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Robert Hitchins Limited

Agricultural Land Classification and Soil Resources

at

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1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Robert Hitchins Limited to investigate the Agricultural Land Classification (ALC) and soil resources of land south of Coate Road, Devizes, Wiltshire, 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 Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria 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 **MAFF (1988).** *Agricultural Land Classification of England and Wales. Revised guidelines and criteria 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 as Grade 3. 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. Most of the site has previously been subject to detailed survey and classified as approximately one-third Grade 2 and two-thirds Subgrade 3a³. The surveyed area was checked and the un-surveyed portion of the site was surveyed fully following the detailed methodology set out in the ALC guidelines.

2 Site and climatic conditions

General features, land form and drainage

- 2.1 The site extends to 10.7ha, comprising two arable fields, the edge of a third field and a short section of Coate Road that separates them. The site is bounded by Windsor Road to the west, other agricultural land to the north and south, and a village hall to the east.
- 2.2 The topography is characterised by a gentle north-facing slope which falls from an altitude of around 140m to around 130m above Ordnance Datum (AOD).
- 2.3 Drainage of the site is via the slope which directs water to the Kennet and Avon Canal.

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 135m AOD, and are given in Table 1. The climate at the site is moist and moderately cool. Moisture deficits are moderate. The number of Field Capacity Days is larger than is average for lowland England (150) and is unfavourable for

³ **FRCA (1999).** *Dunkirk Hill, Sleight Road and Roundway Devizes, Agricultural Land Classification.* Job No.: 36/99 37/99 38/99

providing opportunities for agricultural field work. There is however no climatic limitation to the ALC.

Table 1: Local agro-climatic conditions

Parameter	Value
Grid Reference	SU 02200 62100
Average Annual Rainfall	754mm
Accumulated Temperatures >0°C	1,390 day°
Field Capacity Days	169 days
Average Moisture Deficit, wheat	100mm
Average Moisture Deficit, potatoes	89mm

Soil parent material and soil type

- 2.5 The bedrock geology mapped by the British Geological Survey⁴ across most of the site belongs to the Upper Greensand Formation which includes sand and sandstone. The West Melbury Marly Chalk Formation is mapped across the sloping southern edge of the site and consists of buff, grey and off-white soft marly chalk and hard limestone. Superficial head deposits are mapped across the western field parcel and include unsorted rock debris and soil material.
- 2.6 The Soil Survey of England and Wales soil association mapping⁵ (1:250,000 scale) shows the Upton 2 association across most of the site, with Ardington association in the west and north. The main Upton soils comprise moderately stony, silty clay loams which are variably calcareous. The soils are naturally well drained in Wetness Class (WC) I. The nearby Ardington soils are characterised by brown earths with olive and greenish, sandy clay loam subsoils. Profiles range from WC I to III depending on springwater sources⁶.

⁴ **British Geological Survey (2025).** *BGS Geology Viewer*, <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/>

⁵ **Soil Survey of England and Wales (1984).** *Soils of South West England* (1:250,000), Sheet 5

⁶ **Findlay et al (1984).** *Soils and Their Use in South West England*. Soil Survey of England and Wales Bulletin 14, Harpenden.

3 Agricultural land quality

Soil survey methods

- 3.1 Eight soil profiles were examined using an Edelman (Dutch) auger at an observation density of one per hectare which is in accordance with the established recommendations for ALC surveys². One soil pit was also excavated to examine subsoil structures and stone content. The locations of observations are indicated on Figure RAC/10608/1b. 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.
- 3.2 One topsoil sample was submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are presented in Appendix 1.
- 3.3 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.
- 3.4 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

