

Taylor Wimpey UK Ltd

**Land at Smithy Bridge Road,
Rochdale**

**Agricultural Land Classification
and
Soil Resources**

February 2018



Reading Agricultural Consultants Ltd

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1 Introduction

- 1.1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Taylor Wimpey UK Ltd to investigate the Agricultural Land Classification (ALC) and soil resources of land at Smithy Bridge Road, Rochdale, by means of a detailed survey of soil and site characteristics.
- 1.1.2 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 (1988¹), and summarised in Natural England's Technical Information Note 049².
- 1.1.3 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.
- 1.1.4 Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use, and Grade 5 is very poor quality land, with severe limitations due to adverse soil, relief, climate or a combination of these. Grade 3 land is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Land which is classified as Grades 1, 2 and 3a in the ALC system is defined as best and most versatile agricultural land.
- 1.1.5 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 on an Ordnance Survey base at a scale of One Inch to One Mile (1:63,360). The site is mapped on the Provisional ALC map as urban land but adjacent to land provisionally graded 3 and 4. 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 ..."

- 1.1.6 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

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.

observation density of one boring per hectare. This survey follows the detailed methodology set out in the MAFF guidelines.

2 Site and Climatic Conditions

2.1 General Features, Land Form and Drainage

2.1.1 The site extends to 14.4ha of agricultural grassland, to the north-east of Rochdale and east of Smallbridge. The site is surrounded by housing along the Halifax Road to the north, at Smallbridge to the west and at Smithy Bridge Road to the east. The River Roch forms the southern boundary.

2.1.2 Topography at the site slopes gently down towards the River Roch, sloping steeply downwards at the river banks. Altitudes fall from 155m above Ordnance Datum (AOD) in the north-west to approximately 130m AOD along the river.

2.2 Agro-climatic Conditions

2.2.1 Agro-climatic data for the site has been interpolated from the Meteorological Office's standard 5km grid point data set at a representative altitude of 141m AOD. The data are given in Table 1. The site is very wet and cold with moderately small to small crop moisture deficits. The number of Field Capacity Days is significantly higher than is typical for lowland England and is very unfavourable for providing opportunities for agricultural land work.

Table 1: Local agro-climatic conditions

Average Annual Rainfall	1230mm
Accumulated Temperatures >0°C	1,274 day°
Field Capacity Days	273 days
Average Moisture Deficit, wheat	53mm
Average Moisture Deficit, potatoes	32mm

2.2.2 There is an overriding climatic limitation at this site to Subgrade 3b (Figure 1 of the ALC guidelines).

2.3 Soil Parent Material and Soil Type

2.3.1 The principal underlying geology is mapped by the British Geological Survey³ as Milnrow Sandstone which is a carboniferous sandstone derived from a shallow

³ **British Geological Survey (2018).** *Geology of Britain viewer*, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

marine setting. The bedrock geology is overlain by glacial till, which includes sediments of variable size including sand, silt and gravel.

- 2.3.2 The Soil Survey of England and Wales soil association mapping⁴ (1:250,000 scale) indicates the presence of the Brickfield 3 association. The topsoil typically consists of very dark greyish brown, slightly stony clay loam, over a greyish brown clay loam upper subsoil which shows evidence of gleying. The lower subsoil typically consists of grey stony clay loam. Water remains in the upper part of the profile for long periods in winter and spring such that these soils are usually assigned to Wetness Class (WC) IV, although can be improved to WC III with a well-designed drainage system⁵.

3 Agricultural Land Quality

3.1 Soil Survey Methods

- 3.1.1 Fourteen soil profiles were examined using an Edelman (Dutch) auger at an observation density of one per hectare in accordance with the established recommendations set out in Natural England's TIN049². One observation pit was also excavated to examine subsoil structures (Appendix 3). The locations of observations are indicated on Figure RAC7959-1. 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.
- 3.1.2 One soil sample was submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are given in Appendix 1.
- 3.1.3 Soil Wetness Class (WC) was inferred from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling, and slowly permeable subsoil

⁴ **Soil Survey of England and Wales (1984).** *1:250,000 scale soil association mapping, Sheet 1 – Soils of Northern England*

⁵ **Jarvis et al (1984).** *Soils and their Use in Northern England.* Soil Survey of England and Wales, Bulletin No.10

layers at least 15cm thick, in relation to the number of Field Capacity Days at the location.

