



August 2021

Elan Homes

Agricultural Land Classification and Soil Resources

at

Land off Stocking Lane, Shenington

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1. Introduction

- 1.1. Reading Agricultural Consultants Ltd (RAC) is instructed by Elan Homes to investigate the Agricultural Land Classification (ALC) and soil resources of land off Stocking Lane, Shenington by means of a detailed survey of site and soil characteristics.
- 1.2. Guidance for assessing the quality of agricultural land in England and Wales is set out in the 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 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 established ALC guidelines.

2. Site and climatic conditions

General features, land form and drainage

- 2.1. The site extends to 2.8ha of grassland, grazed by sheep at the time of survey. The site is bordered to the north-east and south-east by Stocking Lane and Rattlecombe Road respectively, which are, in part, separated from the site by residential properties in the eastern corner. Quarry Farm forms the southern boundary. Other agricultural land and Shenington school border to the west.
- 2.2. Topography across the site is very gently sloping from 180m above Ordnance Datum (AOD) in the west to 178m AOD in the east. Land drainage within the site 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 dataset at representative altitude of 179m AOD. The data are given in Table 1. The site has a cold, moderately moist climate and moderate moisture deficits. The number of Field Capacity Days (FCD) is larger than the 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	715mm
Accumulated Temperatures >0°C	1,296 day°
Field Capacity Days	162 days
Average Moisture Deficit, wheat	93mm
Average Moisture Deficit, potatoes	80mm

Soil parent material and soil type

- 2.4. The underlying geology mapped by the British Geological Survey³ across the site is the Marlstone Rock Formation, comprising sandy ferruginous limestone interbedded with ferruginous calcareous sandstone and ferruginous mudstone beds. Locally any of these lithologies may have an iron content high enough to be classified as Ironstone.
- 2.5. There are no superficial deposits mapped across the site.
- 2.6. The Soil Survey of England and Wales soil association mapping⁴ (1:250,000 scale) shows the Banbury association across the site, which are characterised by fine and coarse loamy ferruginous soils over ironstone. Profiles are well drained and are 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 an observation density of one per hectare in accordance with the established recommendations for ALC surveys². One observation pit was also excavated to examine subsoil structures and stone content. The locations of observations are shown on Figure RAC/9274/1. At each observation

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 Midland and Western England* (1:250,000), Sheet 6.

⁵ **Ragg et al (1984).** *Soils and Their Use in Midland and Western*. Soil Survey of England and Wales Bulletin 12, Harpenden.

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 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 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 within the site.

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

- 3.7. The topsoil comprises brown (7.5YR4/3 in the Munsell soil colour charts⁷) heavy clay loam. Stone content is slight, at 7-10% by volume. Soil structure is medium subangular blocky and the consistency is friable.
- 3.8. The upper and lower subsoil is of strong brown (7.5YR4/6) heavy clay loam. Structure is medium granular to medium subangular blocky and is friable to very friable, readily breaking down into fine peds. Stone content is slight to moderate, at 7-25%. Upper and lower subsoil horizons are differentiated by an increase in stone content with depth.
- 3.9. All soil profiles are well drained and assessed as WC I. With a heavy clay loam topsoil and FCD period of 162 days, Table 6 of the ALC guidelines¹ shows that these profiles are limited to Grade 2 by soil wetness and workability, as shown in Figure RAC/9274/2.

