

Land at Bayards, Level Mare Lane, Eastergate

Agricultural Land Classification and Soil Resources

August 2021

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1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Reside Developments Ltd to investigate the Agricultural Land Classification (ALC) and soil resources of the land at Bayards, Level Mare Lane, Eastergate 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 land (1988)¹, and summarised in Natural England's Technical Information Note 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 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 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 MAFF guidelines.

2 Site and climatic conditions

General features, land form and drainage

- 2.1 The site extends to approximately 2.1ha of grass paddocks in equestrian use, and is bounded to the north by Level Mare Lane, to the south by a track leading to Northfield Farmhouse and to the west by Bayard Stables and other grass paddocks. Land to the east was granted permission in December 2020 for the development of 42 dwellings (application reference BN/50/20/PL), with construction about to commence.
- 2.2 Topography across the site is flat at around 17m above Ordnance Datum (AOD). Land drainage is primarily through the soil profile.

Agro-climatic conditions

- 2.3 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 17m AOD, and are given in Table 1. The site has relatively warm and moist climate, with large crop moisture deficits. The number of Field Capacity Days is above average for lowland England (150) and is slightly unfavourable for providing opportunities for agricultural field work.

Table 1: Local agro-climatic conditions

Parameter	Value
Average Annual Rainfall	786mm
Accumulated Temperatures >0°C	1,529 day°
Field Capacity Days	161 days
Average Moisture Deficit, wheat	115mm
Average Moisture Deficit, potatoes	112mm

Soil parent material and soil type

- 2.4 The principal underlying geology mapped by the British Geological Survey³ (BGS) includes the Lambeth Group Member across the northern and central parts of the site, with the London Clay Formation covering a small portion of the southern boundary.
- 2.5 The Lambeth Group Member comprises vertically and laterally variable sequences mainly of clay, some silty or sandy, with some sands and gravels. The London Clay Formation is characterised by blue-grey or grey-brown clay with variable portions of silt and some sand.
- 2.6 Superficial head deposits overlie the bedrock across the site and include poorly sorted, angular rock debris and/or clayey hillwash material.
- 2.7 The Soil Survey of England and Wales soil association mapping⁴ (1:250,000 scale) shows the Hamble 2 association across the site. These soil are characterised by deep, stoneless silty soils, locally over gravel. These soils are permeable, well drained and typically assessed as Wetness Class (WC) I⁵.

3 Agricultural land quality

Soil survey methods

- 3.1 Three soil profiles were examined across the site, using an Edelman (Dutch) auger at a density of more than one per hectare which is the normal recommendation for ALC surveys². One soil pit was also excavated to examine subsoil structures and stone contents. The locations of observations are indicated on Figure RAC/9268/1. At each observation point the following characteristics were assessed for each soil horizon up to a maximum of 120 cm or any impenetrable layer:

³ **British Geological Survey (2021).** *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 No.15

- soil texture;
- significant stoniness;
- colour (including localised mottling);
- consistency;
- structural condition;
- free carbonate; and
- depth.

- 3.2 A topsoil sample from the pit 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 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 land quality has been carried out according to the MAFF revised ALC guidelines (1988)¹. Soil profiles have been described according to Hodgson (1997)⁶ which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.
- 3.6 There is one soil type present at the site. Topsoil is dark greyish brown to brown (10YR4/2 to 10YR4/3 in the Munsell soil colour charts⁷) medium silty clay loam, to an average depth of 27cm. The topsoil is mostly very slightly stony at 5% by volume, with volumes increasing to the south. Structure is medium subangular blocky and the consistency is friable.

