LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP27

Date of Excavation: 12/09/2014

Description of Strata	Legend	Depth -m Scale	Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	Shear Strength (kPa) (Cu) PP	Water Level -m
TOPSOIL Brown sandy clay TOPSOIL with limestone gravel		0.00	(0.45)	0.10	D			
CORNBRASH Dense orange brown very sandy clayey limestone and sandy limestone GRAVEL			0.45 (0.25) 0.70	0.45 0.50	CBR D			
CORNBRASH Strong horizontally bedded closely fractured, platy orange brown LIMESTONE		1.00	(0.60) 1.30	1.00	D			
Trial Pit terminated at 1.30 m		2.00 3.00 4.00						Dry

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2

NGR:445891: 216240

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP28

Date of Excavation: 09/09/2014

Description of Strata	Legend	Depth -m Scale	Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	Shear Strength (kPa) (Cu) PP	Water Level -m
TOPSOIL Dark brown sandy gravelly clayey silty TOPSOIL. Gravel is fine to coarse angular limestone.		0.00	(0.50)					
LIMESTONE Loose dark brown sandy clay gravelly angular limestone cobbles. Gravel is fine to coarse angular limestone.			0.50 (0.30) 0.80	0.50	D			
LIMESTONE Medium dense dense orange brown sandy gravelly angular limestone COBBLES. Gravel is fine to coarse angular limestone with ornage-brown sandy clay matrix.		1.00	(0.60) 1.40	1.00	D			
CORNBRASH Strong orange-brown and slightly grey horizontally bedded platy LIMESTONE. ...groundwater seepage at 1.40m sitting at 1.6m No progress past 1.70m.		2.00	(0.30) 1.70	1.50	D			
Trial Pit terminated at 1.70 m		3.00 4.00						

Remarks

1. Method of Excavation: JCB
2. Backfilled with Site Arisings
3. Groundwater: Slight seepage at 1.4m
4. Stability: Stable
5. Logged by MJ to +A2

NGR:446055: 216037

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP29

Date of Excavation: 11/09/2014

Description of Strata	Legend	Depth -m Scale	Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	Shear Strength (kPa) (Cu) PP	Water Level -m
TOPSOIL Dark brown cobbly gravelly CLAY. Cobbles and gravel subrounded and subangular limestone		0.00	(0.30) 0.30	0.10	D			
. Yellowish orange cobbly gravelly SAND. Cobbles and gravel are subrounded and subangular limestone. Cobbles become more frequent further down trial pit		1.00	(1.00) 1.30	0.50 1.00	D D			
Trial pit terminated on hard (limestone) layer *Trial Pit terminated at 1.30 m*		2.00 3.00 4.00						Dry

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2
5. Soakaway test performed

NGR: 446182: 216369

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP30

Date of Excavation: 12/09/2014

Description of Strata	Legend	Depth -m Scale	Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	Shear Strength (kPa) (Cu) PP	Water Level -m
TOPSOIL Brown sandy clay TOPSOIL with limestone gravel		0.00	(0.35) 0.35	0.10	D			
CORNBRASH Strong extremely closely fractured orange brown horizontally bedded platy LIMESTONE with orange brown sandy clay on fractures			(0.55) 0.90	0.50	D			
CORNBRASH Dense orange brown very sandy slightly clayey limestone GRAVEL		1.00	(0.30) 1.20	1.00	D			
CORNBRASH Strong horizontally bedded closely fractured, platy orange brown and grey LIMESTONE No progress past 1.30m			(0.10) 1.30	1.30	D			
Trial Pit terminated at 1.30 m		2.00						Dry
		3.00						
		4.00						

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2
5. Soakaway test performed
6. Trial pit dimensions: 0.8 x 3.05 x 1.3m

NGR:446302: 216347

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP31

Date of Excavation: 12/09/2014

Description of Strata	Strata Change: Legend	Depth -m: Scale	Depth -m: Strata	Samples: Depth -m	Samples: Type	Shear Strength (kPa) (Cu): HV	Shear Strength (kPa) (Cu): PP	Water Level -m
TOPSOIL Brown sandy clay TOPSOIL with limestone gravel		0.00	(0.30) 0.30	0.10	D			
CORNBRASH Strong extremely closely fractured orange brown horizontally bedded platy LIMESTONE with sandy clay on fractures			(0.20) 0.50	0.50	D			
CORNBRASH Medium dense orange brown very sandy clayey angular fine to coarse limestone GRAVEL			(0.25) 0.75	0.80	D			
CORNBRASH Very strong horizontally bedded closely fractured, orange brown LIMESTONE		1.00	(0.05) 0.80					
Trial Pit terminated at 0.80 m		2.00 3.00 4.00						Dry

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2
5. Trial pit dimensions: 0.7 x 3.0 x 0.8m

NGR: 445826: 216156

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP32

Date of Excavation: 11/09/2014

Description of Strata	Legend	Depth -m: Scale	Depth -m: Strata	Samples: Depth -m	Samples: Type	Shear Strength (kPa) (Cu): HV	Shear Strength (kPa) (Cu): PP	Water Level -m
TOPSOIL Dark brown cobbly gravelly CLAY. Cobbles and gravel are subangular limestone		0.00	(0.30) 0.30	0.10	D			
CORNBRASH Light yellow cobbly gravelly SAND. Cobbles and gravel are subrounded to subangular limestone gettig more cobbly deeper into trial pit		1.00	(0.80) 1.10	0.50 1.00	D D			
Trial pit terminated due to hard layer *Trial Pit terminated at 1.10 m*		2.00 3.00 4.00						Dry

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2
5. Soakaway test performed

NGR:446045: 216217

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP33

Date of Excavation: 12/09/2014

Description of Strata	Legend	Strata Change Depth -m Scale	Strata Change Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	Shear Strength (kPa) (Cu) PP	Water Level -m
TOPSOIL Brown sandy clay TOPSOIL with limestone gravel		0.00	(0.30) 0.30	0.10	D			
CORNBRASH Dense orange brown very sandy platy limestone COBBLES			(0.40) 0.70	0.40 0.50	CBR D			
CORNBRASH Dense light orange brown very sandy slightly clayey angular fine to coarse limestone GRAVEL		1.00	(0.40) 1.10	1.00	D			
CORNBRASH Strong closely fractured, horizontaly bedded platy orange brown LIMESTONE No progress past 1.20m			(0.10) 1.20					
Trial Pit terminated at 1.20 m		2.00						Dry
		3.00						
		4.00						

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2

NGR:446242: 216265

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP34

Date of Excavation: 09/09/2014

Description of Strata	Legend	Depth -m Scale	Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	Shear Strength (kPa) (Cu) PP	Water Level -m
TOPSOIL Dark brown slightly clayey gravelly sandy silty TOPSOIL. Gravel is fine to coarse angular limestone.		0.00	(0.30) 0.30	0.10	D			
Silty sandy CLAY Medium dense orange sandy gravelly angular limestone COBBLES. Gravel is fine to coarse.		1.00	(1.30) 1.60	0.50 1.00 1.50	D D D			
Silty sandy CLAY Stiff light grey mottled orange slightly gravelly slightly sandy silty CLAY. Gravel is firm slightly angular limestone.		2.00	(1.40) 3.00	2.00 2.50 3.00	D D D		134 100	
Trial Pit terminated at 3.10 m		3.00 4.00						

Remarks

1. Method of Excavation: JCB
2. Backfilled with Site Arisings
3. Trail Pit Dimensions: 0.6 x 2.8 x 3.1
4. Max depth of Visible Roots: 0.4
5. Groundwater: Dry
6. Stability: Stable
7. Logged by MJ to +A2

NGR:445632: 215963

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP35

Date of Excavation: 11/09/2014

Description of Strata	Strata Change: Legend	Strata Change: Depth -m Scale	Strata Change: Depth -m Strata	Samples: Depth -m	Samples: Type	Shear Strength (kPa) (Cu): HV	Shear Strength (kPa) (Cu): PP	Water Level -m
TOPSOIL Brown sandy clay TOPSOIL with limestone gravel		0.00	(0.35) 0.35	0.10	D			
CORNBRASH Strong extremely closely fractured orange brown platy horizontally bedded LIMESTONE			(0.45) 0.80	0.40 0.50	CBR D			
CORNBRASH Dense orange brown very sandy slightly clayey fine to coarse LIMESTONE and sandy limestone GRAVEL		1.00	(0.55) 1.35	1.00	D			
CORNBRASH Strong closely fractured, horizontaly bedded platy grey and orange brown LIMESTONE			(0.05) 1.40					
Trial Pit terminated at 1.40 m		2.00						Dry
		3.00						
		4.00						

