

Land at Wykham Park Farm, Banbury  
CA10769

## Appendix 4

### Description of Verification Trial Pits (soil survey record, droughtiness calculations, photographs)

#### Legend for non-self-explanatory terms:

**Horizons** - number of different horizons identified within the profile

**Depth** - depth to the bottom of the (horizon number) horizon in cm

**Soil Type** - mineral or organic-mineral/peaty texture

**Texture** - C - clay, ZC - silty clay, SC - sandy clay, CL - clay loam, SCL – sandy clay loam, ZCL - silty clay loam, SL - sandy loam, LS - loamy sand, S - sand).  
- Abbreviations M and H medium and heavy texture (M <27 %, H > 27 % Clay)

**Hue** - Munsell colour hue

**Value** - Munsell colour value

**Chroma** - Munsell colour chroma

**Mottling abundance** - presence of >2 % mottling, followed by Munsell colour (**value** and **chroma**) of the mottles

**Ped face different colour** - colour of ped faces different from the main horizon colour

**Biopores** - 'yes' if >0.5 % biopores greater than 0.5 mm diameter present

**Stones > 2 cm** - Percentage of 2 – 6 cm diameter stones

**Stones > 6 cm** - Percentage of > 6 cm diameter stones

**Structure** - Structure type; sg - single grain; gr – granular; sab - subangular blocky; ab - angular blocky; pr – prismatic; pl – platy; mas – massive.

**Development** - How well the structure is developed; w – weak; m – moderate; s – strong.

**Ped size** - size of the peds; f – fine; m – medium; c – coarse; vc - very coarse.

**Strength** - Soil consistence; l – loose; vf - very friable; fr – friable; fir – firm; vfir - very firm; exfir - extremely firm; exhd - extremely hard.

**Overall ALC** - *this part of the table combines results of the classification for every limitation*

**Description of Verification Trial Pits**

sample_id	UK grid ref	crop	gradient	num_horizons	h1_depth	h1_soil_type	h1_mineral_soil_texture	h1_hue	h1_value	h1_chroma	h1_mottling	h1_ped_faces_differential_color	h1_biopores	h1_stones_greater_than_2
TP1	SP 44253 38631	ploughed	<7°	4	30	mineral	mcl	10YR	4	4	no	no	yes	5
TP2	SP 45258 38563	oil_seed_rape	<7°	3	27	mineral	mcl	10YR	4	6	no	no	yes	0
TP3	SP 44941 38666	oil_seed_rape	<7°	3	30	mineral	mcl	10YR	4	3	no	no	yes	0
TP4	SP 44580 38562	ploughed	<7°	4	30	mineral	hcl	10YR	4	4	no	no	yes	10
TP5	SP 44508 38773	oil_seed_rape	<7°	3	25	mineral	hzcl	10YR	4	4	no	no	yes	0
TP6	SP 44852 38818	oil_seed_rape	<7°	4	25	mineral	mzcl	10YR	4	4	no	no	yes	0

sample_id	h1_stones _greater_t han_6	h1_struct ure	h1_develo pment	h1_ped_si ze	h1_streng th	h2_depth	h2_soil_ty pe	h2_miner al_soil_te xture	h2_hue	h2_value	h2_chrom a	h2_mottli ng	h2_ped_f aces_diffe rent_colo ur	h2_biopor es
TP1	10	sab	m	f	vfr	50	mineral	hcl	10YR	4	6	no	no	yes
TP2	10	sab	m	f	fr	42	mineral	mcl	10YR	4	6	no	no	yes
TP3	5	sab	m	f	fr	60	mineral	mcl	10YR	4	6	no	no	yes
TP4	0	sab	m	f	fr	40	mineral	hcl	10YR	5	4	no	no	no
TP5	0	sab	m	vc	fir	50	mineral	hzcl	10YR	3	4	no	no	yes
TP6	0	sab	m	c	fr	45	mineral	mzcl	5YR	4	6	no	no	yes

