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Statkraft UK Limited Agricultural Land Classification and Soil Resources

of
Land off Shephurst Lane, Marden, Kent

Beechwood Court,
Long Toll, Woodcote,
RG8 0RR

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1 Introduction

- 1.1 Reading Agricultural Consultants Ltd (RAC) is instructed by Statkraft UK Limited to investigate the Agricultural Land Classification (ALC) and soil resources of land off Sheephurst Lane, Marden, Kent, 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 in Annex 2 of the NPPF³ 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*. <http://publications.naturalengland.org.uk/file/5526580165083136>

² **Natural England (2012)**. *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land*. <http://publications.naturalengland.org.uk/file/4424325>

³ **Ministry of Housing, Communities and Local Government (2021)**. *National Planning Policy Framework*. <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

on an Ordnance Survey base at a scale of One Inch to One Mile (1:63,360). The Provisional ALC map shows the site undifferentiated 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.
- 1.8 The site has not been surveyed previously, and the nearest detailed survey data to the north and east of Marden show that land in this locality has been classified as a mix of Grades 2, 3a and 3b.

2 Site and climatic conditions

General features, land form, drainage and flood risk

- 2.1 The site extends to approximately 74.5ha, comprising seven arable fields to the north of Sheephurst Lane and south of a railway line to the west of Marden. At the time of survey, the fields were cropped in winter beans or wheat with some grass margins in Countryside Stewardship.
- 2.2 Topography is level apart from a slight rise on land adjoining Sheephurst Lane. The land is 18m to 20m above Ordnance Datum (AOD). There are no gradient limitations to agricultural land quality.
- 2.3 Most of the land lies on or adjacent to a floodplain, though groundwater is well controlled by a network of quite deep functioning ditches.

Agro-climatic conditions

- 2.4 Agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset at a representative altitude of 18m AOD, and are given in Table 1. The site is warm and drier than much of Kent, with large crop moisture deficits possible. The number of days when soil is at Field Capacity is slightly below average for lowland England (150) which makes

the land favourable for agricultural field work. There is no overriding climatic limitation to agricultural land quality.

Table 1: Local agro-climatic conditions

Parameter	
Grid Reference	TQ 572495 144693
Average Annual Rainfall	671 mm
Accumulated Temperatures >0°C	1,492 day
Field Capacity Days	139 days
Average Moisture Deficit, wheat	124 mm
Average Moisture Deficit, potatoes	122 mm

Soil parent material and soil type

- 2.5 The underlying geology is mapped by the British Geological Survey⁴ as Weald Clay described as dark grey, thinly-bedded mudstones (shales) and mudstones with subordinate siltstones and fine- to medium-grained sandstones, which include some shelly limestone layers. The last is shown on the rising land in the south-west of the site.
- 2.6 All the flat land within the site is shown as covered by superficial deposits, either of River Terrace clay and silt or Alluvium in the east.
- 2.7 The Soil Survey of England and Wales soil mapping⁵ (1:250,000 scale) shows Shabbington association in the west of the site and Fladbury 3 association in the east. Shabbington association soils are fine loamy or silty passing to sandy or gravelly base, and are naturally subject to seasonal fluctuating waterlogging (Wetness Class (WC) III or IV). However, installation of effective drainage schemes can improve them to WC II or I. Fladbury 3 soils can have issues of slow permeability limiting improvement to WC III.

3 Agricultural land quality

Soil survey methods

- 3.1 In total, 93 soil profiles were examined using an arable gouge auger at an observation density of more than one per hectare which is greater than the established recommendations for ALC surveys². Five soil pits were also excavated to examine structure and stone content. The locations of observations are indicated on Figure RAC/9221/1. At each observation point the

⁴ **British Geological Survey (2021).** *Geology of Britain viewer*, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

⁵ **Soil Survey of England and Wales (1984).** *Soils of South East England (1:250,000)*, Sheet 6

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 Six topsoil samples (composites 0-25cm depth) were submitted for laboratory determination of particle size distribution, pH, organic matter content and nutrient contents (P, K, Mg). Results are given in Appendix 1.

3.3 Soil nutrient levels are low in the west of the site and good in the east. Organic matter levels are mostly suboptimal for heavier soils. All the land has alkaline pH. These factors can be ameliorated and are not a basis for classifying the land. Minimal tillage is improving the structure in the surface but causing firmer blockier structures in the *lower* topsoil (14-28cm), Appendix 3.

3.4 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.

3.5 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 is affected if the AP is insufficient to balance the MD and droughtiness occurs.

Agricultural land classification

3.6 Assessment of agricultural 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

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

recognised source for describing soil profiles and characteristics according to the revised ALC guidelines.

- 3.7 Plate 1 below shows soils according to superficial geology, differentiating between those formed on River Terrace deposits (C), on Alluvium (Y) and on Weald Clay (G). Medium topsoil textures for each type are shown as 2; heavier topsoil textures as 3; and clayey topsoil textures as 4.

Plate 1: Soil Types



- 3.8 The soil types are summarised below in the following table.

Table 2: Description of soil types

Code C2	Medium textured topsoil on River Terrace deposits
Topsoil	At least 28cm of stoneless or very slightly stony medium clay loam, brownish (2.5Y5/4 in the Munsell soil colour charts ⁷).
Upper Subsoil	Clay loam, greyish brown or brown (2.5Y5/3 or 5/4) with some mottles overlying more compact manganiferous clay loam or clay starting at 35-45cm, which has restricted permeability.
Lower Subsoil	Friable permeable clay loam or sandy clay loam starts at 50-60cm, slightly stony with many manganese and grey mottles, dominant colour can be strong brown (7.5YR6/8). Passes to stonier sandy material within 1m.

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

Limitations	The compact layer may be as little as 15cm thick and should respond to subsoiling. WC is II or III which, coupled with medium topsoil, sets ALC Grade at 2 or 3a. Droughtiness limits some profiles to 3a. See Appendix 3 pit F.
Code C3	Heavier topsoil on River Terrace deposits
Topsoil	At least 28cm of stoneless heavy (silty) clay loam, brownish (2.5Y4/4 or 5/4). Friable in top 10cm, firmer blocky beneath.
Upper Subsoil	Heavy clay loam, greyish brown (2.5Y5/3) with some mottles overlying a compact manganeseiferous clayey layer starting at 35-45cm, which is slowly permeable.
Lower Subsoil	Permeable clay loam or sandy clay loam starts at 50-60cm, slightly stony with many manganese and grey mottles, dominant colour can be strong brown (7.5YR6/8). Passes to stonier sandy material within 1m, locally clayey.
Limitations	Slowly permeable layer often less than 15cm thick which acts as a barrier to rooting (to beans) but could be remedied by subsoiler. WC is II which, coupled with heavy loam topsoil, gives ALC Grade 3a. See Appendix 3 pit E. Where the subsoil clay is thicker or in lower lying areas, profiles are WCIII and ALC Grade 3b.
Code Y3c	Calcareous loam on Alluvium
Topsoil	At least 25cm of heavy clay loam, brownish (10YR4/3). Slightly stony with small ironstones and limestones. Slightly calcareous. Friable.
Upper Subsoil	Below 35cm is silty clay loam without stones. Greyish brown (2.5Y5/3) with some mottles and manganese layers.
Lower Subsoil	Slowly permeable starting 80-105cm: heavy silty clay loam or grey calcareous (Weald) clay.
Limitations	WC is II which, coupled with calcareous heavy clay loam topsoil, sets ALC Grade at 2. Drought limits to Grade 2.
Code Y2	Medium silt on Alluvium
Topsoil	At least 28cm of stoneless medium silty clay loam, brownish (2.5Y4/4). Friable.
Upper Subsoil	Heavy silty clay loam, greyish brown (2.5Y5/2-5/6) with some mottles or manganese below 35cm. Locally contains a compact silty clay layer within 60cm.
Lower Subsoil	Friable mottled strong-brown ochreous + manganeseiferous (silty) clay loam, locally dark brown (mainly manganese). Heavy (silty) clay loam below 80cm.
Limitations	WC is II or III which, coupled with medium topsoil, sets ALC Grade at 2 or 3a. Drought limits to Grade 2.
Code Y3	Heavier silt on Alluvium
Topsoil	At least 28cm of heavy silty clay loam, brownish (2.5Y4/4 or 5/4). Stoneless (locally a few hard stones). Friable with firmer blocks in lower topsoil.
Upper Subsoil	Medium silty clay loam, greyish brown (2.5Y5/3-5/6) with some mottles over a compact manganeseiferous clayey layer starting at 35-45cm.
Lower Subsoil	Friable mottled strong-brown ochreous + manganeseiferous (silty) clay loam. Denser greyer clayey layers occur below 70cm. Locally, Weald Clay within 1m.
Limitations	The compact slowly permeable layer in upper subsoil is often < 15cm deep and can be subsoiled. WC is usually II but III where the clayey layers are more extensive. Coupled with heavier topsoil this sets ALC Grade at 3a, sometimes 3b.
Code Y4	Clayey land on Alluvium
Topsoil	About 25cm of stoneless silty clay, brownish (2.5Y4/4 or 5/4). Firm blocky structures, except in drill rows.
Upper	Clay or silty clay, varying from slightly mottled to common mottles (colour

Subsoil	2.5Y5/3-7/1). Slowly permeable within 35cm but of variable thickness (10 to 30cm).
Lower Subsoil	Friable mottled strong-brown (7.5YR6/8) manganiferous (silty) clay loam overlying within 80cm silty clay or greenish grey (7.5GY7/1) Weald clay, especially along north.
Limitations	Where compact slowly permeable in upper subsoil is < 15cm it can be subsoiled. According to clay depths, WC varies from II to IV but because of the clayey topsoil the land cannot be rated higher than ALC Grade 3b. See Appendix 3, pits A and B.
Code G2	Medium soils on Weald Clay and limestone
Topsoil	About 28cm of slightly stony medium clay loam, brownish (10YR4/4). Very friable.
Upper Subsoil	Clay start depth varies from 30 to 70cm, overlain by heavy silty clay loam. Upper subsoil is olive-brown (2.5Y5/6) with a few mottles, locally slightly calcareous.
Lower Subsoil	Clay, light (greenish) grey (10-7.5GY-7/1) with many ochreous/ manganese mottles. Slowly permeable; can contain very stony (limestone) layers within 80cm.
Limitations	WC III or II. Bean growth seems unrestricted. ALC Grade limited to 3a or 2 due to wetness and/or droughtiness. See Appendix 3 pit D.
Code G3	Heavy land on Weald Clay (and Limestone)
Topsoil	At least 25cm of stoneless heavy (silty) clay loam locally silty clay, brownish (2.5Y4/4 or 5/4). Friable breaking into subangular blocks.
Upper Subsoil	Clay start depth varies from 20 to 60cm, overlain by silty clay loam or silty clay - grey (2.5Y5/3) to yellowish-brown (5/6) with common iron or manganese mottles. Very slightly calcareous.
Lower Subsoil	Firm clay, light (greenish) grey (10-7.5GY-7/1) with many ochreous and some manganese. Slowly permeable, passes to very dense mudstone within 1m. Locally calcareous.
Limitations	WC III (locally IV) due to slowly permeable subsoil within 45cm. Bean growth seems restricted by compaction; patches of weed or no establishment. Heavier topsoil sets Grade at 3b (wetness). See Appendix 3 pit C.

