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Robert Hitchins Limited

Agricultural Land Classification and Soil Resources

at

Land Off Windsor Drive, Devizes, Wiltshire

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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 off Windsor Drive, 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. 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 2.9ha, comprising an arable field and a short section of highway. Windsor Drive and residential properties bound the site to the west, other agricultural land is to the south and north, and Gypsy Patch is to the east.
- 2.2 The topography is characterised by a north-west-facing hillside which falls from an altitude of around 150m to around 140m 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 145m 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 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 01800 61900
Average Annual Rainfall	757mm
Accumulated Temperatures >0°C	1,379 day°
Field Capacity Days	169 days
Average Moisture Deficit, wheat	99mm
Average Moisture Deficit, potatoes	88mm

Soil parent material and soil type

- 2.5 The bedrock geology mapped by the British Geological Survey³ across most of the site belongs to the West Melbury Marly Chalk Formation, consisting of buff, grey and off-white soft marly chalk and hard limestone. In the very north of the site, sand and sandstone of the Upper Greensand Formation is mapped. There are no mapped superficial deposits.
- 2.6 The Soil Survey of England and Wales soil association mapping⁴ (1:250,000 scale) shows the Upton 2 association at the site, with Ardington association in close proximity to 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 sources⁵.

3 Agricultural land quality

Soil survey methods

- 3.1 Three 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/10608/1a. 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;

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.

- 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 Hodgson⁶ 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 by soil wetness, mostly to Subgrade 3b with approximately one-third Subgrade 3a.
- 3.7 There is one soil type at the site which includes very dark greyish brown (10YR3/2 in the Munsell soil colour charts⁷) clay topsoil of around 28cm average depth. The topsoil is non-calcareous and very slightly stony. There is slight compaction in the topsoil which has a firm consistency and weak, medium angular blocky structure. Few fine roots and only one worm were observed in the topsoil excavated from the pit.

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

- 3.8 The base of the upper subsoil layer generally becomes shallower as altitude increases, with recorded depths to 48cm, 40cm and 36cm from lowest to highest point assessed. The upper subsoil is greyish brown (10YR5/2) clay which is very slightly calcareous. There are no stones. The clay is ochreous mottled and very stiff, representing a gleyed and slowly permeable layer (SPL) in the southern and northern profiles (being just over 15cm thick).
- 3.9 The lower subsoil is a mix of very calcareous, light yellowish brown (2.5Y6/3) clay and chalk. The clay breaks to fine angular blocky peds under light to medium pressure. The lower subsoil is permeable. The easternmost profile at the highest altitude is therefore in WC I and is limited by wetness to Subgrade 3a due to the clay topsoil texture.
- 3.10 Although the other two profiles have a SPL within 46cm, which would lead to WC IV, the layer is thin (17 and 18cm each) and only marginal to SPL. Being directly underlain by the permeable chalk material, which makes up a much larger proportion of the profile (72 to 80cm), will facilitate water movement through the upper subsoil. With clay topsoil, profiles in WC III (or II) have a wetness limitation to Subgrade 3b.
- 3.11 The ALC distribution within the site is shown in Figure RAC/10608/2a 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)	%
Subgrade 3a	Good quality	0.9	31
Subgrade 3b	Moderate quality	1.7	59
Non-agricultural		0.3	10
Total		2.9	100

