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Richborough

Agricultural Land Classification and Soil Resources

at

Land off Crick Road, Caldicot, Monmouthshire

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1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Richborough to investigate the Agricultural Land Classification (ALC) and soil resources of land off Crick Road, Caldicot, 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.
- 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 is defined in paragraph 3.58 of Planning Policy Wales² as the best and most versatile (BMV) agricultural land.
- 1.6 Natural Resources Wales with the Welsh Government has published a Predictive ALC Map for Wales³. The map is designed on a 50m grid. Criteria including climate, slope, soil wetness, droughtiness and stone contents have been considered and used to determine the most likely limitation to agricultural land quality within each grid square. The map predicts this site to be

¹ **MAFF (1988)**. *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land*. MAFF Publications

² **Welsh Government (2024)**. Planning Policy Wales, Edition 12, February 2024
<https://www.gov.wales/sites/default/files/publications/2024-07/planning-policy-wales-edition-12.pdf>

³ **Welsh Government (2024)**. *DataMapWales*. <https://datamap.gov.wales/maps/new#/>

mostly Grade 2 in the east, Subgrade 3a in the west, a band of Grade 4 in the centre and Subgrade 3b in between.

- 1.7 However, as explained by the Welsh Government's Frequently Asked Questions on ALC⁴, the only way to accurately determine the agricultural grade of land is by a detailed field survey in accordance with the current ALC guidelines. This survey follows the established methodology and guidelines for carrying out ALC surveys.

2 Site and climatic conditions

General features, land form and drainage

- 2.1 The site is located to the north-east of Caldicot and is formed of two areas separated by a disused railway line, totalling approximately 34.3ha. The eastern area is primarily non-agricultural, occupied by the David Broome Event Centre, although there are some paddocks to the north of the main built area and a small grassland parcel to the south of them. The western area is grassland within which is a dense, established tree belt.
- 2.2 Crick Road marks the eastern boundary of the site. The B4245 and Caldicot Country Park are to the south, Nedern Brook is to the west and other agricultural land to the north.
- 2.3 The site collectively occupies a shallow west-facing slope. The highest altitude is around 20m above Ordnance Datum (AOD), falling to around 10m AOD at the brook. There is no limitation to the ALC caused by slope. Drainage of the land is primarily by the slope and the brook which ultimately directs water southward and into the Severn Estuary.
- 2.4 DataMapWales³ shows the land in the north, west and south of the site, in line with Nedern Brook, as Flood Zone 3, reflecting predicted long-term flood risk⁵.

Agro-climatic conditions

- 2.5 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 15m AOD and are given in Table 1. The climate at the site is warm and wet with moderate moisture deficits. The number of Field

⁴ **Welsh Government (2020).** *Agricultural Land Classification, Frequently Asked Questions.* <https://gov.wales/sites/default/files/publications/2020-06/agricultural-land-classification-frequently-asked-questions.pdf>

⁵ **Natural Resources Wales (2025).** *Flood map for planning.* <https://flood-map-for-planning.naturalresources.wales/>

Capacity Days (FCD) is large and is unfavourable for providing opportunities for agricultural field work. There is however no overriding climatic limitation.

Table 1: Local agro-climatic conditions

Parameter	Measurement
Grid Ref	ST 48777 89245
Altitude	15m AOD
Average Annual Rainfall	916mm
Accumulated Temperatures >0°C	1,528 day°
Field Capacity Days	194 days
Average Moisture Deficit, wheat	94mm
Average Moisture Deficit, potatoes	84mm

Soil parent material and soil type

- 2.6 The bedrock geology mapped by the British Geological Survey⁶ belongs to the Mercia Mudstone Group. Across most of the site, sandstones are mapped as the predominant component and in the west and north, mudstones are more prevalent.
- 2.7 Superficial alluvium deposits are mapped in conjunction with Nedern Brook and mainly comprise compressible silty clay.
- 2.8 The Soil Survey of England and Wales soil association mapping⁷ (1:250,000 scale) shows the Escrick 2 association across most of the site, the East Keswick 3 association to the east and the Conway association to the west.
- 2.9 The dominant soils of the Escrick 2 association around Caldicot include sandy silt loam or sandy loam topsoil and upper subsoil, over sandy loam or clay loam lower subsoils (Escrick series); or loamy sand or sand lower subsoils (Wick series). Both series are well drained in Wetness Class (WC) I.
- 2.10 The East Keswick soils are mainly clay loam throughout the profile which is also well drained, while the contrasting Conway association, which develops in alluvium, is characterised by silty clay loam textures which are seasonally waterlogged (WC IV)⁸.