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

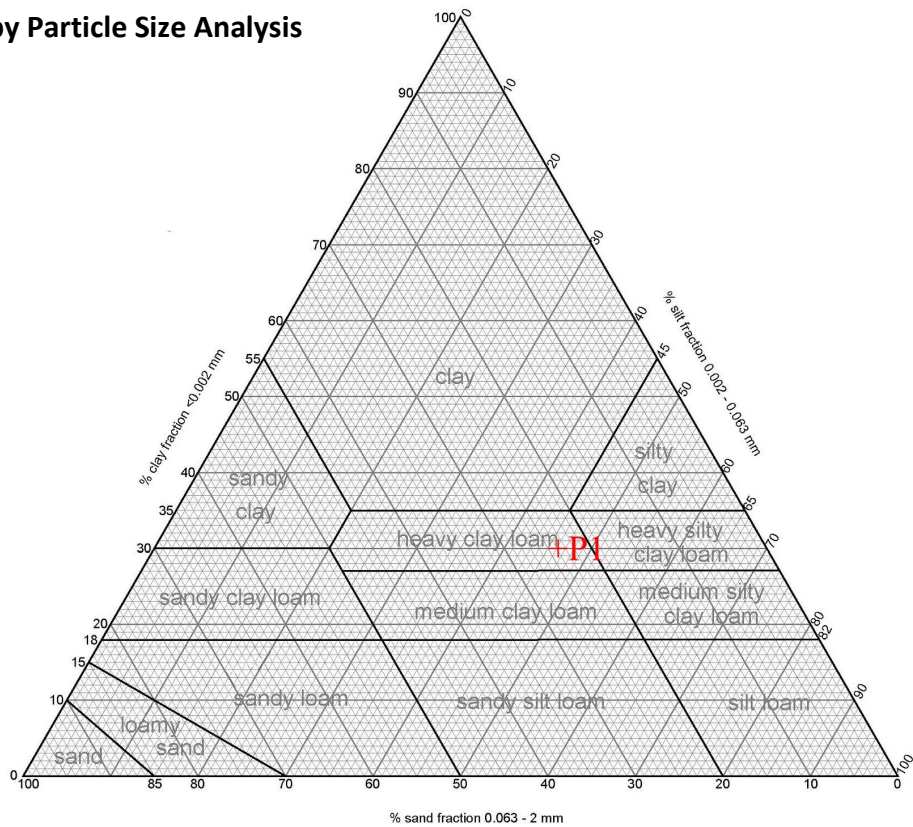
Appendix 1: Laboratory Data

Determinand	P1 TS	Units
Sand 2.00-0.063 mm	46	% w/w
Silt 0.063-0.002 mm	24	% w/w
Clay <0.002 mm	30	% w/w
Organic Matter	1.8	% w/w
Texture	Heavy clay loam	

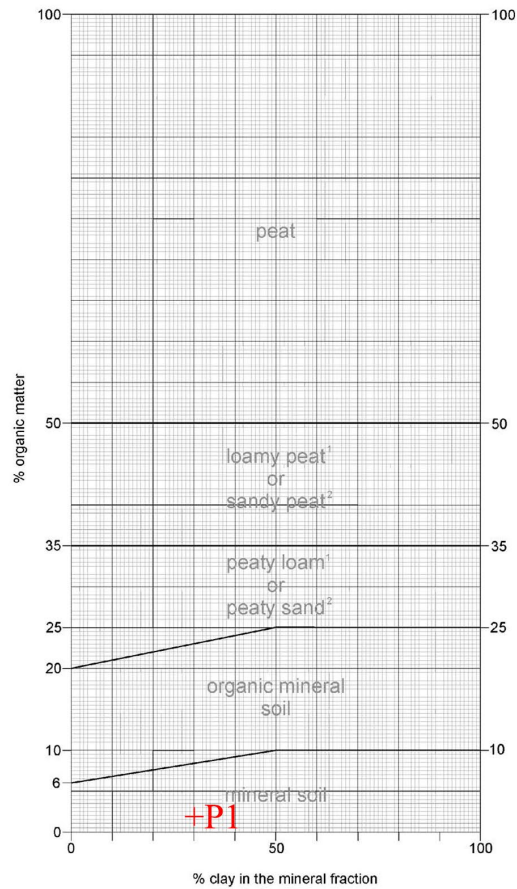
Determinand	P1 TS	Units
Soil pH	6.9	
Phosphorus (P)	15.2	Mg/l (av)
Potassium (K)	81.8	Mg/l (av)
Magnesium (Mg)	91.1	Mg/l (av)

Determinand	P1 TS	Units
Phosphorus (P)	1	ADAS Index
Potassium (K)	1	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 calculations are made 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
Sstone	3	2

hard flint & pebble

Climate Data	
MDwheat	93
MDpotato	80
FCD	162

Wetness Class Guidelines	II	III	IV	V
SPL within 80cm, gleying within 40cm	>71cm	44-71cm	<44cm	
SPL within 80cm, gleying at 40-70cm	>57cm	<57cm		
No SPL but gleying within 40cm	coarse subsoil	I	other cases	II