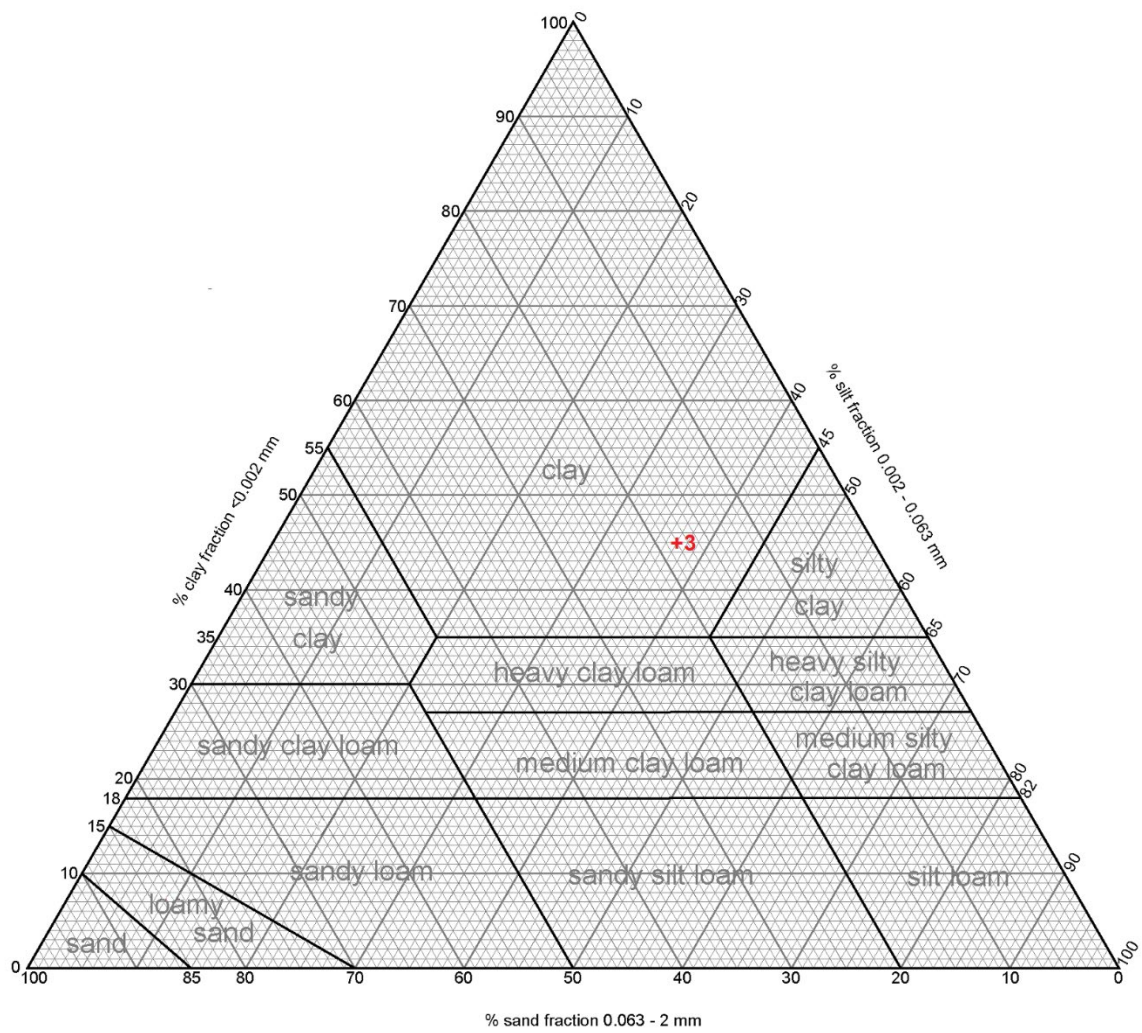
Appendix 1: Laboratory Data

Determinand	Site 3	Units
Sand 2.00-0.063 mm	18	% w/w
Silt 0.063-0.002 mm	37	% w/w
Clay <0.002 mm	45	% w/w
Organic Matter	6.6	% w/w
Texture	Clay	

