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A30 Chiverton to Carland Cross
Environmental Statement

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Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended)
APFP Regulation 5(2)(a)

A30 Chiverton to Carland Cross

Agricultural Land Classification

and

Soil Resources

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1. Introduction

1.1.1. Reading Agricultural Consultants Ltd (RAC) is instructed by WSP on behalf of the Highways England to investigate the Agricultural Land Classification (ALC) and soil resources of land along the A30 between Chiverton and Carland Cross, Cornwall, 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 (1988[1]), and summarised in Natural England's Technical Information Note 049[2].

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 Provisional ALC map shows the length of the route to be of undifferentiated Grade 3 quality with an area of Grade 2 to the north-west of Shortlanesend. 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 19th December 2012.

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 area subject to survey extends to approximately 12.7km in length and largely follows the route of the existing A30 between Chiverton and Carland Cross. Much of the land was under grass at the time of survey, with large arable fields to the south of the route and to the north of the B3284.

2.1.2. Topography throughout the survey area is undulating. The highest altitudes are at the northern and southern ends of the survey area, at around 145m above Ordnance Datum (AOD). The lowest altitudes, of around 75m AOD, are at Trevalso, Nancarrow and Little Nanteague. Slopes are typically shallow to moderate, although exceptionally steep gradients are present to the north of Carland Cross, measured at between 17 and 20°.

2.1.3. Drainage of land in the survey area is via the low altitude valleys which drain into the River Allen, flowing southward to Truro.

2.2. Agro-climatic Conditions

2.2.1. Agro-climatic data for the north and south of the survey area have been interpolated from the Meteorological Office's standard 5km grid point data set at representative altitudes of 120m and 135m AOD, and are given in Table 1. The area is warm and very wet with moderate to moderately small crop moisture deficits. The Field Capacity Day (FCD)[3] regimes are longer than is the average for lowland England and considered to be unfavourable for providing opportunities for agricultural field work. There is an overriding climatic limitation within the survey area to Grade 2.

Table 1: Local agro-climatic conditions

	Carland Cross	Chiverton
Average Annual Rainfall	1,127mm	1,119mm
Accumulated Temperatures >0°C	1,506 day°	1,492 day°
Field Capacity Days	218 days	217 days
Average Moisture Deficit, wheat	84mm	82mm
Average Moisture Deficit, potatoes	71mm	68mm

[3] Field Capacity Days represent the period when the soil moisture deficit is zero; i.e. the soil is full (or over-full) of water.

2.3. Soil Parent Material and Soil Type

2.3.1. The underlying geology mapped by the British Geological Survey[4] in the north of the survey area, between Carland Cross and north of Marazanvose, is the Grampound Formation, comprising thinly interlaminated slaty mudstone and siltstone. Sporadic beds of sandstone and limestone may also be present. South of Marazanvose, interbedded slaty mudstone and sandstone of the Porthtowan Formation is mapped.

2.3.2. In the vicinity of Carland Cross, Zelah and Marazanvose, superficial deposits of glacial Head are mapped. These deposits may include poorly sorted gravel, sand and clay.

2.3.3. The Soil Survey of England and Wales soil association mapping[5] (1:250,000 scale) shows the Denbigh 2 association to be present throughout the survey area. This association consists of well drained, fine loamy soils overlying slate or slate rubble. In south Cornwall, some slates are locally more weathered to slowly permeable clays, though most soils are of Wetness Class (WC) I.

2.3.4. Around Carland Cross, Chybucca and Three Burrows, there are pockets of the Sportsmans association. These soils occur on ridge tops and valley sides over sandstones, slates and shales and are characterised by slowly permeable and compact subsoil overlain by more permeable loamy material. Sportsmans soils are typically of WC III[6].

3. Agricultural Land Quality

3.1. Soil Survey Methods

3.1.1. Observation of 70 soil profiles was attempted across the accessible land within the survey area, using an Edelman (Dutch) auger at an observation density of approximately one per hectare. However, the soil was exceptionally dry in many places resulting in severe difficulties in extracting material to observe. Two pits were also excavated with a spade to examine subsoil structures of the main soil type. The locations of observations are indicated on Figures RAC7538-1 - 4. The following characteristics were assessed for each observable soil horizon up to a maximum of 120cm or any impenetrable layer:

[4] **British Geological Survey (2017).** *Geology of Britain viewer, http://mapapps.bgs.ac.uk/geologyofbritain/home.html*

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

[6] **Findlay *et al.* (1984).** *Soils and Their Use in South West England, Soil Survey of England and Wales,* Bulletin 14. Harpenden

- soil texture;
- significant stoniness;
- colour (including local gley and mottle colours);
- consistency;
- structural condition;
- free carbonate; and
- depth.

3.1.2. Three topsoil samples 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.

3.1.3. Soil Wetness Class (WC) was inferred from the matrix colour, presence or absence of, and depth to, greyish and ochreous gley mottling and/or poorly permeable subsoil 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 guidelines (1988[1]). Soil profiles have been described according to Hodgson (1997[7]) which is the recognised source for describing soil profiles and characteristics according to the MAFF revised ALC guidelines.

3.2.2. Agricultural land quality in the survey area is most affected by soil wetness and workability as influenced by the very wet climate. The limitation ranges from very good quality Grade 2 to moderate quality Subgrade 3b, depending on the specific topsoil texture. A small area of land at the northern end of the survey area is limited to Grade 5 due to exceptionally steep slopes.

3.2.3. In accordance with the published soil association mapping, there is considered to be one dominant soil type throughout the area. The topsoil is of clay loam or clay of around 30cm average thickness. The colour is predominantly brown (7.5YR4/3 7.5YR4/4, 10YR4/3 or 10YR5/3 in the Munsell soil colour charts[8]), with greyish brown and yellowish brown (10YR4/2, 10YR5/2 or 10YR5/4) also present.

[7] **Hodgson, J. M. (Ed.) (1997).** *Soil survey field handbook*. Soil Survey Technical Monograph No. 5, Silsoe.
[8] **Munsell Color (2009).** *Munsell Soil Color Book,* Grand Rapids, MI, USA

3.2.4. At the northern end of the survey area, the topsoil structure is moderately well to well developed with fine angular blocky peds. The consistency was loose and dry at the time of survey. Common to many medium roots grow throughout the topsoil, which is well drained and adequately aerated through common pores. Between 0 and 25cm depth, the stone content of the profile is around 15% total stone, mostly smaller than 2cm. The stone content increases to 30% total to a depth of around 30cm, from where the material becomes predominantly stone within a soil matrix (estimated at 70%). As the soil was so dry, it was not possible to excavate this further.

3.2.5. In the centre of the survey area and shown in Pit 2, the topsoil structure is weakly developed with fine subangular blocky peds. Common medium roots are present, though few pores were observed. The stone content is around 5% at the soil surface, increasing to 20% between around 20 to 40cm.

3.2.6. Subsoil was observed in Pit 2 and comprised heavy clay loam with a weak, fine subangular blocky structure. Few fine and medium roots are distributed within the soil between depths of 45 to 50cm. The stone content is very high at between 60 and 70% by volume. There is no evidence of wetness in the subsoil: the profile is of WC I. Photographs of each of the pits are given in Appendix 3.

3.2.7. This subsoil type is common throughout the survey area, predominantly comprising heavy clay loam or clay textures. The colour is various shades of brown or yellowish brown (7.5YR4/3, 5/3, 5/4, 5/6, 10YR4/3, 5/3, 5/4 or 5/6) and the stone content is commonly estimated at 15 to 20% in the upper subsoil layers. The average depth to which soil was observed is around 50cm in the south of the survey area and around 40cm in the north.

3.2.8. Most of the subsoil observed is well drained and shows no evidence of waterlogging, resulting in WC I. The main limitation to agricultural land quality is therefore determined by the topsoil texture in combination with the number of FCDs. Where the topsoil is of medium clay loam, the wetness and workability limitation is to Grade 2. Profiles with heavy clay loam topsoil are limited to Subgrade 3a and those with clay topsoil are limited more severely to Subgrade 3b.

3.2.9. A second minor soil type is present in which the subsoil displays ochreous mottles against a greyish or pale matrix colour. Although still permeable, the high number of FCDs and fine soil textures result in WC III. In profiles of WC III with a medium clay loam topsoil texture, the wetness and workability limitation is to Subgrade 3a and where of heavy clay loam is to Subgrade 3b.

