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University of Reading

Agricultural Land Classification and Soil Resources

at

Loddon Garden Village / Thames Valley Science Park Link Road (LGV / TVSP Link Road)

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1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by the University of Reading to investigate the Agricultural Land Classification (ALC) and soil resources of land proposed for the Loddon Garden Village / Thames Valley Science Park Link Road at Thames Valley Science Park, Shinfield by means of a detailed survey of soil and site characteristics.
- 1.2 Guidance for assessing the quality of agricultural land in England and Wales is set out in the Department for Environment, Food and Rural Affairs (Defra)/Welsh Government guidelines for grading the quality of agricultural land¹, and summarised in Natural England's Technical Information Note (TIN) 049².
- 1.3 Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. The principal physical factors influencing grading are climate, site conditions and soil which, together with interactions between them, form the basis for classifying land into one of the five grades.
- 1.4 Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use. Grade 2 is very good quality agricultural land, with minor limitations which affect crop yield, cultivations or harvesting. Grade 3 land has moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield, and is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Grade 4 land is poor quality agricultural land with severe limitations which significantly restrict the range of crops and/or level of yields. Grade 5 is very poor quality land, with very severe limitations which restrict use to permanent pasture or rough grazing.
- 1.5 Land which is classified as Grades 1, 2 and 3a in the ALC system is defined as best and most versatile (BMV) agricultural land.
- 1.6 As explained in Natural England's TIN049, the whole of England and Wales was mapped from reconnaissance field surveys in the late 1960s and early 1970s, to provide general strategic guidance on agricultural land quality for planners. This Provisional Series of maps was published

¹ **Welsh Government and Defra (2025).** *Joint Publication 069 - Agricultural Land Classification of England and Wales. Guidelines for grading the quality of agricultural land.*

² **Natural England (2012).** *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land, Second Edition.*

on an Ordnance Survey base at a scale of One Inch to One Mile (1:63,360). The Provisional ALC map shows the site to be of undifferentiated Grade 3 quality. However, TIN049 explains that:

"These maps are not sufficiently accurate for use in assessment of individual fields or development sites, and should not be used other than as general guidance. They show only five grades: their preparation preceded the subdivision of Grade 3 and the refinement of criteria, which occurred after 1976. They have not been updated and are out of print. A 1:250 000 scale map series based on the same information is available. These are more appropriate for the strategic use originally intended ..."

- 1.7 TIN049 goes on to explain that a definitive ALC grading should be obtained by undertaking a detailed survey according to the published guidelines, at an observation density of one boring per hectare. This survey follows the methodology set out in the ALC guidelines.

2 Site and climatic conditions

General features, land form and drainage

- 2.1 The site extends to approximately 5.3 hectares (ha) of agricultural land in four fields, three of which have been in arable use, with the easternmost field in permanent pasture.
- 2.2 The proposed access road runs from Cutbush Lane East and the British Museum building in the west, to the north and east of New Covert and then eastwards to a field of permanent pasture adjacent to the M4 motorway.
- 2.3 The topography is largely level at between around 40m and 42m above Ordnance Datum (AOD), with a main ditch running alongside the existing farm access track between the western and central field (and south of New Covert), which is fed also by ditches from the north; and ditches to the south of the central field and between the central and eastern field, which all run eventually to the River Loddon to the south-east.

Agro-climatic conditions

- 2.4 Agro-climatic data for the site have been interpolated from the Meteorological Office's standard 5km grid point data set at a representative altitude of 40m AOD. The data are given in Table 1. The site is warm with moderate rainfall. Crop moisture deficits are large. The number of Field Capacity Days is smaller than is typical for lowland England and is favourable for providing opportunities for agricultural field working.

Table 1: Local agro-climatic conditions

Parameter	Value
Average Annual Rainfall	656mm
Accumulated Temperatures >0°C	1,479 day°
Field Capacity Days	137 days
Average Moisture Deficit, wheat	117mm
Average Moisture Deficit, potatoes	113mm

Soil parent material and soil type

- 2.5 The bedrock geology mapped by the British Geological Survey³ across the site is silty clay of the London Clay Formation. Most of the site is overlain by sedimentary superficial deposits of brickearth, comprising clay, silt and sand, with the bedrock in the eastern field overlain by sand and gravel river terrace deposits.
- 2.6 The Soil Survey of England and Wales soil association mapping⁴ (1:250,000 scale) shows the Hurst association across the site. This association develops in river terrace deposits and commonly comprises coarse and fine loamy, permeable soils which are variably affected by groundwater⁵.