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2

NGR: 445825: 216032

Key	
∇	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP36

Date of Excavation: 09/09/2014

Description of Strata	Legend	Depth -m Scale	Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	Shear Strength (kPa) (Cu) PP	Water Level -m
TOPSOIL Dark brown sand gravelly clayey silty TOPSOIL. Gravel is fine to coarse angular limestone.		0.00	(0.25) 0.25					
Silty Cobbly Gravel Medium dense orange-brown sandy silty GRAVEL with occasional limestone COBBLES. Gravel is fine to coarse angular limestone.			(0.40) 0.65	0.50	D			
LIMESTONE Strong horizontally-bedded orange-brown and light grey extremely closely fractured platy LIMESTONE with orange-brown sandy clay in fractures.		1.00	(0.75)	1.00	D			
No progress past 1.40m.			1.40	1.40	D			
Trial Pit terminated at 1.40 m		2.00 3.00 4.00						

Remarks

1. Method of Excavation: JCB
2. Backfilled with Site Arisings
3. Groundwater: Dry
4. Stability: Stable
5. Logged by MJ to +A2

NGR: 445995: 216103

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon **TRIAL PIT:** TP37

Date of Excavation: 12/09/2014

Description of Strata	Legend	Depth -m Scale	Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	PP	Water Level -m
TOPSOIL Brown sandy clay TOPSOIL with limestone gravel		0.00	(0.35) 0.35	0.10	D			
CORNBRASH Strong extremely closely fractured orange brown platy horizontally bedded LIMESTONE			(0.45) 0.80	0.40 0.50	CBR D			
CORNBRASH Dense light orange brown very sandy angular slightly clayey fine to coarse limestone GRAVEL		1.00	(0.30) 1.10	1.00	D			
CORNBRASH Very strong closely fractured, horizontaly bedded platy orange brown LIMESTONE			(0.10) 1.20					
Trial Pit terminated at 1.20 m		2.00						Dry
		3.00						
		4.00						

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2

NGR:446156: 216137

∇	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP38

Date of Excavation: 12/09/2014

Description of Strata	Strata Change: Legend	Depth -m: Scale	Depth -m: Strata	Samples: Depth -m	Samples: Type	Shear Strength (kPa) (Cu): HV	Shear Strength (kPa) (Cu): PP	Water Level -m
TOPSOIL Brown sandy clay TOPSOIL with limestone gravel		0.00	(0.35) 0.35	0.10	D			
CORNBRASH Medium dense orange brown very sandy slightly clayey angular platy fine to coarse limestone GRAVEL and COBBLES		1.00	(0.95) 1.30	0.50 1.00	D D			
FOREST MARBLE Stiff fissured light grey and buff very silty CLAY with nodules			(0.10) 1.40	1.40	D			
Trial Pit terminated at 1.40 m		2.00 3.00 4.00						Dry

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2
5. Trial pit dimensions: 3.0 x 0.70 x 1.40m

NGR:445703: 215858

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:

LOCATION: Land East of Woodstock, Oxon	**TRIAL PIT:** TP39
	Date of Excavation: 12/09/2014

Description of Strata	Strata Change: Legend	Strata Change: Depth -m Scale	Strata Change: Depth -m Strata	Samples: Depth -m	Samples: Type	Shear Strength (kPa) (Cu): HV	Shear Strength (kPa) (Cu): PP	Water Level -m
TOPSOIL Brown sandy clay TOPSOIL with limestone gravel		0.00	(0.30)	0.10	D			
CORNBRASH Strong extremely closely fractured orange brown platy horizontally bedded LIMESTONE with sandy CLAY in fractures			0.30 (0.20)					
CORNBRASH Medium dense orange brown very sandy angular slightly clayey fine to coarse limestone GRAVEL and occasional cobbles			0.50 (0.25)	0.50	D			
CORNBRASH Very strong closely fractured, horizontaly bedded platy orange brown LIMESTONE No progress past 0.80m		1.00	0.75 (0.05) 0.80	0.80	D			
Trial Pit terminated at 0.80 m		2.00						Dry
		3.00						
		4.00						

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2
5. Trial pit dimensions: 0.70 x 3.30 x 0.80m

NGR:445995: 215957

▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date September 2014	**TRIAL PIT LOG**	**Report No.** 14.08.005a **Client Ref:**

LOCATION: Land East of Woodstock, Oxon

TRIAL PIT: TP40

Date of Excavation: 12/09/2014

Description of Strata	Legend	Depth -m Scale	Depth -m Strata	Samples Depth -m	Samples Type	Shear Strength (kPa) (Cu) HV	Shear Strength (kPa) (Cu) PP	Water Level -m
TOPSOIL Dark brown sandy clay TOPSOIL with limestone gravel		0.00	(0.30) 0.30	0.10	D			
CORNBRASH Strong extremely closely fractured, horizontaly bedded platy orange brown fossiliferous LIMESTONE No progress past 0.80m			(0.50) 0.80	0.40 0.50	CBR D			
Trial Pit terminated at 0.80 m		1.00 2.00 3.00 4.00						Dry

Remarks

1. Method of Excavation: JCB
2. Groundwater: Dry
3. Stability: Stable
4. Logged by MB to +A2

NGR:445886: 215792

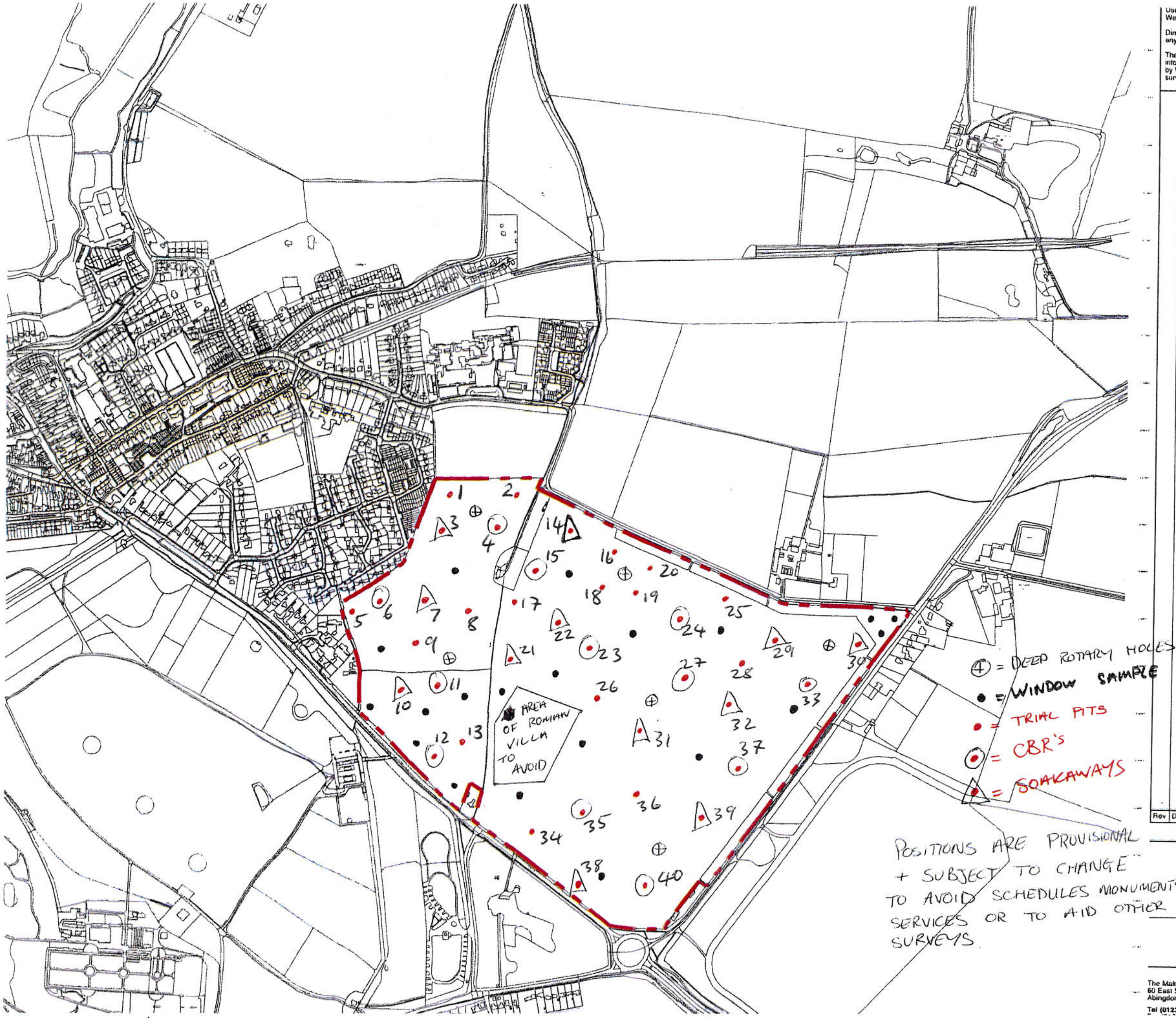
▽	Water Strike
▼	Water (Standing Level)
W	Water Sample
B	Bulk Sample
D	Small Disturbed Sample
V	Vane Test
P	Penetrometer Test
M	Mexe Penetrometer
CBR	CBR Sample
UF	Under Foundations

Date
September 2014

TRIAL PIT LOG

Report No. 14.08.005a

Client Ref:



Use figured dimensions at all other times. In case of doubt contact West Waddy:ADP

Dimensions to be checked on site before work commences and any discrepancies reported to the Architect.