- 3.1.4 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.

3.2 Agricultural Land Classification and Site Limitations

- 3.2.1 Assessment of quality has been carried out according to the MAFF revised 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.
- 3.2.2 The site has an overriding climate limitation to Subgrade 3b due to the combination of high rainfall and low temperature. The land adjoining the River Roch is downgraded further to Grade 4 due to the severe gradient in excess of 1 in 5. A small section to the south-east along the river is downgraded to Grade 4 due to groundwater; at the time of survey this area was heavily waterlogged and covered in reeds. The area to the south-east of the site along Smithy Bridge Road has been classified as non-agricultural land due to the high proportion of concrete structures in the area.
- 3.2.3 The lighter textured profiles of Subgrade 3b typically contain 30cm of sandy clay loam topsoil which is black (10YR2/1 in the Munsell soil colour charts⁷). This lies over a dark grey to dark yellowish brown (10YR3/1–10YR3/4) sandy clay loam upper subsoil, which is mottled but not gleyed. The lower subsoil typically consists of dark grey or dark yellowish brown sandy clay with some sandy loam, with clay also present. This is typically mottled but not gleyed. These profiles are influenced most by the overriding climatic limitation to Subgrade 3b.
- 3.2.4 The heavier textured profiles of Subgrade 3b consist of black (10YR2/1) silty, medium or heavy clay loam which contains a high proportion of organic matter. The topsoil contains many roots, with friable medium subangular blocky peds visible. The upper subsoil consists of brown (10YR5/3) clay or sandy clay loam, and contains moderately developed medium to fine subangular blocky peds. Many, medium distinct ochreous mottles were observed with profiles gleyed within 40cm. The lower subsoil consists of brown (10YR5/3) clay or sandy loam which is gleyed and contains moderate, medium subangular/angular blocky peds. These profiles are limited by both soil wetness/workability and the overriding climatic limitation to Subgrade 3b.

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

3.2.5 The areas of each ALC grade are given in Table 2 and are shown in Figure RAC7969-2.

Table 2: ALC Areas

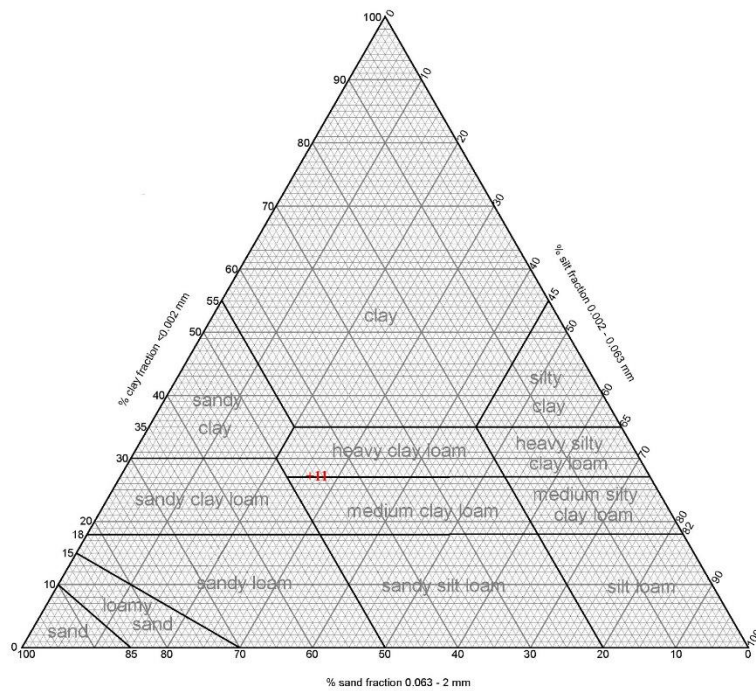
Grade	Description	Area (ha)	% of agric. land
3b	Moderate quality	11.4	79
4	Poor quality	1.8	13
Na	Non-agricultural	1.2	8
	Total Agricultural	14.4	100