³ **British Geological Survey (2026).** *Geology of Britain viewer*, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

⁴ **Soil Survey of England and Wales (1984).** *Soils of South East England* (1:250,000), Sheet 6

⁵ **Jarvis *et al* (1984).** *Soils and their use in South East England*. Soil Survey of England and Wales Bulletin 15, Harpenden.

3 Agricultural land quality

Soil survey methods

- 3.1 Ten soil profiles were examined within the site boundary using a Dutch (Edelman) auger at an observation density of considerably more than the recommended density of one per hectare, giving a very intensive survey density. In addition, data from an observation pit in the site of the Natural History Museum building to the west of the site have been used, particularly in the assessment of subsoil structures and stone content.
- 3.2 The locations of observations are indicated on Figure RAC/9617/1a. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 120cm or any impenetrable layer:
- soil texture;
 - stone content;
 - colour (including localised mottling);
 - consistency;
 - structural condition;
 - free carbonate; and
 - depth.
- 3.3 Two topsoil samples were submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are presented in Appendix 1.
- 3.4 Soil Wetness Class (WC) was determined from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling, and slowly permeable subsoil layers at least 15cm thick, in relation to the number of Field Capacity Days at the location.
- 3.5 Soil droughtiness was investigated by the calculation of moisture balance equations (given in Appendix 2). Crop-adjusted Available Profile Water (AP) is estimated from texture, stoniness and depth, and then compared to a calculated moisture deficit (MD) for the standard crops wheat and potatoes. The MD is a function of potential evapotranspiration and rainfall. Grading of the land can be affected if the AP is insufficient to balance the MD and droughtiness occurs.

Agricultural land classification and site limitations

- 3.6 Assessment of land quality has been carried out according to the revised ALC guidelines¹. Soil profiles have been described according to Hodgson⁶ which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.
- 3.7 The site is classified as mostly Subgrade 3a with patches of Subgrade 3b quality land. Most profiles are limited by soil droughtiness, with two profiles equally limited by soil wetness and one profile mostly limited by soil wetness. Photographs of the soil profiles are contained in Appendix 3.
- 3.8 Topsoils in the Subgrade 3a areas mostly comprise dark brown (10YR3/3 in the Munsell soil colour charts⁷) sandy loam or sandy silt loam of 27-34cm depth. Very dark greyish brown (10YR3/2) and dark yellowish brown (10YR3/4) colours are also present. Stone content is slight at up to around 10% by volume of medium, angular gravel. The topsoil is friable with a fine and medium subangular blocky structure, and contains many to very many fine roots.
- 3.9 The upper subsoil comprises brown, dark yellowish brown and yellowish brown (10YR4/3, 10YR4/4 and 10YR5/4) sandy clay loam, with one profile having a grey (10YR5/1) upper subsoil. The upper subsoil is commonly mottled but is mostly permeable and not gleyed, with friable to firm consistencies and medium subangular blocky structures. Stone content is slight at up to around 7% by volume of medium gravel.
- 3.10 The lower subsoil comprises sandy clay loam or sandy clay, usually over a very stony sand at variable depths. The sandy clay loam and sandy clay is brown, yellowish brown and greyish brown (including 10YR4/3, 10YR5/2, 10YR5/3, 10YR5/6, 10YR6/4), with a firm consistency and is mottled and slowly permeable. The very stony, yellowish brown (10YR5/6) sand is found at depths of between 50cm and 95cm below ground level. The sand lower subsoil is granular, very stony with up to 50% small, angular stones, and was wet from groundwater at the time of survey.
- 3.11 These profiles are mostly limited to Subgrade 3a by drought. Two profiles in the west are gleyed and slowly permeable immediately beneath the topsoil, are poorly drained in WC IV and classified as Subgrade 3a also on a wetness limitation.

⁶ **Hodgson (2022)**. *Soil survey field handbook*. Soil Survey Technical Monograph No. 5, Cranfield.