sample_id	h2_stones_greater_than_2	h2_stones_greater_than_6	h2_structure	h2_development	h2_ped_size	h2_strength	h3_depth	h3_soil_type	h3_mineral_soil_texture	h3_hue	h3_value	h3_chroma	h3_mottling	h3_mottling_hue
TP1	0	10	ab	m	c	fir	80	mineral	c	10YR	4	6	no	
TP2	5	10	sab	m	c	fr	120	mineral	SOFT SANDSTONE AND IRONSTONE - EXTREMELY STONY					
TP3	0	10	sab	m	c	fr	120	mineral	c	10YR	5	6	yes	5YR
TP4	10	0	sab	m	c	fr	95	mineral	c	2.5YR	6	4	no	5YR
TP5	0	0	ab	m	vc	vfir	120	mineral	hzcl	5Y	5	3	yes	5YR
TP6	0	0	ab	w	c	fir	60	mineral	hzcl	2.5Y	4	4	yes	5YR

sample_id	h3_mottling_value	h3_mottling_chroma	h3_ped_ferrous_color	h3_ped_ferrous_hue	h3_ped_ferrous_value	h3_biopores	h3_stones_greater_than_2	h3_stones_greater_than_6	h3_structure	h3_development	h3_ped_size	h3_strength	h4_depth	h4_soil_type
TP1			no			yes	0	35	sab	w	c	vfir	120	mineral
TP2														
TP3	6	8	yes	N	6	no	0	35	pl	w	vc	fr		
TP4	6	8	no			no	0	0	pr	w	vc	exfir	120	mineral
TP5	5	8	no			no	0	5	pr	m	c	exfir		
TP6	5	8	no			no	0	above_35	ab	w	c	fir	120	mineral

sample_id	h4_mineral_soil_texture	h4_hue	h4_value	h4_chroma	h4_mottling	h4_mottling_hue	h4_mottling_value	h4_mottling_chroma	h4_ped_faces_differential_color	h4_biopores	h4_stones_greater_than_2	h4_stones_greater_than_6	h4_structure	h4_development
TP1	hzcl	10YR	4	4	no				no	yes	0	20	sab	w
TP2														
TP3														
TP4	STONES ONLY													
TP5														
TP6	hzcl	2.5Y	5	2	yes	5YR	5	8	no	no	0	0	ab	w

Overall ALC

sample_id	h4_ped_size	h4_strength	Climatic ALC	Gradient	Summer Flood Risk	Winter Flood Risk	Soil depth	Topsoil stoniness	Restored (disturbed)	Wetness class	Wetness limitation	Droughtiness	Texture	ALC Grade
TP1	c	vfir	1	1	1	1	1	3a	no	I	1	2	1	3a
TP2			1	1	1	1	2	3a	no	I	1	3a	1	3a
TP3			1	1	1	1	1	2	no	II	2	2	1	2
TP4			1	1	1	1	1	2	no	III	3b	2	1	3b
TP5			1	1	1	1	1	1	no	III	3b	2	1	3b
TP6	vc	exfir	1	1	1	1	1	1	no	III	3a	2	1	3a

<b>sample_id</b>	<b>Limited by</b>	<b>Slowly permeable layer (SPL) criteria</b>
<b>TP1</b>	topsoil stoniness	no SPL within 80 cm
<b>TP2</b>	topsoil stoniness/droughtiness	no SPL within 80 cm
<b>TP3</b>	topsoil stoniness/wetness/droughtiness	>18% clay weak very coarse platy structure
<b>TP4</b>	wetness	>18% clay coarse prismatic structure
<b>TP5</b>	wetness	>18% clay coarse prismatic structure
<b>TP6</b>	wetness	>18% clay weak coarse angular blocky



<b>sample_id</b>	<b>Criteria for the limitation</b>	<b>Soil association</b>	<b>Soil series</b>
<b>TP1</b>	5–10 % stones >6cm	544 Banbury	Banbury
<b>TP2</b>	5–10 % stones >6cm, MB <5 (wheat), and -10 mm (potatoes)	544 Banbury	Banbury
<b>TP3</b>	5–10 % stones >6cm, SPL at 60, not gleyed <70, mcl topsoil, MB <30 (wheat), and 10 mm (potatoes)	544 Banbury	Irondown
<b>TP4</b>	SPL at 40, gleyed 40–70 (pale, ochreous mottles) hcl topsoil	544 Banbury	Irondown
<b>TP5</b>	SPL at 50, gleyed 40–70 (pale, ochreous mottles) hzcl topsoil	544 Banbury	Irondown
<b>TP6</b>	SPL at 45, gleyed 40–70 (greyish, ochreous mottles) mzcl topsoil	545 Banbury	Irondown

## Droughtiness Calculations

### Abbreviations:

TAv – Total amount of soil water available to plants, considered to be the volumetric soil water content between 0.05 and 15 bar suction or, in case of sands and loamy sands, 0.10 and 15 bar suction. These suctions approximate to the conditions of field capacity and wilting point (when the plants can extract no more moisture from the soil).

