

A47 Wansford to Sutton Dualling

Scheme Number: TR010039

Volume 6

6.3 Environmental Statement Appendices **Appendix 9.2 – Agricultural Land Classification** **report**

APFP Regulation 5(2)(a)

Planning Act 2008

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

July 2021

Infrastructure Planning

Planning Act 2008

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

A47 Wansford to Sutton
Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT APPENDICES
Appendix 9.2 - Agricultural Land Classification report

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010039
Application Document Reference	TR010039/AP/6.3
BIM Document Reference	HE551494-GTY-EGT-000-RP-LE-30004
Author:	A47 Wansford to Sutton Project Team, Highways England

Version	Date	Status of Version
Rev 0	July 2021	Application Issue



Agricultural Land Classification

Land bordering the A47 east of Wansford

September 2020

ADAS GENERAL NOTES

Project No.: 1010559-W

Title: Agricultural Land Classification – Land bordering the A47 east of Wansford

Date: 07/09/2020

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

Status: Final

Author	<u>Vic Gauld</u>	Technical reviewer	<u>Martin Worsley</u>
Date:	<u>07/09/2020</u>	Date:	<u>07/09/2020</u>

Project manager	<u>Darren Ingram</u>
Date:	<u>07/09/2020</u>

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

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

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

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

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

EXECUTIVE SUMMARY

ADAS have been instructed by Sweco to undertake an agricultural land classification survey of 103.1 ha of land. The land is situated to the north and south of the A47, immediately east of the junction with the A1, east of Wansford in Cambridgeshire.

The survey has identified shallow stony soils over limestone, permeable loamy soils and slowly permeable clayey soils. These soils form agricultural land of grade 2, subgrade 3a and subgrade 3b quality. The principal limitations to agriculture are droughtiness and soil wetness.

CONTENTS

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

Tables

Table 3.4: Topsoil texture analysis.	7
Table 4.1: Agro-climatic variables	8
Table 4.3: Grade areas	11

Appendices

ANNEX 1 – SOIL SURVEY DETAILS	
ANNEX 2 – MAP 1: LOCATION OF OBSERVATIONS	
ANNEX 3 – MAP 2: SOIL TYPES	
ANNEX 4 – MAP 3: AGRICULTURAL LAND CLASSIFICATION	
ANNEX 5 – PSD TEXTURE ANALYSIS	
ANNEX 6 – ALC GRADES SYSTEM	

1 INTRODUCTION

ADAS have been instructed by Sweco to undertake an agricultural land classification survey. This report provides information on the soils and agricultural quality of land to the north and south of the A47, immediately east of the junction with the A1, east of Wansford in Cambridgeshire. The report is based on a survey of the land carried out in July 2020.

1.1 Site Environment

The land surveyed is located to the north and south of the A47 between the A1 junction and the village of Ailsworth, west of Peterborough, Cambridgeshire. The A1 forms the site's western boundary. To the south of the western end of the site is the River Nene. To the north and east the site is bordered by adjoining agricultural land. The survey area spans 20 agricultural fields and a meadow area next to the river. The fields are separated by roads, hedgerows and ditches. The land of the survey area is gently sloping with an average elevation of approximately 20 m AOD.

1.2 Agricultural Use

At the time of survey the agricultural land of the survey area was a combination of grazed grassland, winter and spring cereals and fallow fields.

1.3 Published Information

1.3.1 Geology

1:50,000 scale BGS information¹ records the basal geology at the western end of the site as Jurassic limestone of the Upper and Lower Lincolnshire Limestone Formations. Jurassic mudstone of the Whitby Mudstone Formation is mapped alongside the River Nene and in a spur to its north. Jurassic argillaceous rocks, with subordinate sandstone and limestone, belonging to the Rutland Formation are shown in the east of the site. Also mapped in the east is Jurassic limestone of the Bilsworth Formation, and of the Upper and Lower Lincolnshire Formations.

Overlying river terrace deposits, comprised of sand and gravel, are mapped in central and eastern areas of the site. Alluvial deposits, comprised of clay, silt, sand and gravel, are mapped beside the River Nene in the south.

1.3.2 Soils

The national soil map, published at 1:250,000 scale, records the eastern end of the survey area as belonging predominantly to the Sutton 1 soil association. This is an association of soils formed in river terrace gravel. Soils of this association are generally well drained permeable soils through which excess winter rainfall drains rapidly. Sutton 1 soils are fine and coarse loamy, overlying calcareous river terrace gravel of flint, limestone or chalk at varying depths.

¹ British Geological Survey, 2020. *Geology of Britain viewer*. Online resource: <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>

The north eastern corner of the site is mapped as belonging to the Sherborne soil association. This association is formed in Jurassic limestone and clay. This association is comprised of shallow well drained brashy calcareous clayey soils found over limestone, with some associated deeper slowly permeable calcareous clayey soils.

The Elmton 1 soil association is mapped at the western end of the survey area. This is an association of soils formed in Jurassic limestone. These soils are permeable and overlie well-fissured limestone, and as a result they are well drained. This association is comprised of shallow calcareous well drained brashy fine loamy soils over limestone, with some similar deeper soils and some non-calcareous and calcareous clayey soils.

Fladbury 1 soils are mapped as following the River Nene. This soil association is formed in river alluvium and is usually found flanking rivers that drain catchments of Jurassic rocks. Fladbury 1 soils are usually slowly permeable stoneless clayey soils, calcareous in places, and variably affected by groundwater².