Appendix 1: Laboratory Data

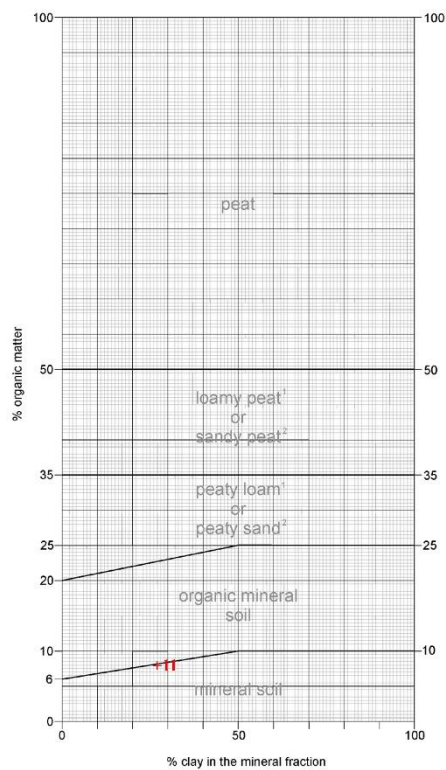
Determinand	Profile 11	Units
Sand 2.00-0.063 mm	47	% w/w
Silt 0.063-0.002 mm	26	%w/w
Clay <0.002 mm	27	% w/w
Organic Matter WB	8.4	% w/w
Texture	Heavy Clay Loam/Medium Clay Loam	% w/w

Determinand	Profile 11	Units
Soil pH	5.4	
Phosphorus (P)	4.6 (0)	mg/l (ADAS Index)
Potassium (K)	60.9 (1)	mg/l (ADAS Index)
Magnesium (Mg)	58.8 (2)	mg/l (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

Stone types					Climate Data				Wetness Class Guidelines													
%		TA _v	E _{av}		MDwheat	53			SPL within 80cm, gleying within 40cm					74		74		V				
hard		1	0.5		MDpotato	32			SPL within 80cm, gleying at 40-70cm					*								
chalk		10	7		FCD	273			No SPL but gleying within 40cm					coarse subsoil		///		other cases		///		
hard		flint & pebble			Maximum depth of auger penetration is <u>underlined</u>																	
Site No.	Depth cm		Texture	CaCO ₃	Colour	Mottle colour	abund- ance	stone% hard	stone% chalk	Struct- ure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)				
1	T	0	30	SZL	10YR4/2			2			56	56			II	2	3b	CI				
		30	45	SZL	10YR3/1	och	mmd	2			25	25										
		45	62	SCL	10YR4/2	och	cmd	2			19	25	y									
		62	120	SC	10YR3/1	och	cmd	2			57	12										
										Total	157	118										
										MD	104	86										
										Droughtiness grade (DR)	1	1										
2	T	0	40	SCL	10YR2/1 10YR4/2 & 10YR2/1			2			67	67			I	2	3b	CI				
		40	70	SCL	10YR2/1			2			34	44										
		70	90	SCL	10YR5/3 & 5/4			2			20	0										
		90	120	SC	10YR3/1	och	cmd	2			29	0										
										Total	150	111										
										MD	97	79										
										Droughtiness grade (DR)	1	1										
3	T	0	40	ZCL	10YR2/1			2			75	75			III	3a	3b	CI				
		40	50	C	10YR4/2	och	mmd	2			16	16										
		50	120	C	10YR4/2	och	cmd	2			55	31	y									
										Total	145	122										
										MD	92	90										