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

- 3.7 The upper subsoil comprises brown to dark yellowish brown (10YR4/3, 10YR4/4) medium silty clay loam. Stone content is predominantly very slight, at 5%, with higher volumes in the south. The upper subsoil structure is medium subangular blocky and the consistency is friable.
- 3.8 The lower subsoil comprises yellowish brown (10YR5/4) heavy silty clay loam. Structure is medium subangular blocky and the consistency is friable. Stone content is predominantly very slight with moderate levels found at depth, around 30%. This moderately stony horizon was observed within the base of Pit 1 and comprises rounded flints of varying sizes.
- 3.9 All of the agricultural land at the site is classified as Grade 2 on a soil droughtiness limitation, as shown in Figure RAC/9268/2.

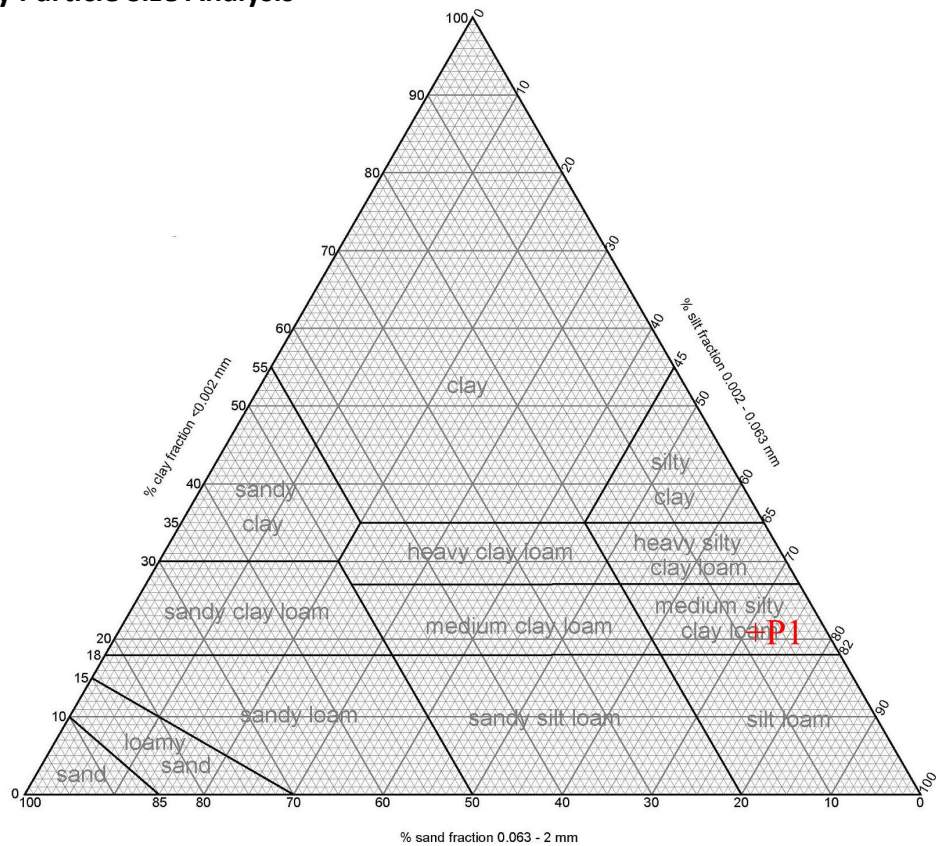
Appendix 1: Laboratory Data

Determinand	P1 Topsoil	Units
Sand 2.00-0.063 mm	8	% w/w
Silt 0.063-0.002 mm	71	% w/w
Clay <0.002 mm	21	% w/w
Organic Matter	1.9	% w/w
Texture	Medium silty clay loam	

