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National Trust

Agricultural Land Classification and Soil Resources

at

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1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by the National Trust to investigate the Agricultural Land Classification (ALC) and soil resources of land at Stourhead, Stourton, 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 2. 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 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 around 8.2 hectares (ha) in two fields. The site is bounded to the north by the National Trust's overflow car park at Stourhead and on all other sides by other agricultural land. All of the land is under grass: the eastern field is managed and mown along the northern edge but the remainder is rough grass and other vegetation including saplings that look to be self-seeded.
- 2.2 The topography is very gently sloping from around 185 m above Ordnance Datum (AOD) in the west, down to around 176 m AOD in the east.
- 2.3 Drainage of the site is through the soil profile and facilitated by the slope, which ultimately directs water into the catchment of the River Stour.

Agro-climatic conditions

- 2.4 Agro-climatic data for the site have been interpolated from the Meteorological Office's standard 5 km grid point data set at a representative altitude of 180 m AOD, and are given in Table 1. The climate at the site is cool and wet. Moisture deficits are moderate to moderately small. The number of Field Capacity Days is larger than is average for lowland England (150) and is unfavourable for providing opportunities for agricultural field work. There is an overriding climatic limitation to Grade 2.

Table 1: Local agro-climatic conditions

Parameter	Value
Grid Reference	ST 77700 33700
Average Annual Rainfall	940 mm
Accumulated Temperatures >0°C	1,347 day°
Field Capacity Days	199 days
Average Moisture Deficit, wheat	80 mm
Average Moisture Deficit, potatoes	65 mm

Soil parent material and soil type

- 2.5 The bedrock geology mapped by the British Geological Survey³ is the Boyne Hollow Chert Member of the Upper Greensand Formation, characterised by sand and sandstone with beds of chert.
- 2.6 No superficial deposits are mapped.
- 2.7 The Soil Survey of England and Wales soil association mapping⁴ (1:250,000 scale) shows the Charity 1 association in the east of the site and the Bearsted 2 association in the west.
- 2.8 The main Charity soils comprise slightly or moderately stony silty clay loam throughout the profile. They are well drained, in Wetness Class (WC) I.
- 2.9 The main soils of the Bearsted 2 association include sandy loam or sandy silt loam topsoils and upper subsoils, and become sandier with depth. The profiles are also well drained, WC I⁵.

³ **British Geological Survey (2025).** *BGS Geology Viewer*, <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/>

⁴ **Soil Survey of England and Wales (1984).** *Soils of South West England* (1:250,000), Sheet 5

⁵ **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 Seven soil profiles were examined using an Edelman (Dutch) auger at an observation density of approximately 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/10868/1. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 120 cm 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 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 15 cm 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 Hodgson⁶ which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines. Observations were of restricted depth due to the dry ground conditions at the time of survey.
- 3.6 Agricultural land quality at the site is limited by wetness and workability, as well as the overriding climatic limitation, to Grade 2. There is one soil type.
- 3.7 The topsoil is silt loam in the east, medium clay loam to sandy silt loam in the centre and medium silty clay loam in the west. The topsoil is dark brown or occasionally dark greyish brown (10YR3/3 or 10YR4/2 in the Munsell soil colour charts⁷), slightly stony and friable. The structure is weakly developed, with medium subangular blocky peds.
- 3.8 Observations of subsoil were limited due to the very dry ground conditions but the upper subsoil comprises silt loam or medium silty clay loam textures. Most is brown (10YR4/3), or dark greyish brown in the east (10YR4/2). There is some mottling in the upper subsoil, which is gleyed in the south-eastern profile. In the west, the upper subsoil is slightly stony but across most of the site it is moderately stony, with around 25% stone by volume, comprising large stones. The upper subsoil is friable with a weak, fine angular blocky structure.
- 3.9 The maximum depth of observation across all profiles was 50 cm. Aligning with the mapped soil types, it is assumed that the profiles continue to be moderately stony and permeable to depth.
- 3.10 The soil profiles are therefore assessed as WC I and have a slight wetness and workability limitation to Grade 2, as well as the overriding climatic limitation, also the Grade 2.
- 3.11 The area of each ALC grade is given in Table 2 and the ALC distribution is shown in Figure RAC/10868/2. Photographs taken at the site are given in Appendix 3.

Table 2: ALC areas

Grade	Description	Area (ha)	%
Grade 2	Very good quality	8.1	99
Non-agricultural		0.1	1
Total		8.2	100

⁶ Hodgson, J. M. (Ed.) (1997). *Soil survey field handbook*. Soil Survey Technical Monograph No. 5, Silsoe.