- 3.5 Assessment of agricultural land quality has been carried out according to the revised ALC guidelines¹. Soil profiles have been described according to Hodgson⁷ which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.
- 3.6 Agricultural land quality across the site is limited variably by soil wetness, mostly to Subgrade 3b, with Grades 2 and 3a present in the west and north. This survey was not able to verify the presence of the previously mapped Grade 2 and Subgrade 3a in the largest field parcel.
- 3.7 There are two main soil types at the site. Across the largest field parcel is very dark greyish brown and dark greyish brown (10YR3/2 and 10YR4/2 in the Munsell soil colour charts⁸) clay or occasionally silty clay topsoil. The average depth is 27cm. The topsoil is non-calcareous, slightly stony or stoneless and has a weak to moderate fine angular blocky structure. The topsoil was moist but friable at the time of survey, other than in the very east where the ground conditions were wet.
- 3.8 The upper subsoil is clay which is greyish brown or occasionally brown (10YR5/2 or 10YR5/3), mottled and commonly very firm, other than in the pit location where it is more friable. The upper subsoil is non-calcareous and poorly structured which inhibits drainage, but is of variable thickness. Across most of the largest field parcel, there is a lower subsoil of very calcareous, pale brown or light yellowish brown (10YR6/3 or 2.5Y6/3) clay which is friable, crumbly and permeable, with a weak fine angular blocky structure. An additional slowly permeable clay horizon occasionally lies beneath.
- 3.9 Depending on the thickness of the slowly permeable upper subsoil and the presence or absence of the deeper slowly permeable lower subsoil, the profiles range from WC II to WC IV. Due to the confirmed clay topsoil texture, all profiles in the largest field parcel are limited by wetness to Subgrade 3b. For this reason the previous classifications of Grade 2 and Subgrade 3a could not be verified, as it was based on a topsoil texture of medium clay loam.
- 3.10 One profile on the northern side of the large field parcel may have been subject to previous disturbance, with what looked to be brick debris observed in the subsoil.
- 3.11 The second soil type is present in the smaller, western field. The topsoil is very dark grey (10YR3/1) sandy clay loam of 29cm depth. The topsoil is non-calcareous, very slightly stony and

⁷ **Hodgson, J. M. (Ed.) (1997).** *Soil survey field handbook*. Soil Survey Technical Monograph No. 5, Silsoe.

⁸ **Munsell Color (2009).** *Munsell Soil Color Book*. Grand Rapids, MI, USA

was moist but friable. In the north of the parcel the subsoil horizons comprise brown (10YR5/3) loamy medium sand which passes to greenish black (10Y2.5/1) sandy clay loam lower subsoil. The subsoil is mottled throughout and the profile is in WC II. With a sandy clay loam topsoil, the previous classification as Grade 2 is confirmed. In the south of the parcel, the subsoil horizons comprise sandy clay which transitions from very dark grey (2.5Y3/1) to the greenish black as in the north. The sandy clay lower subsoil is slowly permeable and the profile is in WC III. With sandy clay loam topsoil, the previous classification as Subgrade 3a is also confirmed.

3.12 The edge of the field parcel that lies on the north side of Coate Road has previously been verified by RAC as Grade 2 quality.

3.13 The ALC distribution within the site is shown in Figure RAC/10608/2b and the areas of each grade are given in Table 2. Photographs taken at the site are given in Appendix 3.

Table 2: ALC areas

Grade	Description	Area (ha)	%
Grade 2	Very good quality	1.0	9
Subgrade 3a	Good quality	0.6	6
Subgrade 3b	Moderate quality	7.8	73
Non-agricultural		1.3	12
Total		10.7	100