4	T	0	45	SCL	10YR2/1	och	fmd	2	Droughtiness grade (DR)		1	1	/	2	3b	CI			
		45	70	SCL	10YR3/4	och	cmd	2			75	75							
		70	120	SZL	10YR3/4	och	mmd	2			27	37							
								2		54	0								
								Total		156	112								
						MD		103	80										
5	T	0	35	SL	10YR2/1	Yell	fmd	2	Droughtiness grade (DR)		1	1	/	1	3b	CI			
		35	72	SCL	10YR3/4	och	mff	2			58	58							
		72	120	SL	10YR3/4	och	mfd	2			44	52							
								2		52	0								
								Total		154	110								
						MD		101	78										
6	T	0	40	ZCL	10YR2/1	och	mfp	2	Droughtiness grade (DR)		1	1	y	IV	3b	3b	CI/We		
		40	80	C	10YR5/3	och	cmd	2		poor	75	75						y	y
		80	120	ZC	10YR3/2	och	mmd	2			33	38						y	y
								2		31	0								
								Total		139	113								
						MD		86	81										
7	T	0	35	ZCL	10YR3/1	och	mff	2	Droughtiness grade (DR)		1	1	y	///	3a	3b	CI		
		35	70	C	10YR5/3	och	mfd	2			65	65						y	y
		70	120	C	10YR3/4	och	mff	2			39	55						y	y
								2		39	0								
								Total		144	120								
						MD		91	88										
8	T	0	30	SCL	10YR3/1			2	Droughtiness grade (DR)		1	1	/	2	3b	CI			
		30	<u>60</u>	C	10YR5/3	och	fff	2			50	50							
		60	120	C	10YR3/4	och	mff	10			39	47							
								10		44	15								
								Total		133	112								
						MD		80	80										
9	T	0	30	ZCL	10YR2/1			2	Droughtiness grade (DR)		1	1	///	3a	3b	CI			
										56	56								

		30	55	SCL	10YR4/2	och	mmd	2		34	37	y				
		55	80	hSCL	10YR5/3	och	mmd	2		25	22	y				
		80	120	SC	10YR5/3	och	mmd	2		39	0	y				
					Total					154	115					
					MD					101	83					
					Droughtiness grade (DR)					1	1					
10	T	0	30	mCL	10YR3/2			2		53	53		///	3a	3b	Cl/We
		30	45	hCL	10YR3/2	och	mmd	2		24	24					
		45	120	C	10YR5/3	och	mmp	2	poor	54	32	y				
					Total					131	108					
					MD					78	76					
					Droughtiness grade (DR)					1	1					
11	T	0	40	mCL	10YR2/1	och	fmd	2		71	71		//	3a	3b	Cl
		40	70	SCL	10YR4/3	och	mmd	2		34	44					
		70	120	SL	10YR5/3	och	cmd	2		54	0	y				
					Total					159	115					
					MD					106	83					
					Droughtiness grade (DR)					1	1					
12	T	0	30	mCL	10YR2/1	och	fmd	2		53	53		//	3a	3b	Cl
		30	50	SCL	10YR4/3	och	cmd	2		29	29					
		50	120	SL	10YR5/3	och	mmd	10		70	27	y				
					Total					152	110					
					MD					99	78					
					Droughtiness grade (DR)					1	1					
13	T	0	45	mCL	10YR2/1			2		79	79		//	3a	3b	Cl
		45	65	SCL	10YR5/3	och	mmd	2		22	29	y				
		65	120	SL	10YR5/3	och	mmd	2		59	7	y				
					Total					161	116					
					MD					108	84					
					Droughtiness grade (DR)					1	1					