3.2.10. A small area of the site, at Observation 41 (shown in Appendix 3), is limited to Subgrade 3b by topsoil stone content as the percentage of topsoil stones larger than 2cm exceeds 15% by volume.

3.2.11. Where the soil was too dry to enable full observations, assumptions have been made as to the composition of subsoil horizons, based upon nearby auger and pit observations. Due to the correlation between the mapped soil type and the findings of the survey, an assumption has also been made regarding the presence of mudstone bedrock within a moderate depth of the soil surface. The assumption is typically 80cm

depth so as not to impose a more severe wetness limitation on profiles which evidence otherwise suggests are permeable.

3.2.12. The total areas of each ALC grade are given in Table 2 and are shown in Figures RAC7538-5 - 8.

Table 2: Agricultural Land Classification

Grade	Description	Area (ha)	% of agric. land
1	Excellent quality	0.0	-
2	Very good quality	69.9	47
3a	Good quality	44.3	30
3b	Moderate quality	31.4	21
4	Poor quality	0.0	-
5	Very poor quality	1.9	1
	Total Agricultural	147.5	100
	Other land	64.3	

Appendix 1: Laboratory Data

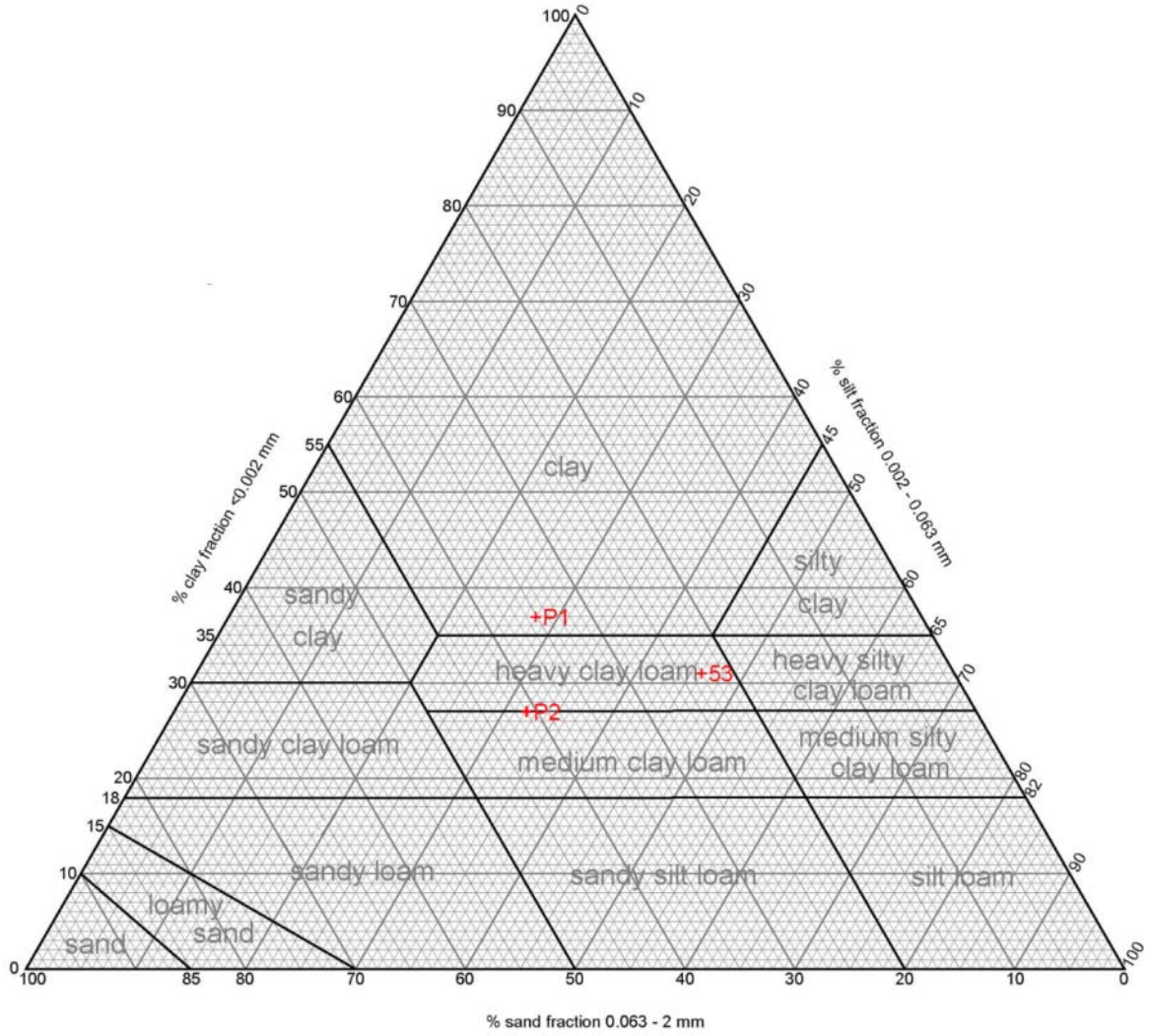
Determinand	Site P1	Site P2	Site 53	Units
Sand 2.00-0.063 mm	35	41	23	% w/w
Silt 0.063-0.002 mm	28	32	46	%w/w
Clay <0.002 mm	37	27	31	% w/w
Organic Matter WB	4.2	4.2	4.9	% w/w
Texture	Clay	Heavy Clay Loam	Heavy Clay Loam	% w/w

Determinand	Site P1	Site P2	Site 53	Units
Soil pH	5.4	5.7	5.8	
Phosphorus (P)	5.8	8.4	3.8	mg/l (av)
Potassium (K)	93.1	28.6	26.2	mg/l (av)
Magnesium (Mg)	67.3	35.1	80.5	mg/l (av)

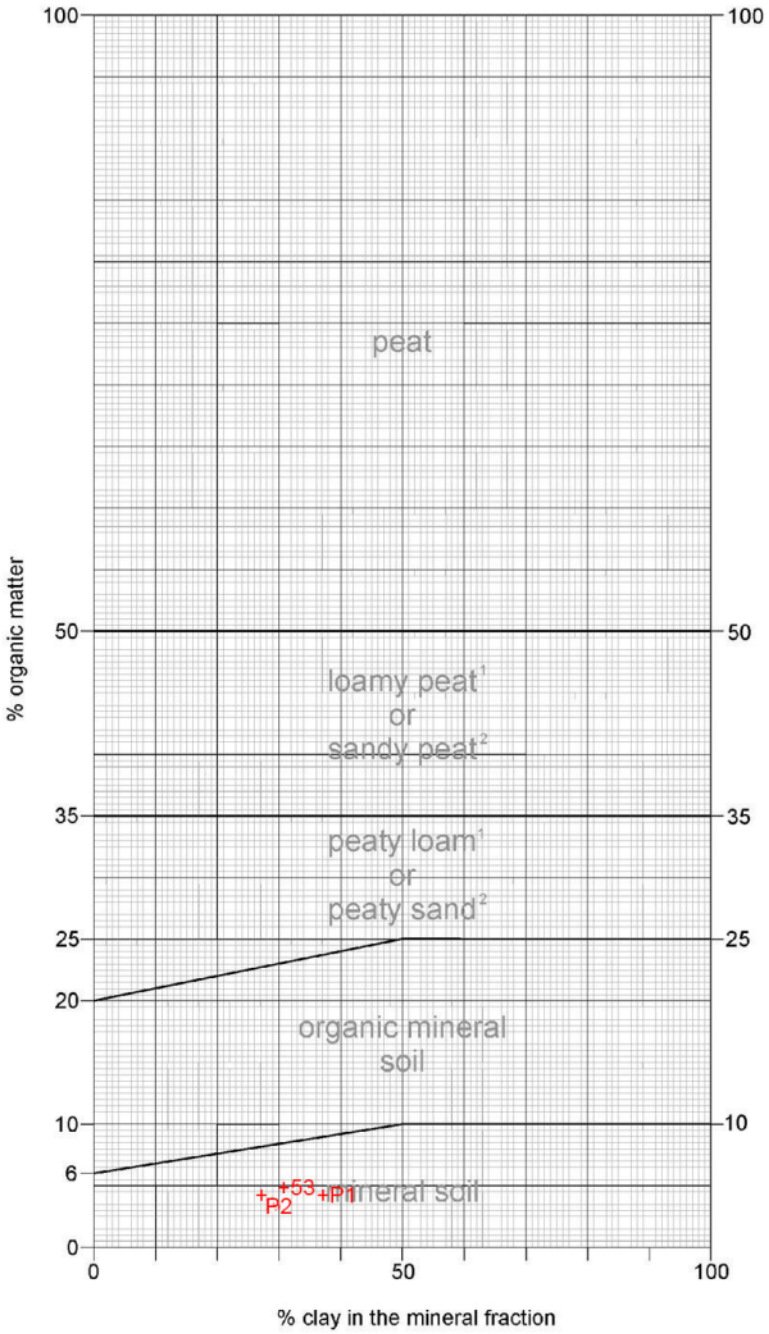
Determinand	Site P1	Site P2	Site 53	Units
Phosphorus (P)	0	0	0	ADAS Index
Potassium (K)	1	0	0	ADAS Index
Magnesium (Mg)	2	1	2	ADAS Index

