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Anwyl Land Limited

Agricultural Land Classification and Soil Resources

at

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1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Anwyl Land Limited to investigate the Agricultural Land Classification (ALC) and soil resources of land off Langley Common Road, Arborfield, 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.* MAFF Publications.

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. 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 2.4ha of grassland in a single triangular parcel. The site is bounded along the eastern edge by Langley Common Road, to the west by residential properties off Rickman Close and to the north-west and north by other agricultural grassland.
- 2.2 The site is largely level at around 55m above Ordnance Datum (AOD).
- 2.3 Drainage of the site is through a drain in the northern corner and also through the soil profile. The north of the site is at medium to high risk of surface water flooding³ following the route of the drain that flows east across the site.

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 55m AOD, and are given in Table 1. The climate at the site is warm and with moderate rainfall. Moisture deficits are moderately large to large. The number of Field Capacity Days is smaller than is average for lowland England (150) and is favourable for providing opportunities for agricultural field work. There is no overriding climatic limitation to agricultural land quality.

³ **Environment Agency (2023).** *Map of long term flood risk.* Available at <https://check-long-term-flood-risk.service.gov.uk/map?easting=476293&northing=166697&map=RiversOrSea>

Table 1: Local agro-climatic conditions

Parameter	Value
Grid Reference	SU 76598 66260
Average Annual Rainfall	668mm
Accumulated Temperatures >0°C	1,462 day°
Field Capacity Days	137 days
Average Moisture Deficit, wheat	114mm
Average Moisture Deficit, potatoes	108mm

Soil parent material and soil type

- 2.5 The underlying geology mapped by the British Geological Survey⁴ across the site is the London Clay Formation, consisting of blue-grey or grey-brown silty clay with common carbonate concretions. No superficial deposits are mapped.
- 2.6 The Soil Survey of England and Wales soil association mapping⁵ (1:250,000 scale) shows the Wickham 4 association across the site, characterised by silty clay loam or clay loam upper horizons passing to increasingly grey clay with depth. The subsoils are slowly permeable and most of the soils are poorly drained in Wetness Class (WC) IV.
- 2.7 The Bursledon association is mapped in close proximity to the west. Profiles of the main soil series, the Bursledon series, include sandy loam or clay loam topsoils, over clay loam or sandy clay loam subsoils, passing to interbedded sand and clay at depth. Near Reading, the Ellingham series is also common, comprising sandy loam topsoil and upper subsoil which passes to slowly permeable sandy clay loam lower subsoil. The profiles are typically in WC II or III⁶.

⁴ **British Geological Survey (2023).** *BGS Geology Viewer*, <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/>

⁵ **Soil Survey of England and Wales (1984).** *Soils of South East England* (1:250,000), Sheet 6

⁶ **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 Ground conditions were extremely dry at the time of survey. Four locations were selected in which to observe soil profiles using an Edelman (Dutch) auger. One soil pit was also attempted to examine subsoil structures and stone content. The locations of observations are indicated on Figure RAC/10086/1. 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;
 - significant stoniness;
 - 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 at the site is limited variably by soil wetness and/or droughtiness to Grade 2 or Subgrade 3a. The soils identified align with soils of the Bursledon association mapped immediately to the west of the site.
- 3.7 There is one main topsoil type across the site, comprising medium sandy loam or, in the north, medium clay loam which is very dark greyish brown or dark greyish brown (10YR3/2 or 10YR4/2 in the Munsell soil colour charts⁸). The topsoil is stoneless to very slightly stony. There is a dense root mat at the surface, below which the topsoil structure is moderately well developed with fine subangular blocky peds.
- 3.8 The upper subsoil in the centre of the site at the pit location comprises brown (10YR5/3) medium sandy loam which has a weakly developed structure such that the soil was solid and difficult to extract, although once excavated was seen to form fine angular blocky peds. Ochreous mottles and ferrimanganiferous concretions are present in the upper subsoil and are indicative of prolonged and repeated wet conditions. It is assumed that a slowly permeable lower subsoil horizon is responsible for such conditions within an otherwise permeable horizon. The profile is assessed as WC III and with sandy loam topsoil is limited to Grade 2 by both wetness and droughtiness.
- 3.9 A profile observed in the north of the site in closer proximity to the drain includes an upper subsoil of brown (10YR5/3) sandy clay loam. There is no stone, the consistency is friable, and the soil is gleyed but is permeable.
- 3.10 The sandy clay loam passes to sandy clay at a depth of 42cm which was moist and had a sticky, compressible consistency at the time of survey. The lower subsoil is also mottled and gleyed and has reduced permeability. This profile is also in WC III and is limited by wetness to Subgrade 3a with a medium clay loam topsoil.
- 3.11 The ALC distribution within the site is shown in Figure RAC/10086/2 and the areas of each grade are given in Table 2. Photographs taken at the site are given in Appendix 3.