1.3.3 Previous Agricultural Land Classification

No detailed post-1988 agricultural land classification is publically available for this site. However, the provisional ALC map, published at 1:250,000 scale prior to the revision and subdivision of grade 3 in 1988, records the land as being of grade 2, grade 3 and grade 4 quality³. Grade 2 land is mapped to the north of the A47 at the western end of site and to the south of the A47 at the eastern end. Grade 3 quality land is mapped to the north of the A47 in the east of the site, and the land immediately adjacent to the River is mapped as grade 4.

² Hodge C.A.H., 1984. *Soils and their use in Eastern England*. Soil Survey of England and Wales, Harpenden.

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

2 METHODOLOGY

A detailed soil survey was carried out in July 2020. The survey was based on observations at intersects of a 100 m grid, giving a sampling density of at least one observation per hectare. During the survey soils were examined via a combination of auger borings and a soil description pit to a maximum depth of 1.2 m. A log of the details of each observation point is attached to this report as Annex 1. A map showing the location of each observation point is attached to this report as Annex 2 (Map 1).

Soil samples were taken representative of the top 25 cm of the soil profile and these were submitted to NRM for laboratory particle size distribution (PSD) analysis. Full details of the analysis is included in Annex 5.

3 SOILS

Four principal soil types have been identified at this site. The spread of these soil types is shown in Map 2, attached to this report as Annex 3. Details of each soil type are given below.

3.1 Permeable soils

3.1.1 Shallow stony soils over limestone

These soils are found at the western end of the site and in a small area in the northern tip of the eastern end. Soils are typified by a slightly to moderately stony fine loamy or clayey topsoil overlying a moderately to extremely stony fine loamy or clayey subsoil. The subsoil grades to limestone bedrock with depth. The depth of these soils varies, with most in the range of 25 cm to 45 cm. The soils are calcareous. There is no evidence of seasonal waterlogging.

An example soil profile is described below from the pit at observation 44 (see Map 1).

0-23 cm	Dark olive brown (2.5Y 3/3) clay; slightly stony, with 12% small, medium and large platy limestone fragments; moderately developed medium to coarse angular blocky structure; firm; common fine fibrous roots; very calcareous; clear wavy boundary to:
23-42+ cm	Dark yellowish brown (10YR 3/6) clay; very stony, with 40% medium and large platy limestone fragments, increasing with depth; moderately developed medium angular blocky structure; firm; a few very fine fibrous roots; >0.5% macropores; very calcareous; gradual boundary to shattered limestone.

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

3.1.2 Permeable loamy soils

These soils are found in central and eastern areas of the site. They are typified by fine and coarse loamy textures. Some profiles are calcareous, some profiles are slightly to moderately stony in the subsoil and some profiles overly sand and gravel within 80 cm depth. The soils show little evidence of gleying above 80 cm depth.

An example soil profile is described below from the pit at observation 60 (see Map 1).

0-30 cm	Dark brown (10YR 3/3) heavy clay loam; very slightly stony with 1% small angular flints; weakly developed medium subangular blocky structure; very firm; many fine fibrous roots and a few fine roots; non-calcareous; smooth clear boundary to:
30-50 cm	Dark yellowish brown (10YR 4/4) heavy clay loam; very slightly stony with 1% small angular flints; weakly developed coarse angular blocky structure; very firm; common fine fibrous roots; c. 2% macropores; non-calcareous; smooth gradual boundary to:
50-75 cm	Yellowish brown (10YR 5/6) sandy clay loam; stoneless; moderately developed medium columnar structure; very firm; common fine fibrous roots; >0.5% macropores; non-calcareous; smooth clear boundary to:
75-85+ cm	Reddish brown (5Y 5/3) sandy clay loam with common fine yellowish brown (10YR 5/4 and 5/8) mottles; moderately stony with 15-20% small subrounded hard stones; moderately developed coarse columnar structure; very firm; no roots; <0.5% macropores; non-calcareous.

An example soil profile is described below from the pit at observation 83 (see Map 1).

0-23 cm	Dark brown (10YR 3/3) sandy clay loam; very slightly stony with a few small and medium angular flints and subangular hard stones; moderately developed coarse subangular blocky structure; firm; common fine fibrous roots; non-calcareous; smooth clear boundary to:
23-45 cm	Greyish brown (10YR 5/2) sandy clay loam; very slightly stony with a few small and medium angular flints and subangular hard stones; weakly developed coarse subangular blocky structure; very firm; a few fine fibrous roots; non-calcareous; with more than 1% macropores; smooth clear boundary to:
45-60 cm	Brown (7.5YR 4/2) sandy clay loam with common medium strong brown (7.5YR 5/6) mottles; moderately developed medium to coarse subangular blocky structure; slightly stony with common small and medium hard subrounded and subangular stones; very firm; a few very fine fibrous roots; >2% macropores; non-calcareous; gradual boundary to:
60-80 cm	Brown (7.5YR 5/4) medium sandy loam with common very fine strong brown (7.5YR 5/8) mottles; very slightly stony with a few small angular flints; moderately developed medium to coarse subangular blocky structure; friable; non-calcareous; gradual boundary to:
80-100 cm	Brown (7.5YR 5/4) sandy clay loam with common large strong brown (7.5YR 5/8) mottles; slightly stony with 10% small and medium subrounded and subangular hard stones.