⁷ **Munsell Color (2009)**. *Munsell Soil Color Book*. Grand Rapids, MI, USA

- 3.12 The Subgrade 3b land has contrasting limitations. The profile to the north of New Covert is found in a very stony area, and comprises a very dark greyish brown (10YR3/2), moderately stony, sandy loam topsoil; over a dark greyish brown (10YR4/2), very stony, loamy sand upper subsoil; and a dark grey (10YR4/1), very stony sand lower subsoil. Stone content, mostly comprising small, angular gravel, is estimated at around 50% by volume. Although this profile was very wet at the time of survey from groundwater, it is limited mostly by soil droughtiness due to the coarse textures and high stone content.
- 3.13 The Subgrade 3b profile in the central field comprises a very dark greyish brown (10YR3/2) sandy clay loam topsoil. Stone content is very slight at around 2% by volume. The topsoil is friable with a medium subangular blocky structure. This lies over a brown and greyish brown (10YR5/3 and 5/2) sandy clay upper subsoil, which is mottled and slowly permeable with a firm consistency. A very stony sand lower subsoil lies beneath the sandy clay but, as the profile is slowly permeable immediately beneath the topsoil, it is classified as Subgrade 3b on wetness.
- 3.14 The areas of each ALC grade are given in Table 2 and are shown in Figure RAC/9617/2a.

Table 2: Agricultural Land Classification

Grade	Description	Area (ha)	%
3a	Good quality	3.7	70
3b	Moderate quality	1.5	28
Non-agricultural		0.1	2
Total		5.3	100

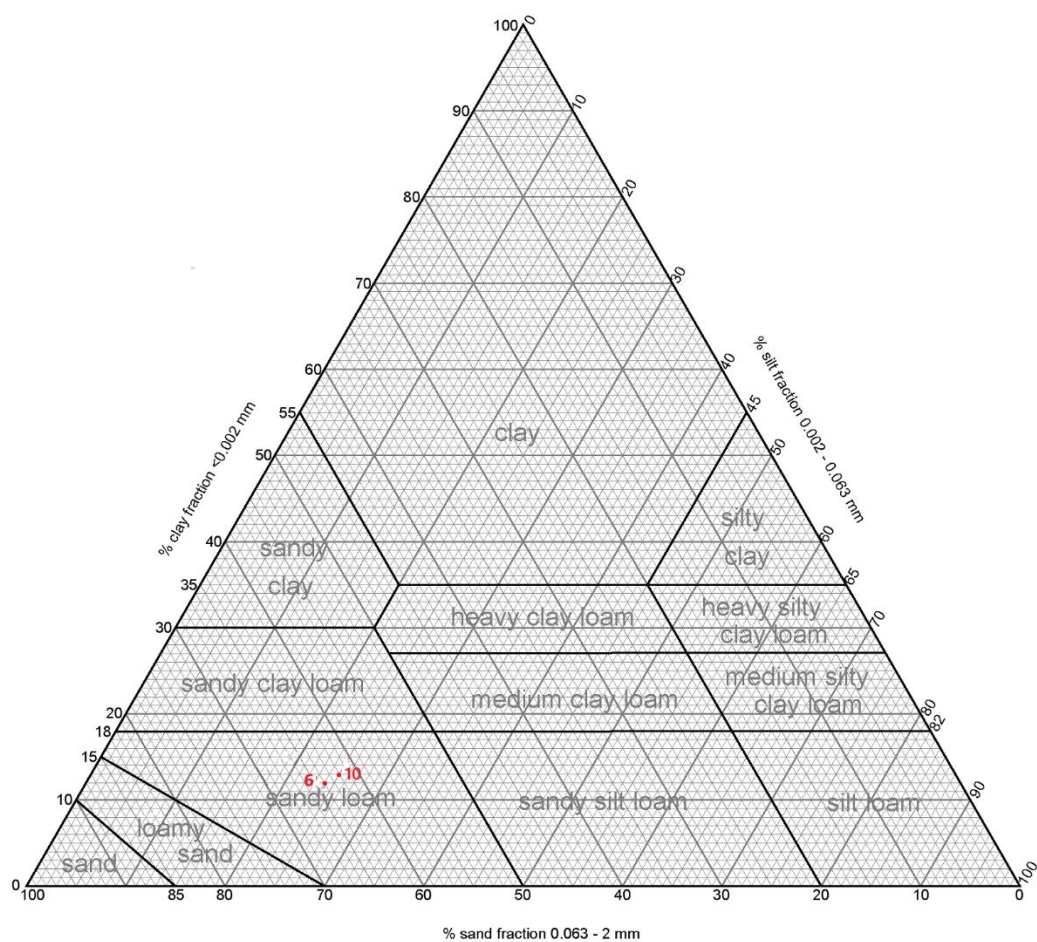
Appendix 1: Laboratory Results

Determinand	Profile 6 Topsoil (arable)	Profile 10 Topsoil (permanent pasture)	Units
Sand 2.00-0.063 mm	64	62	% w/w
Silt 0.063-0.002 mm	24	25	% w/w
Clay <0.002 mm	12	13	% w/w
Organic Matter	2.7	3.6	% w/w
Texture	Sandy loam	Sandy loam	