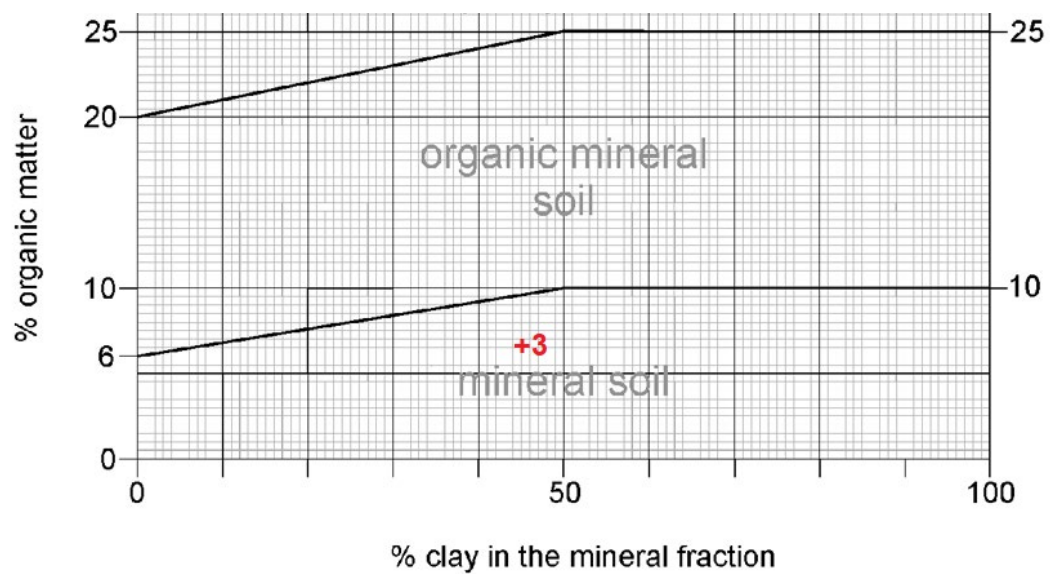
Determinand	Site 3	Units
Soil pH	8.3	
Phosphorus (P)	35.4	mg/l (av)
Potassium (K)	727	mg/l (av)
Magnesium (Mg)	104	mg/l (av)

Determinand	Site 3	Units
Phosphorus (P)	3	ADAS Index
Potassium (K)	5	ADAS Index
Magnesium (Mg)	3	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	99	SPL within 80cm, gleying within 40cm	>73cm	46-73cm	<46cm	V	1379 D° Limitation Grade 1	
hard	1	0.5	MDpotato	88	SPL within 80cm, gleying at 40-70cm	>60cm	<60cm				
chalk	10	7	FCD	169	No SPL but gleying within 40cm	coarse subsoil	I	other cases	II		
hard	flint & pebble		AAR	757	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	48	C	v.sli	10YR5/2	Fe	com	0	0	poor	23	23	y	y				
		48	90	C	very	2.5Y6/3			0	10		35	34	n	n				
		90	120	C	very	2.5Y6/3			0	25		23	0	n	n				
	Total											132	108	Not WC IV due to lower subsoil					
	MB											33	20						
	Droughtiness grade (DR)												1	1					
2	T	0	23	C		10YR3/2			1	0	-	39	39	n	n	///	3b	3b	WE
		23	40	C	v.sli	10YR5/2	Fe	com	0	0	poor	22	22	y	y				
		40	120	C	very	2.5Y6/3			0	10		71	46	n	n				
		Total											132	107	Not WC IV due to lower subsoil				
	MB											33	19						
	Droughtiness grade (DR)												1	1					
	3 Pit	T	0	30	C		10YR3/2			1	0	-	51	51	n	n	/	3a	3a
30			36	C	mod	10YR5/2			0	5		9	9	n	n				
36			42	C	very	2.5Y6/3			0	25		9	9	n	n				
42			120	C	very	2.5Y6/3			0	25		66	41	n	n				
Total											134	109							
MB											35	21							
Droughtiness grade (DR)												1	1						