Appendix 3: Pit and site photographs

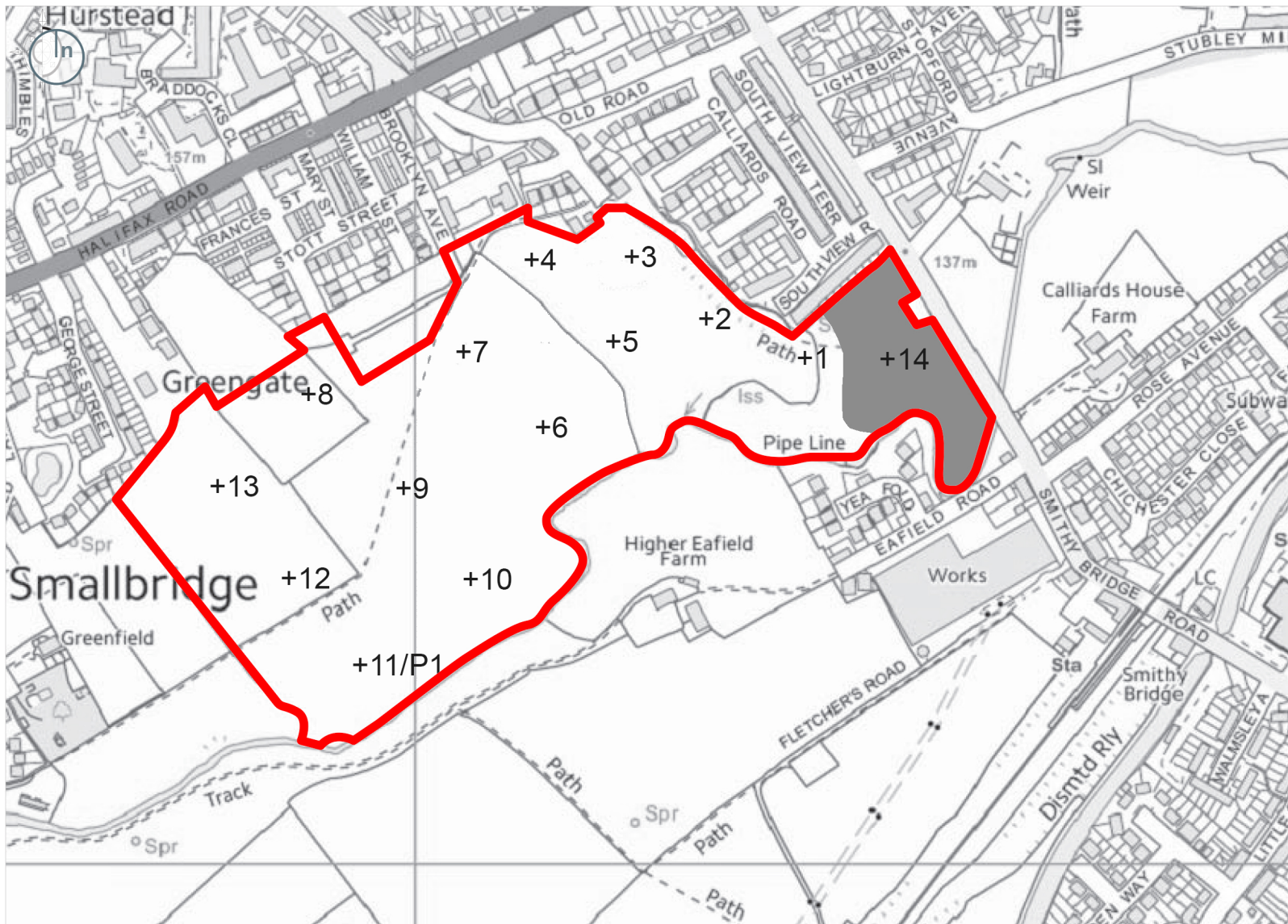


View of slope to River



View of concrete structures





- Survey Area
- .1 Auger Observation
- .P1 Pit Observation

Figure:
RAC7959-1
Observation Map

Site:
Land at Smithy
Bridge Road

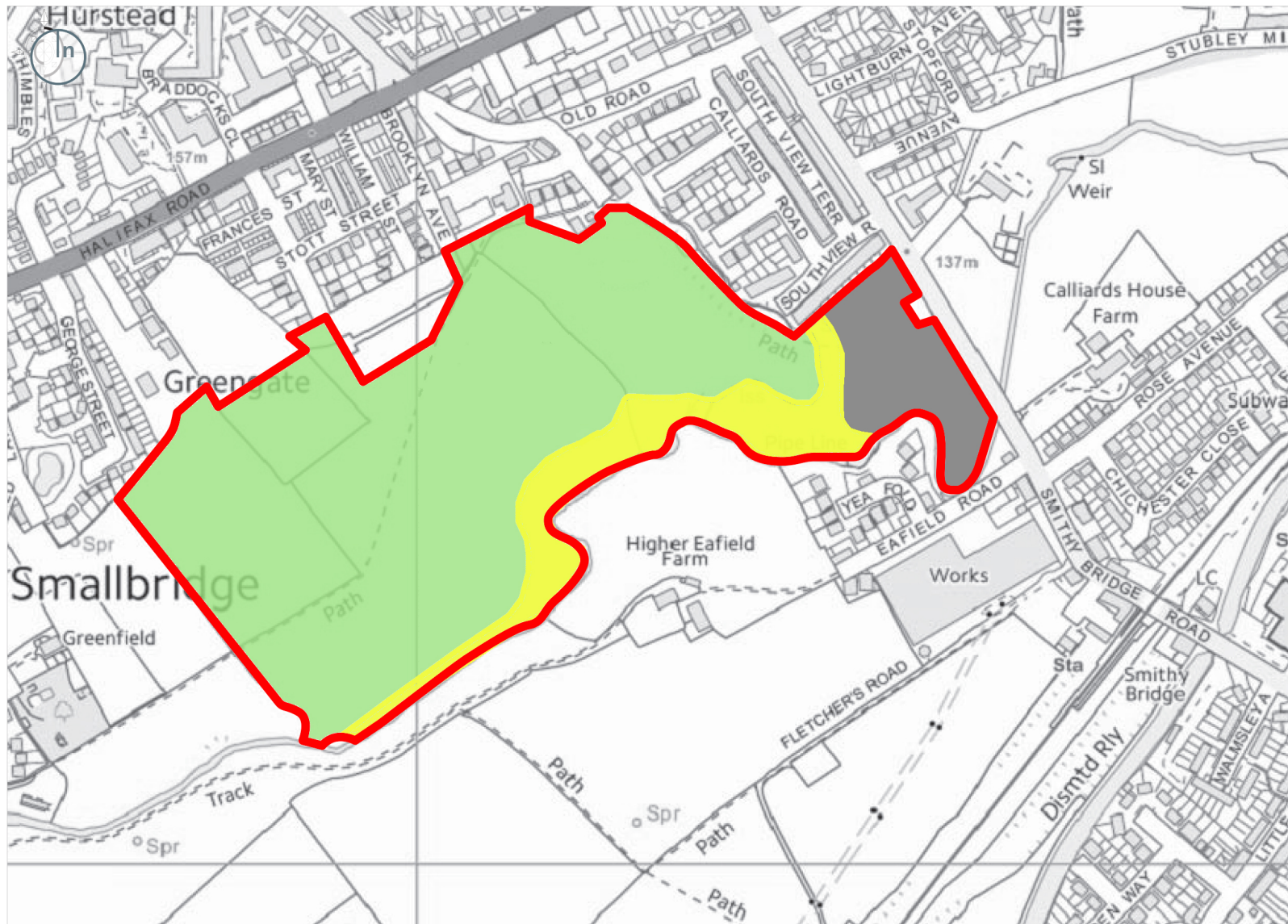
Client:
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Scale:
1:5000 @ A4

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- ★ Grade 1 - excellent quality
 - ★ Grade 2 - very good quality
 - ★ Subgrade 3a - good quality
 - ★ Subgrade 3b - moderate quality
 - ★ Grade 4 - poor quality
 - ★ Grade 5 - very poor quality
 - ★ Not Present
- } Best and most versatile land

Figure:
RAC7959-2
Agricultural Land
Classification Map

Site:
Land at Smithy Bridge
Road

Client:
Taylor Wimpey

Scale:
1:5000 @ A4

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