⁶ **British Geological Survey (2024).** *Geology Viewer* <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/>

⁷ **Soil Survey of England and Wales (1984).** *Soils of Wales* (1:250,000), Sheet 2

⁸ **Rudelforth et al (1984).** *Soils and Their Use in Wales*. Soil Survey of England and Wales Bulletin 11, Harpenden.

3 Agricultural land quality

Soil survey methods

- 3.1 Ten soil profiles were examined using an Edelman (Dutch) auger at an observation density of one per hectare across areas proposed for built development, in accordance with the established recommendations for ALC surveys. One observation pit was also excavated to examine subsoil structures. The locations of observations are shown on Figure RAC/10027/2. 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;
 - 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). The results are given 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 FCD 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 revised ALC guidelines¹. Soil profiles have been described according to Hodgson⁹ which is the recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.
- 3.6 The main limitations to agricultural land quality are soil wetness and workability, which is heavily influenced by the climatic conditions of the site. Most of the agricultural land east of the railway is classified as Grade 2. There is a small area of Grade 1 in the south-east, and Subgrade 3b in the flood zone across the south and west.
- 3.7 The topsoil is medium clay loam, sandy clay loam or sandy loam which is very dark brown, dark brown or brown (7.5YR2.5/2, 7.5YR3/2 or 7.5YR4/3 in the Munsell soil colour charts¹⁰). The topsoil is stoneless or very slightly stony, friable to very friable, and often has a dense root mat. In two roughly central locations, the topsoil has a higher organic matter content than elsewhere. In the pit location, the topsoil structure is well developed transitioning to moderate, with medium subangular blocky peds.
- 3.8 The upper subsoil in the northernmost profile observed is reddish brown (5YR4/3) clay, but in all other locations is sandy clay loam, sandy loam or loamy sand. Most of the upper subsoils are dark brown (7.5YR3/3 or 7.5YR3/4), but there are other instances of reddish brown (5YR4/3) and brown (7.5YR4/4). The upper subsoil is stoneless to very slightly stony, friable, occasionally mottled but well drained, and has a weak, fine subangular blocky structure. In the pit location, there were common medium roots observed to 60cm, and worm channels continuing with depth.
- 3.9 Lower subsoils are generally medium sandy loam or loamy medium sand. In one central location, this passes to medium sand at a depth of around 84cm. The lower subsoils are also friable and freely draining with a weak, fine angular blocky to crumb structure.
- 3.10 All of the soil profiles are well drained, in WC I. Where there is a medium clay loam or sandy clay loam topsoil texture, there is a wetness and workability limitation to Grade 2 due to the large number of 194 FCD. The profile in the south-east with sandy loam topsoil is Grade 1. Profiles

⁹ **Hodgson, J. M. (Ed.) (1997).** *Soil survey field handbook*. Soil Survey Technical Monograph No. 5, Silsoe.

¹⁰ **Munsell Color (2009).** *Munsell Soil Color Book*. Grand Rapids, MI, USA

with more loamy sand and sand through the subsoil have a slight droughtiness limitation to Grade 2.

- 3.11 In the north and the west of the site, the auger was obstructed by stone at shallow depth. The northernmost of the applicable points is disturbed and non-agricultural and the western two are situated within the mapped flood zone. As noted in the ALC guidelines, regarding flood risk, *“most weight should be given to the predicted long-term risk [...] rather than to the average incidence of flooding in recent years.”* The southern edge of the site is classified as Subgrade 3b.
- 3.12 The areas of each ALC grade at the site are given in Table 2 and their distribution is shown in Figure RAC/10027/3. Photographs taken at the site are given in Appendix 3.