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

Table 2: ALC areas

Grade	Description	Area (ha)	% of agricultural land
Grade 2	Very good quality	1.8	75
Subgrade 3a	Good quality	0.6	25
Total Agricultural		2.4	100

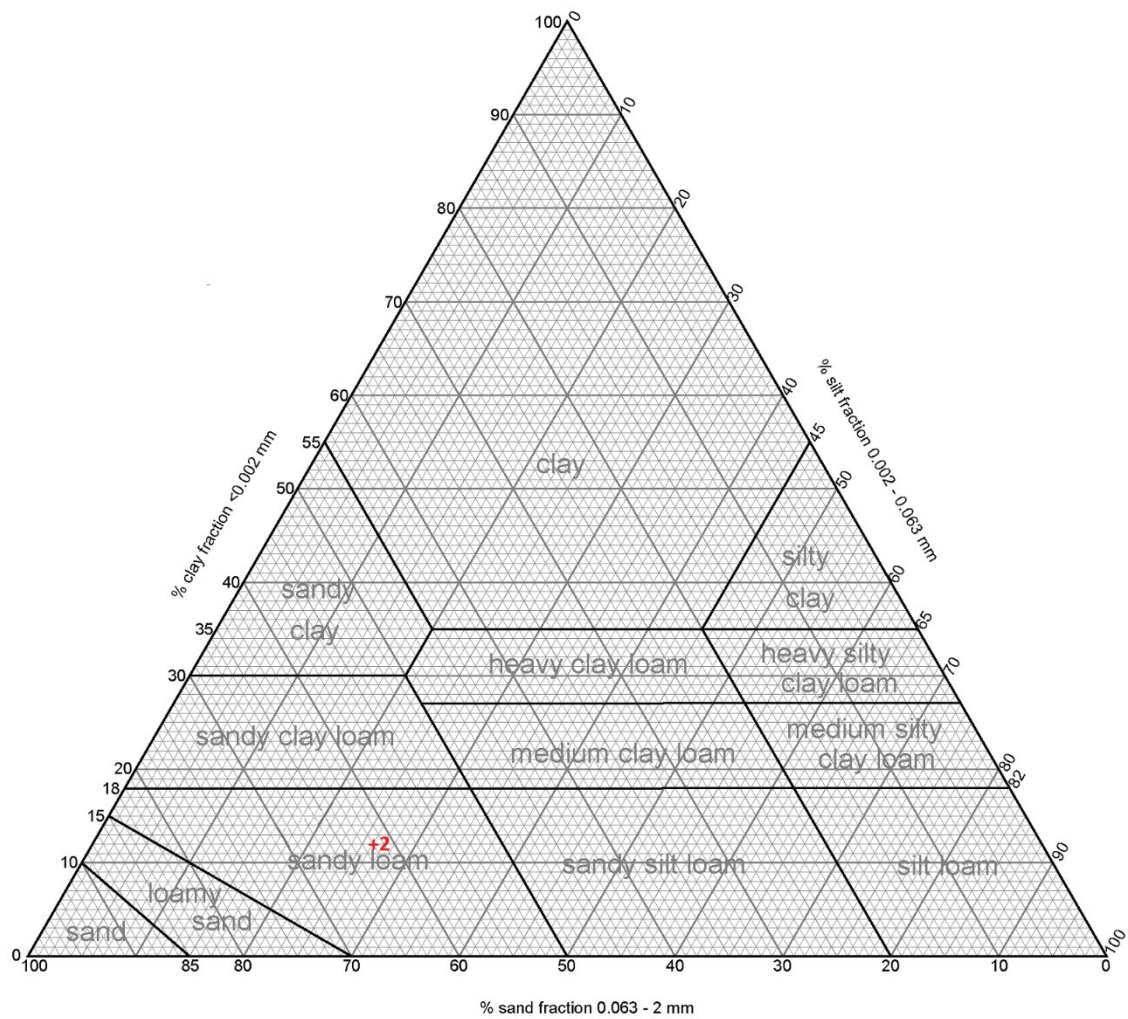
Appendix 1: Laboratory Data

Determinand	Site 2	Units
Sand 2.00-0.063 mm	62	% w/w
Silt 0.063-0.002 mm	26	% w/w
Clay <0.002 mm	12	% w/w
Organic Matter	2.7	% w/w
Texture	Sandy Loam	

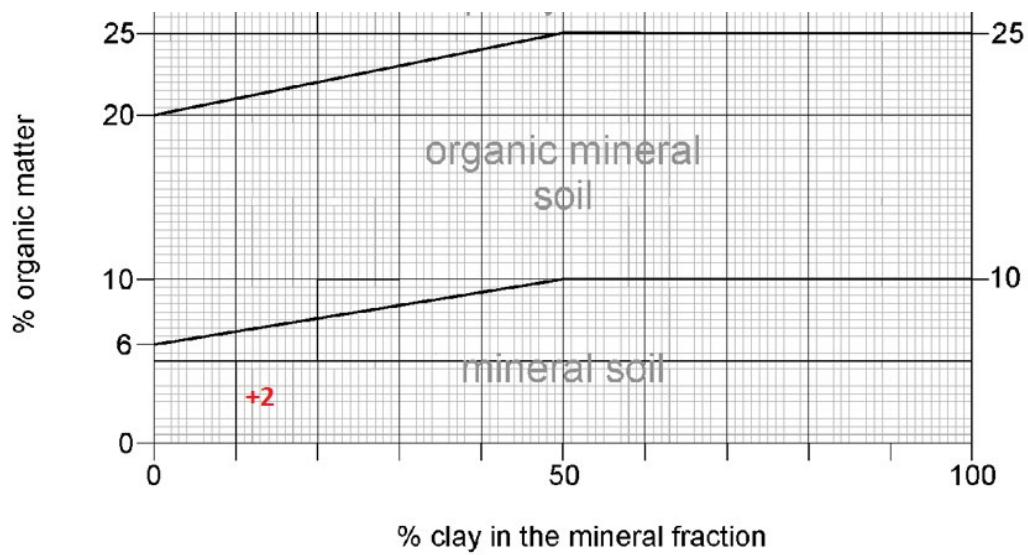
Determinand	Site 2	Units
Soil pH	5.5	
Phosphorus (P)	5.2	mg/l (av)
Potassium (K)	62.8	mg/l (av)
Magnesium (Mg)	70.8	mg/l (av)

Determinand	Site 2	Units
Phosphorus (P)	0	ADAS Index
Potassium (K)	1	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	114	SPL within 80cm, gleying within 40cm	>65cm	37-65cm	<37cm		1462 D°	
hard	1	0.5	MDpotato	108	SPL within 80cm, gleying at 40-70cm	>49cm	<49cm			Limitation	
chalk	10	7	FCD	137	No SPL but gleying within 40cm	coarse subsoil	I	other cases	II	Grade 1	
hard	flint & pebble		AAR	668	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	mSL		10YR3/2			0	0									
2	T 0 24	mSL		10YR3/2			0	0	-	41	41	n	n	III	2	2	WE DR
Pit	24 34	mSL		10YR5/3	FeMn	com	10	0		14	14	y	n				
	34 45	SCL		10YR5/3	FeMn	com	10	0		15	15	y	n				
	45 120	SC					0	0	poor	63	33	y	y				
									Total	132	102						
									MB	18	-6						
									Droughtiness grade (DR)	2	2						
3	T 0	mSL		10YR3/2			0	0	-								
4	T 0 34	mCL		10YR4/2			0	0	-	61	61	n	n	III	3a	3a	WE
	34 42	SCL		10YR5/3	FeMn	com	0	0		12	12	y	n				
	42 55	SC		10YR5/3	Fe	com	0	0	poor	14	17	y	y				
	55 120	SC		10YR5/3	Fe	com	0	0	poor	52	20	y	y				
									Total	140	110						
									MB	26	2						
									Droughtiness grade (DR)	2	2						