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

3.2 Slowly permeable soils

3.2.1 Moderately freely-draining clayey soils

These soils are not gleyed above 40 cm depth. These soils are poorly structured and slowly permeable within 70 cm of the land surface. These soils are variably calcareous.

An example soil profile is described below from the pit at observation 57 (see Map 1).

0-27 cm	Dark greyish brown (10YR 4/2) clay; very slightly stony with 3% small angular fragments of limestone; firm; a few fine fibrous roots; non calcareous:
27-52 cm	Olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/3) clay with a few ochreous mottles; very slightly stony with 2% small limestone fragments; moderate medium to coarse angular blocky structure; firm; a few fine fibrous roots; >0.5% macropores; non calcareous:
52-75 cm	Grey (2.5Y 5/1) clay with many ochreous mottles; stoneless; moderate coarse angular blocky structure; very firm; <0.5% macropores; non calcareous:
75-120	Grey (N 5/1) clay with many ochreous mottles; stoneless; coarse prismatic structure; very firm; no visible roots; <0.5% macropores; non calcareous.

These soils are moderately freely-draining and belong to soil Wetness Class II. They have a moderate capacity to absorb excess winter rainfall.

3.2.2 Imperfectly-draining clayey soils

These soils are gleyed within 40 cm depth. These soils are poorly structured and slowly permeable within 55 cm of the land surface. These soils are variably calcareous.

A typical soil profile is described below from the pit at observation 70 (see Map 1).

0-24 cm	Dark greyish brown (10YR 4/2) clay; very slightly stony with a few small angular limestone fragments; firm; common fine fibrous roots; slightly calcareous; smooth clear boundary to:
24-47 cm	Light olive brown (2.5Y 5/4) and greyish brown (2.5Y 5/2) clay with common ochreous mottles; slightly stony with 10-15% small, medium and large limestone fragments; moderately developed coarse angular blocky to prismatic structure; very firm; common fine fibrous roots; calcareous; gradual boundary to:
47-70+ cm	Light olive brown (2.5Y 5/4) clay with many ochreous mottles; moderately stony with 25% medium and large limestone fragments; moderately developed coarse prismatic structure; very firm; common fine fibrous roots; <0.5% macropores; calcareous.

These soils are imperfectly-draining and belong to soil Wetness Class III. They have a moderate capacity to absorb excess winter rainfall.

3.3 Laboratory Analysis

Samples representative of the top 25 cm of the soil profile were taken and submitted to NRM Laboratories for particle size distribution analysis. The textures were confirmed as the below for each location.

Table 3.3 Topsoil texture analysis

Pit	Topsoil texture
44	Clay
57	Heavy clay loam
60	Heavy clay loam
70	Clay
83	Sandy clay loam

4 AGRICULTURAL LAND CLASSIFICATION

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

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

The Agricultural Land Classification (ALC) system classifies land into five grades numbered 1 to 5, with grade 3 divided into two subgrades (3a and 3b). The system was devised and introduced by the then Ministry of Agriculture, Fisheries and Food (MAFF) in the 1960s and revised in 1988. A description of the grades used in the ALC system is attached to this report as Annex 5.

4.1 Climate

The agricultural climate is an important factor in assessing the agricultural quality of land, and the agricultural climate of this site has been calculated using the Climatological Data for Agricultural Land Classification⁴. As the site is over 3 km long, several sets of climate data have been used to assess the quality of land. Below are two of the relevant site data for an average elevation of 27 m and 10 m respectively.

Table 4.1: Agro-climatic variables

Average Annual Rainfall (AAR)	578 mm
January-June Accumulated Temperature (AT0)	1428 day °C
Field Capacity Days (FCD)	110
Moisture Deficit Wheat (MDW)	119 mm
Moisture Deficit Potatoes (MWP)	113 mm
Climate (upper grade limit)	1

⁴ Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

Average Annual Rainfall (AAR)	574 mm
January-June Accumulated Temperature (AT0)	1447 day °C
Field Capacity Days (FCD)	108
Moisture Deficit Wheat (MDW)	121 mm
Moisture Deficit Potatoes (MWP)	117 mm
Climate (upper grade limit)	1

The site is located in the East of England and has no agro-climatic limitation to agriculture.

4.2 Results

The results of the soil survey described in section 3 were used in conjunction with the agro-climatic data above to classify the land according to the revised guidelines for Agricultural Land Classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food (now Defra)⁵.

This report has identified agricultural land of grade 2, subgrade 3a and subgrade 3b quality. The principal limitations to agricultural use of the land are droughtiness and soil wetness.

Grade 1

No land of this quality has been mapped.

Grade 2

This grade is mapped over 26.9 ha of the site. This is the mean land grade in most areas formed on permeable loamy soils such as those described in section 3.1.2. These soils are freely-draining and belong to wetness class II. The principal limitation to agriculture is soil droughtiness and this has a minor impact on average crop yields. Where the soils have a heavy-textured topsoil soil wetness is a joint limitation and there is a minor impact on the flexibility of cultivations and harvest.