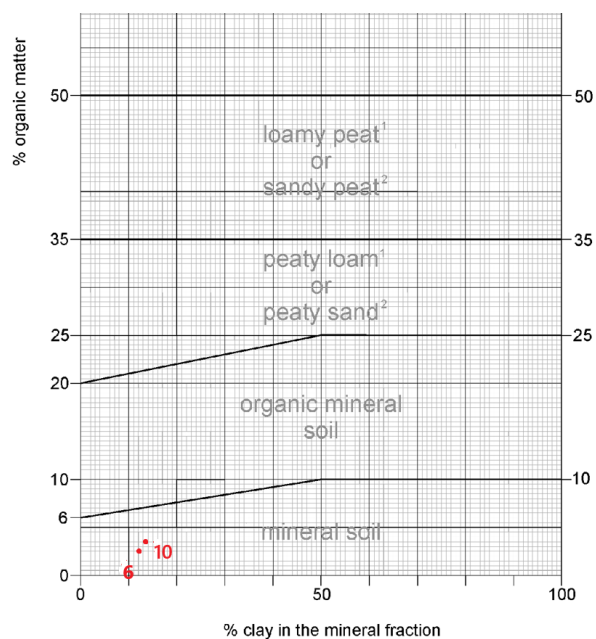
Determinand	Profile 6 Topsoil (arable)	Profile 10 Topsoil (permanent pasture)	Units
Soil pH	6.3	6.2	
Phosphorus (P)	31.2	24.2	mg/l (av)
Potassium (K)	172	74.9	mg/l (av)
Magnesium (Mg)	71.2	74.8	mg/l (av)

Determinand	Profile 6 Topsoil (arable)	Profile 10 Topsoil (permanent pasture)	Units
Phosphorus (P)	3	2	ADAS Index
Potassium (K)	2-	1	ADAS Index
Magnesium (Mg)	2	2	ADAS Index

Soil Texture by Particle Size Analysis



Organic Matter Class



Appendix 2: Soil Profile Summaries and Droughtiness Calculations

Wetness / workability limitations are determined according to the methodology given in Appendix 3 of the ALC guidelines

Droughtiness calculations are made according to the methodology given in Appendix 4 of the ALC guidelines

Grades are shown for drought, wetness and any other soil or site factors which are relevant. The overall Grade is set by the most limiting factor and shown on the right.

Stone types			Climate Data		Wetness Class Guidelines				
%	TA _v	EA _v	MDwheat	117	I	II	III	IV	V
hard	1	0.5	MDpotato	113	SPL within 80cm, gleying within 40cm	>65cm	37-65cm	<37cm	
			FCD	137	SPL within 80cm, gleying at 40-70cm	>47cm	<47cm		
					No SPL but gleying within 40cm	coarse subsoil	I	other cases	II

Maximum depth of auger penetration is underlined

Maximum depth of auger penetration is unlimited																	
hard		flint & pebble															
Site	Depth	Texture	CaCO ₃	Colour	Mottle	abund-	stone%	stone%	Struct-	APwheat	AP potato	Gley	SPL	WC	Wetness	Final	Limiting
No.	cm				colour	ance	hard		ure	mm	mm				grade WE	Grade	Factor(s)
1	0	30	SL	n	10YR3/2		2			50	50	n	n	/	1	3a	DR
	30	50	SCL	n	10YR4/2	Mn och	mmd	7		28	28	y	n				
	50	120	S				50		poor	19	8						
									Total	97	86						
									MD	-20	-26						
									Droughtiness grade (DR)	3a	3a						
2	0	30	LS	n	10YR3/2		2			38	38	n	n	//	1	3a	DR
	30	50	SZL	n	10YR4/4	och	cfd	2	poor	29	29	n	n				
	50	80	SC	n	10YR6/1	och	mmd	7	poor	22	24	y	y				
	80	100	SC	n	10YR5/1	och	vmmp	5	poor	15	0	y	y				
	100	120	S				50		poor	6	0						
									Total	111	92						
									MD	-6	-20						
								Droughtiness grade (DR)	3a	3a							
3	0	34	SZL	n	10YR3/2		2			63	63	n	n	/V	3a	3a	WE DR
	34	50	SCL	n	10YR5/1	och	vmmp	7	poor	19	19	y	y				
	50	120	S				50		poor	19	8						
									Total	102	91						
									MD	-15	-21						
								Droughtiness grade (DR)	3a	3a							
4	0	25	SL	n	10YR3/3	och	fff	2		42	42	n	n	/V	3a	3a	WE DR