Soil Texture by Particle Size Distribution

-



Organic Matter Class



[1] Less than 50% sand in the mineral fraction

[2] 50% sand or more in the mineral fraction

Appendix 2: Soil Profile Summaries and Droughtiness Calculations

Wetness / workability limitations are determined according to the methodology given in Appendix 3 of the ALC guidelines, MAFF 1988

Droughtiness calculations are made according to the methodology given in Appendix 4 of the ALC guidelines, MAFF 1988.

Grades are shown for drought, wetness and any other soil or site factors which are relevant. The overall Grade is set by the most limiting factor and shown on the right.

Stone types		
%	TAv	Eav
hard	1	0.5

Climate Data	
MDwheat	84
MDpotato	71

Wetness Class Guidelines	*II*	*III*	*IV*	*V*
SPL within 80cm, gleying within 40cm		>59cm	<59cm	
SPL within 80cm, gleying at 40-70cm		>79cm	<79cm	
No SPL but gleying within 40cm	coarse subsoil	*II*	other cases	*III*

hard flint & pebble

Maximum depth of auger penetration is underlined

Site No.		Depth cm		Texture	$CaCO_3$	Colour	Mottle colour	abund-ance	stone% hard	stone%	Struct-ure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)
1	T	0	30	ZCL		10YR5/3			5		-	54	54	n	n	*I*	2	**5**	Topo
		30	40	mCL		10YR5/3	och	fmd	15			14	14	n	n				
		40	80	mCL		10YR5/3	och	fmd	50			24	26	n	n				
		80	120	Mst								20	0						
											Total	**112**	**94**						
											MD	28	23						
									Droughtiness grade (DR)			2	1						
2	T	0	25	C		7.5YR4/3			5			41	41	n	n	*I*	3b	**5**	Topo
		25	30	C		10YR5/4			20			7	7	n	n				
		30	80	C		10YR5/4			20			46	52	n	n				
		80	120	Mstone								20	0						
											Total	**112**	**99**						
											MD	28	28						
									Droughtiness grade(DR)			2	1						
3	T	0	30	C		10YR4/3			20			41	41	n	n	*I*	3b	**3b**	WE

		30	80	hCL	10YR5/4			15		53	55	n	n					
		80	120	Mstone						20	0							
									Total	**115**	**96**							
									MD	31	25							
								Droughtiness grade(DR)		1	1							
4	T	0	30	C	10YR4/3			20		41	41	n	n	/	3b	**3b**	WE	
		30	35	hCL	10YR5/4			15		7	7	n	n					
		35	80	hCL	10YR5/4			15		46	48	n	n					
		80	120	Mstone						20	0							
									Total	**115**	**96**							
									MD	31	25							
								Droughtiness grade(DR)		1	1							
5	T	0	10	mCL	10YR4/2	och	fmd	10	-	16	16	n	n	/	2	**2**	WE DR	
		10	30	mCL	10YR5/3	och	fmd	20		26	26	n	n					
		30	80	mCL	10YR5/4			50		33	34	n	n					
		80	120	Mst						20	0							
									Total	**95**	**76**							
									MD	11	5							
								Droughtiness grade (DR)		2	2							
6	T	0	10	mCL	10YR4/2	och	fmd	10	-	16	16	n	n	/	2	**2**	WE DR	
		10	35	mCL	10YR5/3	och	fmd	20		33	33	n	n					
		35	80	mCL	10YR5/4			50		29	30	n	n					
		80	120	Mst						20	0							
									Total	**97**	**79**							
									MD	13	8							
								Droughtiness grade (DR)		2	2							
7	T	0	10	SCL	10YR5/2	och	fmd	10	-	15	15	n	n	/	2	**2**	WE DR	
		10	35	mCL	10YR5/3	och	fmd	20		33	33	n	n					
		35	80	mCL	10YR5/4			50		29	30	n	n					
		80	120	Mst						20	0							

									Total	**96**	**78**								
									MD	12	7								
								Droughtiness grade (DR)		2	2								
8	T	0	35	hCL	10YR5/4			30	-	45	45	n	n	*I*	3a	**3a**	WE DR		
		35	40	hCL	10YR5/4			30		6	6	n	n						
		40	120	hCL	10YR5/3			70		29	17	n	n						
									Total	**80**	**67**								
									MD	-4	-4								
As Pit 1								**Droughtiness grade(DR)**		3a	2								
9	T	0	30	hCL	10YR4/3			15	-	46	46	n	n	*I*	3a	**3a**	WE DR		
		30	35	hCL	10YR4/3			30		6	6	n	n						
		35	120	hCL	10YR5/3			70		32	19	n	n						
									Total	**84**	**71**								
									MD	0	0								
As Pit 1								**Droughtiness grade(DR)**		3a	2								
10	T	0	28	hCL	10YR4/3			5	-	48	48	n	n	*III*	3b	**3b**			
		28	38	hCL	10YR5/3	och	cff	20		14	14	y	n						
		38	120	hCL	10YR5/3	och	cff	70		30	18	y	n						
									Total	**92**	**79**								
									MD	8	8								
As Pit 1								**Droughtiness grade(DR)**		2	2								
11	T	0	25	C	10YR4/3			15	-	37	37	n	n	*I*	3b	**3b**	WE		
		25	30	C	10YR4/3			30		6	6	n	n						
		30	80	C	10YR4/3			70		19	22	n	n						
		80	120	Mst						20	0								
									Total	**82**	**64**								
									MD	-2	-7								
								Droughtiness grade (DR)		3a	2								
12	T	0	30	mCL	10YR5/3			5	-	51	51	n	n	*I*	2	**2**	WE		

		30	80	SCL	10YR5/3			15		52	52	n	n						
		80	120	Mst						20	0								
									Total	**123**	**103**								
									MD	39	32								
								Droughtiness grade (DR)		1	1								
13	T	0	25	mCL	10YR5/3			10	-	41	41	n	n	/	2	**2**	DR		
		25	50	SCL	10YR5/3			15		32	32	n	n						
		50	80	SCL	10YR5/3			30		21	22	n	n						
		80	120	Mst	10YR5/3			50		11	0								
									Total	**105**	**95**								
									MD	21	24								
								Droughtiness grade (DR)		2	1								
14	T	0	40	C	7.5YR4/3			5		65	65	n	n	/	3b	**3b**	WE		
		40	44	C	7.5YR5/3			10		6	6								
		44	80	C	7.5YR5/3			20		27	34	n	n						
		80	120	Mstone						20	0								
									Total	**118**	**104**								
									MD	34	33								
								Droughtiness grade(DR)		1	1								
15	T	0	35	hCL	7.5YR4/3			5		60	60	n	n	/	3a	**3a**	WE		
		35	44	hCL	10YR5/4	och	ffd	10		13	13	n	n						
		44	120	hCL	10YR5/4	och	ffd	10		72	38	n	n						
									Total	**145**	**111**								
									MD	61	40								
								Droughtiness grade(DR)		1	1								
16	T	0	28	hCL	7.5YR4/3			5		48	48	n	n	/	3a	**3a**	WE		
		28	30	hCL	7.5YR5/3			20		3	3	n	n						
		30	80	hCL	7.5YR5/3			20		50	52	n	n						
		80	120	Mstone						20	0								