Subgrade 3a

This grade is mapped over 24.2 ha of the site. This is the mean land grade in areas formed on slowly permeable clayey soils such as those described in section 3.2.1. and 3.2.2. These soils are moderately freely-draining and imperfectly draining and belong to wetness class II and III. The principal limitations to agriculture on land formed by these soils are soil wetness and droughtiness. Soil wetness has a moderate impact on the flexibility of cultivation and harvest. Droughtiness has a moderate impact on average crop yields.

This land grade is also formed on the deeper of the shallow stony soils over limestone. These soils are described in section 3.1.1. These soils are freely-draining and belong to wetness

⁵ MAFF, (1988). *Agricultural Land Classification for England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land*.

class I. Droughtiness is the principal limitation to agriculture, and this has a moderate impact on average crop yields.

Subgrade 3b

This grade is mapped over 15.3 ha of the site. This land is formed on shallow stony soils over limestone such as those described in section 3.1.1. These soils are freely-draining and belong to wetness class I. Droughtiness is the principal limitation to agriculture, and this has a moderate impact on average crop yields.

Grade 4

No land of this quality has been mapped.

Grade 5

No land of this quality has been mapped.

Non-agricultural

There are 36.8 ha of non-agricultural land within the survey area. This land accounts for the existing route of the A47, plus side roads and tracks, a residential property, some wooded areas and other amenity land.

Urban

No land of this quality has been mapped.

4.3 Summary of grade areas

The boundaries between the different grades of land are shown on Map 2, attached to this report as Annex 3. The area occupied by each grade is shown below.

Table 4.3: Grade areas

Grade	Total (ha)	Total (%)	Permanent Loss (ha)	Permanent Loss (%) ⁶
Grade 1	-	-	-	-
Grade 2	26.9	26.0	5.3	5.2
Subgrade 3a	24.2	23.5	2.6	2.6
Subgrade 3b	15.3	14.8	2.2	2.2
Grade 4	-	-	-	-
Grade 5	-	-	-	-
Non-agricultural	36.8	35.7	7.6	7.4
Urban	-	-	-	-
Total:	103.1 ha	100 %	17.9 ha	17.3 %

⁶ As percentage of total area.

ANNEXES

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile								Agricultural Land Classification					
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
1	0 - 25	Dk Gr Br	MSZL	-	-	ca	20	16	2	Stopped on limestone	3	I	1	3b	3b	DR
2	0 - 30	Br	SCL	-	-	-	3	-	-	Stopped on limestone	1	I	1	3b	3b	DR
	30 - 40	Br	SCL	o	no	-	5	-	-							
3	0 - 20	V Dk Gr Br	HZCL	-	-	v ca	2	-	-		1	III	3a	3a	3a	WE, DR
	20 - 40	Gr Br	ZC	xxx	no	v ca	2	-	-							
	40 - 120	Gr Br	ZC	xxx	yes	v ca	2	-	-							
4	0 - 25	Dk Gr Br	HCL	-	-	ca	10	6	1	Stopped on limestone	3	I	2	3b	3b	DR
5	0 - 32	Br	MCL	-	-	v ca	6	4	-	Stopped on limestone	3	I	1	3b	3b	DR
6	0 - 29	Dk Br	HCL	-	-	v ca	15	10	5	Stopped on limestone	2	I	2	3b	3b	DR
7	0 - 32	Br	SCL	-	-	v ca	5	-	-	Stopped on limestone	1	I	1	3b	3b	DR

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile							Agricultural Land Classification						
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
8	0 - 28	Dk Br	MCL	-	-	v ca	10	5	2	Stopped on limestone	1	I	1	3a	3a	DR
	28 - 42	Dk Yl Br	HCL	o	no	v ca	10									
9	0 - 32	Dk Gr Br	HCL	-	-	v ca	5			Stopped on limestone	1	I	2	3a	3a	DR
	32 - 50	Yl Br	SCL	o	no	v ca	10									
10	0 - 28	Dk Gr Br	C	-	-	ca	10	8	1	Stopped on limestone	3	I	2	3b	3b	DR
11	0 - 28	Br	SCL	-	-	v ca	8	3	3	Soft weathered limestone Stopped on limestone	1	I	1	3b	3b	DR
	28 - 38	Dk Yl Br	SCL	o	no	v ca	10									
	38 - 48	V Pl Br	Other	o	no	v ca	-									
12	0 - 30	Dk Br	MCL	-	-	ca	8	3	1	Stopped on limestone	2	I	1	3a	3a	DR
	30 - 58	Yl Br	SCL	o	no	v ca	-									
13	0 - 25	Dk Gr Br	MCL	-	-	ca	10	-	-	Stopped on limestone	2	I	1	3b	3b	DR
	25 - 38	Br	MCL	o	no	-	-									
14	0 - 25	Dk Gr Br	SCL	-	-	ca	25	-	-	Stopped on limestone	3	I	1	3b	3b	DR

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Texture	Mottling	Soil Profile					Notes	Agricultural Land Classification					
					SPL	CaCO ₃	Stones (%)				°	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
15	0 - 34 34 - 65	Dk Br Yl Br	MCL MSL	- o	- no	ca v ca	10 15	8	3	Stopped on limestone	2	I	1	3a	3a	DR
16	0 - 22 22 - 30 30 - 35	Dk Br Br V Pl Br	MCL MCL Other	- o o	- no no	v ca v ca v ca	15 20 50	6	6	Soft weathered limestone Stopped on limestone	3	I	1	3b	3b	DR
17	Not	Surveyed								Non-agricultural						
18	Not	Surveyed								Non-agricultural						
19	Not	Surveyed								Non-agricultural						
20	Not	Surveyed								Non-agricultural						
21	0 - 30 30 - 58	Br Br Yl	HCL HCL	- o	- no	v ca v ca	8 5	3	3	Stopped on limestone	2	I	2	3a	3a	DR