3.9 The main limitations to agricultural land quality at the site are soil wetness, droughtiness and flooding/groundwater.

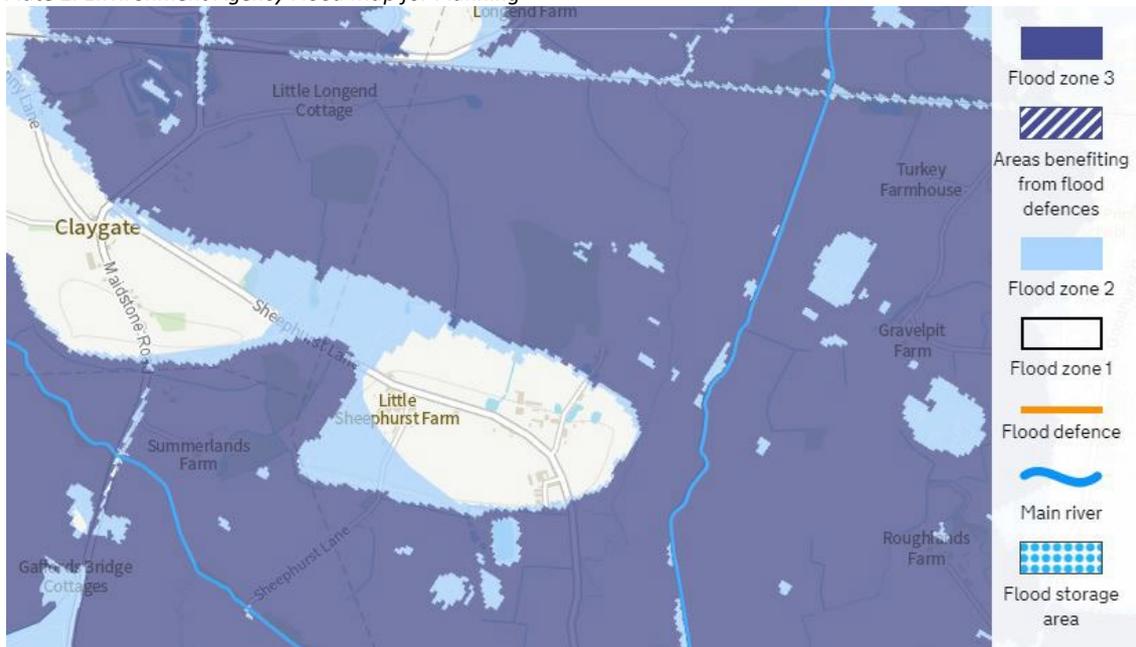
3.10 **Wetness/Workability.** Many of the River Terrace and Alluvial soils are characterised by thin clayey or compact layers in the upper subsoil overlying looser material below 50cm (see Appendix 3 Pits A, E and F). These compact layers can be remedied by subsoiling and are not a grade limitation unless they are at least 15cm thick. Profiles classified as Subgrade 3b either have silty clay topsoil or are WC III with heavy silty clay loam topsoil. Profiles with medium clay loam topsoils are limited to Grade 2 or 3a depending on WC.

3.11 The Weald clay subsoils are slowly permeable, although the presence of traces of carbonate in the clay upper subsoil assist soil structure (Appendix III, pit C) but cannot rate higher than WC III.

3.12 **Droughtiness.** Most soils have good water reserves for deep rooted crops, and are limited to Grade 2 (3a on some deep clay profiles). Other profiles are downgraded to Subgrade 3a because of limited water supply to 70cm for shallower rooted crops (Appendix 2).

3.13 **Flood risk.** As shown in Plate 2, most of the site is shown as being at moderate risk of flooding (Flood Zone 3), with the main river running along the eastern edge of the site. Groundwater was not encountered in any of the profiles. The high concentrations of manganese fragments in the lower subsoil indicate fluctuating groundwater but much is relic historical, since most fields now have functioning deep ditches to lower the water table.

Plate 2: Environment Agency Flood Map for Planning



3.14 According to one local source, the land is usually dry but floods seriously in about one year in twenty. Unless this happens in summer, Grade cannot be lowered to less than 2 on flood risk. There were however some areas of poor crop establishment noted during the survey which correspond with water collecting hollows, and which are downgraded to Subgrade 3b. Some problem patches in the south-eastern field (shown as Flood Zone 2) might be related to spring-line effects as well as from the restricted permeability of the Weald clay.

3.15 The areas of each ALC grade are given in Table 3 and their distribution is shown in Figure RAC/9221/2.

Table 3: ALC areas

Grade	Description	Area (ha)	%
Grade 2	Very good quality	6.9	9
Subgrade 3a	Good quality	28.2	38
Subgrade 3b	Moderate quality	39.4	53
Total		74.5	100

Appendix 1: Laboratory Data

Soil Texture by Particle Size Analysis

Determinand	A	B	C	E	F	G	Units
Sand 2.00-0.063 mm	12	9	23	20	31	11	% w/w
Silt 0.063-0.002 mm	52	51	49	43	42	56	% w/w
Clay <0.002 mm	36	40	28	35	27	33	% w/w
Organic Matter	4.9	3.6	3.3	3.8	3.2	3.4	% w/w
Texture	Silty Clay	Silty Clay	Heavy Clay loam	Heavy Silty Clay Loam	Heavy Clay Loam	Heavy Silty Clay Loam	

Nutrients, pH and Organic Matter

Determinand	A	B	C	E	F	G	Units
Soil pH	7.9	7.2	7.8	7.8	7.8	7.6	
Phosphorus (P)	26.6 (3)	32.6 (3)	10.6 (1)	8.4 (0)	9.4 (0)	23.8 (2)	mg/l (av)
Potassium (K)	193 (2+)	211 (2+)	97 (1)	87 (1)	81 (1)	174 (2-)	mg/l (av)
Magnesium (Mg)	81 (2)	153 (3)	62 (2)	76 (2)	71 (2)	79 (2)	mg/l (av)

ADAS indices in parenthesis, 0 very low, 1 low, 2/2- medium, 3/2+ good.

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
Soft	4	3

Mn and other fragments

Climate Data	
MDwheat	124
MDpotato	122
FCD	139

AAR 671

Wetness Class Guidelines	II	III	IV	V	Climate
SPL within 80cm, gleying within 40cm	>65cm	37-65cm	<37cm		1492 D°
SPL within 80cm, gleying at 40-70cm	>47 cm	<47cm			Limitation
No SPL but gleying within 40cm	coarse subsoil	I	other cases	II	Grade 1

Maximum depth of auger penetration is underlined

Site No.	Depth cm	Texture	CaCO ₃	Colour	Mottle colour	abundance	stone% hard	stone% Soft	Structure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)
1	T 0 30	mCL		2.5Y5/4			2		-	53	53			II	2	3a	DR
	30 50	mCL	n	2.5Y5/3	Fe	com	10			29	29	y					
	50 80	SZL			Mn	many	15	10		26	27	y					
	<u>80</u> 120	SL					30		poor	23	0	y					
	Total										131	109					
MB										7	-13						
Droughtiness grade (DR)										2	3a					Beans (tall)	
2	T 0 25	mCL		2.5Y4/4			0		-	45	45			III	3a	3a	WE DR
	25 32	mCL	n	2.5Y5/3	Fe	com	0			11	11	y					
	32 45	hZCL	n	2.5Y5/4	Mn	many	0	10	m/poor	17	17	y					
	45 55	C			Mn	few	0		poor	10	13	y	(y)				
	55 75	mCL		7.5YR6/8	Mn	com	5	5		18	22	y					
	75 90	SCL					20			12	0	y					
<u>90</u> 120	SCL					30			21	0	y						
Thin										Total		136	109			FL.flood risk	EA Fz3
SPL										MB		12	-13				
Droughtiness grade (DR)										2	3a					Beans (tall)	
3	T 0 30	hCL	n	2.5Y4/4			0		-	54	54			III	3b	3b	WE
	30 45	hZCL		2.5Y6/3	Fe	com	0		m/poor	22	22	y	(y)				
	45 50	ZC		10Y7/1	Fe	many	5		poor	6	6	y	(y)				
	50 85	SCL		7.5R6/8	Mn	many	20	5		27	23	y					
	<u>85</u> 120	SL					30			27	0	y					
Compact Upper subsoil										Total		136	105			FL.flood risk	EA Fz3
MB										MB		12	-17				
Droughtiness grade (DR)										2	3a					Beans (short and part bare)	