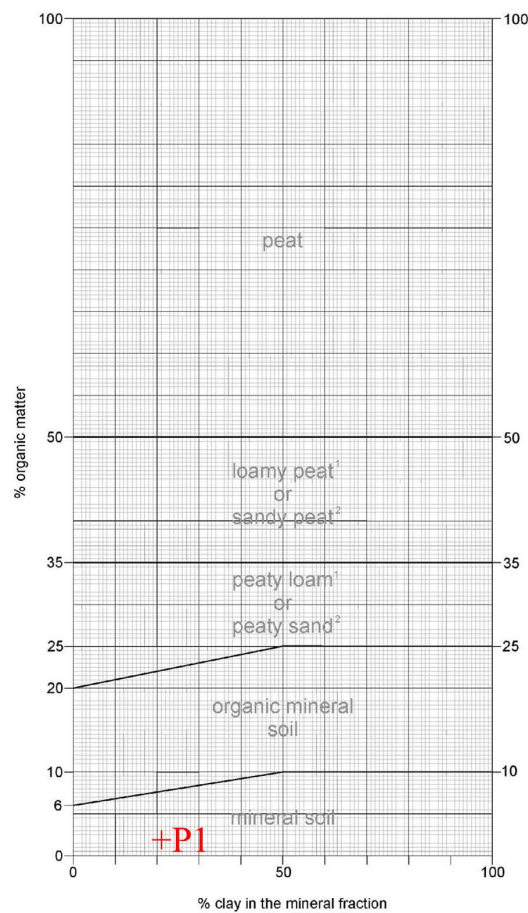
Determinand	P1 Topsoil	Units
Soil pH	5.7	
Phosphorus (P)	7.4	Mg/l (av)
Potassium (K)	57.6	Mg/l (av)
Magnesium (Mg)	77.1	Mg/l (av)

Determinand	P1 Topsoil	Units
Phosphorus (P)	0	ADAS Index
Potassium (K)	0	ADAS Index
Magnesium (Mg)	2	ADAS Index

Soil Texture by Particle Size Analysis



Organic Matter Class



¹ Less than 50% sand in the mineral fraction

² 50% sand or more in the mineral fraction

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

Climate Data	
MDwheat	115
MDpotato	112
FCD	161

Wetness Class Guidelines	II	III	IV	V
SPL within 80cm, gleying within 40cm	>71cm	43-71cm	<43cm	
SPL within 80cm, gleying at 40-70cm	>56cm	<56cm		
No SPL but gleying within 40cm	coarse subsoil	I	other cases	II

hard					flint & pebble		Maximum depth of auger penetration is <u>underlined</u>												
Site		Depth		Texture	CaCO ₃	Colour	Mottle	abund-	stone%	stone%	Struct-	APwheat	AP	Gley	SPL	WC	Wetness	Final	Limiting
No.		cm					colour	ance	hard		ure	mm	potato				grade WE	Grade	Factor(s)
1	T	0	28	mZCL		10YR4/3			5			51	51	n	n	/	1	2	DR
		28	42	mZCL		10YR4/4			5			23	23	n	n				
		42	100	hZCL		10YR5/4			5			61	45	n	n				
		<u>100</u>	120	hZCL		10YR5/4			30			14	0	n	n				
							Total				148	119							
							MD				33	7							
Droughtiness grade (DR)												1	2						
2/P1	T	0	26	mZCL		10YR4/2			5			47	47	n	n	/	1	2	DR
		26	43	mZCL		10YR4/3			5			28	28	n	n				
		43	73	hZCL		10YR5/4			5			33	44	n	n				
		<u>73</u>	120	hZCL		10YR5/4			30			34	0	n	n				
							Total				141	118							
							MD				26	6							
Droughtiness grade (DR)												2	2						
3	T	0	27	mZCL		10YR4/3			10			46	46	n	n	/	1	2	DR
		27	66	mZCL		10YR4/3			12			49	59	n	n				
		<u>66</u>	120	hZCL		10YR5/4			30			39	5	n	n				
							Total				134	110							
							MD				19	-2							
		Droughtiness grade (DR)												2	2				