									Total	**121**	**103**								
									MD	37	32								
								Droughtiness grade(DR)		1	1								
17	T	0	25	C	7.5YR4/3			20		35	35	n	n	/	3b	**3b**	WE		
		25	30	hCL	7.5YR5/3			20		7	7	n	n						
		30	80	hCL	7.5YR5/3			20		50	52	n	n						
		80	120	Mstone						20	0								
									Total	**111**	**93**								
									MD	27	22								
								Droughtiness grade(DR)		2	1								
18	T	0	22	hCL	7.5YR4/3			20		32	32	n	n	/	3a	**3a**	WE		
		22	30	hCL	7.5YR5/3			20		10	10	n	n						
		30	80	hCL	7.5YR5/3			20		50	52	n	n						
		80	120	Mstone						20	0								
									Total	**113**	**95**								
									MD	29	24								
								Droughtiness grade(DR)		2	1								
19	T	0	30	mCL	10YR5/3			5	-	51	51	n	n	/	2	**2**	WE		
		30	80	SCL	10YR4/3			15		52	52	n	n						
		80	120	Mst						20	0								
									Total	**123**	**103**								
									MD	39	32								
								Droughtiness grade (DR)		1	1								
20	T	0	28	hCL	10YR5/3			5	-	48	48	n	n	/	3a	**3a**	We		
		28	35	mCL	10YR5/3	och	fmd	15		10	10	n	n						
		35	80	mCL	10YR5/3	och	fmd	30		39	40	n	n						
		80	120	Mst						20	0								
									Total	**116**	**98**								
									MD	32	27								
								Droughtiness grade (DR)		1	1								

T/s as sample

21	T	0	30	mCL	10YR5/3			5	-	51	51	n	n	/	2	**2**	WE
		30	80	mCL	10YR5/2			15		53	55	n	n				
		80	120	Mst						20	0						
									Total	**125**	**106**						
									MD	41	35						
								Droughtiness grade (DR)		1	1						
22	T	0	28	SCL	10YR5/3			5	-	45	45	n	n	/	2	**2**	WE DR
		28	50	SCL	10YR5/2	och	fmd	15		28	28	n	n				
		50	80	SCL	10YR5/2	och	fmd	50		16	16						
		80	120	Mst						20	0						
									Total	**109**	**90**						
									MD	25	19						
								Droughtiness grade (DR)		2	1						
23	T	0	33	SCL	10YR5/3			5	-	53	53	n	n	/	2	**2**	WE DR
		33	45	SCL	10YR5/2	och	fmd	10		16	16	n	n				
		45	80	SCL	10YR5/2	och	fmd	50		20	20	n	n				
		80	120	Mst						20	0						
									Total	**110**	**90**						
									MD	26	19						
								Droughtiness grade (DR)		2	1						
24	T	0	23	hCL	10YR4/3			10		37	37	n	n	/	3a	**3a**	WE
		23	27	mCL	7.5YR4/3			20		5	5	n	n				
		27	80	mCL	7.5YR4/3			20		54	56	n	n				
		80	120	Mstone						20	0						
									Total	**117**	**99**						
									MD	33	28						
								Droughtiness grade(DR)		1	1						
25	T	0	20	hCL	10YR4/3			10		33	33	n	n	/	3a	**3a**	WE
		20	30	hCL	10YR4/3			10		15	15	n	n				

		30	80	hCL	7.5YR4/3			20		50	52	n	n				
		80	120	Mstone						20	0						
									Total	**117**	**99**						
									MD	33	28						
								Droughtiness grade(DR)		1	1						
26	T	0	28	hCL	10YR4/3			10		46	46	n	n	/	3a	**3a**	WE
		28	32	hCL	10YR4/3			10		6	6	n	n				
		32	80	hCL	7.5YR4/3			20		48	49	n	n				
		80	120	Mstone						20	0						
									Total	**119**	**101**						
									MD	35	30						
								Droughtiness grade(DR)		1	1						
27	T	0	30	C	7.5YR4/3			5		49	49	n	n	/	3b	**3b**	WE
		30	80	C	7.5YR4/3			20		46	52	n	n				
		80	120	Mstone						20	0						
									Total	**114**	**101**						
									MD	30	30						
								Droughtiness grade(DR)		1	1						
28	T	0	25	mCL	10YR5/3			5	-	43	43	n	n	/	2	**2**	DR
		25	80	SCL	10YR5/3	och	mmd	15		58	58	n	n				
		80	120	Mst						20	0						
									Total	**121**	**101**						
									MD	37	30						
								Droughtiness grade (DR)		1	1						
29	T	0	28	mCL	10YR4/4			5		48	48	n	n	/	2	**2**	WE
		28	30	mCL	7.5YR4/3			20		3	3	n	n				
		30	80	mCL	7.5YR4/3			20		50	52	n	n				
		80	120	Mstone						20	0						
									Total	**121**	**103**						

									MD	37	32							
								Droughtiness grade(DR)		1	1							
30	T	0	35	mCL	10YR5/3			5	-	60	60	n	n	/	2	**2**	WE	
		35	80	SCL	10YR5/3	och	mmd	15		45	45	n	n					
		80	120	Mst						20	0							
									Total	**125**	**105**							
									MD	41	34							
								Droughtiness grade (DR)		1	1							
31	T	0	25	mCL	10YR5/3			5	-	43	43	n	n	/	2	**2**	WE	
		25	42	mCL	10YR5/3			15		23	23	n	n					
		42	80	mCL	10YR5/3			30		31	32	n	n					
		80	120	Mst	10YR5/3					20	0							
									Total	**117**	**98**							
									MD	33	27							
								Droughtiness grade (DR)		1	1							
32	T	0	30	hCL	7.5YR4/3			5		51	51	n	n	/	3a	**3a**	WE	
		30	80	hCL	7.5YR4/3			20		50	52	n	n					
		80	120	Mstone						20	0							
									Total	**122**	**103**							
									MD	38	32							
								Droughtiness grade(DR)		1	1							
33	T	0	50	hCL	7.5YR4/3			10		82	82	n	n	/	3a	**3a**	WE	
		50	70	hCL	7.5YR5/3			20		16	26	n	n					
		70	120	hCL	7.5YR5/3			20		41	0	n	n					
									Total	**138**	**108**							
									MD	54	37							
								Droughtiness grade(DR)		1	1							
34	T	0	30	hCL	10YR5/3	och	fmd	5	-	51	51	n	n	/	3a	**3a**	We	
		30	42	SCL	10YR4/3	och	mmd	15		15	15	n	n					
		42	80	SCL	10YR4/3	och	mmd	30		30	30	n	n					

		80	120	Mst						20	0						
									Total	**117**	**97**						
									MD	33	26						
								Droughtiness grade (DR)		1	1						
35	T	0	30	mCL	10YR5/3	och	fmd	5	-	51	51	n	n	*III*	3a	**3a**	We
		30	45	SCL	10YR5/3	och	mmd	15		19	19	y	n				
		45	80	SCL	10YR5/3	och	mmd	20		30	31	y	n				
		80	120	Mst						20	0						
									Total	**121**	**101**						
									MD	37	30						
								Droughtiness grade (DR)		1	1						
36	T	0	48	mCL	10YR 4/3			5		82	82	n	n	*I*	2	**2**	WE
		48	56	hCL	10YR 5/4			30		7	9	n	n				
		56	80	hCL	10YR 5/4			30		17	16	n	n				
		80	120	Mstone						20	0						
									Total	**126**	**108**						
									MD	42	37						
								Droughtiness grade(DR)		1	1						
P2	T	0	20	hCL	10YR4/3			5		34	34	n	n	*I*	3a	**3a**	WE
		20	45	hCL	10YR4/3			20		33	33	n	n				
		45	50	hCL	10YR5/4			60		4	4	n	n				
		50	80	hCL	10YR5/4			60		13	14	n	n				
		80	120	Mstone						20	0						
									Total	**103**	**84**						
									MD	19	13						
								Droughtiness grade(DR)		2	1						
37	T	0	20	C	7.5YR3/3			2		33	33	n	n	*I*	3b	**3b**	WE
		20	24	hCL	7.5YR4/2			20		5	5	n	n				
		24	80	hCL	7.5YR4/2			20		58	60	n	n				
		80	120	Mstone						20	0						