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

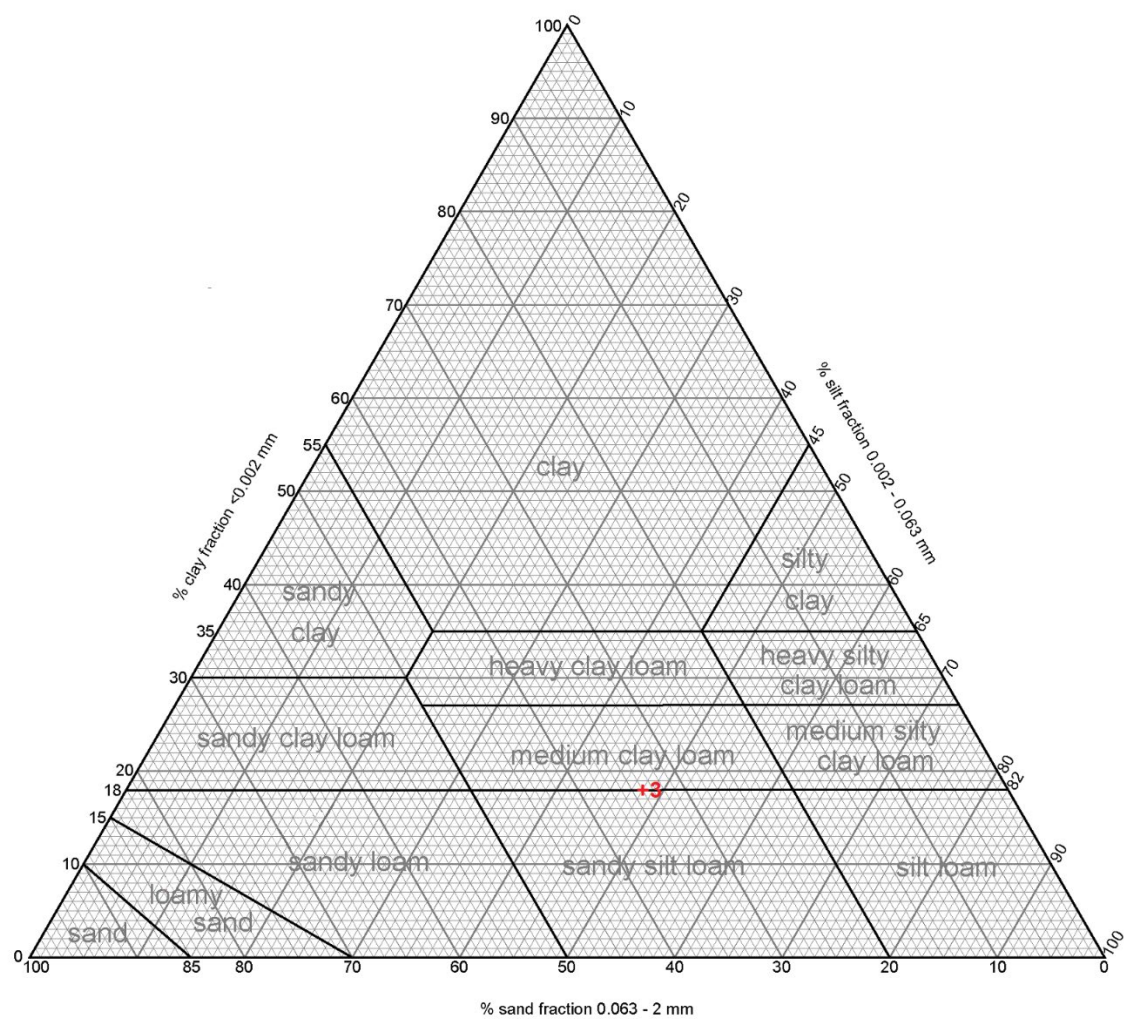
Appendix 1: Laboratory Data

Determinand	Pit 1	Units
Sand 2.00-0.063 mm	34	% w/w
Silt 0.063-0.002 mm	48	% w/w
Clay <0.002 mm	18	% w/w
Organic Matter	3.0	% w/w
Texture	Medium clay loam / Sandy silt loam	