The accuracy of this drawing may be reliant upon survey information provided by third parties. No liability will be accepted by WestWaddy:ADP for errors in or arising from such third party survey information.

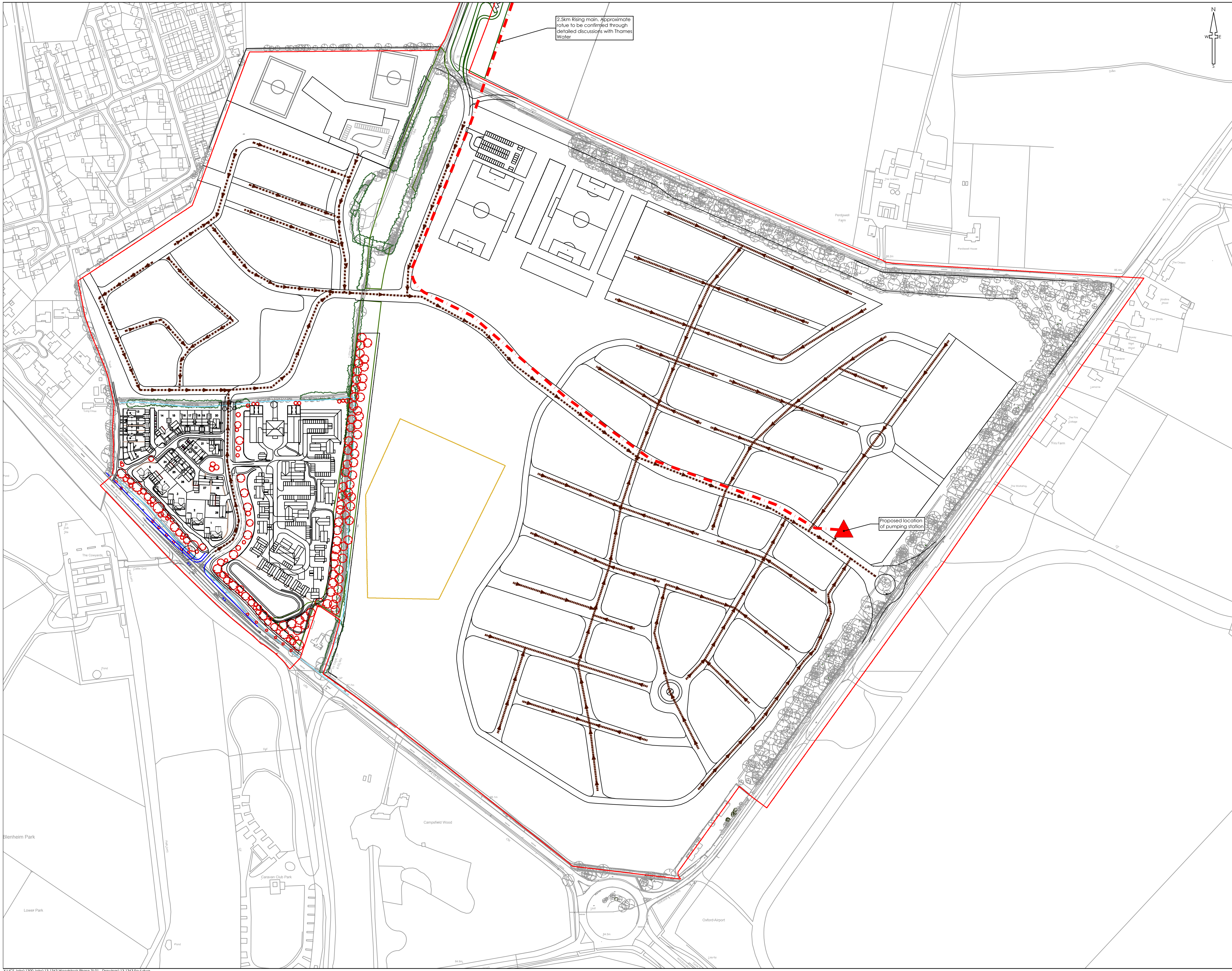
Rev	Date	Revisions	initials	checked
.	07/14	First issue	RB	GB

East Woodstock

Site Location Plan

The Malthouse
60 East St. Helen Street
Abingdon, Oxfordshire, OX14 5EB
Tel (01235) 523139

Appendix E – Foul Drainage Strategy



NOTES

1. All dimensions and levels are in metres unless otherwise noted
2. This drawing is to be read in conjunction with the relevant Architect's/Engineer's drawings, specifications and CDM documentation
3. This drawings has been produced electronically and may have been photo reduced or enlarged when copied. Work to figured dimensions only (DO NOT SCALE). All dimensions to be checked on site. Any errors or omissions to be reported to the engineer immediately.
4. This drawing contains coloured lines / information that may not be clear if reproduced in black and white.

Rev	Drawn by	Chk'd by	Comments	Date
P03	NJ	DJ	Drainage amended in accordance with revised Architectural site layout (SK012 Rev E)	21/11/14
P02	ATD	TST	Route of rising main amended	05/11/14
P01	ATD	TST	Initial issue	05/11/14

DRAWING TITLE
Site Wide Drainage Strategy Plan
Foul Water

PROJECT
Woodstock East
Woodstock
Oxfordshire

DESIGNED BY	DRAFTED BY	APPROVED BY
TST	ATD	DJ

DATE 05/11/2014

STATUS **INFORMATION**

SCALE 1:2500 @ A1

0m 62.5m 125m
Scale bar @ 1:2500

CLIENT
PYE

Infrastruct CS Ltd

JOB NUMBER	DRAWING NUMBER	REVISION
13-1363	103	P03

Infrastruct CS Ltd: 26A High Street, Eynsham, Oxford, OX29 4HB - Tel: 01865 880909: info@infrastructcs.co.uk: www.infrastructcs.co.uk

X:\ICS Jobs\1300 Jobs\13-1363 Woodstock Phase 3\01 - Drawings\13-1363 Foul.dwg

NOTES

1. All dimensions and levels are in metres unless otherwise noted
2. This drawing is to be read in conjunction with the relevant Architect's/Engineer's drawings, specifications and CDM documentation
3. This drawings has been produced electronically and may have been photo reduced or enlarged when copied. Work to figured dimensions only (DO NOT SCALE). All dimensions to be checked on site. Any errors or omissions to be reported to the engineer immediately.
4. This drawing contains coloured lines / information that may not be clear if reproduced in black and white.