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile							Agricultural Land Classification						
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
22	0 - 30 30 - 48	Dk Gr Br Br Yl	HCL CSL	- o	- no	v ca v ca	5 5	- -	- -	Stopped on limestone	2	I	2	3a	3a	DR
23	0 - 30 30 - 41	Dk Br Br Yl	SCL SCL	- o	- no	v ca v ca	20 15	13	5	Stopped on limestone	4	I	1	3b	3b	DR
24	0 - 32 32 - 63 63 - 100	Dk Gr Br Br Yl Pl Yl + Br Yl + Yl	SCL FSL FSL	- o o	- no no	v ca ca sl ca	10 3 #N/A	7	3		2	I	1	2	2	DR
25	0 - 25 25 - 40 40 - 100	Dk Gr Br Br Yl Br	HCL HCL LMS	- o o	- no no	v ca ca -	5 10 30	-	-	Stopped on sand & gravel	2	I	2	3a	3a	DR
26	0 - 22 22 - 36	Dk Gr Br Br	HCL HCL	- -	- -	sl ca -	10 10	8 8	2 2	Stopped on stones	1	(I)	(2)	(2)	(2)	(WE, DR)
27	0 - 22 22 - 45	Dk Gr Br St Br	MCL SCL	- o	- no	sl ca -	5 5	2		Stopped on stones	1	(I)	(1)	(2)	(2)	(DR)
28	Not	Surveyed								Non-agricultural						

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile								Agricultural Land Classification					
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
29	0 - 29 29 - 63 63 - 100	Dk Br Dk Yl Br Dk Yl Br	HCL CSL CSL	- o xx	- yes no	sl ca sl ca ca	0 0	-	-		0	II	3a	2	3a	WE
30	0 - 21 21 - 48 48 - 100	Dk Gr Br Li Ol Br + Br Gr	ZC ZC ZC	- xxx xxx	- yes yes	no - -	0 0	-	-		0	III	3b	3a	3b	WE
31	0 - 20 20 - 42 42 - 52 52 - 100	V Dk Gr Br Dk Gr Br Dk Gr Br Gr + Gr Br	HZCL HCL SCL C	- o o xxx	- no no yes	ca - - -	0 0 10	-	-	Grit	0	II	2	2	2	DR/WE
32	0 - 27 27 - 47 47 - 100	V Dk Br Dk Br Gn Gr	HCL HCL C	- xxx xxxx	- yes yes	- - -	5 30	2 6	1	Gravelly	0	III	3b	3a	3b	WE
33	0 - 21 21 - 90	Br Yl Br	MCL MCL	- o	- no	- v ca	5 10				5	I	1	2	2	DR
34	0 - 26 26 - 80	Dk Gr Br Br	HCL HCL	- o	- no	- -	2 0	-	-	Stopped on stones	2	I	2	2	2	WE, DR

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile								Agricultural Land Classification					
			Texture	Mottling	SPL	CaCO ₃	Stones (%)		Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
							Total	>2cm >6cm								
35	0 - 17	Dk Br	MCL	-	-	-	0	-	-	Grit	0	I	1	3a	3a	DR
	17 - 28	Br	MCL	o	no	-	0	-	-							
	28 - 65	Dk Yl Br	LMS	o	no	-	0	-	-							
	65 - 100	Yl Br	LMS	o	no	-	5	-	-							
36	0 - 27	Dk Br	HCL	-	-	v ca	5	-	-	Stopped on limestone	2	I	2	3a	3a	DR
	27 - 54	Yl Br	HCL	o	no	v ca	5	-	-							
37	0 - 20	Dk Gr Br	SCL	-	-	-	3	-	-		2	I	1	2	2	DR
	20 - 30	Br	SCL	o	no	-	2	-	-							
	30 - 60	Yl Br	SCL	o	no	-	2	-	-							
	60 - 100	Dk Yl Br	SCL	o	no	-	2	-	-							
38	Not	Surveyed								Non-agricultural						
39	0 - 20	Dk Yl Br	HCL	-	-	ca	8	5		Stopped on limestone	5	I	2	3a	3a	DR
	20 - 46	Yl Br	HCL	o	no	v ca	13									
40	0 - 27	Dk Gr Br	C	-	-	ca	5	3	-	FMCs	1	III	3a	2	3a	WE
	27 - 35	Br	C	o	no	no	2									
	35 - 52	Br + Dk Yl Br	C	x	no	-										
	52 - 80	Dk Gr	C	xxxx	yes	-										
41	0 - 24	Dk Gr Br	C	-	-	ca	8	5	0	Grit	3	II	2	2	2	WE, DR
	24 - 48	Dk Yl Br + Br	C	x	no	ca	5									
	48 - 62	Br + Gn Gr	C	xxx	yes	-	5									
	62 - 90	Gr Br	C	xxx	yes	-										