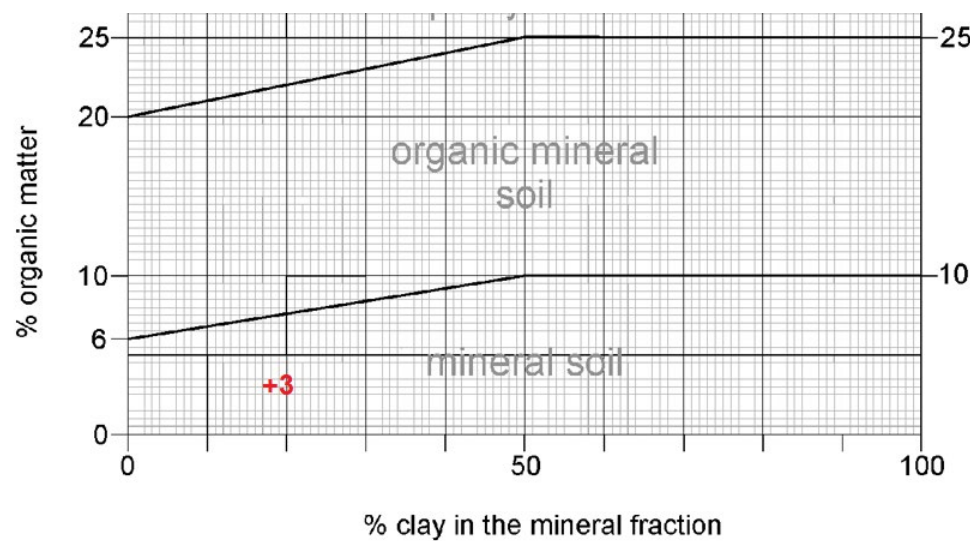
Determinand	Pit 1	Units
Soil pH	6.2	
Phosphorus (P)	26.2	mg/l (av)
Potassium (K)	177	mg/l (av)
Magnesium (Mg)	60.3	mg/l (av)

Determinand	Pit 1	Units
Phosphorus (P)	3	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		
%	TA _v	EA _v
hard	1	0.5
chalk	10	7

hard flint & pebble

Climate Data	
MDwheat	80
MDpotato	65
FCD	199

Wetness Class Guidelines	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>
SPL within 80cm, gleying within 40cm		>54cm	<54cm	
SPL within 80cm, gleying at 40-70cm	>72cm	<72cm		
No SPL but gleying within 40cm	coarse subsoil	<i>I</i>	other cases	<i>II</i>

Maximum depth of auger penetration is underlined

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	23		ZL			5	0		50	50	n	n	<i>I</i>	2	2	WE
		23	35		ZL			25	0		20	20	n	n				
		<u>35</u>	60		ZL			25	0		36	42	n	n				
		60	120		ZL			25	0		<u>64</u>	<u>17</u>	n	n				
										Total	170	129						
										MD	90	64						
										Droughtiness grade (DR)		1	1					
2	T	0	26		ZL			5	0	-	57	57	n	n	<i>I</i>	2	2	WE
		26	30		ZL	Fe	com	25	0		7	7	y	n				
		<u>30</u>	60		ZL	Fe	com	25	0		44	50	y	n				
		60	120		ZL			25	0		<u>64</u>	<u>17</u>	n	n				
										Total	172	131						
										MD	92	66						
										Droughtiness grade (DR)		1	1					
3 Pit	T	0	28	mCL	10YR3/3			5	0	-	48	48	n	n	<i>I</i>	2	2	WE
		28	40	mZCL	10YR4/3	Fe	com	25	0		16	16	n	n				
		<u>40</u>	60	mZCL	10YR4/3	Fe	com	25	0		21	26	n	n				
		60	120	mZCL				25	0		<u>46</u>	<u>13</u>	n	n				
										Total	130	103						

										MD	50	38						
										Droughtiness grade (DR)	1	1						
4	T	0	26	mCL	10YR3/3			5	0	-	45	45	n	n	/	2	2	WE
		26	30	mZCL	10YR4/3	Fe	com	25	0		5	5	n	n				
		<u>30</u>	60	mZCL	10YR4/3	Fe	com	25	0		34	39	n	n				
		60	120	mZCL				25	0		46	13	n	n				
										Total	129	102						
										MD	49	37						
										Droughtiness grade (DR)	1	1						
5	T	0	23	mCL	10YR3/3			5	0	-	39	39	n	n	/	2	2	WE
		23	30	ZL	10YR4/3	Fe	com	25	0		12	12	n	n				
		<u>30</u>	60	ZL	10YR4/3	Fe	com	25	0		44	50	n	n				
		60	120	ZL				25	0		64	17	n	n				
										Total	159	118						
										MD	79	53						
										Droughtiness grade (DR)	1	1						
6	T	0	30	mZCL	10YR4/2			2	0	-	56	56	n	n	/	2	2	WE
		30	50	mZCL	10YR4/3	Fe	com	10	0		31	31	n	n				
		<u>50</u>	60	mZCL	10YR4/3	Fe	com	10	0		9	15	n	n				
		60	120	mZCL				10	0		54	15	n	n				
										Total	150	118						
										MD	70	53						
										Droughtiness grade (DR)	1	1						
7	T	0	22	mZCL	10YR4/2			5	0	-	40	40	n	n	/	2	2	WE
		22	28	ZL	10YR4/3			25	0		10	10	n	n				
		<u>28</u>	60	ZL	10YR4/3			25	0		47	54	n	n				
		60	120	ZL				25	0		64	17	n	n				
										Total	161	120						
										MD	81	55						
										Droughtiness grade (DR)	1	1						