4	T	0	25	hCL	n	2.5Y5/4			0	-	45	45		IV	3b	3b	WE GW	
		25	34	hZCL		2.5Y5/3	Fe	com	0		m/poor	13	13	y				
		34	49	C		7.5Y7/1	Fe	many	0		poor	20	20	y	(y)			
		49	85	SCL		7.5R6/8	Mn	many	10	10		30	26	y				
		85	120	SL					30		poor	20	0	y				
							Compact Upper subsoil					Total	128	104				
									MB	4	-18					GW.Groundwater low spot 3b		
									Droughtiness grade (DR)	3a	3a					Beans (bare patches nearby)		
5	T	0	28	hZCL	n	2.5Y5/4			0	-	53	53		III	3b	3b	WE	
		28	42	hZCL		2.5Y5/6	Mn	few	0		m/poor	20	20					
		42	63	C		7.5Y7/1	Fe	many	0		poor	20	27	y	y			
		63	72	mCL		7.5R6/8	Mn	many	10	10		8	9	y				
		72	120	SL					30		poor	28	0	y				
							Compact Upper subsoil					Total	128	110				
									MB	4	-12							
									Droughtiness grade (DR)	3a	3a					Beans		
6	T	0	30	hCL	n	2.5Y5/4			2	-	53	53		II	3a	3a	WE DR	
		30	44	hCL		2.5Y5/6	Fe	com	2		m/poor	19	19	(y)				
		44	50	C		7.5Y7/1	Fe	many	0		poor	8	8	y	(y)			
		50	80	SZL		7.5R6/8	Mn	many	5	10		29	30	y				
		80	120	SL					30		poor	23	0	y				
							Compact Upper subsoil					Total	132	110				
									MB	8	-12							
									Droughtiness grade (DR)	2	3a					Beans		
7	T	0	25	CL	n	2.5Y5/3			0	-	45	45		III	3b	3b	WE	
		25	35	hZCL		2.5Y5/4			0			17	17					
		35	44	ZC		2.5Y5/4	Fe	few	0		m/poor	12	12					
		44	85	C		10Y7/2	Mn	many	0	10	poor	30	31	y	y			
		85	120	MSt					0		poor	18	0	y	y			
							Weald Clay					Total	122	106				
									MB	-2	-16							
									Droughtiness grade (DR)	3a	3a					Beans		
8	T	0	25	ZC	n	2.5Y4/2			0	-	43	43		II	3b	3b	WE GW	
		25	50	hCL		2.5Y4/4			0			40	40					
		50	80	hCL		2.5Y5/3	Fe	com	10		poor	21	24	y	y			

		<u>80</u>	120	MSt					0	poor	20	0	y	y			
										Total	124	107		FL.flood risk	EA Fz3		
										MB	0	-16		GW.Groundwater	spring?	3b	
										Droughtiness grade (DR)		3a	3a	Beans (bare patch)			
9	T	0	30	CL	n	10YR4/4			0	-	54	54		//	3a	3a	WE DR
		30	40	ZC		2.5Y6/4	Fe	com	0		15	15	y				
		40	75	ZC		2.5Y6/4	grey	many	0	m/poor	32	36	y				
		75	80	hCL		10YR3/3	Mn	pred		10	5	0	y				
		<u>80</u>	120	C		7.5YG7/1		many	0		poor	28	0	y	y		
										Total	134	105		FL.flood risk	EA Fz3		
										MB	10	-17					
						Weald Clay				Droughtiness grade (DR)		2	3a	Beans (better)			
10	T	0	28	hZCL	n	2.5Y4/4			2	-	52	52		///	3b	3b	WE
		28	42	hZCL		2.5Y5/4	Mn	few	2	m/poor	20	20	(y)				
		42	85	C/CL		7.5Y7/1	Fe	many	0	poor	35	35	y	y			
		85	100	SCL		7.5R6/8	Mn	many	5	10	13	0	y				
		<u>100</u>	120	SL					20		poor	13	0	y			
						Mottled				Total	133	107		FL.flood risk	EA Fz3		
						38cm				MB	9	-15					
										Droughtiness grade (DR)		2	3a	Beans			
11	T	0	28	hCL	n	2.5Y5/4			2	-	49	49		//	3a	3a	WE DR
		28	35	hZCL		2.5Y5/4	Mn	few	2		12	12					
		35	49	C		2.5Y5/3	Fe	com	0	poor	18	18	y	(y)			
		49	65	SCL		7.5R6/8	Mn	many	10	10	14	20	y				
		<u>65</u>	120	SL					30		43	5	y				
										Total	136	105		FL.flood risk	EA Fz3		
										MB	12	-17					
										Droughtiness grade (DR)		2	3a	Beans (short)			
12	T	0	25	hZCL	n	2.5Y5/4			0	-	48	48		//	3a	3a	WE DR
		25	37	hZCL		2.5y5/3	Fe	com	0		20	20	y				
		37	50	ZC		2.5Y5/3	Mn	com	5	poor	15	15	y	(y)			
		50	80	mCL		7.5R6/8	Mn	many	5	10	26	28	y				
		80	100	SL			Mn	many	10	10	18	0	y				
		<u>100</u>	120	SL					30		16	0	y				
										Total	143	111		FL.flood risk	EA Fz3		
										MB	19	-11					

														Droughtiness grade (DR)		2	3a	Beans (short)	
13	T	0	28	CL	n	2.5Y4/4			0	-	50	50		//	3a	3a	WE DR		
		28	35	hCL		2.5Y5/4	Fe	few	0		11	11							
		35	44	ZC		2.5Y5/3	FeMn	com	5	poor	10	10	y	(y)					
		44	65	mCL	slight	7.5R6/8	Mn	many	10	10	21	28	y						
		<u>65</u>	120	SL					30		43	5	y						
											Total		136	105	FL.flood risk		EA Fz3		
											MB		12	-17					
														Droughtiness grade (DR)		2	3a	Beans (mod)	
14	T	0	27	mCL		10YR5/4			0	-	49	49		//	2	2	WE DR		
		27	35	mCL	n	10YR6/4	Fe	few	0		13	13							
		35	65	hCL	n	2.5Y5/4	Fe	com	0		39	48	y						
		65	80	LC			Mn	many	5	10	9	6	y	y					
		80	100	SCL		7.5YR6/8	Mn	com	5	5	18	0	y						
		<u>100</u>	120	SL					30		16	0	y						
											Total		144	115	FL.flood risk		EA Fz3		
											MB		20	-7					
														Droughtiness grade (DR)		2	2	Beans	
15	T	0	20	hCL	n	2.5Y5/4			0	-	36	36		///	3b	3b	WE		
		20	35	hZCL		2.5Y5/4	Fe	few	0	m/poor	22	22							
		35	60	C		10Y7/1	Fe	many	0	poor	27	33	y	y					
		60	100	hZCL		7.5R6/8	Grey	com	5	m/poor	31	14	y						
		<u>100</u>	120	Mst					0	poor	10	0	y	y					
											SPL				FL.flood risk		EA Fz3		
											40cm								
											Total		125	104					
											MB		1	-18					
														Droughtiness grade (DR)		3a	3a	Beans (short)	
16	T	0	28	hCL	n	2.5Y5/4			0	-	50	50		///	3b	3b	WE		
		28	40	ZC		2.5Y5/4	Fe	few	0	m/poor	16	16							
		40	60	C		2.5Y5/3	FeMn	com	0	5	19	25	y	y					
		60	90	mCL		10YR3/3	Mn	pred	10	10	25	13	y						
		90	120	hCL		7.5YR7/8	grey	many	5	5	23	0	y						
											Upper subsoil				FL.flood risk		EA Fz3		
											Total		134	105					
											MB		10	-17					
														Droughtiness grade (DR)		2	3a	Beans (mod)	
17	T	0	28	mCL	slight	10YR4/4			2	-	49	49		//	2	2	WE DR		

					Weald Clay				Droughtiness grade (DR)	3a	3a		Beans (bare patch)				
22	T	0	28	hZCL	n	2.5Y4/4			0	-	53	53	///	3b	3b	WE	
		28	42	ZC	n	2.5Y6/3	Fe	com	0		21	21	y				
		42	65	ZC		7.5YR6/8	grey	com	0	poor	20	28	y	y			
		65	100	C		7.5YG7/1	Fe	com	0	poor	25	7	y	y			
		<u>100</u>	120	Mst				many	0	poor	10	0	y	y			
										Total	129	108			FL.flood risk	EA Fz2	
										MB	5	-14			GW.Groundwater	?	
					Weald Clay				Droughtiness grade (DR)	2	3a		Beans (edge of bare patch)				
23	T	0	28	mCL		2.5Y4/4			0	-	53	53	IV	3b	3b	WE	
		28	35	hZCL		2.5Y5/3	Fe	many	0		12	12	y				
		35	50	C	n	10Y7/1	Fe	many	0	poor	20	20	y	y			
		<u>50</u>	120	Mst					0	poor	35	16	y	y			
										Total	120	101			FL.flood risk	EA Fz2	
										MB	-4	-21					
					Weald Clay				Droughtiness grade (DR)	3a	3a		Beans (part bare)				
34	T	0	25	hZCL	n	2.5Y4/4			0	-	48	48	//	3a	3a	WE DR	
		25	40	hZCL		2.5Y5/3	Fe	com	0		26	26	y				
		40	50	hZCL		2.5Y6/3	Mn	many	5	5	m/poor	13	13	y	(y)		
		50	65	SL	n	7.5YR6/8	Mn	many	20	5		13	17	y			
		<u>65</u>	120	SL					30			43	5	y			
						Mn layer				Total	142	109			FL.flood risk	EA Fz3	
						40cm				MB	18	-13					
									Droughtiness grade (DR)	2	3a		Beans (taller)				
35	T	0	30	mCL	n	2.5Y5/4			2	-	53	53	//	2	3a	DR	
		30	45	hCL		2.5Y5/4	FeMn	few	2	m/poor	21	21	y				
		45	65	mCL		2.5Y6/3	Mn	many	2	10		21	29	y			
		65	80	SZL		7.5YR6/8	Mn	pred	10	10		14	7	y			
		<u>80</u>	120	SL					30			31	0	y			
						Mn starts				Total	140	110			FL.flood risk	EA Fz3	
						35cm				MB	16	-12					
									Droughtiness grade (DR)	2	3a		Beans (taller)				
36	T	0	28	hCL	n	2.5Y4/4			2	-	49	49	//	3a	3a	WE DR	
		28	40	mCL		2.5Y6/4	Fe	few	0		19	19	y				
		40	80	mCL		2.5Y6/3	Mn	pred	5	10	m/poor	35	37	y			