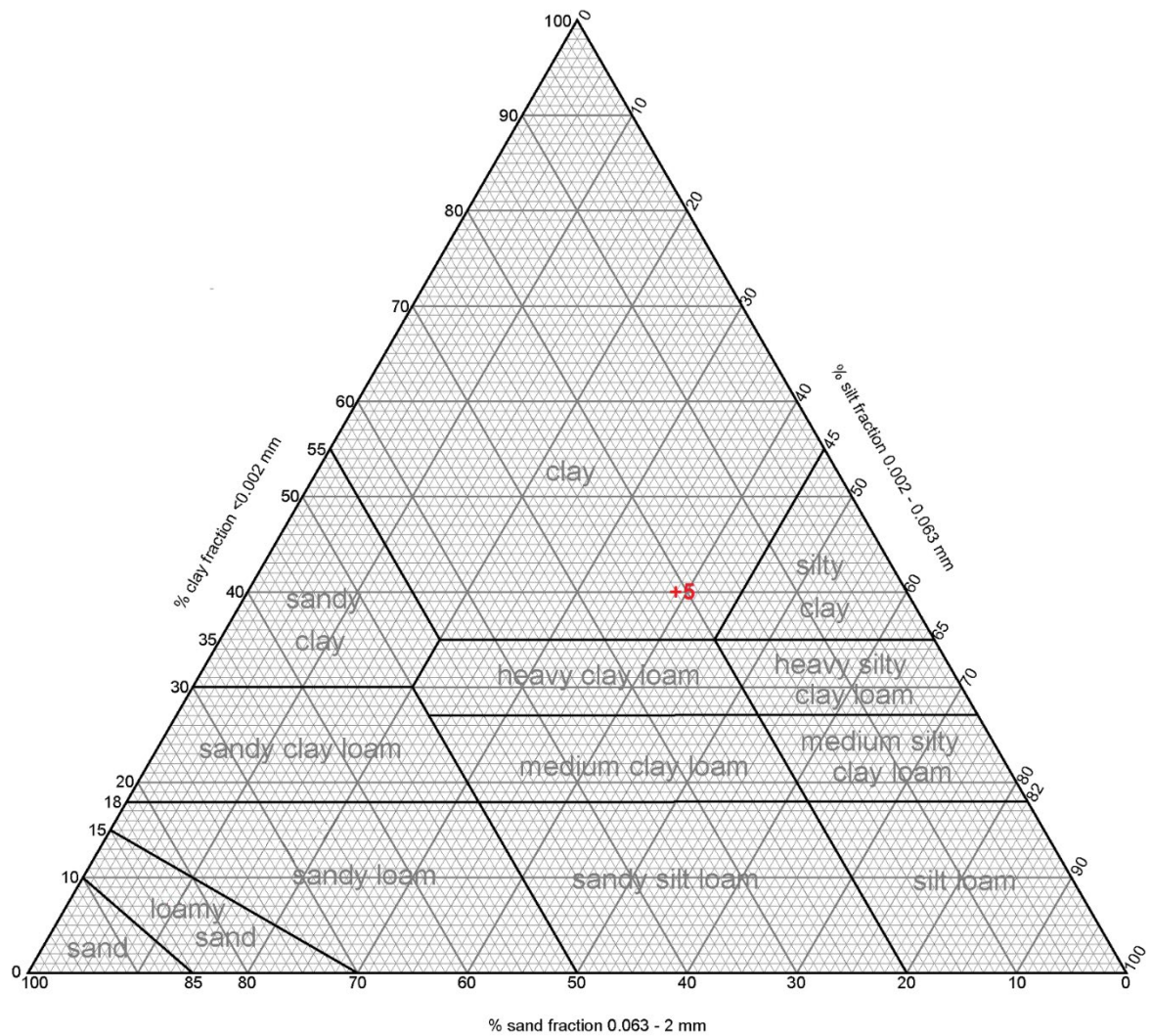
Appendix 1: Laboratory Data

Determinand	Site 5	Units
Sand 2.00-0.063 mm	21	% w/w
Silt 0.063-0.002 mm	39	% w/w
Clay <0.002 mm	40	% w/w
Organic Matter	4.7	% w/w
Texture	Clay	

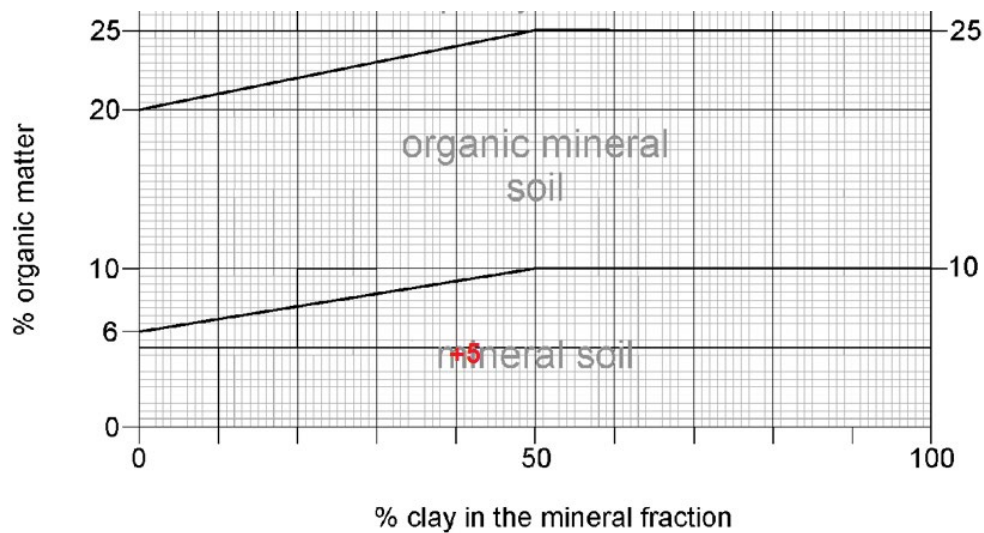
Determinand	Site 5	Units
Soil pH	8.0	
Phosphorus (P)	8.2	mg/l (av)
Potassium (K)	121	mg/l (av)
Magnesium (Mg)	72.9	mg/l (av)

