(See following page)



ANALYTICAL REPORT

Report Number	16037-18	K474	SIMON MCMILLAN
Date Received	12-JUN-2018		RSK ADAS LTD
Date Reported	18-JUN-2018		ALCESTER RD
Project	A1 BIRTLEY 060618 SOIL		STRATFORD-UPON-AVON
Reference	ADAS DRAYTON		WARWICKSHIRE
Order Number	1010277		CV37 9RQ

Laboratory Reference		SOIL390914									
Sample Reference		BIRTLEY PIT 1 TS									
Determinand	Unit	SOIL									
Sand 2.00-0.063mm	% w/w	59									
Silt 0.063-0.002mm	% w/w	23									
Clay <0.002mm	% w/w	18									
Textural Class **		SCL/SL									

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.

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** Please see the attached document for the definition of textural classes.

Reported by ***Darren Whitbread***
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Project	A1 BIRTLEY 060618 SOIL		STRATFORD-UPON-AVON
Reference	ADAS DRAYTON		WARWICKSHIRE
Order Number	1010277		CV37 9RQ

Laboratory Reference		SOIL390915									
Sample Reference		BIRTLEY PIT 2 TS									
Determinand	Unit	SOIL									
Sand 2.00-0.063mm	% w/w	15									
Silt 0.063-0.002mm	% w/w	39									
Clay <0.002mm	% w/w	46									
Textural Class **		C									

Notes

Analysis Notes The sample submitted was of adequate size to complete all analysis requested.
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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 4: Description of the Grades and Subgrades

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. In practice, the grades are defined by reference to the land's physical characteristics, for which the cut-offs are described in Section 3 of the 1988 MAFF (now Defra) ALC guidelines. The most productive and flexible land falls into Grades 1, 2 and Subgrade 3a and collectively comprises about one-third of the agricultural land in England and Wales. About half the land 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.

Descriptions are also given of other land categories which may be used on ALC maps.

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 on Grade 1 land.

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.

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