							Total	**117**	**98**									
							MD	33	27									
						Droughtiness grade(DR)		1	1									
38	T	0	46	mCL	7.5YR4/4	10		75	75	n	n	*I*	2	**2**	WE			
		46	70	C	7.5YR5/4	20		18	31	n	n							
		70	120	C	7.5YR5/4	20		33	0	n	n							
							Total	**126**	**106**									
							MD	42	35									
						Droughtiness grade(DR)		1	1									
39	T	0	35	mCL	7.5YR4/4	10		75	75	n	n	*I*	2	**2**	WE			
		35	70	C	7.5YR5/4	20		18	31	n	n							
		70	120	C	7.5YR5/4	20		33	0	n	n							
							Total	**126**	**106**									
							MD	42	35									
						Droughtiness grade(DR)		1	1									

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		
%	TAv	Eav
hard	1	0.5

Climate Data	
MDwheat	82
MDpotato	68

Wetness Class Guidelines	*II*	*III*	*IV*	*V*
SPL within 80cm, gleying within 40cm		>59cm	<59cm	
SPL within 80cm, gleying at 40-70cm		>79cm	<79cm	
No SPL but gleying within 40cm	coarse subsoil	*II*	other cases	*III*

hard flint & pebble

Maximum depth of auger penetration is underlined

Site No.		Depth cm		Texture	$CaCO_3$	Colour	Mottle colour	abund-ance	stone% hard	stone%	Struct-ure	APwheat mm	AP potato mm	Gley	SPL	WC	Wetness grade WE	Final Grade	Limiting Factor(s)
40	T	0	25	SCL		10YR5/3	och	fmd	5			41	41	n	n	*I*	2	**2**	WE
		25	80	SCL		10YR5/3			15			58	58	n	n				

		80	120	Mst					20	0								
								Total	**118**	**99**								
								MD	36	31								
							Droughtiness grade (DR)		1	1								
41	T	0	33	mCL	10YR4/4			25		45	45	n	n	*I*	2	**3b**	ST	
		33	45	C	7.5YR4/6			25		15	15	n	n					
		45	50	C	7.5YR5/3			40		5	5	n	n					
		50	120	C	7.5YR5/3			40		35	20	n	n					
								Total	**100**	**85**								
								MD	16	14								
							Droughtiness grade(DR)		2	1								
42	T	0	38	mCL	7.5YR4/4			5		65	65	n	n	*I*	2	**2**	WE	
		38	60	C	7.5YR5/6			20		22	29	n	n					
		60	120	C	7.5YR5/6			25		37	12	n	n					
								Total	**124**	**106**								
								MD	40	35								
							Droughtiness grade(DR)		1	1								
43	T	0	25	mCL	10YR5/3	och	ffd	10		41	41	n	n	*I*	2	**2**	DR	
		25	60	SCL	7.5YR4/6	och	fmd	15		41	45	n	n					
		60	80	SCL	7.5YR4/6	och	fmd	15		17	13	n	n					
		80	120	Mst	10YR5/3			50		11	0							
								Total	**110**	**99**								
								MD	28	31								
							Droughtiness grade (DR)		2	1								
44	T	0	26	mCL	7.5YR4/4			25		36	36	n	n	*I*	2	**2**	WE	
		26	36	C	7.5YR5/6			20		13	13	n	n					
		36	120	C	7.5YR5/6			25		60	42	n	n					
								Total	**109**	**90**								
								MD	27	22								
							Droughtiness grade(DR)		2	1								

45	T	0	30	hCL	7.5YR4/4	20		44	44	n	n	*I*	3a	**3a**	WE
		30	40	C	7.5YR5/6	25		12	12	n	n				
		40	120	C	7.5YR5/6	25		55	37	n	n				
							Total	**111**	**93**						
							MD	29	25						
						Droughtiness grade(DR)		2	1						
46	T	0	35	mCL	10YR5/3	10	-	57	57	n	n	*I*	2	**2**	WE
		35	48	hCL	10YR5/2	25		16	16	n	n				
		48	80	hCL	10YR5/2	25		25	27	n	n				
		80	120	Mst				20	0						
							Total	**118**	**100**						
							MD	36	32						
						Droughtiness grade (DR)		1	1						
47	T	0	30	mCL	10YR5/3	10	-	49	49	n	n	*I*	2	**2**	WE
		30	45	hCL	10YR5/2	25		18	18	n	n				
		45	80	hCL	10YR5/2	25		29	31	n	n				
		80	120	Mst				20	0						
							Total	**116**	**98**						
							MD	34	30						
						Droughtiness grade (DR)		1	1						
48	T	0	26	hCL	10YR4/3	20		38	38	n	n	*I*	3a	**3a**	WE
		26	50	C	7.5YR5/6	20		31	31	n	n				
		50	120	C	7.5YR5/6	25		43	25	n	n				
							Total	**112**	**94**						
							MD	30	26						
						Droughtiness grade(DR)		1	1						
49	T	0	30	hCL	10YR4/2	15		46	46	n	n	*I*	3a	**3a**	WE
		30	75	hCL	2.5Y5/6	20		46	52	n	n				
		75	85	hCL	2.5Y6/4	20		8	0	n	n				

		85	120	hCL	2.5Y6/4			20		28	0	n	n					
									Total	**129**	**98**							
									MD	47	30							
								Droughtiness grade(DR)		1	1							
50	T	0	33	mCL	10YR4/2			5	-	60	60	n	n	*III*	3a	**3a**	we	
		33	45	SCL	10YR5/3	och	mmd	20		45	45	y	n					
		45	80	SCL	10YR5/3	och	mfd	40		11	0	y	n					
		80	120	Mst						11	0							
									Total	**116**	**105**							
									MD	34	37							
								Droughtiness grade (DR)		1	1							
51	T	0	25	mCL	10YR4/2			5	-	43	43	n	n	*I*	2	**2**	WE DR	
		25	35	SCL	10YR6/6	och	mmd	15		13	13	n	n					
		35	80	SCL	10YR6/6	och	mmd	40		33	33	n	n					
		80	120	Mst						20	0							
									Total	**108**	**89**							
									MD	26	21							
								Droughtiness grade (DR)		2	1							
52	T	0	38	mCL	10YR4/2			15	-	59	59	n	n	*III*	3a	**3a**	WE	
		38	40	hCL	10YR5/2	och	mmd	25		2	2	y	n					
		40	80	hCL	10YR5/2	och	mmd	40		29	30	y	n					
		80	120	Mst						20	0							
									Total	**110**	**91**							
									MD	28	23							
								Droughtiness grade (DR)		2	1							
53	T	0	35	hCL	7.5YR4/2			5		60	60	n	n	*I*	3a	**3a**	WE	
		35	60	C	2.5Y6/4			20		26	33	n	n					
		60	120	C	2.5Y6/4			20		39	13	n	n					
									Total	**125**	**106**							

									MD	43	38							
								Droughtiness grade(DR)		1	1							
54	T	0	30	mCL	10YR4/3			5	-	51	51	n	n	*I*	2	**2**	WE	
		30	50	hCL	10YR6/6	och	mff	15		28	28	n	n					
		50	80	hCL	10YR6/6	och	mff	40		19	20	n	n					
		80	120	Mst						11	0							
									Total	**109**	**99**							
									MD	27	31							
								Droughtiness grade (DR)		2	1							
55	T	0	30	mCL	10YR4/2			5	-	51	51	n	n	*III*	3a	**3a**	WE	
		30	65	hCL	5YR5/3	och	mmd	10		43	51	y	n					
		65	80	hCL	5YR5/3	och	mmd	30		11	6	y	n					
		80	120	Mst						11	0							
									Total	**116**	**108**							
									MD	34	40							
								Droughtiness grade (DR)		1	1							
56	T	0	35	mCL	10YR4/2			10	-	57	57	n	n	*III*	3a	**3a**	WE	
		35	50	hCL	10YR5/2	och	mmd	20		20	20	y	n					
		50	80	hCL	10YR5/2	och	mmd	40		19	20	y	n					
		80	120	Mst						20	0							
									Total	**115**	**97**							
									MD	33	29							
								Droughtiness grade (DR)		1	1							
57	T	0	25	mCL	10YR5/3			5		43	43	n	n	*III*	3a	**3a**	WE	
		25	30	C	10YR5/3	och	mfd	20		7	7	y	n					
		30	80	C	10YR5/3	och	mfd	20		46	52	y	n					
		80	120	Mstone						20	0							
									Total	**115**	**101**							
									MD	33	33							
								Droughtiness grade(DR)		1	1							