EAv – Easily available water, held in the soil between 0.05 and 2.0 bar suction, used for calculating cereal available water below 50 cm depth where root systems are less well developed, and the plant's ability to extract water is diminished.

Values of TAv and EAv are estimated for each horizon based on soil texture and structural condition according to the ALC guidelines (MAFF, 1988).

AP – crop adjusted available water capacity, a measure of the quantity of water held in the soil profile which can be taken up by a specific crop.

MD – the moisture deficit term used in the ALC droughtiness assessment is a crop-related meteorological variable which represents the balance between rainfall and potential evapotranspiration calculated over a critical portion of the growing season.

MB – moisture balance:  $MB=AP-MD$ , MB for wheat and potatoes determines limitation by droughtiness

Auger point	Data inputs								AP wheat								Droughtiness								ALC limited to											
	Horizon	TAv / EAv	Depth	Texture	% stones	Structural condition	TAv %	EAv %	Start depth	End depth	Horizon thickness	TAv / EAv	% non stone	TAv / EAv stones	% stones	AP wheat	AP(wheat) - MD(wheat)	Start depth	End depth	Horizon thickness	TAv top/sub soil	% non-stone	TAv stones	% stone		AP potatoes	AP(potato) - MD(potato)									
TP1	Topsoil	TAv	30	mcl	15	good	18		0	30	30	18	85	3	15	472.5	127.95	28	0	30	30	18	85	3	15	472.5	99.55	10	2							
		EAv				N/A			0	30	0	0	85	2	15	0																				
	Subsoil 1	TAv	20	hcl	10	moderate	16	10	30	50	20	16	90	3	10	294					30	50	20	16	90	3				10	294					
		EAv				N/A			30	50	0	10	90	2	10	0																				
	Subsoil 2	TAv	30	c	35	moderate	16	8	50	80	0	16	65	3	35	0					50	80	20	16	65	3				35	229					
		EAv				N/A			50	80	30	8	65	2	35	177																				
	Subsoil 3	TAv	40	hzcl	20	moderate	17	10	80	120	0	17	80	3	20	0					80	120	0	17	80	3				20	0					
		EAv				N/A			80	120	40	10	80	2	20	336																				
	Subsoil 4	TAv							120	120	0	0	100	3	0	0					120	120	0	0	100	3				0	0					
		EAv				N/A			120	120	0	0	100	2	0	0																				
Stones	N/A		N/A			N/A	3	2	N/A																											
TP2	Topsoil	TAv	27	mcl	10	good	18		1	27	27	18	90	3	10	445.5	90.465	-10	1	27	27	18	90	3	10	445.5	79.065	-11	3a							
		EAv				N/A			1	27	0	0	90	2	10	0																				
	Subsoil 1	TAv	15	mcl	15	moderate	16	10	27	42	15	16	85	3	15	210.75					27	42	15	16	85	3				15	210.75					
		EAv				N/A			27	42	0	10	85	2	15	0																				
	Subsoil 2	TAv	78	mcl	80	poor	12	7	42	120	8	12	20	3	80	38.4					42	120	28	12	20	3				80	134.4					
		EAv				N/A			42	120	70	7	20	2	80	210																				
	Subsoil 3	TAv							120	120	0	0	100	3	0	0					120	120	0	0	100	3				0	0					
		EAv				N/A			120	120	0	0	100	2	0	0																				
	Subsoil 4	TAv							120	120	0	0	100	3	0	0					120	120	0	0	100	3				0	0					
		EAv				N/A			120	120	0	0	100	2	0	0																				