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile							Agricultural Land Classification						
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
42	0 - 23 23 - 38	Dk Gr Br + Gr V Pl Br	C SCL	- o	- no	v ca v ca	16 20	7	7	Stopped on limestone	3	I	2	3b	3b	DR
43	0 - 25 25 - 32	Dk Gr Br Br	HCL HCL	- o	- no	ca ca	15 40	10	2	Stopped on limestone	1	I	2	3b	3b	DR
44	0 - 23 23 - 42+	Dk Ol Br Dk Yl Br	C C	- o	- no	v ca v ca	10 40	4	4	Stopped on limestone	2	I	2	3b	3b	DR
45	0 - 35 35 - 80	Dk Gr Br Yl Br	C C	- xxx	- yes	sl ca ca	3 3	2	1	Stopped on stones	1	III	3a	3a	3a	WE, DR
46	0 - 31 31 - 40 40 - 89	Dk Yl Br Br Yl + Yl + V Pl Br V Dk Gn Gr	HCL C C	- xxxx xxxx	- yes yes	v ca v ca ca	10 0	8	4		4	III	3a	3a	3a	WE, DR
47	0 - 26 26 - 35	Dk Gr Br Br	HCL HCL	- o	- no	ca -	15 25	10	2	Stopped on limestone	1	I	2	3b	3b	DR
48	0 - 26 26 - 35	Dk Br Dk Yl Br + V Pl Br	C C	- o	- no	v ca v ca	15 40	5	5	Stopped on limestone	1	I	2	3b	3b	DR

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile							Agricultural Land Classification						
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
49	0 - 30 30 - 38 38 - 85	Dk Br Dk Yl Br Li Gr	HCL HCL C	- x xxxx	- no yes	- v ca -	10 10 0				3	III	3b	3a	3b	WE
50	0 - 26 26 - 43 43 - 90	Dk Br Dk Yl Br Li Ol Br	HCL HCL-C C	- xx xxx	- no yes	v sl ca sl ca -	5 5 0	-	-		2	II	3a	2	3a	WE
51	0 - 28 28 - 40 40 - 65 65 - 80	Dk Gr Br Gr Br Li Ol Br Gr + Gr Br	HCL HCL-C C C	- xx xxx xxx	- no yes yes	ca ca - -	5 5 0 0	-	-		1	II	2	2	2	2
52	0 - 25 25 - 68 68 - 77 77 - 100	Dk Gr Br Dk Gr Yl Br Gr	C C SCL C	- xxx xxx xxx	- yes yes yes	ca ca - -	5 0 0 0	3	-	FMCs	3	III	3a	3a	3a	WE, DR
53	0 - 25	Dk Gr Br	C	o	-	ca	10	6	1	Stopped too firm	1	-	-	-	-	-
54	0 - 23 23 - 80	Br Pl Br	SCL SCL	- xxx	- no	no -	5 -	4	-	Stopped too firm	2	II	2	2 / 3a	2 / 3a	DR
55	0 - 30 30 - 40	Dk Br Dk Br	HCL HCL	- o	- no	no no	15 11	11	3	Stopped on stones	1	(I)	(2)	(2)	(2)	(WE, DR)

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile								Agricultural Land Classification					
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
56	0 - 29 29 - 50 50 - 60 60 - 87 87 - 93	Dk Br Yl Br Yl Br + V Pl Br Ol Br Li Rd Br + Yl + Li Ol B	HCL C SCL C SCL	- xxx xxx xxx xxx	- yes yes yes yes	ca ca ca no ca	20 12	15	5		1	III	3a	3a	3a	WE, DR
57	0 - 27 27 - 52 52 - 75 75 - 120	Dk Gr Br Ol Br Gr Gr	C C C C	- xx xxxx xxxx	- no yes yes	no no - -	2 -	1	-		1	II	3a	2	3a	WE
58	0 - 25 25 - 50 50 - 100	Dk Gr Br Br Br	C C C	- xxx xxx	- yes yes	ca - -	3 -	2	-		0	III	3a	3a	3a	WE, DR
59	0 - 20 20 - 42	Dk Br Dk Yl Br	HCL HCL	- o	- no	no no	3 2	2	1	Stopped on stones	1	(I)	(1)	(2)	(2)	(WE, DR)
60	0 - 30 30 - 50 50 - 75 75 - 85+	Dk Br Dk Yl Br Yl Br Rd Br	HCL HCL SCL SCL	- o o xxx	- no no yes	- - - -	3 3 3 20	-	-		1	II	3a	2	3a	WE
61	0 - 26 26 - 42 42 - 52	Br Dk Gr Br Yl Br	MCL MCL HCL	- o o	- no no	ca ca -	8 5	6	-	Stopped too firm	1	I	1	2	2	DR
62	0 - 24	Dk Gr Br	HCL	-	-	ca	5	3	-		1	II	2	2	2	WE, DE