Appendix 3: Soil Pit Photographs

Pit 1. Topsoil depth



Pit 1. Pit wall

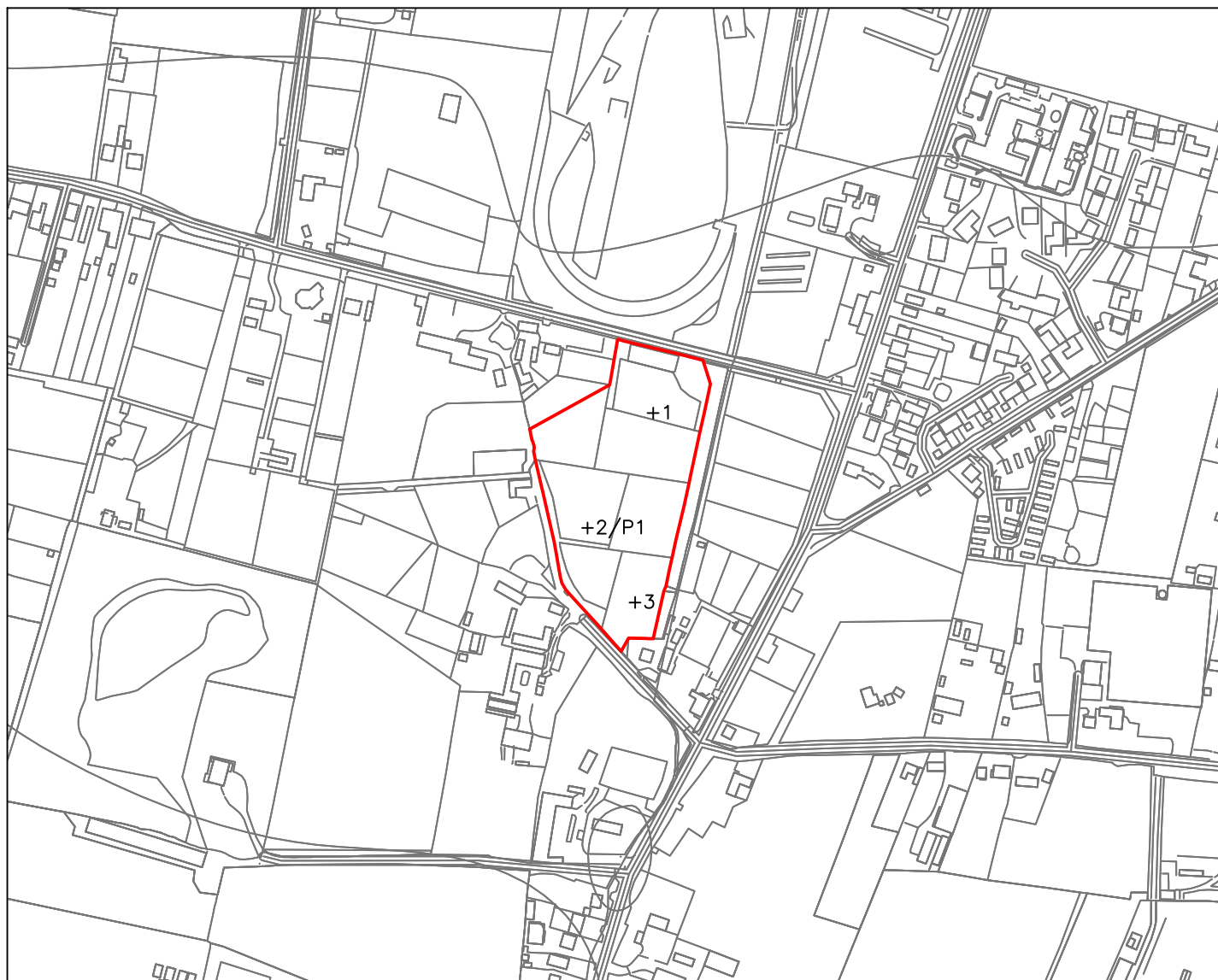


Pit 1: Topsoil



Pit 1. Subsoil



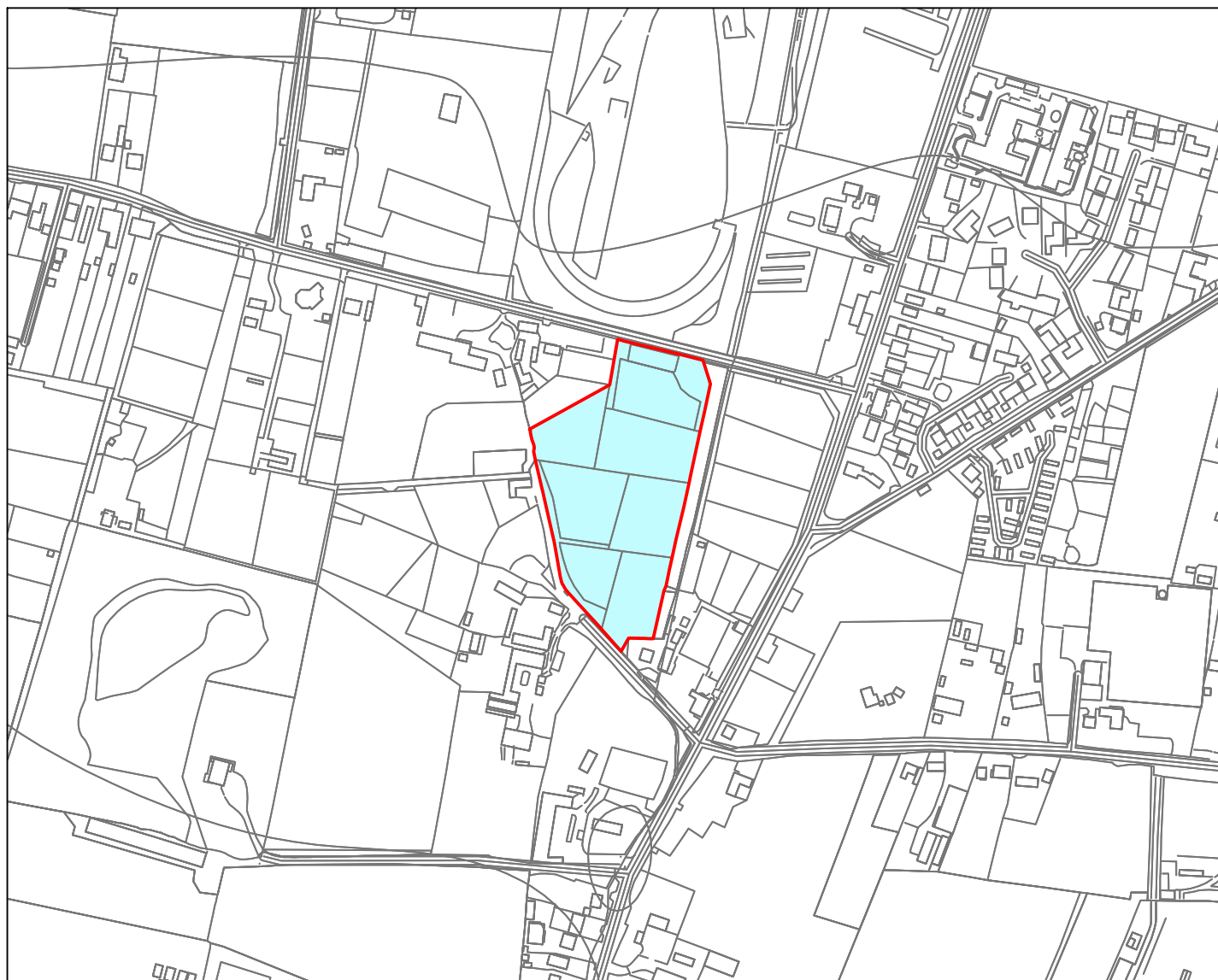


KEY	
	Survey boundary
+1	Observations
+P	Pit

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			Rev.	Comment	Date





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

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