Rev	Drawn by	Chk'd by	Comments	Date
P03	NJ	DJ	Drainage amended in accordance with revised Architectural site layout (SK012 Rev E)	21/11/14
P02	NJ	TST	Route of rising main amended	05/11/14
P01	NJ	TST	Initial issue	08/10/14

DRAWING TITLE
Site Wide Drainage Strategy Plan
Foul Water Outfall Plan

PROJECT
Woodstock East
Woodstock
Oxfordshire

DESIGNED BY TST | DRAFTED BY NJ | APPROVED BY DJ

DATE 08/10/2014 | STATUS **INFORMATION**

SCALE 1:5000

CLIENT
PYE

Infrastruct CS Ltd

JOB NUMBER 13-1363 | DRAWING NUMBER 101 | REVISION P03

X:\ICS Jobs\1300 Jobs\13-1363 Woodstock Phase 3\01 - Drawings\13-1363 Foul.dwg

Appendix F – Greenfield Run Off Rates

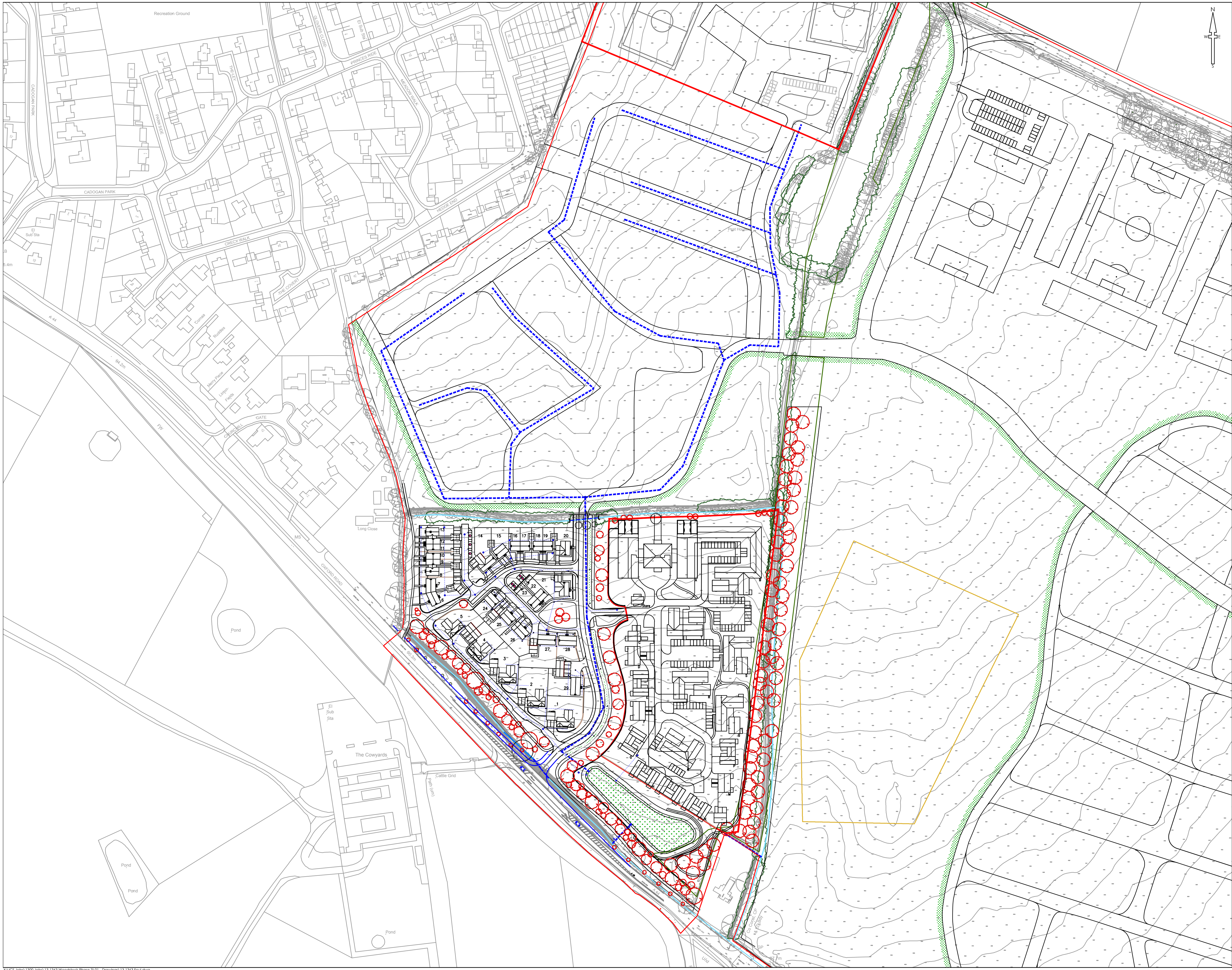
ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.400
Area (ha)	15.695	Urban	0.000
SAAR (mm)	663	Region Number	Region 6

Results	**l/s**
QBAR Rural	50.1
QBAR Urban	50.1
Q2 years	44.1
Q1 year	42.6
Q30 years	113.6
Q100 years	159.9

Appendix G – Surface Water Drainage Network



NOTES

1. All dimensions and levels are in metres unless otherwise noted
2. This drawing is to be read in conjunction with the relevant Architect's/Engineer's drawings, specifications and CDM documentation
3. This drawings has been produced electronically and may have been photo reduced or enlarged when copied. Work to figured dimensions only (DO NOT SCALE). All dimensions to be checked on site. Any errors or omissions to be reported to the engineer immediately.
4. This drawing contains coloured lines / information that may not be clear if reproduced in black and white.

Rev	Drawn by	Chk'd by	Comments	Date
P02	NJ	DJ	Drainage amended in accordance with revised Architectural site layout (SK012 Rev E)	21/11/14
P01	ATD	TST	Initial Issue	04/11/14

DRAWING TITLE
Surface Water Drainage Network
Phase 1

PROJECT
Woodstock East
Woodstock
Oxfordshire

DESIGNED BY	DRAFTED BY	APPROVED BY
TST	ATD	DJ

DATE
04/11/2014

STATUS
INFORMATION

SCALE
1:500 @ A1

0m 12.5m 25.0m
scale bar @ 1:500

CLIENT
PYE

Infrastruct CS Ltd

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JOB NUMBER	DRAWING NUMBER	REVISION
13-1363	105	P02

X:\ICS Jobs\1300 Jobs\13-1363 Woodstock Phase 3\01 - Drawings\13-1363 Foul.dwg

Appendix H - Calculations (detention basin)

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 390 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	88.380	0.680	0.0	49.8	49.8	1079.1	O K
30 min Summer	88.573	0.873	0.1	49.8	49.8	1403.2	O K
60 min Summer	88.729	1.029	0.3	50.0	50.2	1713.0	Flood Risk
120 min Summer	88.841	1.141	0.4	51.2	51.5	1969.2	Flood Risk
180 min Summer	88.879	1.179	0.4	51.6	52.0	2065.0	Flood Risk
240 min Summer	88.890	1.190	0.4	51.8	52.2	2092.4	Flood Risk
360 min Summer	88.884	1.184	0.4	51.7	52.1	2077.2	Flood Risk
480 min Summer	88.873	1.173	0.4	51.5	52.0	2048.3	Flood Risk
600 min Summer	88.858	1.158	0.4	51.4	51.7	2011.0	Flood Risk
720 min Summer	88.840	1.140	0.4	51.1	51.5	1968.2	Flood Risk
960 min Summer	88.800	1.100	0.3	50.7	51.0	1872.8	Flood Risk
1440 min Summer	88.710	1.010	0.2	49.8	50.1	1673.2	Flood Risk
2160 min Summer	88.566	0.866	0.1	49.8	49.8	1391.1	O K
2880 min Summer	88.422	0.722	0.0	49.8	49.8	1145.0	O K
4320 min Summer	88.190	0.490	0.0	49.0	49.0	803.3	O K
5760 min Summer	88.078	0.378	0.0	45.1	45.1	621.7	O K
7200 min Summer	88.017	0.317	0.0	40.7	40.7	517.0	O K
8640 min Summer	87.978	0.278	0.0	36.5	36.5	449.7	O K
10080 min Summer	87.951	0.251	0.0	33.0	33.0	404.3	O K
15 min Winter	88.464	0.764	0.1	49.8	49.8	1213.0	O K
30 min Winter	88.664	0.964	0.2	49.8	49.8	1579.0	O K
60 min Winter	88.825	1.125	0.3	51.0	51.3	1931.1	Flood Risk
120 min Winter	88.942	1.242	0.5	52.5	53.0	2229.2	Flood Risk
180 min Winter	88.985	1.285	0.5	53.1	53.6	2348.1	Flood Risk
240 min Winter	89.000	1.300	0.6	53.3	53.9	2390.7	Flood Risk
360 min Winter	88.998	1.298	0.6	53.3	53.8	2386.7	Flood Risk
480 min Winter	88.980	1.280	0.5	53.0	53.5	2334.3	Flood Risk
600 min Winter	88.962	1.262	0.5	52.8	53.3	2285.0	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	128.285	30
30 min Summer	84.226	44
60 min Summer	52.662	72
120 min Summer	31.800	130
180 min Summer	23.353	188
240 min Summer	18.644	246
360 min Summer	13.543	320
480 min Summer	10.792	382
600 min Summer	9.043	444
720 min Summer	7.823	512
960 min Summer	6.219	648
1440 min Summer	4.493	920
2160 min Summer	3.241	1308
2880 min Summer	2.568	1680
4320 min Summer	1.847	2380
5760 min Summer	1.461	3064
7200 min Summer	1.217	3752
8640 min Summer	1.048	4488
10080 min Summer	0.923	5152
15 min Winter	128.285	30
30 min Winter	84.226	44
60 min Winter	52.662	72
120 min Winter	31.800	128
180 min Winter	23.353	184
240 min Winter	18.644	242
360 min Winter	13.543	350
480 min Winter	10.792	404
600 min Winter	9.043	474