58	T	0	30	mCL	10YR4/3			2		53	53	n	n	*I*	2	**2**	WE
		30	36	hCL	10YR5/4	och	cff	40		6	6	n	n				
		36	80	hCL	10YR5/4	och	cff	40		33	34	n	n				
		80	120	Mstone						20	0						
									Total	**112**	**93**						
									MD	30	25						
								Droughtiness grade(DR)		1	1						
59	T	0	30	hCL	10YR4/2			5		51	51	n	n	*I*	3a	**3a**	WE
		30	80	hCL	10YR5/4			30		44	46	n	n				
		80	120	Mstone						20	0						
									Total	**116**	**97**						
									MD	34	29						
								Droughtiness grade(DR)		1	1						
60	T	0	25	hCL	10YR4/2			5		43	43	n	n	*I*	3a	**3a**	WE
		25	46	C	10YR5/6			25		26	26	n	n				
		46	80	C	10YR5/6			30		22	28	n	n				
		80	120	Mstone						20	0						
									Total	**110**	**96**						
									MD	28	28						
								Droughtiness grade(DR)		2	1						
61	T	0	25	mCL	10YR4/3			10		41	41	n	n	*I*	2	**2**	WE
		25	80	C	10YR5/6			30		46	52	n	n				
		80	120	Mstone						20	0						
									Total	**107**	**93**						
									MD	25	25						
								Droughtiness grade(DR)		2	1						
62	T	0	30	mCL	10YR4/3			10		49	49	n	n	*I*	2	**2**	WE
		30	45	hCL	10YR5/4			40		15	15	n	n				
		45	80	hCL	10YR5/4			40		24	25	n	n				

		80	120	Mstone						20	0							
									Total	**108**	**89**							
									MD	26	21							
								Droughtiness grade(DR)		2	1							
63	T	0	40	mCL	10YR4/4			10		65	65	n	n	*I*	2	**2**	WE	
		40	50	hCL	10YR5/4			20		13	13	n	n					
		50	120	hCL	10YR5/4			20		57	26	n	n					
									Total	**135**	**104**							
									MD	53	36							
								Droughtiness grade(DR)		1	1							
64	T	0	30	mCL	10YR4/2			5	-	51	51	n	n	*I*	2	**2**	WE	
		30	40	hCL	10YR6/6			10		15	15	n	n					
		40	80	hCL	10YR6/6			30		33	35	n	n					
		80	120	Mst						20	0							
									Total	**119**	**100**							
									MD	37	32							
								Droughtiness grade (DR)		1	1							
65	T	0	20	mCL	10YR4/2			5	-	34	34	n	n	*III*	3a	**3a**	WE	
		20	35	hCL	10YR5/2	och	mmd	15		21	21	y	n					
		35	80	hCL	10YR5/2	och	mmd	30		39	40	y	n					
		80	120	Mst						20	0							
									Total	**114**	**95**							
									MD	32	27							
								Droughtiness grade (DR)		1	1							
66	T	0	30	hCL	10YR4/2			10		49	49	n	n	*I*	3a	**3a**	WE	
		30	45	C	10YR4/4	och	cmp	10		22	22	n	n					
		45	60	C	10YR4/4	och	cmp	10		15	22	n	n					
		60	120	Mstone						30	8							
									Total	**115**	**100**							

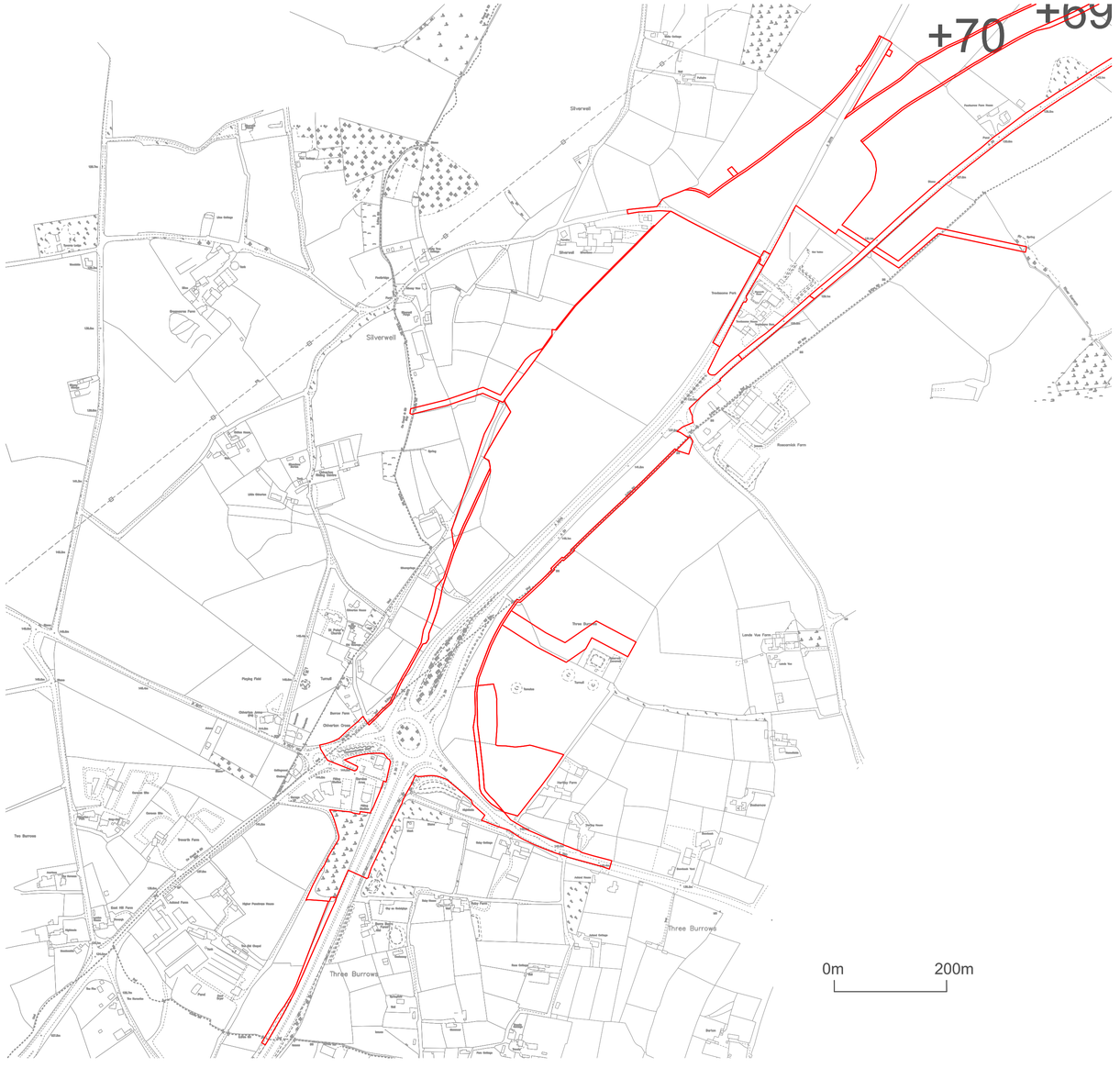
									MD	33	32						
As 40								**Droughtiness grade(DR)**		1	1						
67	T	0	30	mCL	10YR4/2			7	-	50	50	n	n	///	3a	**3a**	WE
		30	48	hCL	10YR5/2	och	mmd	15		25	25	y	n				
		48	80	hCL	10YR5/2	och	mmd	30		24	25	y	n				
		80	120	Mst						20	0						
									Total	**119**	**100**						
									MD	37	32						
								Droughtiness grade (DR)		1	1						
68	T	0	35	hCL	10YR4/2			10		57	57	n	n	/	3a	**3a**	WE
		35	60	C	10YR6/6	och	cfd	10		29	36	n	n				
		60	120	Mstone	2.5YR5/6					30	8	n	n				
									Total	**116**	**101**						
									MD	34	33						
								Droughtiness grade(DR)		1	1						
69	T	0	25	mCL	10YR4/4			10		41	41	n	n	/	2	**2**	WE
		25	60	C	10YR6/6	och	cfd	30		35	40	n	n				
		25	120	Mstone	10YR4/4					55	36	n	n				
									Total	**130**	**117**						
									MD	48	49						
								Droughtiness grade(DR)		1	1						
70	T	0	30	mCL	10YR4/2			10	-	49	49	n	n	/	2	**2**	WE
		30	48	hCL	5YR5/4			15		25	25	n	n				
		48	80	hCL	5YR5/4			30		24	25	n	n				
		80	120	Mst						20	0						
									Total	**117**	**99**						
									MD	35	31						
								Droughtiness grade (DR)		1	1						