Determinand	Site 5	Units
Phosphorus (P)	0	ADAS Index
Potassium (K)	2-	ADAS Index
Magnesium (Mg)	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, MAFF 1988

Droughtiness calculations are made according to the methodology given in Appendix 4 of the ALC guidelines, MAFF 1988.

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					Climate	
%	TA _v	EA _v	MDwheat	100	II		III		IV	V	1390 D° Limitation Grade 1
hard	1	0.5	MDpotato	89	SPL within 80cm, gleying within 40cm		>73cm	46-73cm	<46cm		
chalk	10	7	FCD	169	SPL within 80cm, gleying at 40-70cm		>60cm	<60cm			
hard	flint & pebble		AAR	754	No SPL but gleying within 40cm		coarse subsoil	I	other cases	II	
					Maximum depth of auger penetration is <u>underlined</u>						

Site No.		Depth cm		Texture	CaCO ₃	Colour	Mottle colour	abundance	stone% hard	stone% chalk	Structure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)	
1	T	0	30	C		10YR3/2			1	0		51	51	n	n	//	3b	3b	WE	
		30	44	C	v.sli	10YR5/2	Fe	com	0	0	poor	20	20	y	n					
		44	120	C	very	2.5Y6/3			0	25		62	36	n	n					
	Total										132	106								
	MB										32	17								
Droughtiness grade (DR)												1	1							
2	T	0	27	ZC		10YR3/2			1	0	-	45	45	n	n	///	3b	3b	WE	
		27	47	C	v.sli	10YR5/3	Fe	com	0	0	poor	26	26	y	y	IV				
		47	88	C	very	2.5Y6/3			0	10		35	35	n	n					
		88	120	C	v.sli	10YR5/3	Fe	com	0	0	poor	22	0	y	y					
	Total										129	107								
MB										29	18									
Droughtiness grade (DR)												2	1							
3	T	0	28	C		10YR3/2			1	0	-	47	47	n	n	IV	3b	3b	WE	
		28	50	C	mod	10YR5/2	Fe	com	0	0	poor	29	29	y	y					
		50	90	C	mod	10YR6/3	Fe	few	0	0	m/poor	30	29	n	y					
		90	120	C	mod	10YR6/3	Fe	few	0	0		24	0	n	n					
	Total										130	105								
MB										30	16									
Droughtiness grade (DR)												1	1							

4	T	0	25	ZC		10YR4/2			1	0	-	42	42	n	n	IV	3b	3b	WE
		25	65	C		10YR5/2	Fe	com	0	0	poor	43	52	y	y				
		65	120	C	very	10YR6/3	Fe	com	0	0		44	8	y	n				
											Total	129	102						
											MB	29	13						
Droughtiness grade (DR)												2	1						
5	T	0	25	C		10YR4/2			1	0	-	42	42	n	n	II	3b	3b	WE
	Pit	25	35	C	v.sli	10YR5/2	Fe	com	0	0		16	16	y	n				
		35	120	ZC	very	2.5Y6/2	Fe	com	0	25		75	48	y	n				
											Total	133	106						
											MB	33	17						
Droughtiness grade (DR)												1	1						
6	T	0	27	C		10YR3/2			1	0	-	45	45	n	n	IV	3b	3b	WE
		27	56	C		2.5Y3/1			10	0	poor	31	34	n	y				
		56	120	C		2.5Y3/1			10	0	poor	41	17	n	n				
											Total	117	96						
											MB	17	7						
Droughtiness grade (DR)												2	2						
7	T	0	29	SCL		10YR3/1			1	0	-	49	49	n	n	II	2	2	WE DR
		29	65	LmS		10YR5/3	Fe	com	0	0		28	32	y	n				
		65	120	SCL		10Y2.5/1	Fe	com	0	0		55	8	y	n				
											Total	132	89						
											MB	32	0						
Droughtiness grade (DR)												1	2						
8	T	0	29	SCL		10YR3/1			1	0	-	49	49	n	n	III	3a	3a	WE
		29	65	SC		2.5Y3/1	Fe	com	0	0		47	54	y	n				
		65	120	SC		10Y2.5/1	Fe	com	0	0	poor	44	7	y	y				
											Total	139	109						
											MB	39	20						
Droughtiness grade (DR)												1	1						