Appendix 3: Photographs



Pit 1



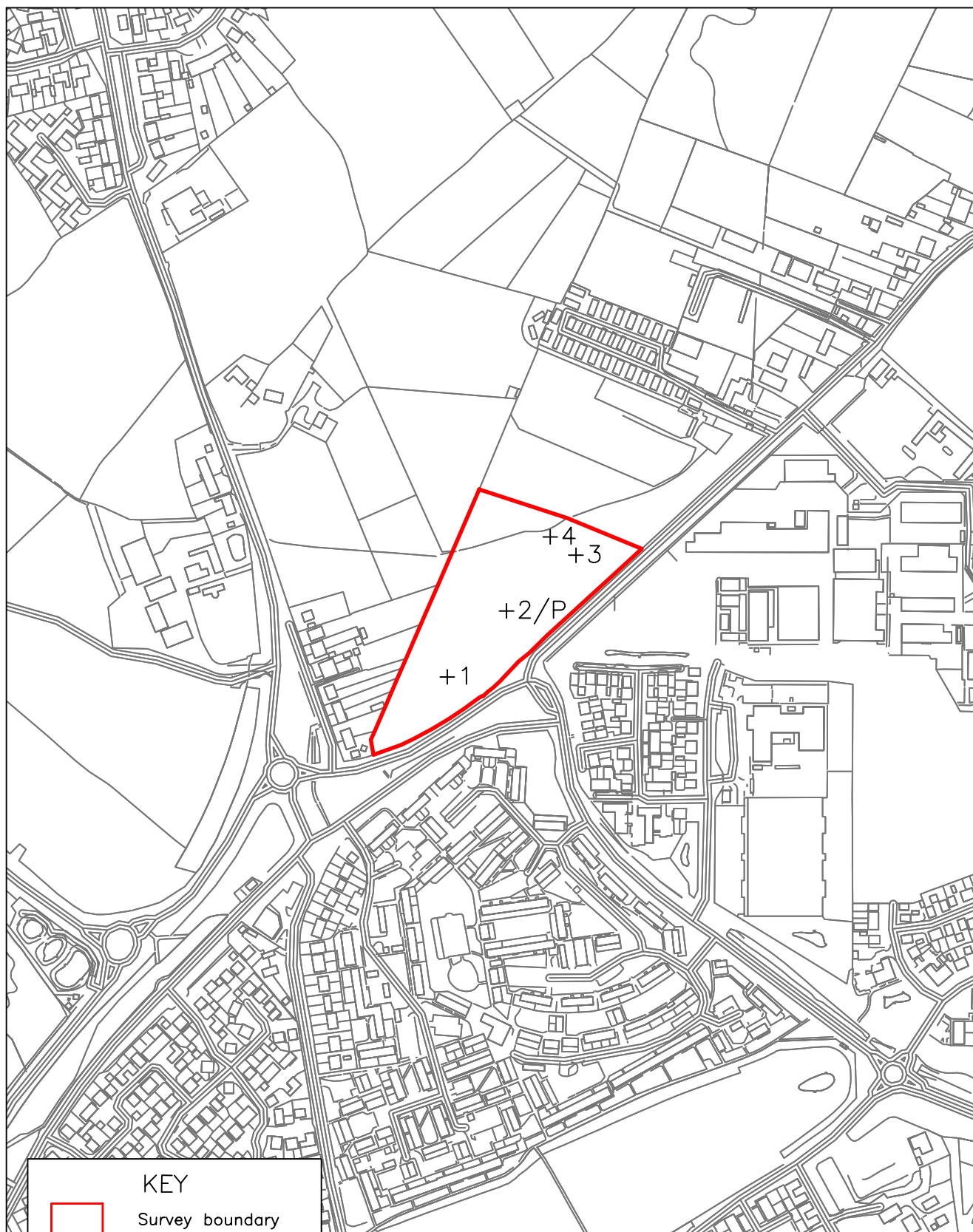
Pit topsoil



Pit subsoil

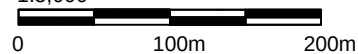


Profile 4 near drain



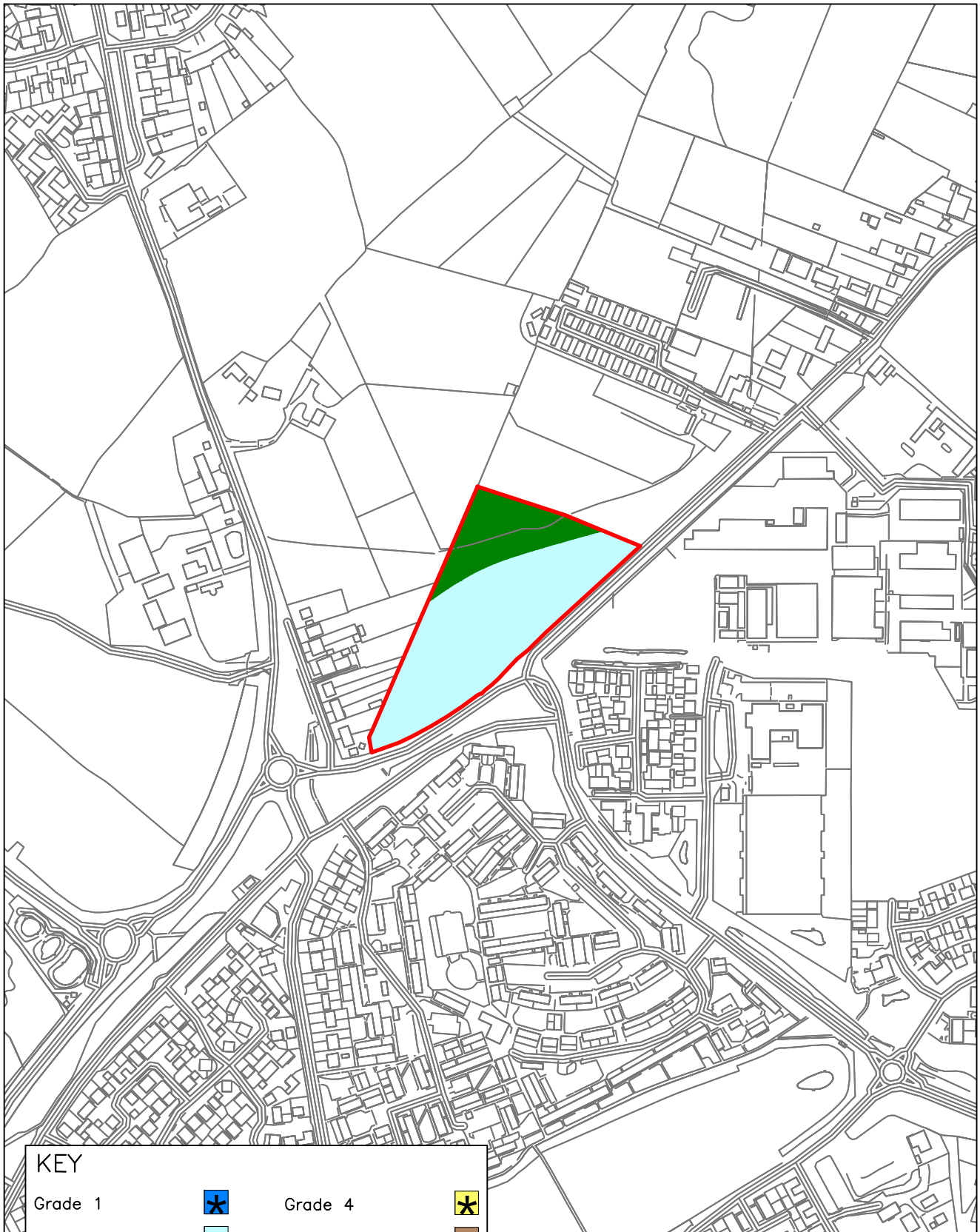
KEY	
	Survey boundary
+1	Observations
+P	Pit

1:5,000



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	Scales 1:5,000@A4	Date 08/2023			
			Rev.	Comment	Date



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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