Appendix 3: Photographs



Pit 1



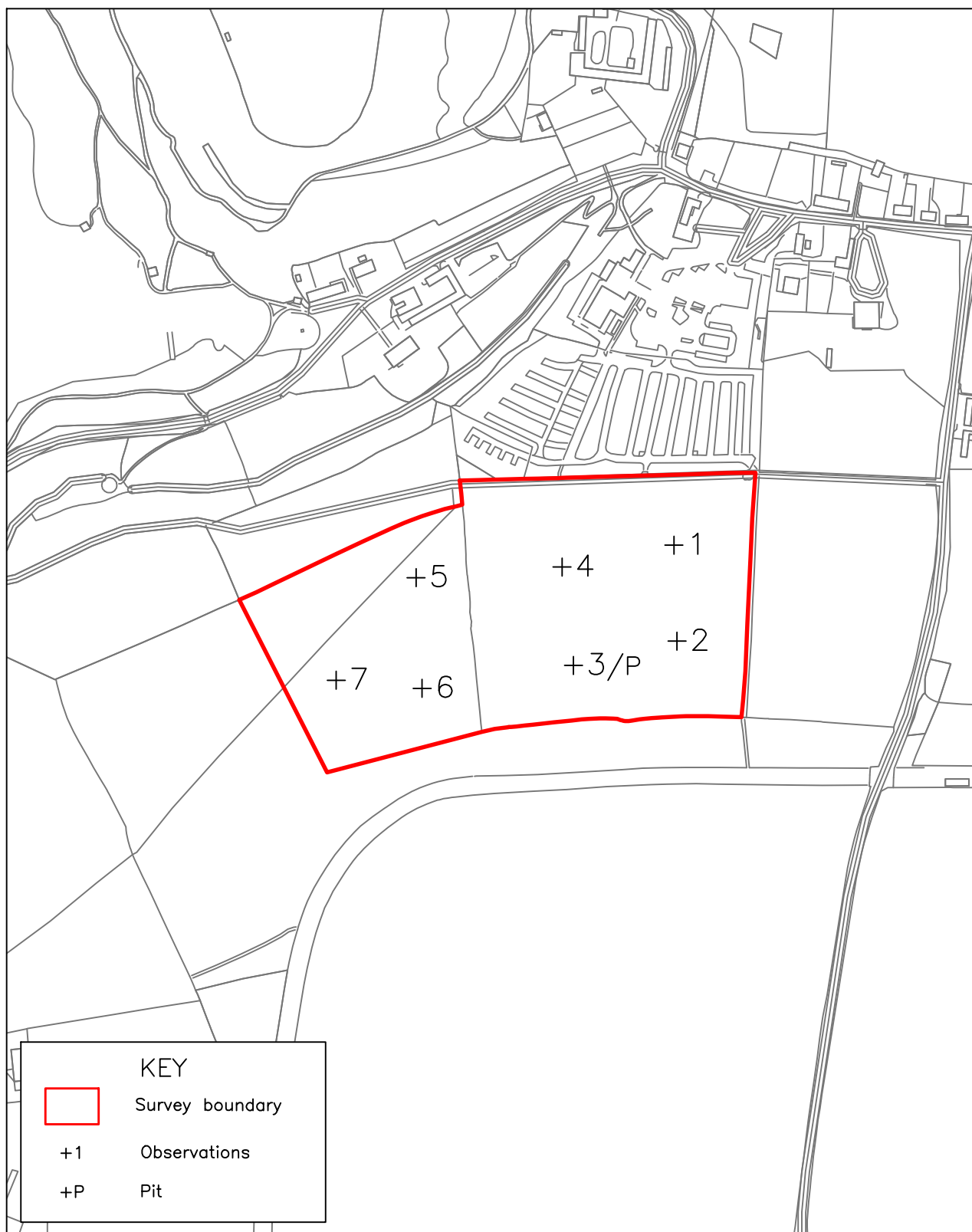
Pit wall and base



Pit topsoil



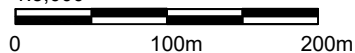
Pit upper subsoil and large stones



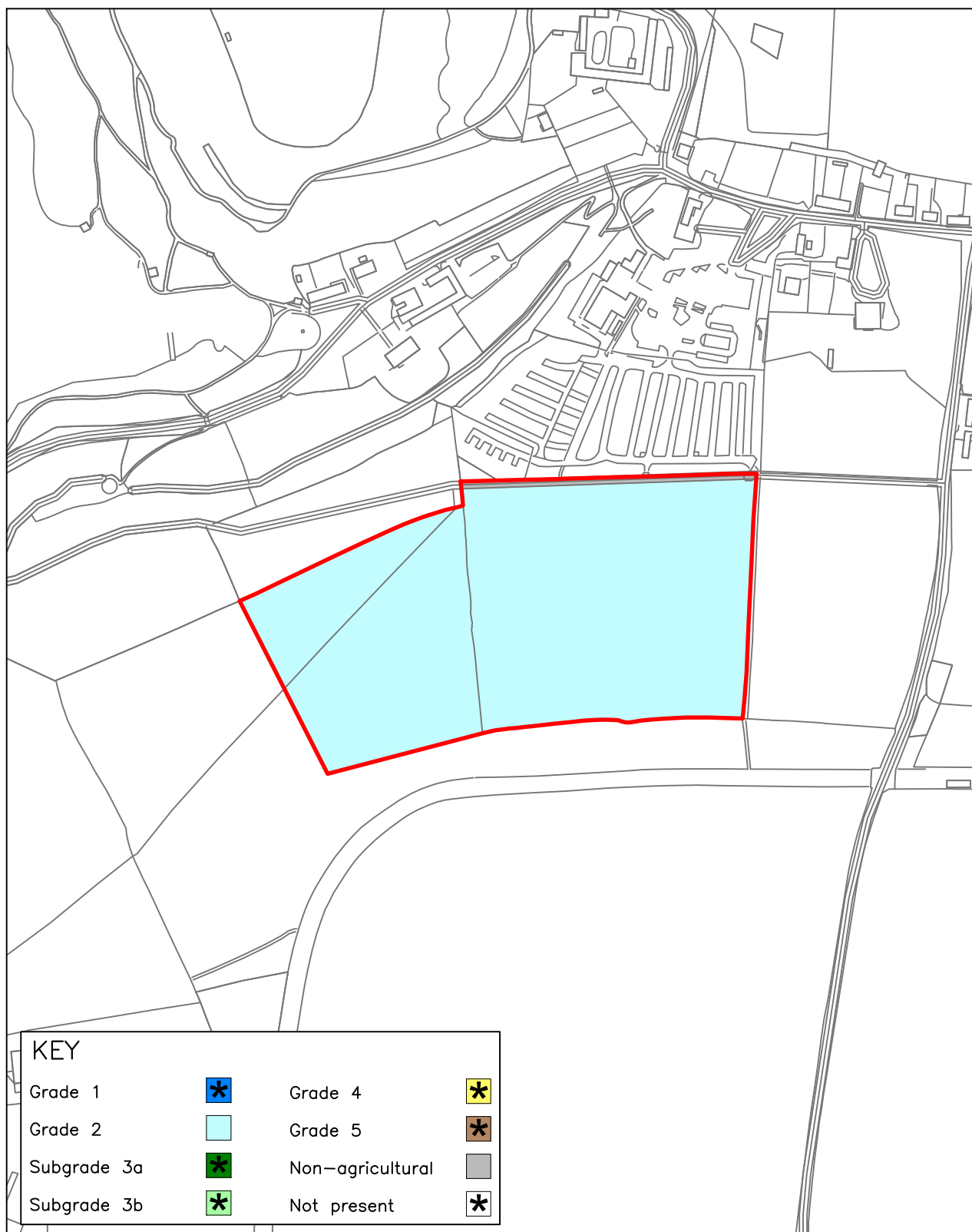
KEY	
	Survey boundary
+1	Observations
+P	Pit

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1:5,000

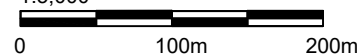


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