Possible disturbance - brick debris in subsoil

Appendix 3: Photographs



Pit 1



Pit topsoil



Pit subsoils



Profile 1



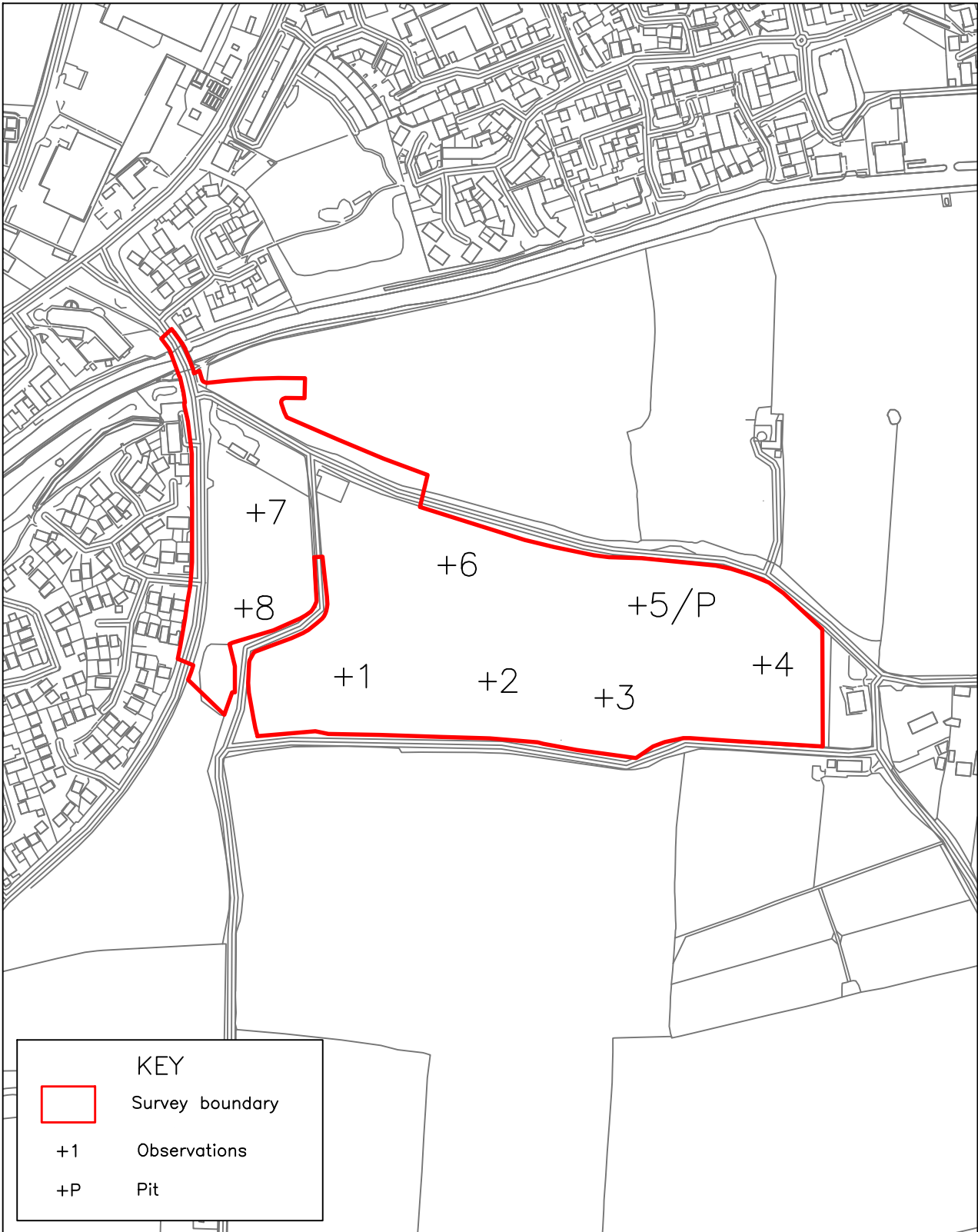
Profile 6



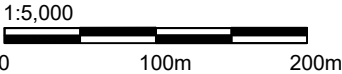
Profile 11



Eastern corner