Appendix 3: Site Photographs

Pit 1

Pit 2

Stone content at Observation 41



Survey area

+1 Observations

+P Pit

Rev.	Comment	Date

Drawing title

OBSERVATIONS
PART 1/4

Contract

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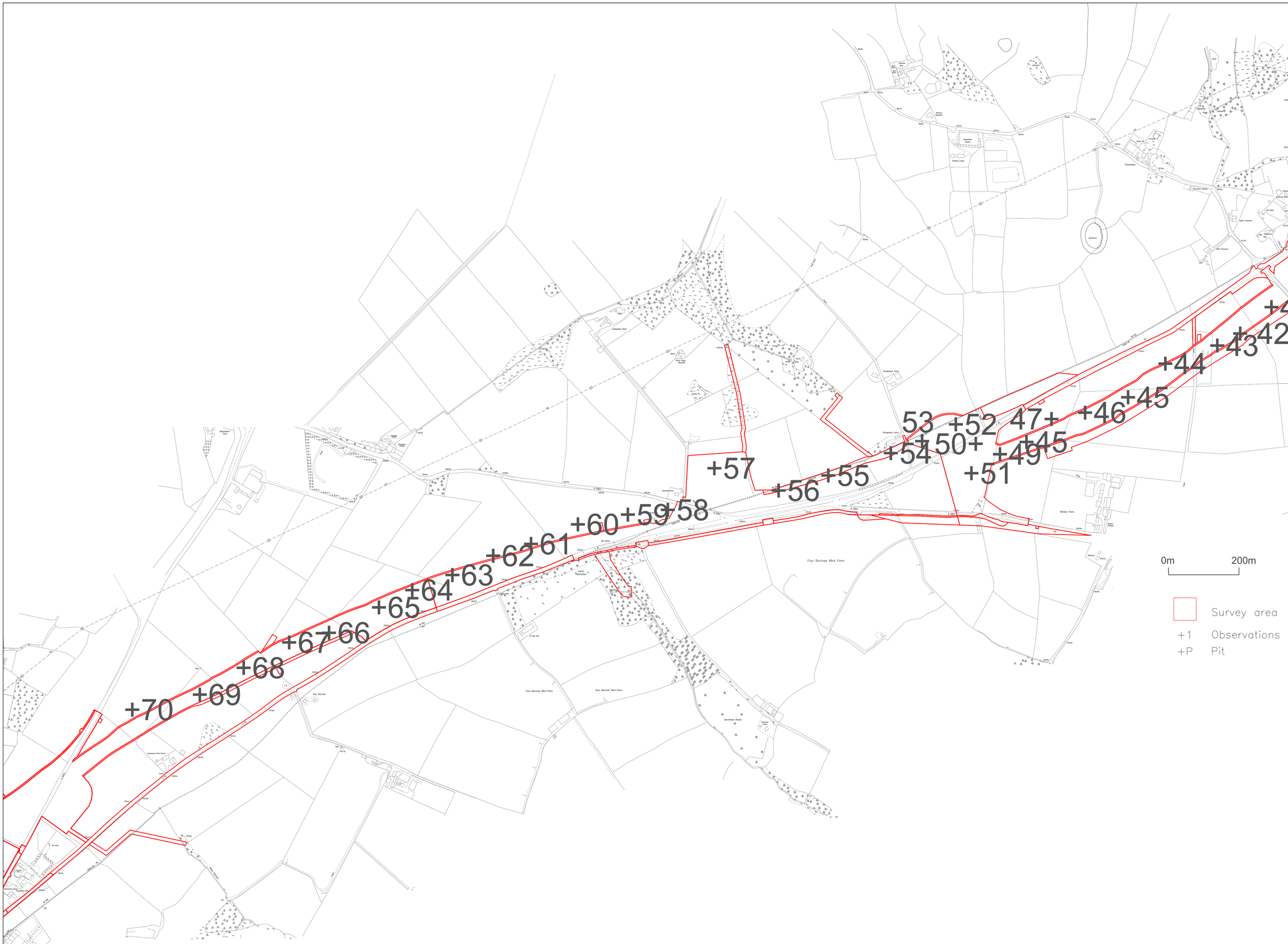

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PART 2/4

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Survey area

+1 Observations

+P Pit

N

+32

+33

+34

+35

+36

+P2

+37

39+

+38

+40

0m 200m

Rev.	Comment	Date

Drawing title
OBSERVATIONS
PART 3/4

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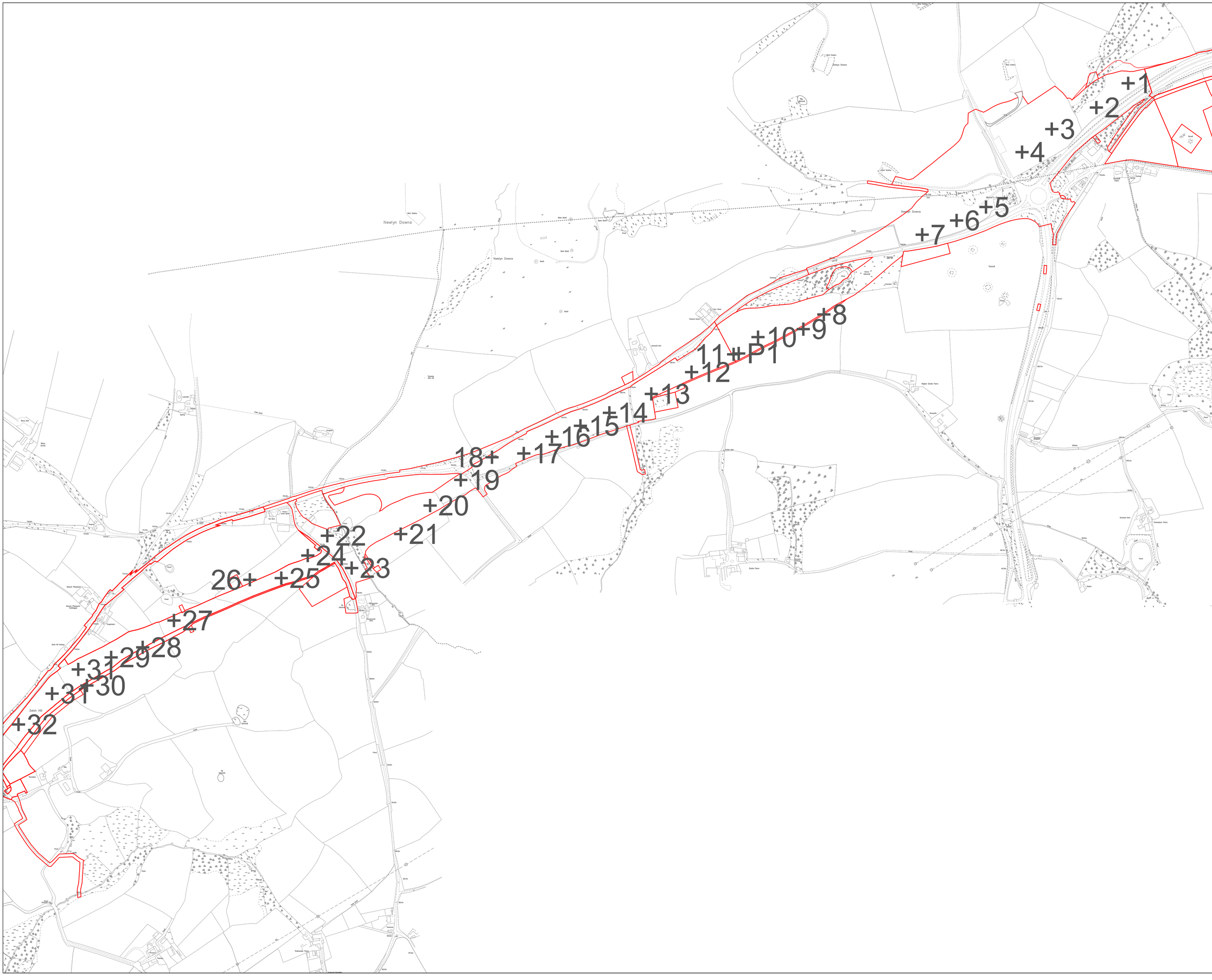