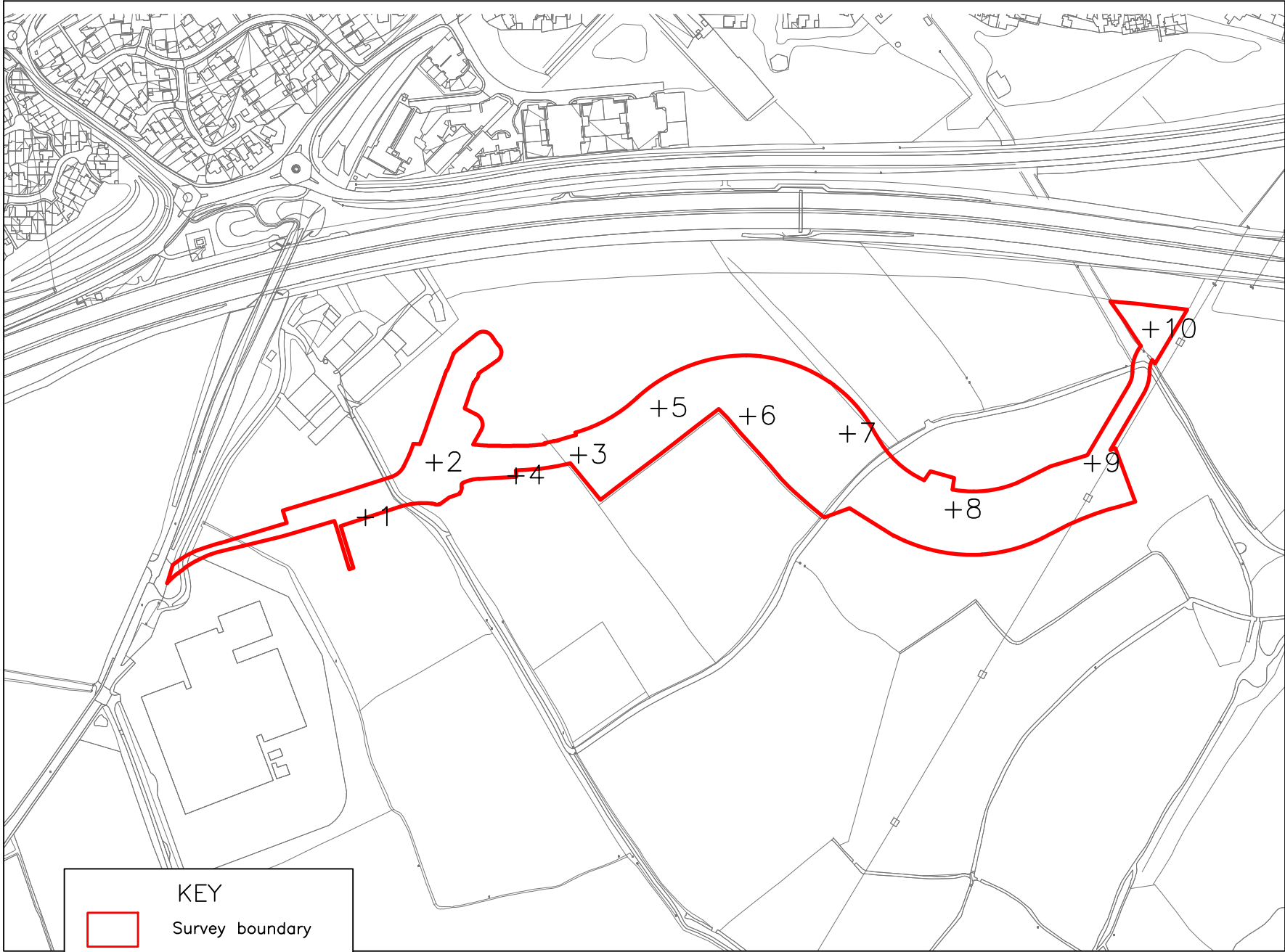
		25	45	SCL	n	10YR5/2	och	mcp	7	poor	24	24	y	y				
		45	65	SC	n	10YR6/1	och	vmcp	12	poor	16	23	y	y				
		65	<u>85</u>	S	n	10YR5/6			50	poor	6	2	n	n				
		85	120	S					50	poor	10	0	n	n				
										Total	98	91						
										MD	-19	-21						
										Droughtiness grade (DR)	3a	3a						
5	T	0	30	SL	n	10YR3/2			20		41	41	n	n	/	1	3b	DR
		30	50	LS	n	10YR4/2	Mn och	mmd	50		10	10	y	n				
		50	<u>60</u>	S	n	10YR4/1			50		3	4	y	n				
		60	120	S					50	poor	17	4						
										Total	71	59						
										MD	-46	-54						
										Droughtiness grade (DR)	3b	3b						
6	T	0	27	SL	n	10YR3/4			2		45	45	n	n	//	1	3a	DR
		27	47	SCL	n	10YR5/4	Mn	cf	2	poor	26	26	n	n				
		47	62	SCL	n	10YR5/6	Mn	cmd	2	poor	13	19	n	n				
		62	85	SC	n	10YR6/4	Mn	cmd	2	poor	18	10	y	y				
		85	120	SC	n	10YR6/4	Mn	cmd	5	poor	27	0	y	y				
										Total	129	100						
										MD	12	-13						
										Droughtiness grade (DR)	2	3a						
7	T	0	30	SL	n	10YR3/3			10		46	46	n	n	///	2	3a	DR
		30	45	SCL	n	10YR5/4	och Mn	cf	5		21	21	n	n				
		45	70	SC	n	10YR5/3	och Mn	cmd	2	poor	22	32	y	y				
		70	<u>95</u>	SCL	n	10YR5/2	och Mn	vmmp	7		23	0	y	y				
		95	120	S					50	poor	7	0		n				
										Total	120	100						
										MD	3	-13						
										Droughtiness grade (DR)	3a	3a						
8	T	0	30	SCL	n	10YR3/2			2		50	50	n	n	/V	3b	3b	WE
		30	50	SC	n	10YR5/3	och	cmd	5	poor	25	25	y	y				