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile								Agricultural Land Classification					
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)
							Total	>2cm	>6cm							
69	0 - 25 25 - 66 66 - 85	Dk Gr Br Li Ol Br Gr	C C C	- x xxx	- no yes	ca sl ca -	5 0 -	3	-		1	II	2	2	2	WE, DR
70	0 - 24 24 - 47 47 - 70+	Dk Gr Br Li Ol Br Li Ol Br	C C C	- xxx xxx	- yes yes	sl ca sl ca v sl ca	3 0 -	2	-	FMCs	1	III	3a	3a	3a	WE, DR
71	0 - 24 24 - 61 61 - 90	Dk Gr Br Br Yl Br	HCL SCL MSL	- o o	- no no	- - -	2 2 2	-	-		1	I	2	2	2	WE, DR
72	0 - 24 24 - 50 50 - 90	Dk Gr Br Li Ol Br Li Ol Br + Gr Br	HCL C C	- xx xxx	- no yes	ca ca ca	2 2 2	-	-		1	II	2	2	2	WE, DR
73	0 - 27 27 - 55 55 - 90	V Dk Gr Br Br Gr Br	HCL-C C C	- xxx xxx	- yes yes	- - -	0 0 0	-	-		1	III	3b	3a	3b	WE
74	0 - 32 32 - 45	Dk Br Dk Yl Br	HCL HCL	- xx	- no	- v ca	3 15	-	-	Stopped on stones	1	(I)	(2)	(2)	(2)	(WE, DR)
75	0 - 24 24 - 33 33 - 70 70 - 85	Dk Gr Br Br Dk Gr Br Dk Yl Br	HCL HCL HCL/C HCL/C	- o o o	- no no no	no ca no ca ca ca	3 3 3 50	2	-	Gravel	1	I	2	2	2	WE, DR

Annex 1: Wansford, A47 - soil survey details

Auger	Depth (cm)	Colour	Soil Profile								Agricultural Land Classification						
			Texture	Mottling	SPL	CaCO ₃	Stones (%)			Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
							Total	>2cm	>6cm								
76	0 - 27	Dk Yl Br	HCL	-	-	-	1				Stopped on stones	1	I	2	2	2	WE, DR
	27 - 64	St Br	SCL	o	no	-	5										
	64 - 82	Yl Rd	SCL	x	no	-	8										
77	0 - 20	Br	MCL	-	-	-	2					1	I	1	2	2	DR
	20 - 70	Yl Br	SCL	o	no	-	2										
	70 - 120	Yl Br + Br	SCL	xx	no	-	2										
78	0 - 27	Dk Gr Br	MCL	-	-	no	3	-	-		Sand & gravel	1	I	1	3a	3a	DR
	27 - 53	Br	HCL	o	no	-	3										
	53 - 68	Br	HCL/C	xx	no	-	-										
	68 - 76+	Br	Other	o	no	-	25										
79	0 - 22	Dk Gr Br	MCL	-	-	no	1					1	I	2	2	2	WE, DR
	22 - 43	Br	M/SCL	o	no	-	1										
	43 - 90	Yl Br	HCL	o	no	-	-										
80	0 - 23	Dk Gr Br	SCL	-	-	no	5	3	-			1	I	1	3a	3a	DR
	23 - 75	Br	SCL	o	no	no	0										
	75 - 90	St Br	LMS	o	no	-	-										
81	0 - 25	Dk Gr Br	MCL	-	-	no	0					1	II	2	2	2	WE, DR
	25 - 32	Br	MCL	o	no	-	0										
	32 - 60	Br	C	o	no	-	-										
	60 - 100	St Br + Br	C	xxx	yes	-	-										
82	0 - 24	Dk Gr Br	HCL	-	-	-	3	2	-			1	III	3b	3a	3b	WE
	24 - 31	Br	HCL	o	no	-	0										
	31 - 38	Dk Yl Br	C	xxx	yes	-	-										

Key to Survey Notes:

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






700 800 900 507000 100 200 300 400 500 600 700 800 900 508000 100 200 300 400 500 600 700 800 900 509000 100 200 300 400 500 600 700 800 900 510000 100 200 300 400 500 600 700