Stones	N/A		N/A			N/A	3	2	N/A																											
TP3	Topsoil	TAv	30	mcl	5	good	18		1	30	30	18	95	3	5	517.5	121.85	21	1	30	30	18	95	3	5	517.5	105.35	15	2							
		EAv				N/A			1	30	0	0	95	2	5	0																				
	Subsoil 1	TAv	30	mcl	10	moderate	16	10	30	60	20	16	90	3	10	294					30	60	30	16	90	3				10	441					
		EAv				N/A			30	60	10	10	90	2	10	92																				
	Subsoil 2	TAv	60	c	35	poor	13	7	60	120	0	13	65	3	35	0					60	120	10	13	65	3				35	95					
		EAv				N/A			60	120	60	7	65	2	35	315																				
	Subsoil 3	TAv							120	120	0	0	100	3	0	0					120	120	0	0	100	3				0	0					
		EAv				N/A			120	120	0	0	100	2	0	0																				
	Subsoil 4	TAv							120	120	0	0	100	3	0	0					120	120	0	0	100	3				0	0					
		EAv				N/A			120	120	0	0	100	2	0	0																				
Stones	N/A		N/A			N/A	3	2	N/A																											
TP4	Topsoil	TAv	30	mcl	10	good	18		1	30	30	18	90	3	10	495	116.2	16	1	30	30	18	90	3	10	495	103.2	13	2							
		EAv				N/A			1	30	0	0	90	2	10	0																				
	Subsoil 1	TAv	10	mcl	10	moderate	16	10	30	40	10	16	90	3	10	147					30	40	10	16	90	3				10	147					
		EAv				N/A			30	40	0	10	90	2	10	0																				
	Subsoil 2	TAv	55	c	0	poor	13	7	40	95	10	13	100	3	0	130					40	95	30	13	100	3				0	390					
		EAv				N/A			40	95	45	7	100	2	0	315																				
	Subsoil 3	TAv	25	c	80	poor	13	7	95	120	0	13	20	3	80	0					95	120	0	13	20	3				80	0					
		EAv				N/A			95	120	25	7	20	2	80	75																				
	Subsoil 4	TAv							120	120	0	0	100	3	0	0					120	120	0	0	100	3				0	0					
		EAv				N/A			120	120	0	0	100	2	0	0																				
Stones	N/A		N/A			N/A	3	2	N/A																											
TP5	Topsoil	TAv	25	hzcl	0	moderate	19		1	25	25	19	100	3	0	475	118.1	18	1	25	25	19	100	3	0	475	100.6	11	2							
		EAv				N/A			1	25	0	0	100	2	0	0																				
	Subsoil 1	TAv	25	hzcl	0	poor	12	6	25	50	25	12	100	3	0	300					25	50	25	12	100	3				0	300					
		EAv				N/A			25	50	0	6	100	2	0	0																				
	Subsoil 2	TAv	70	hzcl	5	poor	12	6	50	120	0	12	95	3	5	0					50	120	20	12	95	3				5	231					
		EAv				N/A			50	120	70	6	95	2	5	406																				
	Subsoil 3	TAv							120	120	0	0	100	3	0	0					120	120	0	0	100	3				0	0					
		EAv				N/A			120	120	0	0	100	2	0	0																				
	Subsoil 4	TAv							120	120	0	0	100	3	0	0					120	120	0	0	100	3				0	0					
		EAv				N/A			120	120	0	0	100	2	0	0																				
Stones	N/A		N/A			N/A	3	2	N/A																											
TP6	Topsoil	TAv	25	mzcl	0	good	19		2	25	25	19	100	3	0	475	115.25	15	2	25	25	19	100	3	0	475	94.75	5	2							
		EAv				N/A			2	25	0	0	100	2	0	0																				
	Subsoil 1	TAv	20	mzcl	0	poor	12	6	25	45	20	12	100	3	0	240					25	45	20	12	100	3				0	240					
		EAv				N/A			25	45	0	6	100	2	0	0																				
	Subsoil 2	TAv	15																																	



Photograph 1 TP1





*Photograph 2 TP2*



*Photograph 3 TP3*





*Photograph 4 TP4*





Photograph 5 TP5





Photograph 6 TP6