		50	70	SC	n	10YR5/2	och	mmp	7	poor	15	24	y	y				
		70	<u>75</u>	S	n				50	poor	1	0		n				
		75	120	S					50	poor	12	0						
										Total	104	99						
										MD	-13	-14						
										Droughtiness grade (DR)	3a	3a						
9	T	0	30	SZL	n	10YR3/3			10		52	52	n	n	///	2	3a	DR
		30	40	SCL	n	10YR4/3	och	cf	2		15	15	n	n				
		40	<u>60</u>	SCL	n	10YR5/3	och	mfd	2	poor	21	26	y	y				
		60	120	SC	n				35	poor	32	9	y	y				
										Total	119	101						
										MD	2	-12						
										Droughtiness grade (DR)	3a	3a						
10	T	0	30	SL	n	10YR3/3			2		50	50	n	n	1	1	3a	DR
		30	50	SCL	n	10YR4/4			5		29	29	n	n				
		50	70	SCL	n	10YR4/2			7		19	28	y	n				
		70	<u>95</u>	SCL	n	10YR4/3			40	poor	13	0	n	n				
		95	120	S					50		7	0						
										Total	117	107						
										MD	0	-6						
										Droughtiness grade (DR)	3a	2						

Appendix 3: Soil profile photographs

Profile 1 Sandy loam over sandy clay loam stopped at 50cm.	Profile 2 Loamy sand over sandy clay to 100cm.	Profile 3 Sandy silt loam over sandy clay loam stopped at 50cm.	Profile 4 Sandy loam over sandy clay loam and sandy clay over sand lower subsoil.
			