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Drawing title
OBSERVATIONS
PART 4/4

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

N

Rev.	Comment	Date

Drawing title
AGRICULTURAL LAND CLASSIFICATION
PART 1/4

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

Rev.	Comment	Date

Drawing title
AGRICULTURAL LAND CLASSIFICATION PART 2/4

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

N

Zelah

0m 200m

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AGRICULTURAL LAND CLASSIFICATION
PART 3/4

Contract
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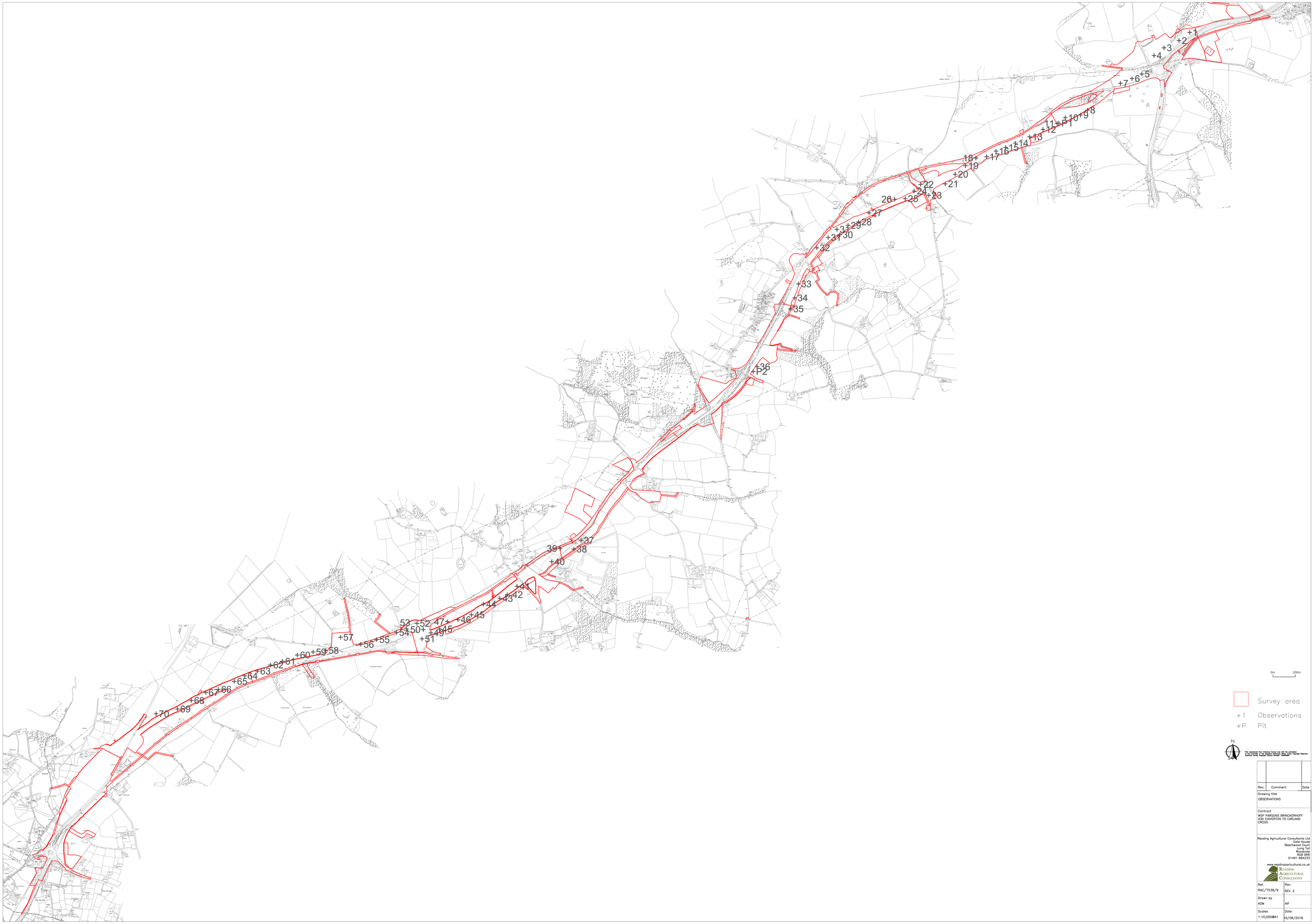

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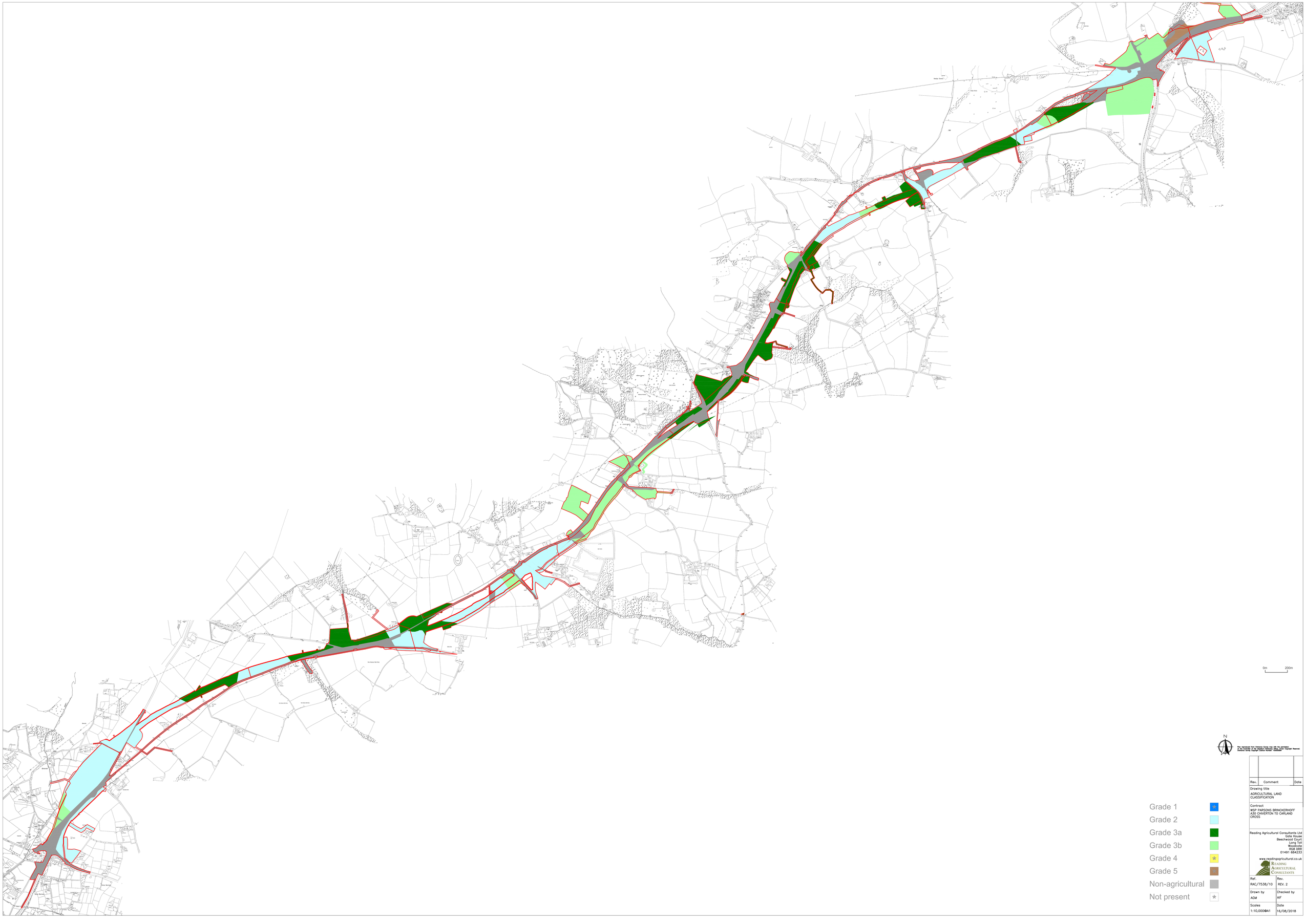

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