Title
Annex 2: Map 1
Location of Observations

Project
A47, Wansford

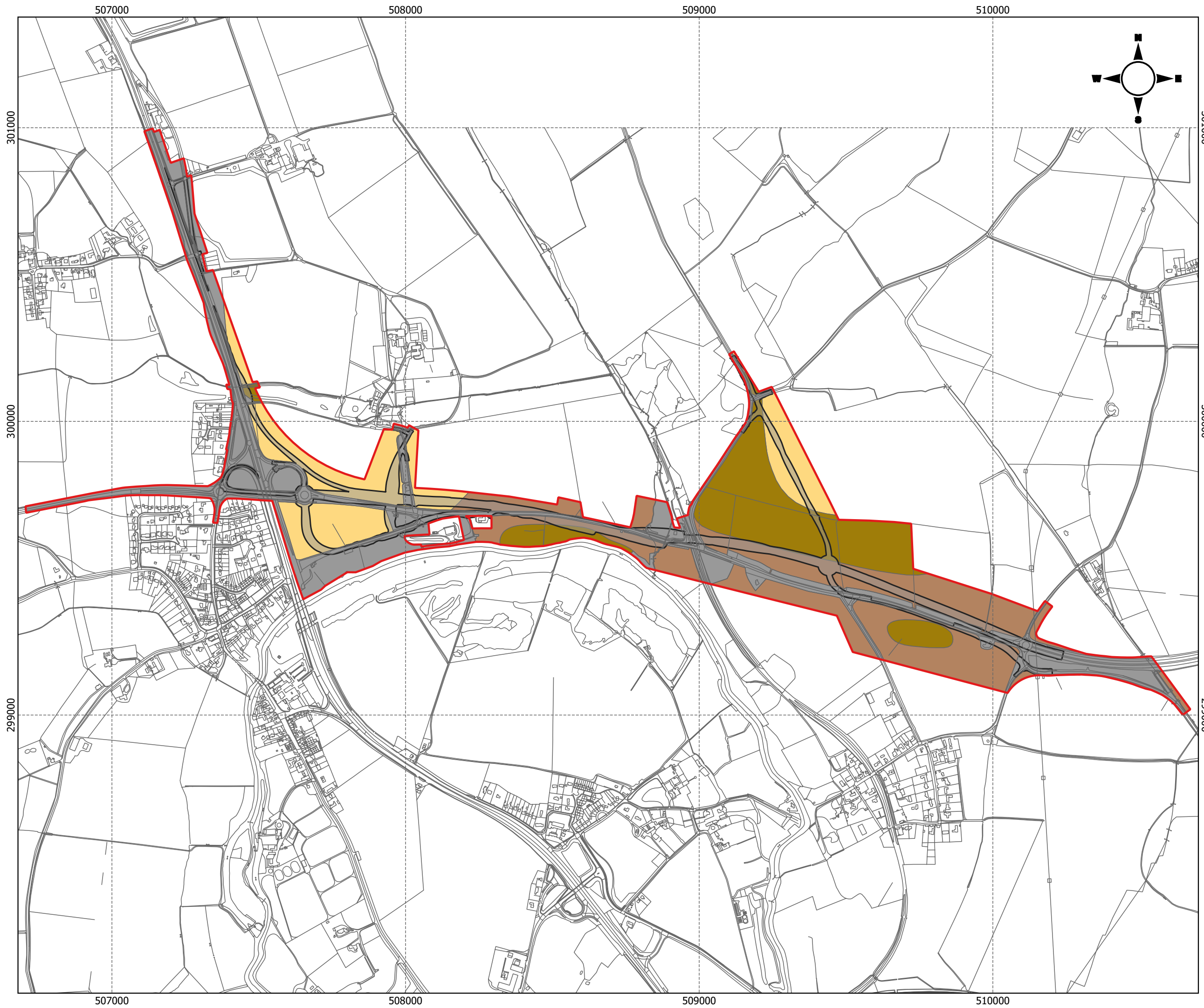
Client
SWECO 

- Key
-  OS MM
 -  Survey area
 -  New road footprint
 -  Soil auger
 -  Soil description pit

Date: 03 / 09 / 2020
Scale: 1 : 12,000 at A3




700 800 900 507000 100 200 300 400 500 600 700 800 900 508000 100 200 300 400 500 600 700 800 900 509000 100 200 300 400 500 600 700 800 900 510000 100 200 300 400 500 600 700










Title
Annex 3: Map 2
Soil Types

Project
A47, Wansford

Client

SWECO 

- Key**
-  OS MM
 -  Survey area
 -  New road footprint
 -  Soils not surveyed
 -  Shallow stony soils
 -  Permeable loamy soils
 -  Slowly permeable clayey soils

Date: 03 / 09 / 2020

Scale: 1 : 12,000 at A3





Title
Annex 4: Map 3
Agricultural Land Classification

Project
A47, Wansford

Client



Key

- OS MM
- ▭ Survey area
- ▭ New road footprint
- ▭ Non agricultural land
- ▭ Grade 2
- ▭ Subgrade 3a
- ▭ Subgrade 3b

Date: 03 / 09 / 2020

Scale: 1 : 12,000 at A3





ANALYTICAL REPORT

Report Number	16606-20	K754	VICTORIA GAULD	Client	VICTORIA GAULD
Date Received	29-JUL-2020		RSK ADAS LTD		
Date Reported	11-AUG-2020		MEDEN VALE		
Project	1010559 WANSFORD 23 07 20		MANSFIELD		
Reference	VICTORIA GAULD		NOTTINGHAMSHIRE		
Order Number	P69101VG2807		NG20 9PD		

Laboratory Reference		SOIL485414	SOIL485415	SOIL485416	SOIL485417	SOIL485418					
Sample Reference		1-PIT AT 44	2-PIT AT 57	3-PIT AT 60	4-PIT AT 70	5-PIT AT 83					
Determinand	Unit	SOIL	SOIL	SOIL	SOIL	SOIL					
Sand 2.00-0.063mm	% w/w	22	31	36	21	56					
Silt 0.063-0.002mm	% w/w	29	35	37	32	25					
Clay <0.002mm	% w/w	49	34	27	47	19					
Textural Class **		C	HCL	HCL	C	SCL					

Notes

Analysis Notes The sample submitted was of adequate size to complete all analysis requested.
 The results as reported relate only to the item(s) submitted for testing.
 The results are presented on a dry matter basis unless otherwise stipulated.

Document Control **This test report shall not be reproduced, except in full, without the written approval of the laboratory.**

Reported by ***Myles Nicholson***
 Natural Resource Management, a trading division of Cawood Scientific Ltd.
 Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS
 Tel: 01344 886338
 Fax: 01344 890972
 email: enquiries@nrm.uk.com

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

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.

ANNEX 6 – DESCRIPTION OF ALC GRADES

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

Grade 1 – excellent quality agricultural land

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

Grade 2 - very good quality agricultural land

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

Grade 3 - good to moderate quality agricultural land

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

Subgrade 3a - good quality agricultural land

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

Subgrade 3b - moderate quality agricultural land

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

Grade 4 - poor quality agricultural land

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

Grade 5 - very poor quality agriculture land

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