Table 2: Agricultural land classification

Grade	Description	Hectares	%
Grade 1	Excellent quality	0.5	2
Grade 2	Very good quality	12.0	35
Subgrade 3b	Moderate quality	7.0	20
Non-agricultural		14.8	43
Total		34.3	100

Appendix 1: Laboratory Data

Determinand	Obs 10 Pit	Units
Sand 2.00--0.063 mm	59	% w/w
Silt 0.063-0.002 mm	25	% w/w
Clay <0.002 mm	16	% w/w
Organic Matter	2.8	% w/w
Texture	Sandy loam	

Determinand	Obs 10 Pit	Units
Soil pH	6.3	
Phosphorus (P)	5.0	mg/l (av)
Potassium (K)	37.9	mg/l (av)
Magnesium (Mg)	124	mg/l (av)

Determinand	Obs 10 Pit	Units
Phosphorus (P)	0	ADAS Index
Potassium (K)	0	ADAS Index
Magnesium (Mg)	3	ADAS Index

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
Sstone	3	2

hard flint & pebble

Climate Data	
MDwheat	94
MDpotato	84
FCD	194

Wetness Class Guidelines	II	III	IV	V
SPL within 80cm, gleying within 40cm		>52cm	<52cm	
SPL within 80cm, gleying at 40-70cm	>70cm	<70cm		
No SPL but gleying within 40cm	coarse subsoil	I	other cases	II

Maximum depth of auger penetration is underlined

Site		Depth		Texture	CaCO ₃	Colour	Mottle	abund-	stone%	stone%	Struct-	APwheat	AP potato	Gley	SPL	WC	Wetness	Final	Limiting	
No.		cm				colour		ance	hard	Sstone	ure	mm	mm				grade WE	Grade	Factor(s)	
1	T	0	22	SCL		7.5YR4/3			0		-	37	37	n	n	/	2	2	WE	
		22	48	SCL		10YR4/3	Fe	com	5			37	37	n	n					
		48	78	mZCL		7.5YR4/3	Fe	com	2			31	37	n	n					
		78	85	SCL		7.5YR4/4	Fe	com	2			7	0	n	n					
		85	120	SCL		7.5YR4/4	Fe	com	0	10		32	0	n	n					
		Total										144	111							
		MB										50	27							
Droughtiness grade(DR)												1	1							
2	T	0	27	mCL		10YR3/2			0		-	49	49	n	n	/	2	2	WE	
		27	45	C		5YR4/3	Fe	com	0			29	29	n	n					
		45	60	mSL		5YR4/4	Fe	few	0			19	23	n	n					
		60	120	mSL		5YR4/4	Fe	few	0			66	15	n	n					
		Total										162	115							
		MB										68	31							
Droughtiness grade(DR)												1	1							
3	T	0	10	mSL		10YR3/2			0		-	17	17	n	n	/		Non Ag		
		10	25	mSL		5YR4/3	Fe	com	25			17	17	n	n					
		25	60									49	53	n	n					
		60	120									66	15	n	n					
												Topsoil directly onto stone.								

														Disturbed/ non-agricultural	
								Total	149	102					
								MB	55	18					
								Droughtiness grade(DR)	1	1					
4	T	0	28	mCL	7.5YR2.5/2	0	-	50	50	n	n	/	2	2	WE
		28	45	CL		25		21	21	n	n				
		45	120	mSL		0		85	38	n	n				
								Total	156	109					
								MB	62	25					
								Droughtiness grade(DR)	1	1					
5	T	0	33	mSL	5YR3/2	0	-	56	56	n	n	/	1	2	DR
		33	45	mSL		25		14	14	n	n				
		45	120	LmS		0		47	23	n	n				
								Total	116	92					
								MB	22	8					
								Droughtiness grade(DR)	2	2					
6	T	0	20	oSL	7.5YR2.5/2	0	-	46	46	n	n	/	1	2	DR
		20	50	LmS	7.5YR3/4	1		27	27	n	n				
		50	54	LmS	7.5YR3/3	15		2	3	n	n				
		54	120	LmS	7.5YR3/3	15		34	12	n	n				
								Total	109	88					
								MB	15	4					
								Droughtiness grade(DR)	2	2					
7	T	0	15	oSL	7.5YR3/2	0	-	35	35	n	n	/	1	2	DR
		15	54	LmS	7.5YR3/3	2		33	34	n	n				
		54	84	LmS	5YR3/3	0		18	14	n	n				
		84	120	mS	5YR3/2	0		18	0	n	n				
								Total	104	83					
								MB	10	-1					
								Droughtiness grade(DR)	2	2					
8	T	0	40	SCL	7.5YR4/3	0	-	68	68	n	n	/	2	2	WE
		40	85	SCL	7.5YR4/4	0		50	45	n	n				