		<u>80</u>	120	SCL					30		29	0	y				
						Mn layer				Total	132	106		FL.flood risk	EA Fz3		
						35cm				MB	8	-16					
									Droughtiness grade (DR)		2	3a		Beans (taller)			
37	T	0	30	mCL	n	2.5Y5/4			2	-	53	53		///	3a	3a	WE DR
		30	45	hCL		2.5Y5/3	Fe	com	2	m/poor	21	21	y				
		45	80	LC		7.5YR6/8	grey	many	5	10	poor	24	28	y	y		
		80	95	SCL		7.5YR6/8	Mn	pred	5	10		13	0	y			
		<u>95</u>	120	SL					30			20	0	y			
										Total	131	101		FL.flood risk	EA Fz3		
										MB	7	-21					
									Droughtiness grade (DR)		2	3a		Beans			
38	T	0	32	CL	n	2.5Y4/4			0	-	58	58		//	3a	3a	WE DR
		32	40	hCL		2.5Y5/3	Fe	com	0		13	13	y				
		40	60	C		2.5Y6/3	Mn	pred	0	10	poor	19	24	y	y		
		60	80	SCL		7.5R6/8	Fe	many	10			18	14	y			
		<u>80</u>	120	SL		7.5R6/8	Mn	many	25			34	0	y			
										Total	141	108		FL.flood risk	EA Fz3		
										MB	17	-14					
									Droughtiness grade (DR)		2	3a		Beans (taller)			
39	T	0	28	hCL	n	2.5Y4/4			0	-	50	50		IV	3b	3b	WE
		28	37	C		2.5Y5/3	Fe	com	0		14	14	y				
		37	100	C		7.5GY7/1	Fe	com	5		poor	49	41	y	y		
		<u>100</u>	120	Mst					15		poor	9	0	y	y		
										Total	123	106		FL.flood risk	EA Fz3		
										MB	-1	-16					
									Droughtiness grade (DR)		3a	3a		Beans (taller)			
40	T	0	25	hCL	n	2.5Y4/4			0	-	45	45		IV	3b	3b	WE
		25	35	hCL		2.5Y5/3	Fe	com	0		16	16	y				
		35	55	hCL		10GY7/1	MnFe	many	0	10	poor	21	22	y	y		
		55	80	mCL			MnFe	com	10	10		21	20	y			
		<u>80</u>	120	SCL					30			29	0	y			
										Total	131	103		FL.flood risk	EA Fz3		
										MB	7	-19					
									Droughtiness grade (DR)		2	3a		Beans			

41	T	0	25	hCL	n	2.5Y5/4			2	-	44	44		IV	3b	3b	WE GW	
		25	48	C		7.5Y7/2	Fe	com	0		poor	30	30	y	y			
		48	70	hCL		7.5YR6/8	Mn	many	0		poor	16	26	y	y			
		70	95	SCL		7.5YR5/3	MnFe	many	5	5		23	0	y				
		<u>95</u>	120	SCL			Mn	many	5	5	poor	18	0	y				
												Total	132	100				
									MB	8	-22							
									Droughtiness grade (DR)	2	3a							
													FL.flood risk		EA Fz3			
													GW.groundwater		depression 3b			
													Beans (bare areas)					
42	T	0	28	hCL	n	2.5Y5/3			0	-	50	50		//	3a	3a	WE DR	
		28	35	hCL		2.5Y5/3	FeMn	com	0			11	11	y				
		35	68	hCL		10Y7/1	FeMn	many	5	5	m/poor	33	42	y				
		68	80	C		10Y7/1	Fe	many	5	5	poor	8	2	y	y			
		80	100	mCL		7.5R6/8	Mn	many	5	5	poor	13	0	y	y			
		<u>100</u>	120	SL					25		poor	12	0	y	y			
									Total	128	106							
									MB	4	-16							
									Droughtiness grade (DR)	3a	3a							
													FL.flood risk		EA Fz3			
													Beans (taller)					
43	T	0	30	hCL	n	2.5Y5/4			0	-	54	54		///	3b	3b	WE	
		30	45	C		7.5GY7/1	Fe	many	0		poor	20	20	y	(y)			
		45	70	mCL		7.5YR5/3	Mn	many	0	5		27	39	y				
		70	85	hCL		7.5YR5/3	MnFe	many	0	5	poor	10	0	y	y			
		85	120	SCL			Mn	many	10	5	m/poor	27	0	y				
												Total	138	112				
									MB	14	-10							
									Droughtiness grade (DR)	2	2							
													FL.flood risk		EA Fz3			
													Beans					
44	T	0	29	mZCL	v.slight	2.5Y4/4			2	-	54	54		//	2	3a	DR	
		29	34	mZCL		2.5Y5/4			2			8	8					
		34	55	ZC		2.5Y5/2	MnFe	many	5	10	m/poor	22	25	y	(y)			
		55	90	SCL		5YR6/6	Mn	com	5	5		32	21	y				
		<u>90</u>	120	SL					30			24	0	y				
												Total	140	108				
									MB	16	-14							
									Droughtiness grade (DR)	2	3a							
													FL.flood risk		EA Fz3			
													Beans (tall)					
45	T	0	28	hCL	n	10YR4/4			2	-	49	49		///	3b	3b	WE	
		28	45	hCL		2.5Y6/3	Mn	many	5			26	26	y				
		45	60	C		2.5Y6/3	MnFe	many	5	5	poor	12	18	y	y			
		60	90	mCL		7.5YR6/8	Mn	many	15	5		25	13	y				

			<u>90</u>	120		hCL				15		poor	18	0	y	y			
						Very Mn						Total	131	106			FL.flood risk	EA Fz3	
						35cm						MB	7	-16					
											Droughtiness grade (DR)		2	3a			Beans		
46	T	0	33	mCL	n	10YR4/4			2	-	58	58			//	2	2	WE DR	
		33	50	hCL		2.5Y6/2	Mn	many	2	5	26	26	y						
		50	72	mCL		2.5Y6/2	MnFe	many	2	5	21	30	y						
		72	90	LC		7.5GY7/1	Mn	many	2	5	poor	12	0	y	y				
		<u>90</u>	120	Mst					5		poor	15	0	y	y				
											Total	131	114			FL.flood risk	EA Fz3		
											MB	7	-8						
											Droughtiness grade (DR)		2	2			Wheat		
47	T	0	29	hZCL	n	10YR5/4			0	-	55	55			//	3a	3a	WE	
		29	45	hZCL		2.5Y5/4	Fe	few	0	5	26	26							
		45	79	mCL		2.5Y6/2	Mn	many	0	10	34	37	y						
		79	95	LC		7.5GY7/1	Mn	many	0	5	poor	11	0	y	y				
		95	120	mCL					0	5	poor	17	0	y	y				
						Much Mn					Total	144	118			FL.flood risk	EA Fz3		
						70cm					MB	20	-4						
											Droughtiness grade (DR)		2	2			Wheat		
48	T	0	30	hCL	n	2.5Y5/4			2	-	53	53			//	3a	3a	WE	
		30	70	mCL		2.5Y5/3	FeMn	com	2		51	63	y						
		70	85	SZL		10YR3/3	Mn	pred	5	10	15	0	y						
		85	95	hCL		10Y7/1	FeMn	many			poor	7	0	y	y				
		<u>95</u>	120	mCL							poor	17	0	y	y				
						Mn starts					Total	142	116			FL.flood risk	EA Fz3		
						33cm					MB	18	-6						
											Droughtiness grade (DR)		2	2			Wheat		
49	T	0	30	hCL	n	2.5Y4/4			2	-	53	53			//	3a	3a	WE DR	
		30	45	CL		2.5Y5/3	Fe	com	2		24	24	y						
		45	70	ZC		10Y7/1	Fe	many			m/poor	21	32	y	(y)				
		70	85	mCL		7.5YR6/8	Mn	com	0	10	14	0	y						
		85	120	hCL		10Y7/1	FeMn	many	0	5	poor	25	0	y	y				
											Total	136	109			FL.flood risk	EA Fz3		
											MB	12	-13						
											Droughtiness grade (DR)		2	3a			Wheat, in slight hollow		

50	T	0	30	CL	n	2.5Y5/4			2	-	53	53		//	3a	3a	WE DR	
		30	44	CL		2.5Y5/4	Fe	few	10		20	20						
		44	68	mCL			Mn	many	10	m/poor	21	30	y					
		68	80	C		10Y7/1	Fe	com	0	poor	8	3	y	y				
		80	85	mCL		7.5YR6/8	MnFe	many	0	5	poor	3	0	y	y			
		<u>85</u>	120	hCL			MnFe	many	0	10	poor	23	0	y	y			
											Total	130	106				FL.flood risk	EA Fz3
										MB	6	-16						
										Droughtiness grade (DR)	2	3a					Wheat	
51	T	0	25	mCL	n	2.5Y5/4			0	-	45	45		///	3a	3a	WE DR	
		25	35	mCL		2.5Y5/4	Fe	few	0		16	16						
		35	50	hZCL		2.5Y6/2	Mn	many	0	5	m/poor	21	21	y				
		50	65	C		7.5YR5/3	MnFe	many	0	5	poor	10	19	y	y			
		65	85	CL/C			MnFe	many	0	5	m/poor	16	7	y	y			
		<u>85</u>	120	hCL			MnFe	many	0	10	poor	23	0	y	y			
											Total	132	108				FL.flood risk	EA Fz3
										MB	8	-14						
										Droughtiness grade (DR)	2	3a					Wheat	
52	T	0	32	ZC	n	2.5Y4/4			0	-	54	61		///	3b	3b	WE	
		32	55	C		10Y7/1	Fe	many	0	m/poor	30	33	y					
		55	60	C		10Y7/1	Mn	pred.	0	poor	4	7	y	y				
		60	85	hCL		7.5YR6/8	Mn	many	0	5	poor	17	11	y	y			
		<u>85</u>	120	Mst							poor	18	0	y	y			
											Total	122	112				FL.flood risk	EA Fz3
						ZC-hZCL					MB	-2	-10					
					topsoil					Droughtiness grade (DR)	3a	2					Wheat, soil cracked	
53	T	0	31	ZC	n	2.5Y4/4			0	-	53	53		///	3b	3b	WE	
		31	43	ZC		2.5Y5/3	MnFe	com	0	5	poor	17	17	y				
		43	70	C		10Y7/1	Fe	many	0	poor	23	35	y	y				
		70	90	C/CL		7.5YR6/8	Mn	many	0	5	poor	14	0	y	y			
		<u>90</u>	120	MSt			MnFe	many	0	poor	15	0	y	y				
											Total	122	105				FL.flood risk	EA Fz3
						ZC-hZCL					MB	-2	-17					
					topsoil					Droughtiness grade (DR)	3a	3a					Wheat, soil cracked	
54	T	0	25	hCL	n	2.5Y4/4			4	-	43	43		IV	3b	3b	WE	
		25	35	hCL		2.5Y6/3	Fe	com	4		15	15	y					
		35	65	C		10Y7/1	Fe	many	0	poor	30	39	y	y				