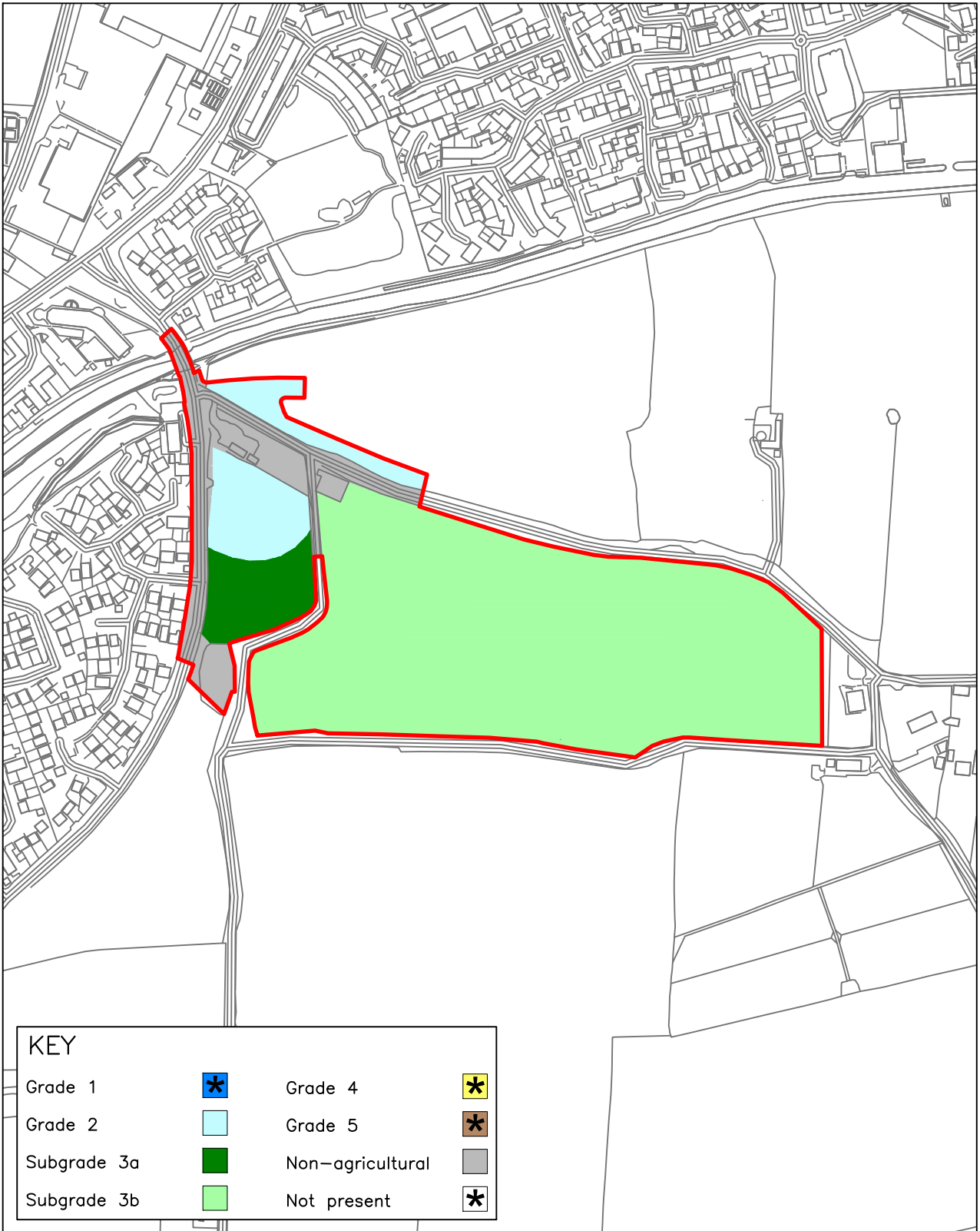
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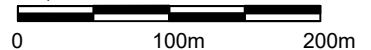


KEY

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

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