Maximum depth of auger penetration is underlined

Site No.		Depth cm	Texture	CaCO ₃	Colour	Mottle colour	abundance	stone% Sstone	stone% 0	Structure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)
1/P1	T	0	28	hCL	n	7.5YR4/3		7			47	47	n	n	I	2	2	WE
		28	48	hCL	n	7.5YR4/6		7			30	30	n	n				
		48	55	hCL	n	7.5YR4/6		10			8	10	n	n				
		55	64	hCL	n	7.5YR4/6		15			8	12	n	n				
		<u>64</u>	120	hCL	n	7.5YR4/6		25			46	7	n	n				
										Total	138	106						
										MB	45	26						
										Droughtiness grade (DR)	1	1						
2	T	0	30	hCL	n	7.5YR4/3		10			49	49	n	n	I	2	2	WE
		30	45	hCL	n	7.5YR4/6		20			19	19	n	n				
		<u>45</u>	55	hCL	n	7.5YR4/6		20			11	13	n	n				
		55	120	hCL	n	7.5YR4/6		25			54	18	n	n				
										Total	132	99						
										MB	39	19						
										Droughtiness grade (DR)	1	1						
3	T	0	27	hCL	n	7.5YR4/3		7			45	45	n	n	I	2	2	WE
		27	48	hCL	n	7.5YR4/6		7			31	31	n	n				
		48	70	hCL	n	7.5YR4/6		15			21	30	n	n				
		<u>70</u>	120	hCL	n	7.5YR4/6		25			41	0	n	n				
										Total	138	106						
										MB	45	26						
										Droughtiness grade (DR)	1	1						