65	105	mCL	7.5YR6/8	Mngr	many	0	5		39	8	y				
<u>105</u>	120	MSt				0		poor	8	0	y	y			
									Total	135	105		FL.flood risk	EA Fz3	
									MB	11	-17				
									Droughtiness grade (DR)		2	3a		Wheat, soil cracked	

55	T	0	30	hZCL	n	2.5Y4/4			0	-	57	57		///	3b	3b	WE
		30	45	hZCL		2.5Y5/3	Mn	com	0		26	26	y				
		45	55	hZCL		2.5Y6/2	Mn	many	0	10	poor	8	11	y	(y)		
		55	65	mCL		7.5YR6/8	Mn	many	0	10		9	15	y			
		65	90	C		10Y7/1	MnFe	many	0		poor	18	7	y	y		
		<u>90</u>	120	MSt					0		poor	15	0	y	y		
									Mn starts		Total	133	115		FL.flood risk	EA Fz3	
									35cm		MB	9	-7				
									Droughtiness grade (DR)		2	2		Wheat, soil cracked			

56	T	0	25	hZCL	n	2.5Y4/4			0	-	48	48		//	3a	3a	WE
		25	32	hZCL		2.5Y5/4	Fe	few	0		27	27					
		32	40	hZCL		2.5Y6/2	Mn	many	0	5	poor	16	19	y	(y)		
		40	65	mCL		7.5YR6/8	Mn	many	0	5		21	18	y			
		65	90	hCL		10Y7/1	MnFe	many	0		poor	6	0	y	y		
		<u>90</u>	120	MSt					0		poor	15	0	y	y		
									Compact Upper subsoil		Total	133	112		FL.flood risk	EA Fz3	
											MB	9	-10				
									Droughtiness grade (DR)		2	2		Wheat, soil cracked			

57	T	0	25	hZCL	n	2.5Y5/4			0	-	48	48		///	3b	3b	WE
		25	41	hZCL		2.5Y5/4	Fe	few	0		27	27					
		41	58	ZC			Mn	many	0	5	poor	16	20	y	y		
		58	80	mCL		7.5YR6/8	Mn	com	0	5		21	18	y			
		80	90	CL		10YR3/3	Mn	very	0	10	poor	7	0	y	y		
		<u>90</u>	120	MSt					0		poor	15	0	y	y		
									Compact Upper subsoil		Total	133	113		FL.flood risk	EA Fz3	
											MB	9	-9				
									Droughtiness grade (DR)		2	2		Wheat, soil cracked			

58	T	0	22	ZCL	n	2.5Y5/4			0	-	42	42		//	3a	3a	WE
		22	35	hZCL		2.5Y5/3	Fe	com	0		22	22	y				
		35	50	hCL			Mn	many	0	5	poor	17	17	y	(y)		
		50	85	SZL		2.5Y6/2	Mn	many	5	5		37	33	y			

		85	120	mCL					0	10	poor	23	0	y	y				
												Total	142	114		FL.flood risk	EA Fz3		
												MB	18	-8					
												Droughtiness grade (DR)		2	2		Wheat		
59	T	0	30	hZCL	n	2.5Y5/4			0	-		57	57			///	3b	3b	WE
		30	38	hCL		2.5Y5/4	Fe	few	5		m/poor	11	11						
		38	55	LC			Mn	many		10	poor	17	20	y	y				
		55	72	mCL		7.5YR6/8	Mn	many		10		16	22	y					
		72	120	C		2.5Y7/1	Fe	many	0		poor	34	0	y	y				
												Total	134	110		FL.flood risk	EA Fz3		
												MB	10	-12					
												Droughtiness grade (DR)		2	3a		Wheat, soil cracked		
60	T	0	27	mZCL	n	10YR5/4			0	-		51	51			///	3a	3a	WE
		27	40	hZCL		2.5Y5/4	Fe	few	0			22	22						
		40	55	LC			Mn	very	0	10	poor	15	17	y	y				
		55	80	mCL		7.5YR6/8	Mn	many	0	5		24	23	y					
		80	120	mCL						10	m/poor	32	0	y					
												Total	144	114		FL.flood risk	EA Fz3		
												MB	20	-8					
												Droughtiness grade (DR)		2	2		Wheat		
61	T	0	25	C	n	2.5Y4/4	Mn	few	0	-		43	43			IV	3b	3b	WE
		25	35	C	slight	5Y5/3	FeMn	com	0		poor	13	13	y	y				
		35	50	C		2.5Y6/3	FeMn	many	0	10	m/poor	20	20	y	(y)				
		50	65	CL		7.5YR6/8	Mn	many	0	10		14	22	y					
		65	80	ZC			FeMn	many	0	5	poor	10	6	y	y				
		80	120	C		10Y7/1	Mn	many		5	poor	27	0	y	y				
												Total	127	104		FL.flood risk	EA Fz3		
												MB	3	-18					
												Droughtiness grade (DR)		3a	3a		(spring) wheat		
62	T	0	30	ZC	n	10YR5/4	Mn	few	0	-		51	51			IV	3b	3b	WE
		30	50	LC		10YR7/1	Mn	many	0	5	poor	24	24	y	y				
		50	70	C		10Y7/1	FeMn	many	0		m/poor	15	29	y	(y)				
		70	80	hCL		10YR3/3	Mn	pred	0	15		9	0	y					
		80	120	C		7.5GY7/1	FeMn	many	0	5	poor	27	0	y	y				
												Total	126	104		FL.flood risk	EA Fz3		
												MB	2	-18					
						Weald						Droughtiness grade (DR)							

		Clay LSS		Droughtiness grade (DR)							3a	3a	(spring) wheat					
63	T	0	25	hZCL	n	2.5Y4/4			0	0	-	48	48		//	3a	3a	WE DR
		25	40	hZCL		2.5Y5/6	Mn	com	0	5		25	25					
		40	54	ZC		2.5Y6/3	Mn	many	0	5	poor	14	16	y	(y)			
		54	70	mCL		10YR7/2	Mn	many	0	10		15	24	y				
		70	92	hCL		10Y7/1	FeMn	many	0	5	m/poor	18	0	y				
		92	120	C		7.5GY7/1	FeMn	many	0	5	poor	19	0	y	y			
												Total	138	112				FL.flood risk EA Fz3
			Weald								MB	14	-10					
			Clay 92cm								Droughtiness grade (DR)	2	3a				(spring) wheat	
64	T	0	25	hZCL	n	2.5Y4/4		few	2	2	-	46	46		///	3b	3b	WE
		25	35	ZC		2.5Y5/4	Mn	com	0			15	15	y				
		35	50	ZC		2.5Y6/3	Mn	many	0	10	poor	17	17	y	y			
		50	85	CL		7.5YR6/8	Mn	many	0	10		33	30	y				
		85	105	ZC			FeMn	many	0		m/poor	15	0	y	y			
		105	120	hCL			Mn	pred		20		13	0	y	y			
												Total	138	107				FL.flood risk EA Fz3
			Compact								MB	14	-15					
			35cm								Droughtiness grade (DR)	2	3a				(spring) wheat	
65	T	0	32	hZCL	n	2.5Y4/4			0	0	-	61	61		//	3a	3a	WE
		32	45	hZCL		2.5Y5/3	Mn	many	0	10		20	20	y				
		45	80	mCL		10YR7/2	Mn	many	0	10		35	37	y				
		80	120	hZCL		10Y7/1	FeMn	many	0	5	m/poor	31	0	y				
												Total	148	118				FL.flood risk EA Fz3
			Compact								MB	24	-4					
			45-50cm								Droughtiness grade (DR)	2	2				(spring) wheat	
66	T	0	27	mZCL	n	2.5Y5/4			0		-	51	51		//	2	2	WE DR
		27	35	mZCL		2.5Y5/6	Fe	few	0			14	14					
		35	50	ZC		2.5Y6/3	MnFe	many	0	10	poor	17	17	y	(y)			
		50	75	hZCL		2.5Y6/3	Fe	com	0			25	34	y				
		75	120	hCL		7.5YR6/8	Mn	many	0	10	poor	30	0	y	y			
											Total	136	116				FL.flood risk EA Fz3	
			Compact								MB	12	-6					
			Upper subsoil								Droughtiness grade (DR)	2	2				Wheat	
67	T	0	35	mZCL	n	10YR4/4			0		-	67	67		//	2	2	WE DR