Profile 5 Sandy loam topsoil over loamy sand upper subsoil. Shallow and stony. 	Profile 6 (arable) Sandy loam topsoil over sandy clay loam upper subsoil and sandy clay lower subsoil. Deep, slowly permeable at 62cm. 	Profile 10 (pasture) Sandy loam topsoil over sandy clay loam subsoil; sand at base. Deep, permeable. 
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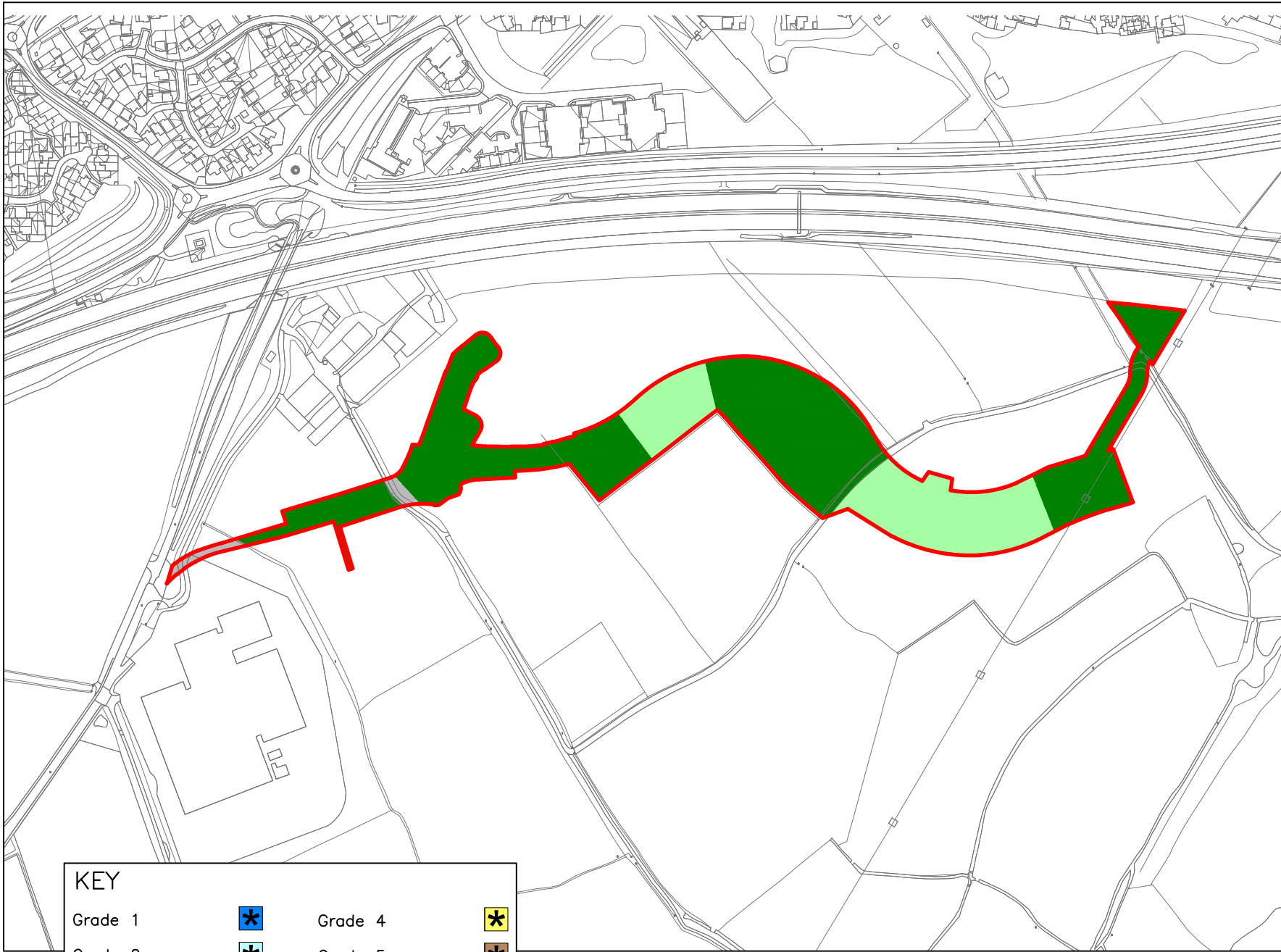


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KEY

Grade 1		Grade 4	
Grade 2		Grade 5	
Subgrade 3a		Non-agricultural	
Subgrade 3b		Not present	

1:5,000
0 100m 200m

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