Appendix 3: Soil Pit Photographs



Pit 1: Pit Wall



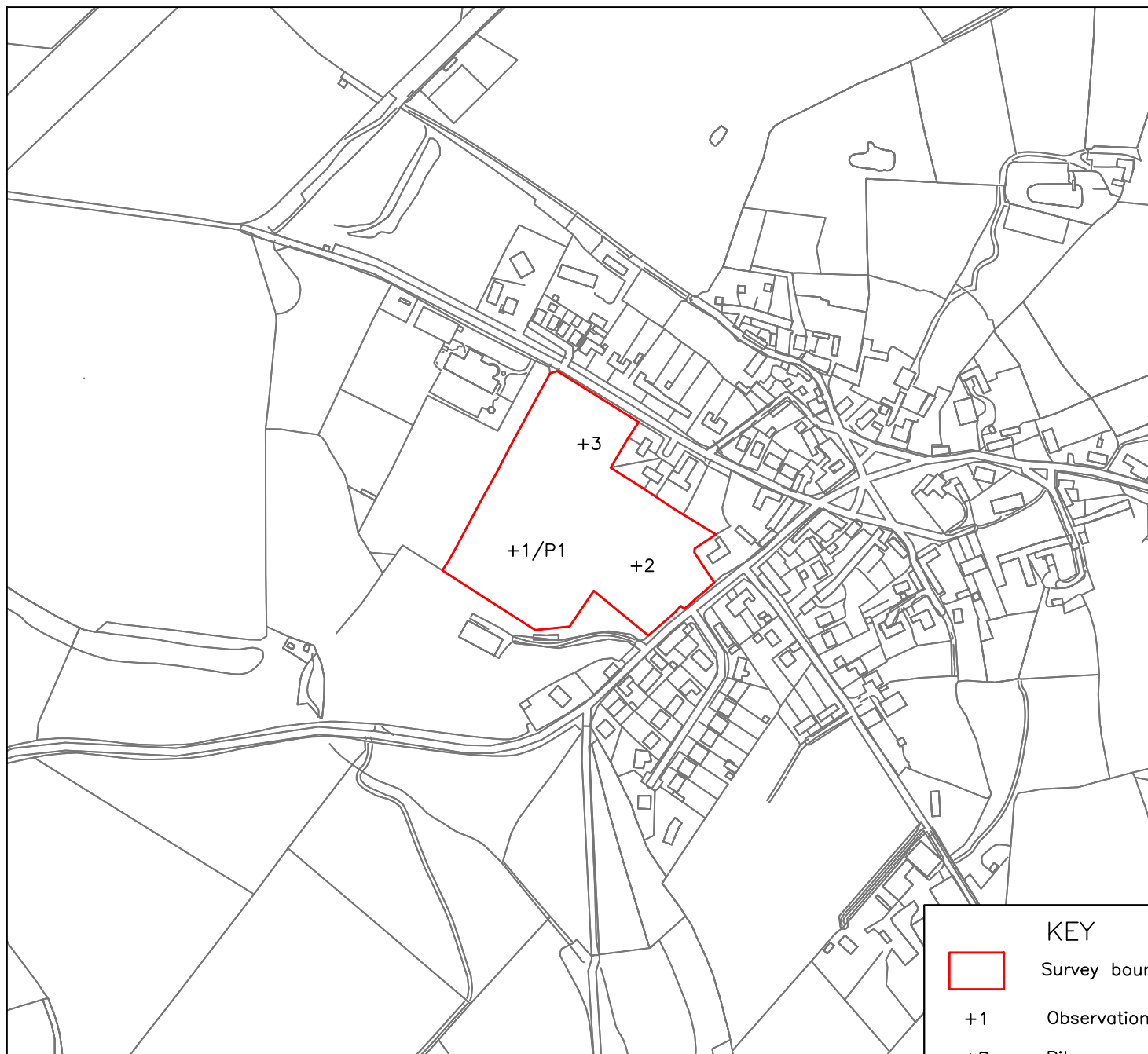
Pit 1: Topsoil




Pit 1: Subsoil

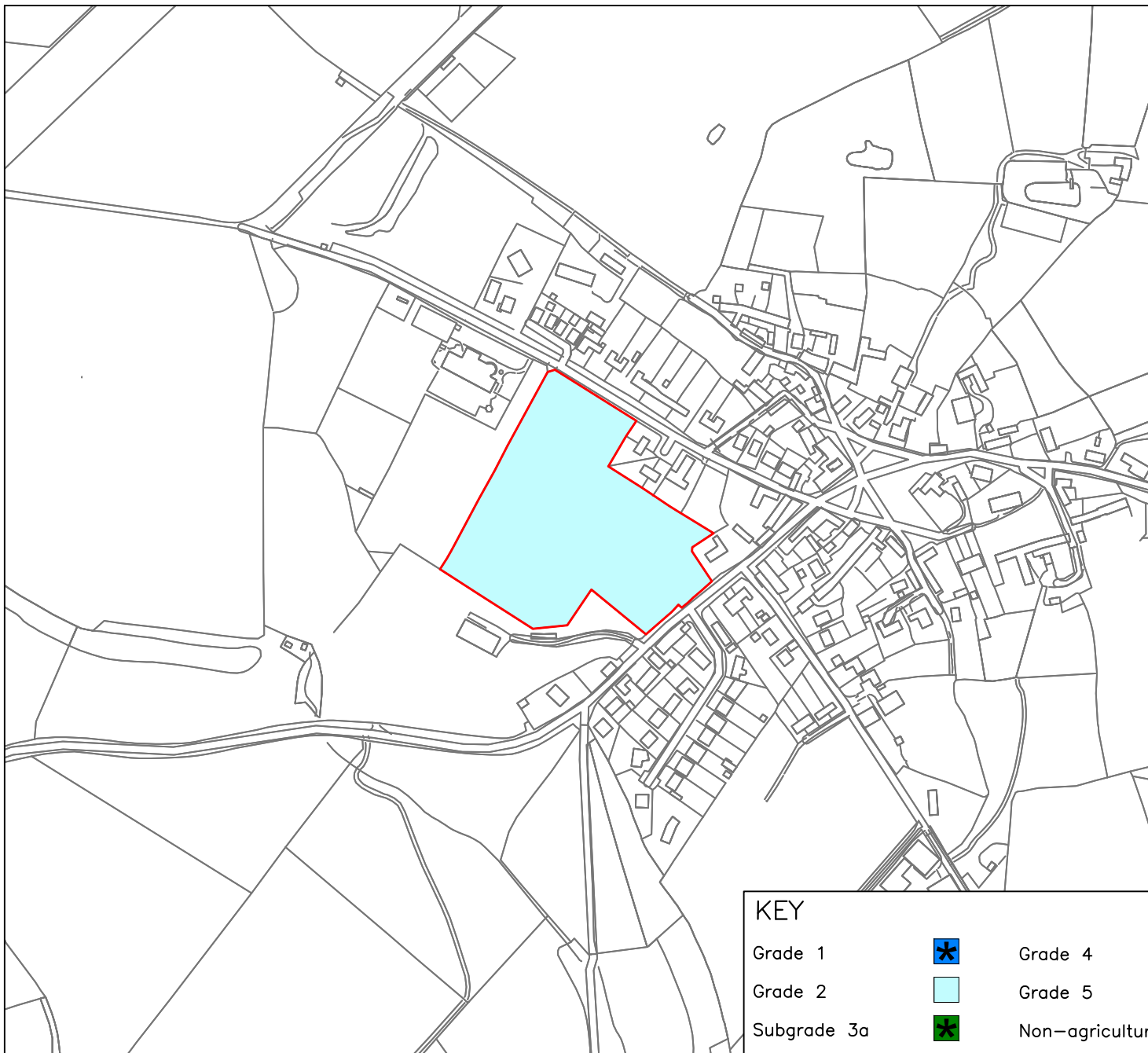


Typical stone type - Ironstone



KEY	
	Survey boundary
+1	Observations
+P	Pit

Rev.	Comment	Date
Drawing title OBSERVATION MAPPING		
Contract LAND OFF STOCKING LANE, SHENINGTON		
Reading Agricultural Consultants Ltd Gate House Beechwood Court Long Toll Woodcote RG8 0RR 01491 684233 www.reading-ag.com		
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1:5,000
0 100m 200m

KEY

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

Rev.	Comment	Date
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