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
720 min Winter	88.941	1.241	0.5	52.5	52.9	2225.2	Flood Risk
960 min Winter	88.888	1.188	0.4	51.7	52.2	2087.8	Flood Risk
1440 min Winter	88.765	1.065	0.3	50.3	50.6	1792.8	Flood Risk
2160 min Winter	88.555	0.855	0.1	49.8	49.8	1370.7	O K
2880 min Winter	88.336	0.636	0.0	49.8	49.8	1012.9	O K
4320 min Winter	88.083	0.383	0.0	45.4	45.4	631.1	O K
5760 min Winter	87.995	0.295	0.0	38.4	38.4	478.3	O K
7200 min Winter	87.948	0.248	0.0	32.6	32.6	400.6	O K
8640 min Winter	87.919	0.219	0.0	28.4	28.4	351.0	O K
10080 min Winter	87.897	0.197	0.0	25.1	25.1	315.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
720 min Winter	7.823	552
960 min Winter	6.219	704
1440 min Winter	4.493	996
2160 min Winter	3.241	1400
2880 min Winter	2.568	1760
4320 min Winter	1.847	2392
5760 min Winter	1.461	3064
7200 min Winter	1.217	3760
8640 min Winter	1.048	4496
10080 min Winter	0.923	5240

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 4.680

Time (mins)	**Area (ha)**	**Time (mins)**	**Area (ha)**	**Time (mins)**	**Area (ha)**	**Time (mins)**	**Area (ha)**
0-4	0.000	4-8	1.560	8-12	1.560	12-16	1.560

Model Details

Storage is Online Cover Level (m) 89.000

Complex Structure

Tank or Pond

Invert Level (m) 87.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1550.0	0.600	1450.0	1.200	1750.0	1.800	0.0	2.400	0.0
0.100	1600.0	0.700	1500.0	1.300	1800.0	1.900	0.0	2.500	0.0
0.200	1650.0	0.800	1550.0	1.400	0.0	2.000	0.0		
0.300	1700.0	0.900	1600.0	1.500	0.0	2.100	0.0		
0.400	1750.0	1.000	1650.0	1.600	0.0	2.200	0.0		
0.500	1400.0	1.100	1700.0	1.700	0.0	2.300	0.0		

Swale

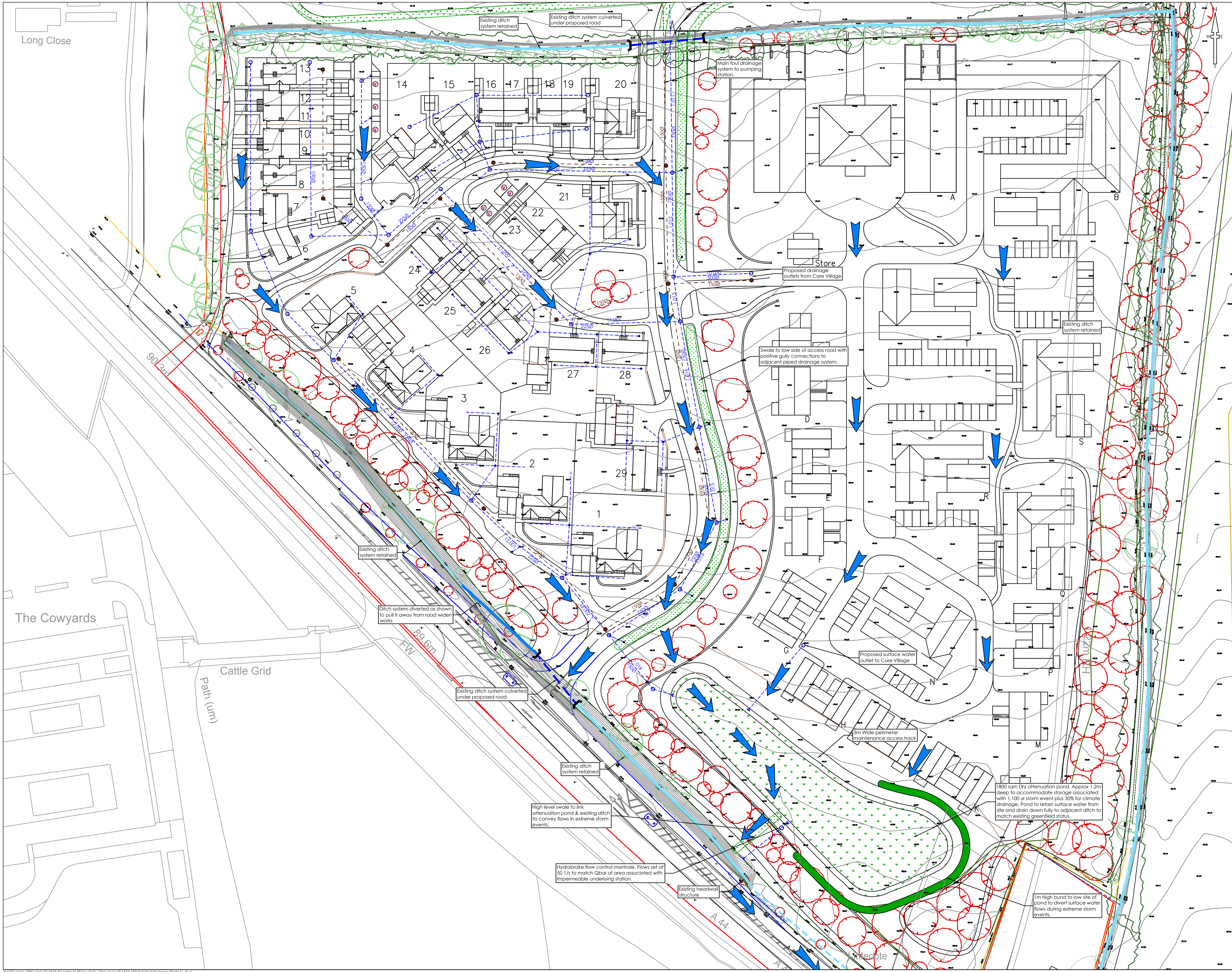
Infiltration Coefficient Base (m/hr)	0.00360	Length (m)	660.0
Infiltration Coefficient Side (m/hr)	0.00360	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	88.300	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0		

Hydro-Brake® Outflow Control

Design Head (m) 1.000 Hydro-Brake® Type Md5 SW Only Invert Level (m) 87.700
Design Flow (l/s) 50.0 Diameter (mm) 275

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.9	0.800	49.1	2.000	64.5	4.000	91.0	7.000	120.4
0.200	25.6	1.000	49.7	2.200	67.6	4.500	96.6	7.500	124.6
0.300	39.0	1.200	51.9	2.400	70.5	5.000	101.8	8.000	128.7
0.400	46.2	1.400	54.8	2.600	73.4	5.500	106.7	8.500	132.7
0.500	49.2	1.600	58.0	3.000	78.8	6.000	111.5	9.000	136.5
0.600	49.8	1.800	61.3	3.500	85.2	6.500	116.0	9.500	140.3

Appendix I – Detailed Drainage Layout – Phase 1



SURVEY INFORMATION
Name of Survey Company
DRG NUMBER: ** DATE RECEIVED: DD/MM/YYYY

ARCHITECT SITE PLAN INFORMATION
Name of Architects
DRG NUMBER: ** DATE RECEIVED: DD/MM/YYYY

NOTES

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4. This drawing contains coloured lines / information that may not be clear if reproduced in black and white.