Appendix 3: Photographs



Profile 2



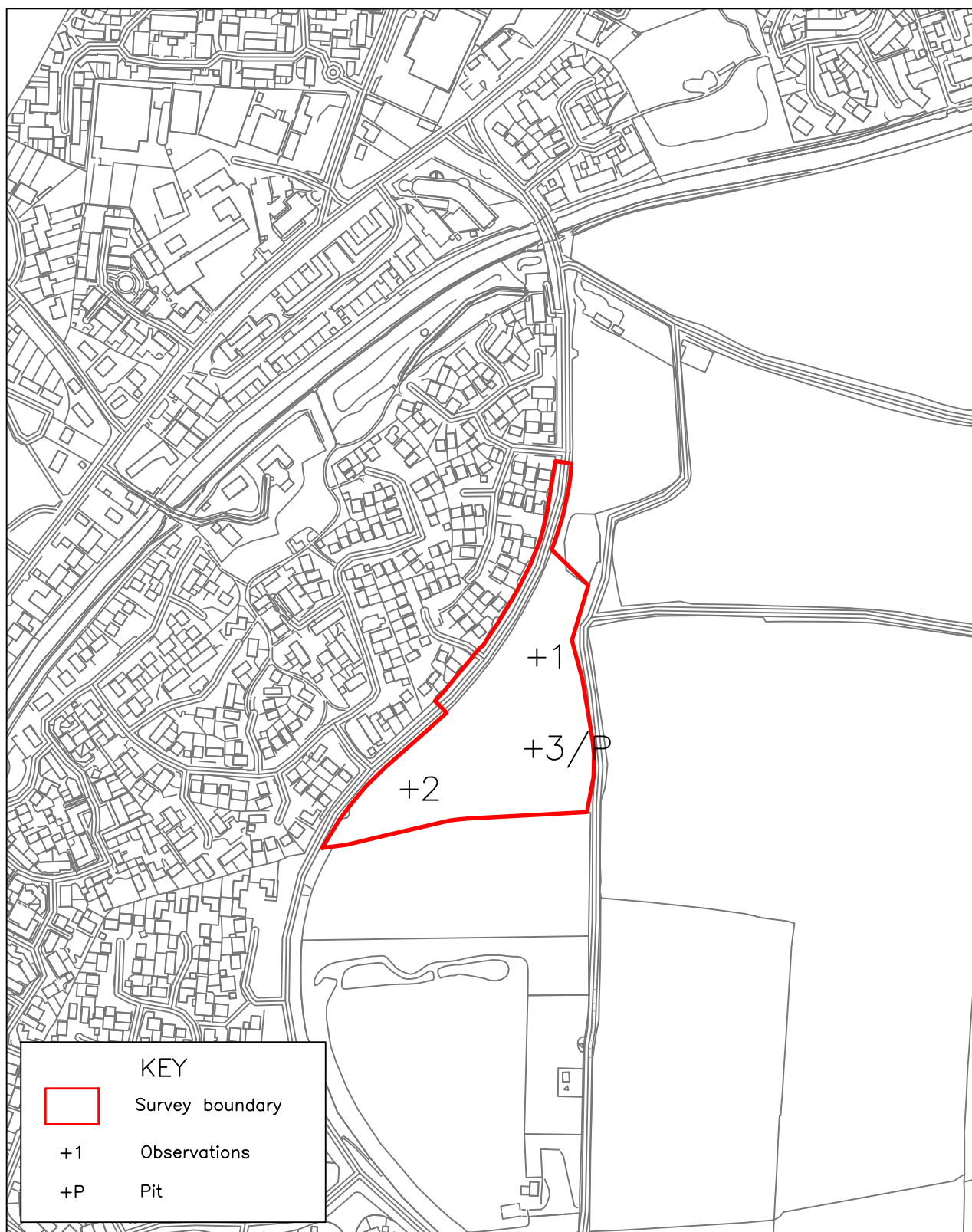
Pit 1



Pit 1 topsoil

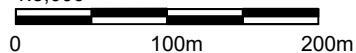


Pit 1 subsoil and chalk

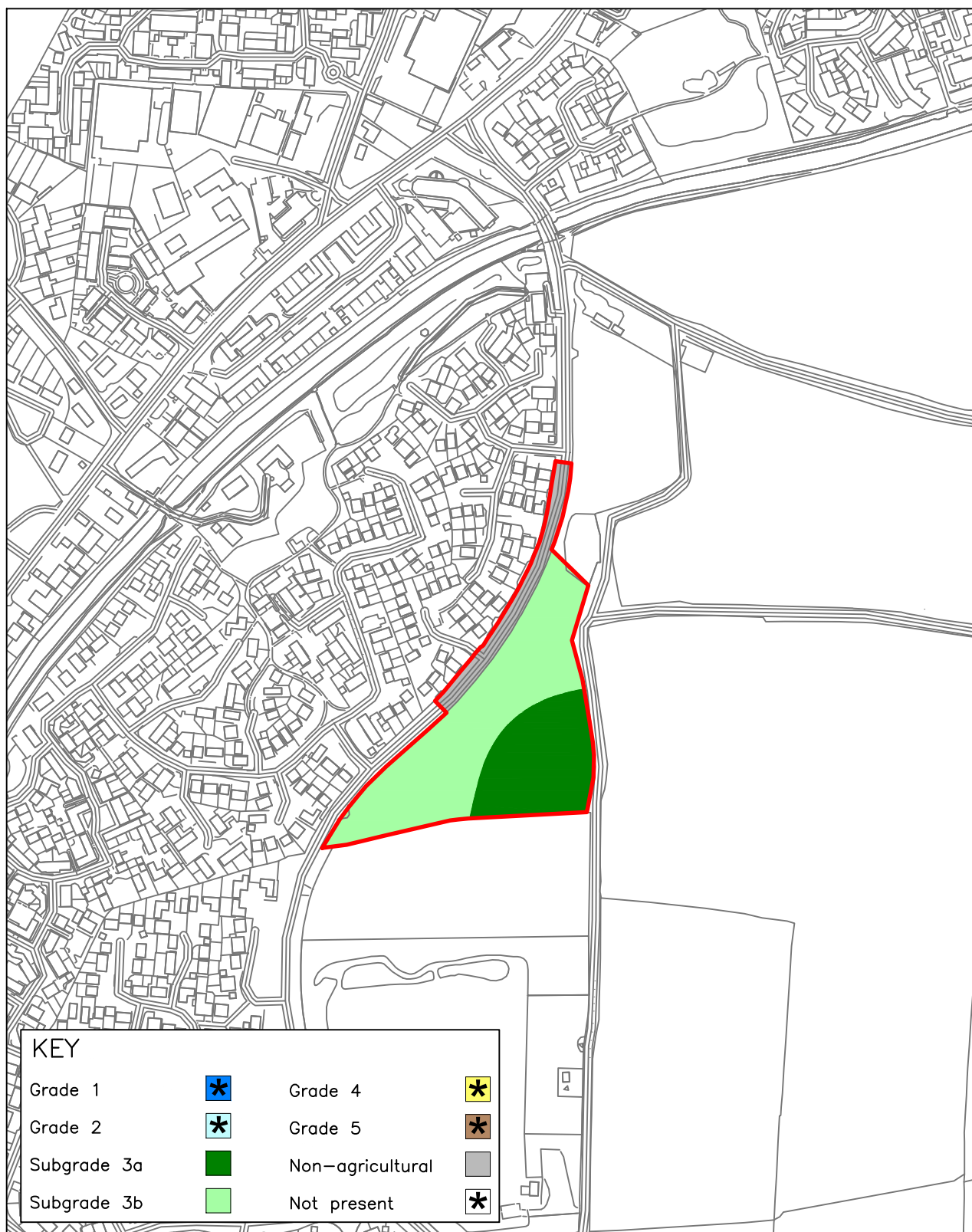


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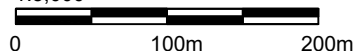


KEY

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

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