														Total		139	113	FL.flood risk		EA Fz2
														MB		15	-9			
														Droughtiness grade (DR)		2	2	Wheat		
72	T	0	27	ZCL	n	2.5Y5/4			0	-	51	51		IV	3b	3b	WE			
		27	37	hZCL		2.5Y6/3	Mn	com	0		17	17	y							
		37	55	LC		2.5Y5/2	Mn	many	0	10	poor	18	21	y	y					
		55	75	hZCL		7.5YR6/8	Fe	com	5		m/poor	15	21	y						
		75	120	C		10Y7/1	FeMn	com	0	5	poor	31	0	y	y					
														Total		133	110	FL.flood risk		EA Fz3
														MB		9	-12			
														Droughtiness grade (DR)		2	3a	Wheat		
														Compact Upper subsoil						
73	T	0	27	mZCL	n	2.5Y5/4			0	-	51	51		///	3a	3a	WE			
		27	35	mZCL		2.5Y5/4	Mn	com	0	5		13	13	y						
		35	65	hCL		2.5Y6/2	MnFe	many	0	10		36	44	y						
		65	90	ZC		10Y7/1	Fe	com	0	5	poor	17	6	y	y					
		90	120	mCL		7.5YR6/8	Mn	com	0	5	m/poor	25	0	y	y					
														Total		142	115	FL.flood risk		EA Fz3
														MB		18	-7			
														Droughtiness grade (DR)		2	2	Wheat		
74	T	0	28	hZCL	n	10YR4/4			0	-	53	53		/	2	2	WE DR			
		28	50	hZCL		2.5Y5/4	Mn	few	0		37	37								
		50	70	mZCL		2.5Y5/2	Mn	com	0	5		19	33	y						
		70	80	mCL		2.5Y5/2	Mn	many	0	10		9	0	y						
		80	120	hCL		2.5Y6/3	Mn	com	0	5	poor	27	0	y	y					
														Total		146	123	FL.flood risk		EA Fz3
														MB		22	1			
														Droughtiness grade (DR)		2	2	Wheat		
75	T	0	30	hZCL	n	10YR5/4			0	-	57	57		//	3a	3a	WE			
		30	50	mZCL		2.5Y6/6			0		34	34								
		50	65	mZCL		2.5Y5/3	Fe	com	0		poor	9	18	y	y					
		65	80	mCL		7.5YR5/3	Mn	many	0	10	poor	10	6	y	y					
		<u>80</u>	120	hCL		7.5YR5/3	Mn	many	0	10	poor	26	0	y	y					
														Total		136	115	FL.flood risk		EA Fz3
														MB		12	-7			
														Droughtiness grade (DR)		2	2	Wheat		

76	T	0	28	mZCL	n	10YR5/4			0	-	53	53		//	2	2	DR WE	
		28	45	mZCL		2.5Y6/6			0		29	29						
		45	80	mCL		2.5Y5/2	Mn	many	0	10	m/poor	30	33	y				
		80	120	hCL		7.5YR5/3	Mn	many	0	10	m/poor	32	0	y				
		Total											144	115		FL.flood risk	EA Fz2	
MB											20	-7						
Droughtiness grade (DR)											2	2		Wheat				
77	T	0	28	mZCL	n	10YR5/4			0	-	53	53		//	2	2	WE DR	
		28	35	mZCL		2.5Y6/6			0		12	12						
		35	85	hZCL		2.5Y5/2	Mn	many		10	m/poor	46	47	y				
		85	120	hCL		7.5YR5/3	Mn	many		10	poor	23	0	y				
		Total											135	112		FL.flood risk	EA Fz2	
MB											11	-10						
Droughtiness grade (DR)											2	2		Wheat				
78	T	0	27	mZCL	n	2.5Y5/4			0	-	51	51		//	2	2	WE DR	
		27	70	mZCL		2.5Y6/4	Mn	com	0	5		57	70	y				
		70	90	hZCL		7.5YR6/8	Mn	many	0	10	m/poor	15	0	y	(y)			
		90	120	mCL		10YR3/3	Mn	pred		30	poor	17	0	y				
		Total											141	122		FL.flood risk	EA Fz3	
MB											17	0						
Droughtiness grade (DR)											2	2		Wheat				
80	T	0	30	hZCL		10YR4/4			0	-	57	57		//	3a	3a	WE	
		30	85	C		2.5Y5/2	Fe	com	0		m/poor	55	58	y				
		85	120	hZCL		2.5Y5/3	Fe	com	0		m/poor	28	0	y				
		Total											140	115		FL.flood risk	EA Fz3	
MB											16	-7						
Droughtiness grade (DR)											2	2		Wheat (ex maize)				
81	T	0	30	hZCL	slight	10YR4/4			0	0	-	57	57		/	2	2	WE DR
		30	50	hZCL		2.5Y5/4	Fe	few	0	0	m/poor	29	29					
		50	105	hZCL		2.5Y5/3	Fe	com	0	5		53	33	y				
		105	120	ZC						10	poor	10	0	y	y			
		Total											149	119		FL.flood risk	EA Fz3	
MB											25	-3						
Droughtiness grade (DR)											2	2		Wheat (ex maize)				
82	T	0	30	CL	slight	10YR4/3			2	2	-	52	52		//	2	2	WE DR

														Total		148	121	FL.flood risk		EA Fz2
														MB		24	-1			
														Droughtiness grade (DR)		2	2	Wheat		
87	T	0	28	hZCL	n	10YR4/4			0	-	53	53		//	3a	3a	WE			
		28	40	hZCL		2.5Y5/4	Mn	few	0		20	20								
		40	50	hZCL		2.5Y5/3	Mn	com	0	5	m/poor	14	14	y						
		50	70	mCL			Mn	many	0	10		19	30	y						
		70	120	ZC/ZCL		7.5YR5/3	FeMn	many	0	10	m/poor	40	0	y	y					
														Total		146	117	FL.flood risk		EA Fz3
														MB		22	-5			
														Droughtiness grade (DR)		2	2	Wheat		
88		0	30	hZCL	n	10YR4/4			0	-	51	51		//	3a	3a	WE DR			
		30	50	hZCL		2.5Y5/3	FeMn	com	0		m/poor	29	29	y						
		50	80	CL		7.5YR6/8	MnFe	many	0	10		28	30	y						
		80	105	hCL			Mn	many	0	10	m/poor	20	0	y						
		105	120	hZCL						20	poor	8	0	y	y					
														Compact				FL.flood risk		EA Fz3
														45-50cm						
														Total		136	110			
														MB		12	-12			
														Droughtiness grade (DR)		2	3a	Wheat		
89	T	0	25	ZC	n	2.5Y5/4			0	-	43	43		//	3b	3b	WE			
		25	38	ZC		2.5Y5/4	Fe	com	0		20	20								
		38	50	C		2.5Y7/2	MnFe	many	0	5	poor	15	15	y	(y)					
		50	80	hCL		7.5YR6/8	Mn	many	0	10		28	30	y						
		80	90	hCL			Mn	many	0	10	poor	7	0	y	y					
		90	120	MSt		7.5GY7/1					poor	15	0	y	y					
														Total		127	107	FL.flood risk		EA Fz3
														ZC-hZCL						
														border						
														MB		3	-15			
														Droughtiness grade (DR)		3a	3a	Wheat		
90	T	0	28	ZC	n	10YR4/4			0	-	48	48		///	3b	3b	WE			
		28	38	ZC		2.5Y6/4	Fe	com	0		15	15	y							
		38	57	C		2.5Y6/3	MnFe	com	0	5	poor	20	24	y	y					
		57	70	ZCL		7.5YR6/8	Mn	many	0	10		12	20	y						
		80	120	ZC/ZCL		7.5YR5/3	FeMn	many	0	10	m/poor	32	0	y	y					
														Total		126	107	FL.flood risk		EA Fz3
														hZCL-						
														ZC						
														MB		2	-15			
														Droughtiness grade (DR)		3a	3a	Wheat		

91	T	0	28	ZC	n	10YR5/4			0	-	48	48		///	3b	3b	WE	
		28	37	ZC		10YR5/3	Fe	com	0		14	14	y					
		37	55	C		10Y7/1	MnFe	many	0	10	poor	19	22	y	y			
		55	70	hZCL			Mn	com	0	5		14	25	y				
		70	90	ZC		7.5YR5/3	FeMn	many	0	10	poor	13	0	y	y			
		<u>90</u>	120	C							poor	21	0	y	y			
											Total	129	107				FL.flood risk	EA Fz3
						Weed patches					MB	5	-15					Wheat
										Droughtiness grade (DR)	2	3a						
92	T	0	30	ZC	n	10YR4/4			0	-	51	51		//	3b	3b	WE	
		30	40	hZCL		2.5Y5/4	Fe	com	0		17	17						
		40	70	hZCL		2.5Y5/3	Mn	many	0	10	m/poor	28	40	y				
		70	82	CL		10YR3/3	Mn	pred	0	15		11	0	y				
		82	105	C		10Y7/1	MnFe	many	0	10	poor	15	0	y	y			
		<u>105</u>	120	MSt							poor	8	0	y	y			
											Total	130	108				FL.flood risk	EA Fz3
						Very dense 85cm					MB	6	-14					Wheat
										Droughtiness grade (DR)	2	3a						
93	T	0	25	C	n	2.5Y5/4			0	-	43	43		IV	3b	3b	WE	
		25	33	ZC		2.5Y5/2	Mn	com	0		12	12						
		33	57	C		2.5Y6/3	MnFe	many	0	5	poor	26	30	y	y			
		57	85	hCL		10Y7/1	Mn	many	0	10	m/poor	22	17	y				
		<u>85</u>	100	CL			Mn	pred	0	15	poor	10	0	y	y			
		100	120	MSt							poor	10	0	y	y			
											Total	122	102				FL.flood risk	EA Fz3
						Very dense 85cm					MB	-2	-20					Wheat
										Droughtiness grade (DR)	3a	3a						
94	T	0	25	ZC	n	10YR5/4			0	-	43	43		//	3b	3b	WE	
		25	35	ZC		2.5Y6/3	Fe	few	0		15	15						
		35	70	ZCL		2.5Y5/3	Fe	com	0	5	m/poor	36	49	y				
		70	100	ZC		10YR5/3	Fe	many	0	0	poor	21	0	y	y			
		100	120	C		7.5GY7/1	Fe	many	0		poor	14	0	y	y			
											Total	129	106				FL.flood risk	EA Fz3
						Weed patches					MB	5	-16					Wheat
											Droughtiness grade (DR)	2	3a					