		85	98	SCL	7.5YR4/3	15		11	0	n	n			
		<u>98</u>	120	SCL	7.5YR4/3	15		19	0	n	n			
							Total	148	113					
							MB	54	29					
							Droughtiness grade(DR)	1	1					
9	T	0	22	mCL	7.5YR4/3	0	-	40	40	n	n	/	2	2 WE
		22	54	mSL	5YR4/3	0		46	48	n	n			
		54	72	mSL	7.5YR4/3	0		20	24	n	n			
		72	120	LmS	7.5YR4/3	0		29	0	n	n			
							Total	135	112					
							MB	41	28					
							Droughtiness grade(DR)	1	1					
10	T	0	40	mSL	7.5YR4/3	2	-	67	67	n	n	/	1	1
Pit		40	90	mSL	5YR3/2	2		58	44	n	n			
		90	120	LmS	5YR4/3	0		18	0	n	n			
							Total	143	111					
							MB	49	27					
							Droughtiness grade(DR)	1	1					

Appendix 3:

Site Photographs



Pit 1



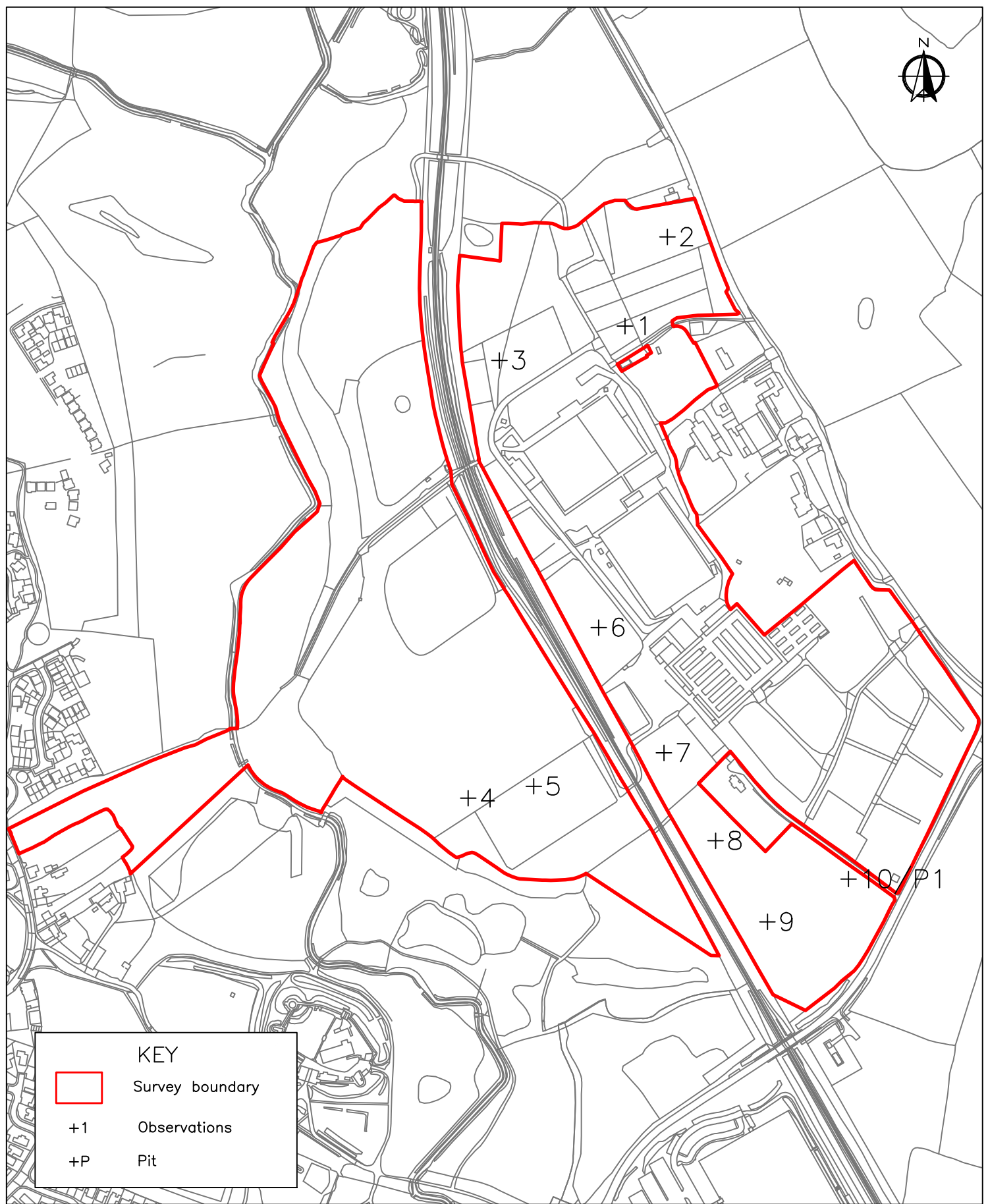
Root mat



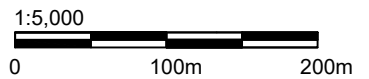
Pit topsoil



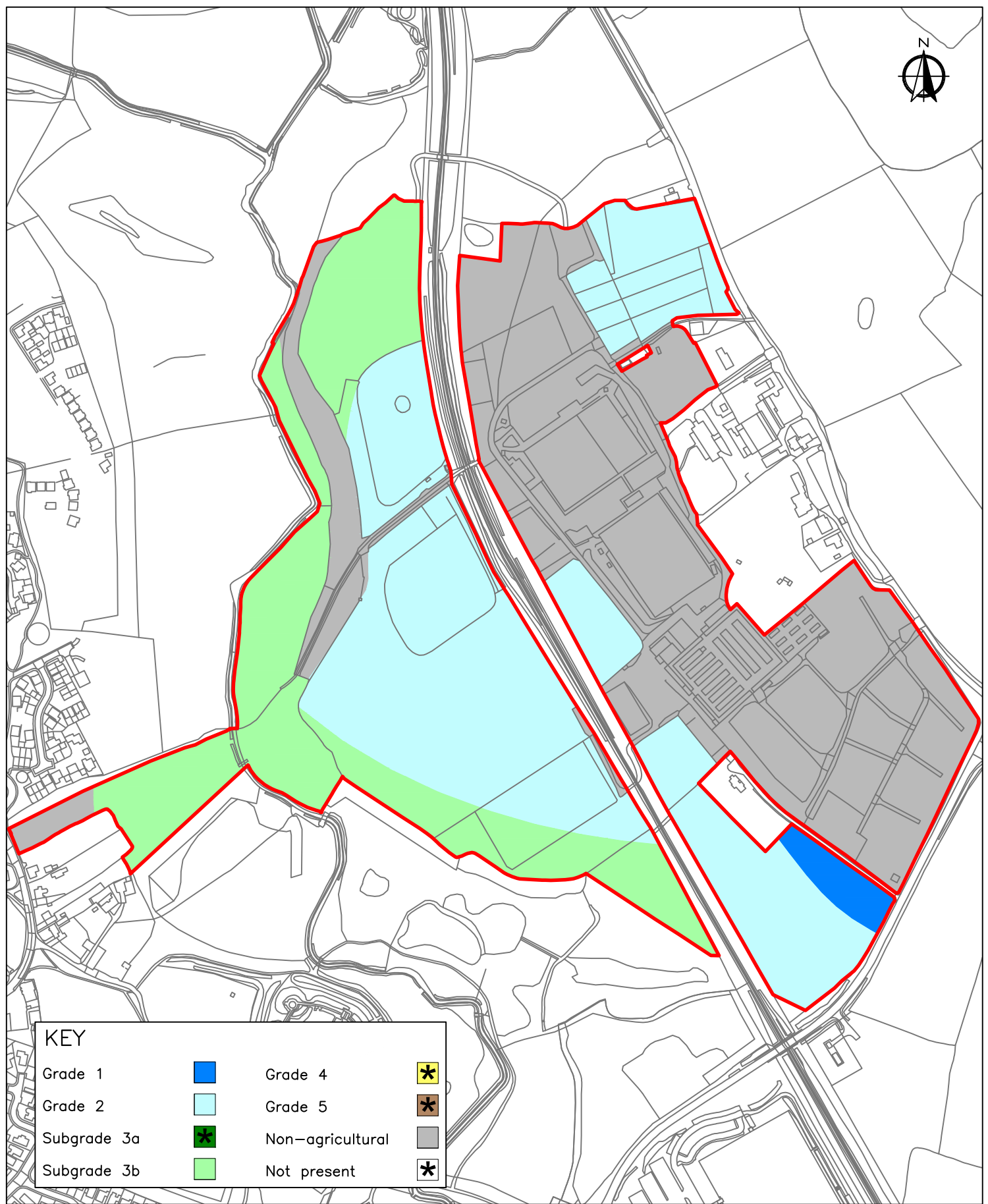
Pit subsoils



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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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1:5,000



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