Drainage Key

Sewers

- Foul water drain (private/non adoptable)
- Surface water drain (private/non adoptable)
- Foul water sewer (Adoptable)
- Surface water sewer (Adoptable)

Chamber Key

FW	SW	
⊗	⊗	PPIC - 475mmØ *
●	○	Manhole Depth 1.25 to 1.5m * Depth 1.55 to 3.0m *

- Swale drainage feature
- Attenuation Pond
- Flood Exceedance route

Rev	Drawn by	Chk'd by	Comments	Date
P01	ATD	TST	Initial Issue	04/11/14

DRAWING TITLE
Detailed Drainage Strategy Phase 1

PROJECT
Woodstock East
Woodstock
Oxfordshire

DESIGNED BY TST
DRAFTED BY ATD
APPROVED BY DJ

DATE 04/11/2014
STATUS **INFORMATION**

SCALE 1:500 @ A1
0m 12.5m 25.0m
scale bar @ 1:500

CLIENT
PYE

Infrastruct CS Ltd

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JOB NUMBER 13-1363
DRAWING NUMBER 102
REVISION P01

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Appendix J – Calculations (Swale)

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 18 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	88.917	0.167	8.5	12.0	Flood Risk
30 min Summer	88.926	0.176	9.1	13.4	Flood Risk
60 min Summer	88.925	0.175	9.0	13.2	Flood Risk
120 min Summer	88.912	0.162	8.2	11.2	Flood Risk
180 min Summer	88.899	0.149	7.4	9.4	Flood Risk
240 min Summer	88.887	0.137	6.7	7.9	Flood Risk
360 min Summer	88.869	0.119	5.7	5.9	Flood Risk
480 min Summer	88.856	0.106	5.0	4.6	Flood Risk
600 min Summer	88.845	0.095	4.4	3.7	Flood Risk
720 min Summer	88.836	0.086	4.0	3.0	Flood Risk
960 min Summer	88.823	0.073	3.3	2.2	Flood Risk
1440 min Summer	88.807	0.057	2.5	1.3	Flood Risk
2160 min Summer	88.796	0.046	1.9	0.8	Flood Risk
2880 min Summer	88.791	0.041	1.5	0.7	Flood Risk
4320 min Summer	88.785	0.035	1.1	0.5	Flood Risk
5760 min Summer	88.781	0.031	0.9	0.4	Flood Risk
7200 min Summer	88.778	0.028	0.7	0.3	Flood Risk
8640 min Summer	88.776	0.026	0.6	0.3	Flood Risk
10080 min Summer	88.775	0.025	0.5	0.2	Flood Risk
15 min Winter	88.928	0.178	9.2	13.7	Flood Risk
30 min Winter	88.936	0.186	9.7	15.1	Flood Risk
60 min Winter	88.931	0.181	9.4	14.3	Flood Risk
120 min Winter	88.912	0.162	8.2	11.3	Flood Risk
180 min Winter	88.894	0.144	7.1	8.8	Flood Risk
240 min Winter	88.879	0.129	6.2	7.0	Flood Risk
360 min Winter	88.856	0.106	5.0	4.6	Flood Risk
480 min Winter	88.841	0.091	4.2	3.3	Flood Risk
600 min Winter	88.829	0.079	3.6	2.5	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	128.285	18
30 min Summer	84.226	27
60 min Summer	52.662	44
120 min Summer	31.800	78
180 min Summer	23.353	108
240 min Summer	18.644	140
360 min Summer	13.543	200
480 min Summer	10.792	260
600 min Summer	9.043	318
720 min Summer	7.823	380
960 min Summer	6.219	498
1440 min Summer	4.493	740
2160 min Summer	3.241	1104
2880 min Summer	2.568	1464
4320 min Summer	1.847	2180
5760 min Summer	1.461	2920
7200 min Summer	1.217	3624
8640 min Summer	1.048	4368
10080 min Summer	0.923	5088
15 min Winter	128.285	19
30 min Winter	84.226	28
60 min Winter	52.662	46
120 min Winter	31.800	82
180 min Winter	23.353	114
240 min Winter	18.644	144
360 min Winter	13.543	204
480 min Winter	10.792	264
600 min Winter	9.043	324

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
720 min Winter	88.820	0.070	3.2	2.0	Flood Risk
960 min Winter	88.807	0.057	2.5	1.3	Flood Risk
1440 min Winter	88.796	0.046	1.9	0.8	Flood Risk
2160 min Winter	88.789	0.039	1.3	0.6	Flood Risk
2880 min Winter	88.785	0.035	1.1	0.5	Flood Risk
4320 min Winter	88.780	0.030	0.8	0.3	Flood Risk
5760 min Winter	88.776	0.026	0.6	0.3	Flood Risk
7200 min Winter	88.774	0.024	0.5	0.2	Flood Risk
8640 min Winter	88.772	0.022	0.4	0.2	Flood Risk
10080 min Winter	88.771	0.021	0.4	0.2	Flood Risk

Storm Event	Rain (mm/hr)	Time-Peak (mins)
720 min Winter	7.823	380
960 min Winter	6.219	502
1440 min Winter	4.493	730
2160 min Winter	3.241	1080
2880 min Winter	2.568	1472
4320 min Winter	1.847	2180
5760 min Winter	1.461	2952
7200 min Winter	1.217	3632
8640 min Winter	1.048	4400
10080 min Winter	0.923	5136

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.070

Time (mins)	**Area (ha)**	**Time (mins)**	**Area (ha)**
0-4	0.000	4-8	0.070

Model Details

Storage is Online Cover Level (m) 89.000

Swale Structure

Infiltration Coefficient Base (m/hr)	0.39000	Length (m)	100.0
Infiltration Coefficient Side (m/hr)	0.39000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	88.750	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.5		

Appendix K – Calculations (Permeable Roads)

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 3 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	88.608	0.108	20.5	6.2	O K
30 min Summer	88.612	0.112	21.2	6.6	O K
60 min Summer	88.599	0.099	18.8	5.2	O K
120 min Summer	88.577	0.077	14.6	3.1	O K
180 min Summer	88.563	0.063	11.9	2.1	O K
240 min Summer	88.553	0.053	10.1	1.5	O K
360 min Summer	88.545	0.045	7.6	1.1	O K
480 min Summer	88.540	0.040	6.1	0.8	O K
600 min Summer	88.537	0.037	5.1	0.7	O K
720 min Summer	88.534	0.034	4.4	0.6	O K
960 min Summer	88.531	0.031	3.6	0.5	O K
1440 min Summer	88.526	0.026	2.6	0.4	O K
2160 min Summer	88.522	0.022	1.9	0.3	O K
2880 min Summer	88.520	0.020	1.5	0.2	O K
4320 min Summer	88.517	0.017	1.1	0.1	O K
5760 min Summer	88.515	0.015	0.8	0.1	O K
7200 min Summer	88.514	0.014	0.7	0.1	O K
8640 min Summer	88.513	0.013	0.6	0.1	O K
10080 min Summer	88.512	0.012	0.5	0.1	O K
15 min Winter	88.614	0.114	21.7	6.8	O K
30 min Winter	88.612	0.112	21.3	6.6	O K
60 min Winter	88.593	0.093	17.6	4.5	O K
120 min Winter	88.565	0.065	12.4	2.2	O K
180 min Winter	88.550	0.050	9.5	1.3	O K
240 min Winter	88.545	0.045	7.6	1.1	O K
360 min Winter	88.538	0.038	5.5	0.8	O K
480 min Winter	88.534	0.034	4.4	0.6	O K
600 min Winter	88.531	0.031	3.7	0.5	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	128.285	16
30 min Summer	84.226	24
60 min Summer	52.662	40
120 min Summer	31.800	70
180 min Summer	23.353	100
240 min Summer	18.644	128
360 min Summer	13.543	188
480 min Summer	10.792	248
600 min Summer	9.043	310
720 min Summer	7.823	364
960 min Summer	6.219	490
1440 min Summer	4.493	724
2160 min Summer	3.241	1072
2880 min Summer	2.568	1448
4320 min Summer	1.847	2140
5760 min Summer	1.461	2904
7200 min Summer	1.217	3544
8640 min Summer	1.048	4272
10080 min Summer	0.923	5136
15 min Winter	128.285	17
30 min Winter	84.226	25
60 min Winter	52.662	40
120 min Winter	31.800	70
180 min Winter	23.353	98
240 min Winter	18.644	128
360 min Winter	13.543	188
480 min Winter	10.792	252
600 min Winter	9.043	298