95	T	0	25	ZC	n	10YR5/4			0	-	43	43		//	3b	3b	WE		
		25	35	ZC		2.5Y6/2	Fe	com	0			15	15	y					
		35	45	ZC		2.5Y7/2	Fe	many	0	5	poor	12	12	y	(y)				
		45	90	CL		10YR3/3	Mn	pred	0	10		45	37	y					
		90	120	hZCL		7.5YR6/8	FeMn	many	0	10	poor	17	0	y	y				
												Total	131	106			FL.flood risk	EA Fz3	
												hZCL- ZC	MB	7	-16				
										Droughtiness grade (DR)		2	3a			Wheat			
96	T	0	30	ZC	n	10YR5/4	Mn	few	0	-	51	51		/V	3b	3b	WE		
		30	52	C		10YR6/2	Fe	com	0		poor	27	29	y	y				
		52	83	ZC		7.5YR6/8	Mn	many	0	10	m/poor	22	23	y					
		83	100	C		7.5GY7/1	FeMn	many	0	10	poor	11	0	y	y				
		<u>100</u>	120	MSt							poor	10	0	y	y				
												Total	121	102			FL.flood risk	EA Fz3	
												Compact 33cm	MB	-3	-20				
										Droughtiness grade (DR)		3a	3a			Wheat			
97	T	0	27	ZC	n	10YR5/4			0	-	46	46		//	3b	3b	WE		
		27	38	ZC		2.5Y5/4			0			17	17						
		38	50	C		10Y7/1	FeMn	com	0	5	poor	15	15	y	(y)				
		50	80	hZCL		7.5YR6/8	Mn	com		5		29	33	y					
		80	100	C		7.5GY7/1	Mn	many	0	10	poor	13	0	y	y				
		<u>100</u>	120	MSt							poor	10	0	y	y				
												Total	130	110			FL.flood risk	EA Fz3	
										Weald Clay LSS	MB	6	-12						
										Droughtiness grade (DR)		2	3a			Wheat			
98	T	0	27	hZCL	n	10YR4/4			0	-	51	51		//	3a	3a	WE		
		27	34	hZCL		2.5Y5/4			0			12	12						
		34	45	hCL		2.5Y6/4	FeMn	com	0	5	poor	13	13	y	(y)				
		45	80	hCL		7.5YR6/8	Mn	many		10		35	37	y					
		80	100	C		7.5GY7/1	FeMn	many	0	5	poor	14	0	y	y				
		<u>100</u>	120	Mst							poor	10	0	y	y				
												Total	135	113			FL.flood risk	EA Fz3	
										Weald Clay LSS	MB	11	-9						
										Droughtiness grade (DR)		2	2			Wheat			
99	T	0	25	ZC	n	2.5Y5/4			0	-	43	43		/V	3b	3b	WE		
		25	32	ZC		2.5Y5/3			0			11	11						
		32	65	C		10YR6/2	Fe	com	0	0	poor	34	43	y	y				

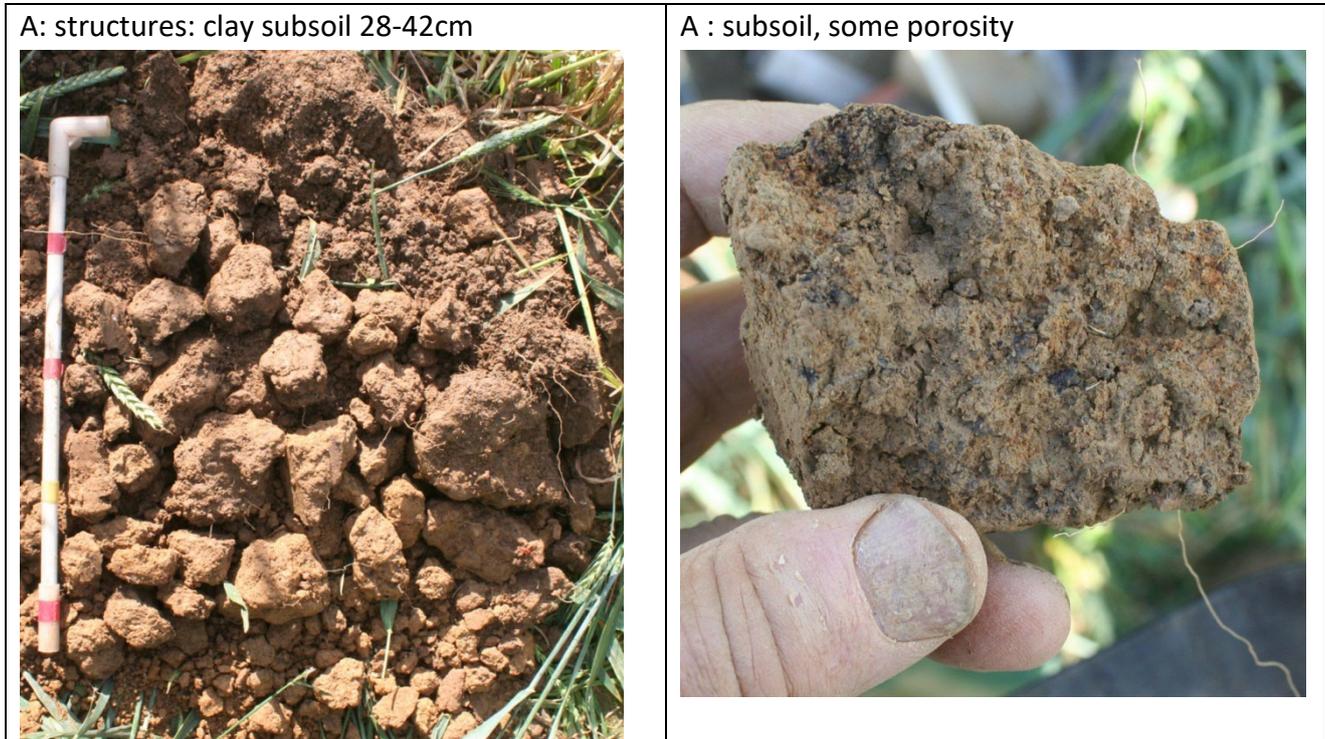
104	T	0	26	ZC	n	10YR4/4		0	-	44	44		///	3b	3b	WE
		26	35	ZC		2.5Y5/3	few	0		14	14					
		35	50	C		2.5Y5/3	FeMn com	0	5	poor	19	19	y	y		
		50	70	CL		7.5YR6/8	Mn many	0	10		19	30	y			
		80	120	ZC			Mn layers	0	5	poor	27	0	y	y		
									Total	122	106		FL.flood risk		EA Fz3	
					Very compact				MB	-2	-16					
						Droughtiness grade (DR)				3a	3a		(spring) wheat			

Appendix 3: Soil pit descriptions and photographs

Pit A		Description (arable)
Ap	0-28 cm	Brown (10 YR 5/4) silty clay. Stoneless. Firm very coarse sub-angular blocks, coarse granular structure in root channels (direct drilled).
Btg	28-42 cm	Greyish (2.5Y 6/3) silty clay, with iron and manganese mottles. Some roots. Very firm coarse angular blocks (compact).
Bg	42-80 cm	Heavy clay loam (10YR 5/3) with many iron mottles and manganese fragments. 5% soft small stones. Dry, friable (fine subangular blocky) and permeable.

Geology: Alluvium, clayey and silty.

Comment: permeability is restricted in clayey upper subsoil, but this layer is less than 15cm thick and could be loosened by subsoiler. The lower subsoil is permeable but (historically was) subject to groundwater. WC is II but ALC grade is limited to Grade 3b because topsoil slightly exceeds 35% clay (Appendix I).



Pit B		Description (arable)
Ap	0-28 cm	Brown (10YR 4/3) silty clay. Stoneless. Firm medium sub-angular blocks with roots.
Bt	28-45 cm	Greyish-brown (2.5Y 5/3) clay, with a few iron mottles. Some roots and firm coarse sub-angular blocks.
Bg	45-75 cm	Silty clay, greyish brown (2.5Y 6/2). Very firm medium-coarse angular blocky structure, common iron and manganese mottles.
Cg	75 cm -	Clay, light greenish grey (7.5GY 7/1) with iron and manganese mottles.

Geology: clayey Alluvium over Weald Clay within 1m.

Comment: upper subsoil has reasonable structure but slowly permeable below 45cm and (historically) subject to groundwater. WC III and ALC Grade 3b. Topsoil has higher clay content (40%) than pit A.

<p>B: structures: clay subsoil 28-42cm</p>	<p>Subsoil below 45cm, low porosity, very firm</p>	<p>Bluish-grey clay at depth</p>
		

Pit C		Description (arable)
Ap	0-26 cm	Brown (2.5Y 4/4) heavy clay loam. Traces of carbonate. Coarse prismatic breaking to medium/fine subangular blocks. Friable.
Bt	26-35 cm	Clay, light olive-brown (2.5Y 6/4) with common faint iron mottles. Some roots and earthworms. Firm medium prismatic structure. Very slightly calcareous.
Bw(g)	35-58 cm	Clay with very firm very coarse prismatic structure. Slightly calcareous (a few limestones). Increasing iron and manganese mottles with depth.
BCg	58 cm -	Clay, light greenish grey (7.5GY 7/1) with common iron and manganese mottles. Calcareous.

Geology: Weald Clay with "Paludina" limestone layers

Comment: upper subsoil is very clayey but not strongly mottled. CaCO₃ helps cracking and structure. However the profile cannot be rated higher than WC III and ALC Grade is 3b.



Pit E		Description (arable)
Ap	0-28 cm	Brown (10 YR 4/4-5/4) heavy silty clay loam. Occasional lime particles. Top 10cm friable, below firm, fine subangular blocky to medium angular blocky.
Bt	28-43 cm	Clay, greyish (10YR 6/3) with common iron mottles. Some roots and earthworms. Very firm, very coarse angular blocks breaking to medium blocks (compact). Non-calcareous.
Bg	43-70 cm	Heavy clay loam, predominantly mottled >50% iron (7.5YR 6/6) and grey (7.5Y 7/1). Dry and friable, fine subangular blocky. Slightly stony increasing to moderately stony with depth
Cg	70 cm -	Auger stopped by stone.

Geology: River Terrace, clayey over loamy-stony.

Comment: permeability is restricted in clayey upper subsoil, but this layer could be loosened by subsoiler. Lower subsoil is permeable although (historically) subject to groundwater. WC is II which limits ALC to Grade 3a based on Wetness, as well as on Droughtiness.

<p>E: structures</p> 	<p>Subsoil above and below 43cm</p>  <p>Below 43cm is weakly structured dry very friable subsoil full of iron and manganese mottles with some hard stones.</p>
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Pit F		Description (arable)
Ap1	0-13 cm	Brown (10 YR 4/4) medium clay loam. Non-calcareous. Friable with coarse granular structure, many roots.
Ap2	13-28 cm	Brown (10 YR 5/4) heavy clay loam. Slightly compact prismatic structures. Fewer roots.
Eb(g)	28-42 cm	Heavy silty clay loam, brown (10YR 6/6 to 5/4), with some iron and manganese mottles. Some roots. Medium/coarse subangular blocky structure. Friable
Btg	42-60 cm	Silty Clay, dark greyish brown (2.5Y 6/2) with 30% iron and 10% manganese mottles. Firm, fragmenting to angular blocks on removal from pit.
	60-65 cm	Dark brown (10YR 3/3) layer of manganese fragments
Cg	65-90 cm	Heavy clay loam, permeable with increasing hard stones.

Geology: River Terrace, silty-clayey over loamy-stony.

Comment: permeability restricted clayey layer starts below 40cm. WC is III which limits ALC to Grade 3a on Wetness. Tall beans, despite some compaction in the lower topsoil.



Location C: beans shorter with weed patches



Location D: tall even bean crop



Location D: beans somewhat shorter (compaction stressed)



Location F: tall bean crop

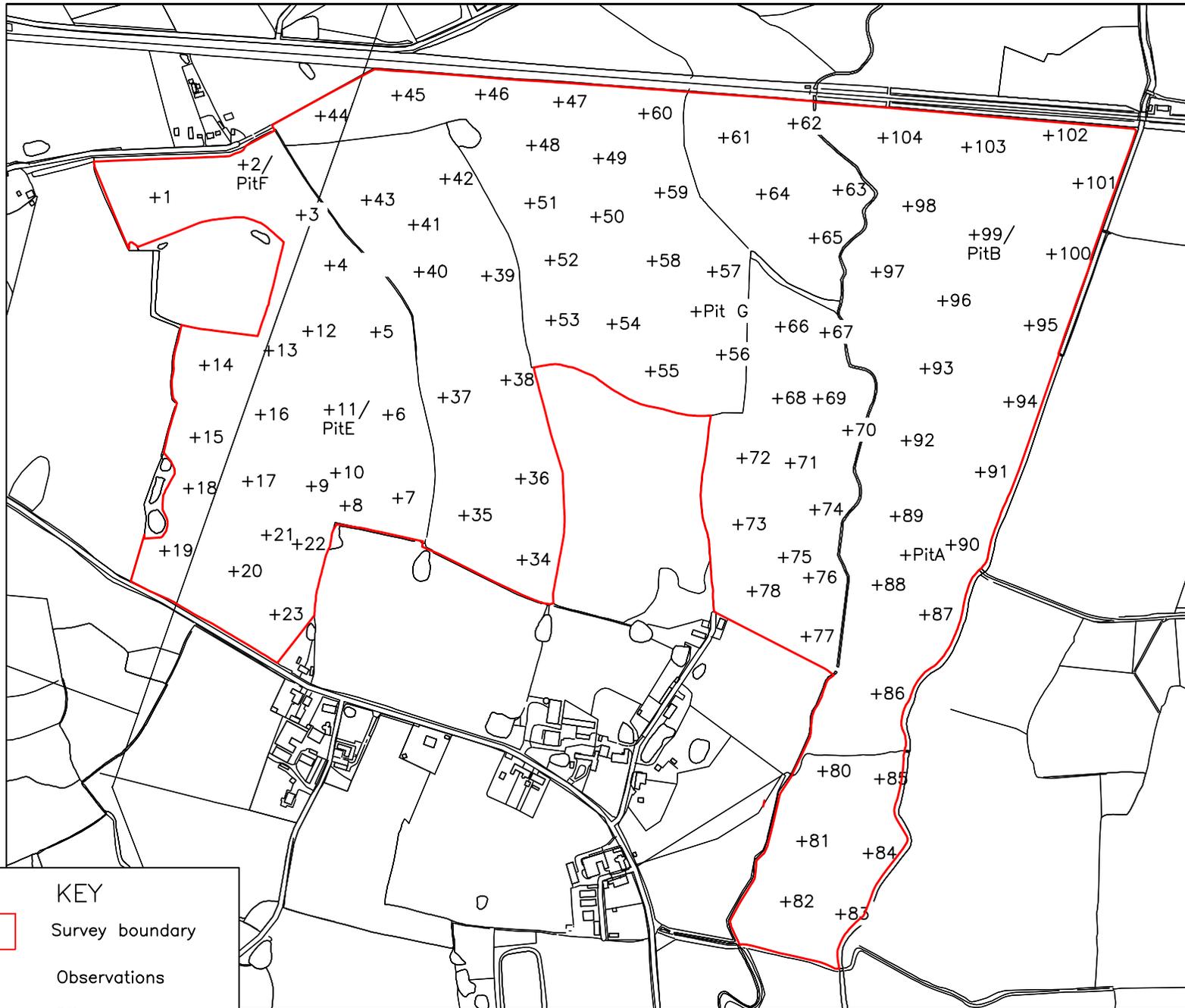


Location B - even wheat crop



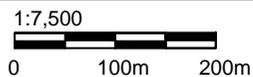
Location G - even wheat crop



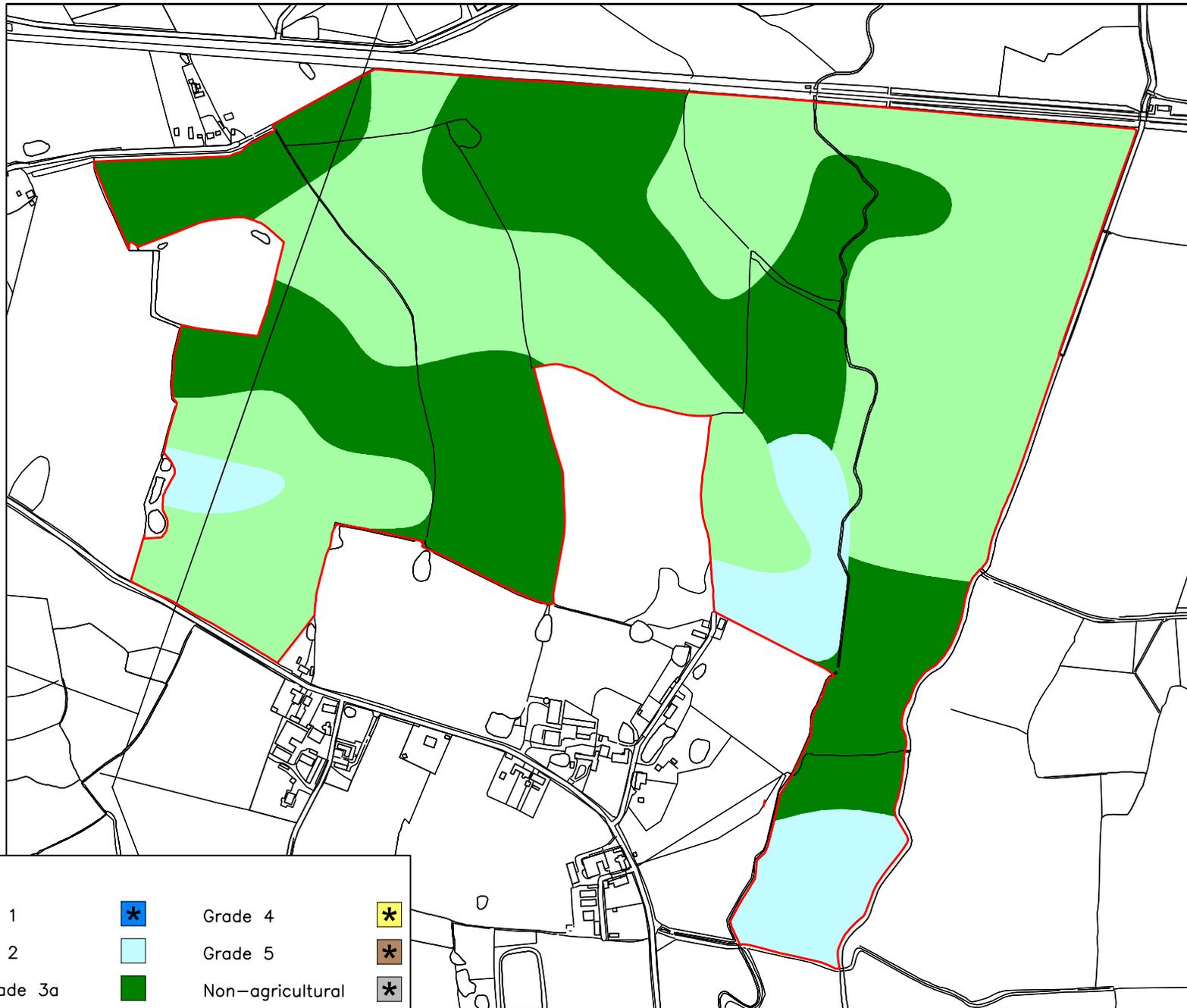


KEY	
	Survey boundary
+1	Observations
+P	Pit

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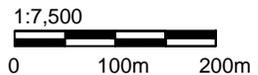


Rev.	Comment	Date
Drawing title OBSERVATION MAPPING		
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Reading Agricultural Consultants Ltd Gate House Beechwood Court Long Toll Woodcote RG8 ORR 01491 684233 www.reading-ag.com		
Ref. RAC/9221/1	Rev. 2022-A	
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Scales 1:7,500@A4	Date 02/2022	



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

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Rev.	Comment	Date
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