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
720 min Winter	88.529	0.029	3.2	0.4	O K
960 min Winter	88.526	0.026	2.6	0.4	O K
1440 min Winter	88.522	0.022	1.9	0.3	O K
2160 min Winter	88.519	0.019	1.3	0.2	O K
2880 min Winter	88.517	0.017	1.1	0.1	O K
4320 min Winter	88.514	0.014	0.8	0.1	O K
5760 min Winter	88.513	0.013	0.6	0.1	O K
7200 min Winter	88.512	0.012	0.5	0.1	O K
8640 min Winter	88.511	0.011	0.4	0.1	O K
10080 min Winter	88.510	0.010	0.4	0.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
720 min Winter	7.823	364
960 min Winter	6.219	484
1440 min Winter	4.493	728
2160 min Winter	3.241	1068
2880 min Winter	2.568	1460
4320 min Winter	1.847	2124
5760 min Winter	1.461	2784
7200 min Winter	1.217	3720
8640 min Winter	1.048	4176
10080 min Winter	0.923	4944

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.070

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.000	4-8	0.070

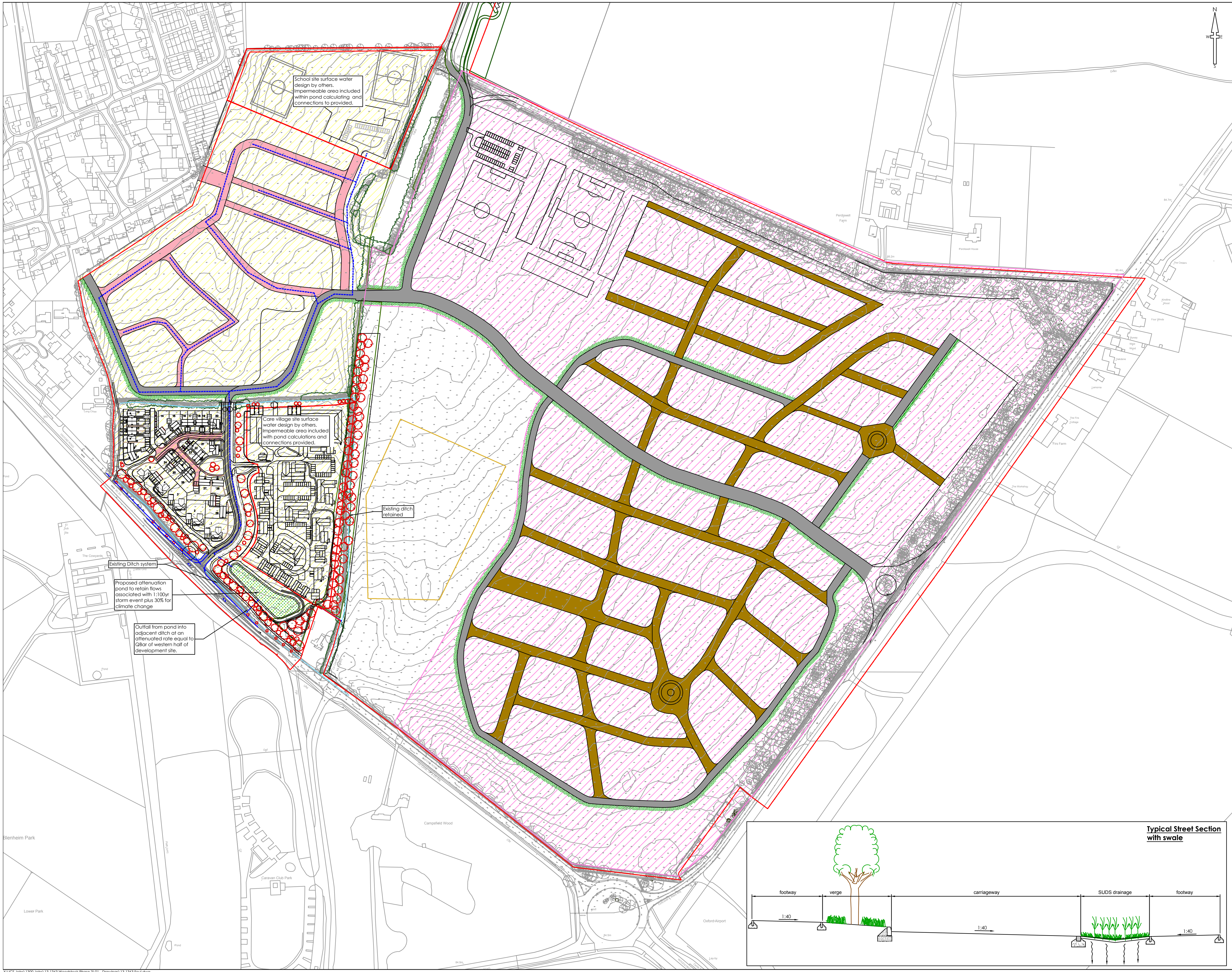
Model Details

Storage is Online Cover Level (m) 89.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.39000	Width (m)	7.0
Membrane Percolation (mm/hr)	1000	Length (m)	100.0
Max Percolation (l/s)	194.4	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	88.500	Cap Volume Depth (m)	0.000

Appendix L – Site Wide Surface Water Drainage



NOTES

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Key

- Impermeable road drained by swale
- Permeable paved roads
- Impermeable road drained to positive drainage system
- Proposed hardstanding & roof areas to be drained via infiltration measures
- Proposed hardstanding & roof area to be drained via positive system into existing ditch systems.

Rev	Drawn by	Chk'd by	Comments	Date
P02	NJ	DJ	Drainage amended in accordance with revised Architectural site layout (SK012 Rev E)	20/11/14
P01	NJ	TST	Initial issue	08/10/14

DRAWING TITLE
Site wide Drainage Strategy Plan
Surface Water

PROJECT
Woodstock East
Woodstock
Oxfordshire

DESIGNED BY TST | DRAFTED BY NJ | APPROVED BY DJ

DATE 08/10/2014 | STATUS INFORMATION

SCALE 1:2500 @ A1 | 0m 62.5m 125m Scale bar @ 1:2500

CLIENT PYE | Infrastruct CS Ltd

JOB NUMBER 13-1363 | DRAWING NUMBER 100 | REVISION P02

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Appendix M – EA Pro-forma Document

Environment Agency Standing Advice to Local Planning Authorities
Version 1.1

West Thames – Surface Water Flood Risk Assessment (FRA) Guidance note and pro-forma for Development over 1ha

To be acceptable as a FRA the applicant should confirm as a minimum:

1. That it will be feasible to balance surface water run-off to the Greenfield run-off rate for all events up to the 1 in 100 year storm (including additional climate change allowance*) and set out how this will be achieved, or if the development is Brownfield, achieve betterment in the surface water runoff regime; ensuring that surface water runoff will not increase flood risk to the development or third parties.

* *Climate Change* - An allowance for climate change needs to be incorporated, which means adding an extra amount to peak rainfall (20% for commercial development, 30% for residential).

2. How sustainable drainage system techniques (SuDS) will be used with any obstacles to their use clearly justified.

3. That the residual risk of flooding has been addressed should any drainage features fail or if they are subjected to an extreme flood event. Overland flow routes or above ground storage of water should not put people and property at unacceptable risk. This could include measures to manage residual risk such as raising ground or floor levels where appropriate.

The applicant should confirm these above points to you by using the pro-forma which is contained below. This should be completed by the developer and returned to you. The top part of the pro-forma includes a section where the developer can clearly state what the difference in rates and volumes as a result of the development will be. The lower sections are provided to show that the developer can explain how drainage rates and volumes are being dealt with on the site in order to not increase rates and volumes. The pro-forma includes a column where the developer should identify where the information is demonstrated. If the pro-forma is completed and signed by the developer, this can serve as a summary of the surface water strategy on the site and will allow them to demonstrate that they have complied with the Technical Guidance to the National Planning Policy Framework (NPPF).

INFORMATION

Climate Change

The NPPF provides advice on the impact of climate change. Table 5 of the Technical Guidance indicates that surface water FRAs should allow for an increase of 30% in peak rainfall intensity for developments still in existence by 2085 (20% for developments with a life expectancy which ends prior to 2085).

Sustainable Drainage Systems (SuDS)

Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. SuDS seek to mimic natural drainage systems and retain water on or near to the site, when rain falls, in contrast to traditional drainage approaches, which tend to pipe water off site as quickly as possible. SuDS therefore offer significant advantages over conventional piped drainage systems and will be applicable to most sites.

Government policy set out in paragraph 103 of the NPPF expects Local Planning Authorities (LPAs) to give priority to the use of SuDS in determining planning applications. Further support for SuDS is set out in chapter 5 of the Planning Policy Statement 25 (PPS25) Practice Guide.

Approved Document Part H of the Building Regulations 2010 also establishes a hierarchy for surface water disposal, which encourages a SuDS approach beginning with infiltration where possible e.g. soakaways or infiltration trenches. Where SuDS are used, it must be established that these options are feasible, can be adopted and properly maintained and would not lead to any other environmental problems.

Where the intention is to dispose to soakaway, these should be shown to work through an appropriate assessment carried out under Building Research Establishment Digest 365.

Further information and references on SuDS can be found in chapter 5 of the PPS25 Practice Guide. The Interim Code of Practice for Sustainable Drainage Systems provides advice on design, adoption and maintenance issues and a full overview of other technical guidance on SuDS. The Interim Code of Practice is available electronically on CIRIA's web site at: http://www.ciria.com/suds/interim_code.htm.

Disposal of surface water to public sewer

Before disposal of surface water to the public sewer is considered all other options set out in Approved Document Part H of the Building Regulations 2010 should be exhausted. When no other practicable alternative exists to dispose of surface water other than the public sewer, the Water Company or its agents should confirm that there is adequate spare capacity in the existing system taking future development requirements into account.

Designing for exceedence

For on/near site flooding, the PPS25 Practice Guide at paragraph 5.51 states that:

"For events with a return-period in excess of 30 years, surface flooding of open spaces such as landscaped areas or car parks is acceptable for short periods, but the layout and landscaping of the site should aim to route water away from any vulnerable property, and avoid creating hazards to access and egress routes (further guidance in CIRIA publication C635 Designing for exceedence in urban drainage - good practice). No flooding of property should occur as a result of a 1 in 100 year storm event (including an appropriate allowance for climate change). In principle, a well-designed surface water drainage system should ensure that there is little or no residual risk of property flooding occurring during events well in excess of the return-period for which the sewer system itself is designed. This is called designing for event exceedence."

The CIRIA publication `Designing for exceedence in urban drainage-good practice' can be accessed via the following link:
http://www.ciria.com/suds/ciria_publications.htm

For off-site flooding, the PPS25 Practice Guide states at paragraph 5.54:

"For the range of annual flow rate probabilities up to and including the one per cent annual exceedence probability (1 in 100 years) event, including an appropriate allowance for climate change, the developed rate of run-off into a watercourse, or other receiving water body, should be no greater than the existing rate of run-off for the same event. Run-off from previously-developed sites should be compared with existing rates, not greenfield rates for the site before it was developed. Developers are, however, strongly encouraged to reduce runoff rates from previously-developed sites as much as is reasonably practicable. Volumes of run-off should also be reduced wherever possible using infiltration and attenuation techniques. Interim guidance on calculation of site run-off rates can be found on the CIRIA website: http://www.ciria.org

Is the proposal part of a larger development site?

LPAs should be aware that some applications for smaller scale developments might be part of larger sites which already have outline permission. In such cases, the LPA should ensure that any conditions which were applied to the larger site, in relation to surface water drainage, are complied with.

Note:
Development which involves a culvert or an obstruction to flow on an Ordinary Watercourse will require consent under the Land Drainage Act 1991 and the Floods and Water Management Act 2010. In the case of an Ordinary Watercourse the responsibility for Consenting lies with the Lead Local Flood Authority (LLFA). An Ordinary Watercourse is defined as any watercourse not identified as a Main River on maps held by the Environment Agency and DEFRA. For further information on Ordinary Watercourses contact the LLFA. We would still wish to be consulted on any proposed culverting or an obstruction to flow on a Main River.

ENVIRONMENT AGENCY WEST THAMES - SURFACE WATER PRO-FORMA

Site Name	**Woodstock East, Woodstock**
Site Size	**70.04 ha**
Development Type (Green/Brown field)	**Green Field Site**

Discharge Rates	**Existing**	**Proposed**	**Difference Between Existing and Proposed**
1 in 1	42.6	50.1	+7.5 l/s
Qbar(1 in 2)	44.1	50.1	+6 l/s
1 in 30	113.6	50.1	-63.5 l/s
1 in 100	159.9	50.1	-109.8 l/s
1 in 100 +Climate change (proposed only)		50.1	
Discharge Volumes			
1 in 1	640.6	640.6	0
Q Bar (1 in 2)	779.2	779.2	0
1 in 30	1478.26	1478.26	0
1 in 100	2005.05	2005.05	0
Proposed 1 in 100 +Climate change		2390.7	

Which Document or Plan is this information contained in

Section 11.5 of the flood risk assessment and drainage strategy report compiled by Infrastruct CS Ltd confirms that the existing site has been considered as a greenfield site and that the underlying ground condition have been substantiated as clays on the western half with gravels on the eastern half. Therefore the current greenfield run off rates and volumes have been provided for the western half on the understanding that the rates and volumes for the eastern half are dealt with on site and infiltrate into the underlying ground conditions.

The proposed surface water drainage system has been developed to replicate this arrangement via the use of a attenuation pond with a restricted outlet into the adjacent watercourse sized to cater for the 1 in 100yr storm event plus climate change with full infiltration devices on the permeable half of the site.

The above section should only show small increases in discharge rate if an increase in discharge volume is shown – otherwise there should be no increase. Note that an increase in discharge volume may be shown in the above table - but how this is being attenuated on site and discharged so as to not increase flood risk should be set out below. If an increase in discharge rate or volume is shown, or if an increase was predicted but has been designed in to the system, please answer the following questions.		
Discharge Rates (The final scheme should show no increase in discharge rates. If a small increase in rate is shown to address trickle or Q-Bar discharge, then this may be acceptable but should tie in with the information provided in the volumes section below.		**Which Document or Plan is this information contained in**
How are increases in discharge rate being dealt with?	Flows from hard standing and roof areas are being drained via the use of a piped gravity connection which will direct flows into the storage pond at the bottom of the site. From here the restricted outfall links to the adjacent watercourse.	Sections 11 and swaler of the FRA
What storage volume is required as a result of restricting discharge rate?	The storage pond and swale network have been modelled within Microdrainage software and requires a storage volume of 2390.7cum to cater for the 1 in 100yr plus Climate change storm event for the site.	Section 11 of the FRA
Where has this volume been provided on site?	Within an attenuation pond and swale network. Further storage is available but this has been discounted at this master plan stage.	Section 11.7 of the FRA
Discharge Volumes (Where an increase in volume is shown, that increase in volume must be either attenuated and trickle discharged at 2l/s/ha. Or, the whole of the sites discharge rate must be restricted to Qbar) (Qbar is the run off rate for the site as if it was a Greenfield site i.e. assuming it is undeveloped). Qbar will be higher if the geology of the site is less permeable.		**Which Document or Plan is this information contained in**

Which method has/will be used to control additional discharge volumes?	*Given the clay ground conditions found on the western half of the site, pluvial flows will find their way into the adjacent ditch systems and so the scheme will not increase discharge volumes.*	*Section 11 of the FRA*
What is the Qbar/Trickle Discharge Rate?	50.1 l/s	Appendix F of the FRA
As a result of restricting rate, what additional attenuation storage volume was/is required?	2390.7cum provided within the storage pond and swale network	Section 11 of the FRA
Where on site will/has this attenuation be provided?	At the lowest point adjacent to the watercourse	Section 11 of the FRA
How will rates be restricted (Hydrobrake etc)?	Via a flow control manhole	Section 11 of the FRA

Please also confirm		**Which Document or Plan is this information contained in**
No flooding of pipe network will occur in the 1 in 30 event	System will be offered for adoption and so no flooding of piped network will occur. Final on-site system to be fully simulated	N/A
Any flooding or exceedence outside the pipe network will be safely contained on site and not increase flooding elsewhere (please indicate on a plan the location of any flooding).		

Which SuDS methods have been used on site.	Attenuation pond and swales for western half and infiltration swales, permeable pavement and soakaways for eastern half of the site	Section 11 of the FRA
If infiltration is proposed - That infiltration rates are acceptable (Provide rate).	1.095 x 10-4m/s (eastern half of site only)	11.10 of the FRA
That infiltration devices or their attenuation areas are appropriately sized.	Infiltration swales and permeable pavements are being proposed for the eastern half of the site	Refer to surface water drainage strategy within Appendices J & K

The above form should be completed using evidence from the Flood Risk Assessment and site plans. It should serve as a summary sheet of the drainage proposals and should clearly show that the proposed rate and volume as a result of development will not be increasing. If there is an increase in rate or volume, the rate or volume section should be completed to set out how the additional rate/volume is being dealt with.

This form is completed using factual information from the Flood Risk Assessment and Site Plans and can be used as a summary of the surface water drainage strategy on this site.

Form Completed By: Tim Trotman
Company: Infrastruct CS Ltd
Date: 4th November 2014