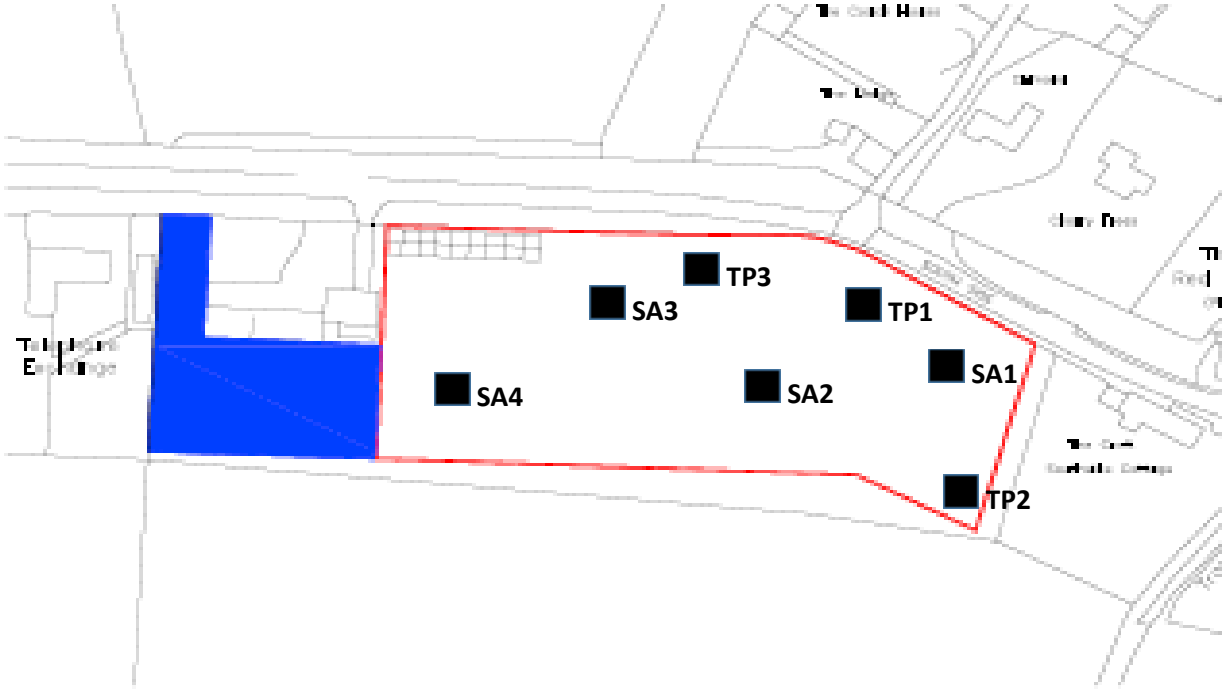
SOUTHSIDE, STEEPLE ASTON

EXPLOATORY HOLE LOCATION PLAN



Brownfield Consultancy
The Cottage, Mill Lane
Fenny Compton, CV47 2YF
Phone: 07852881086

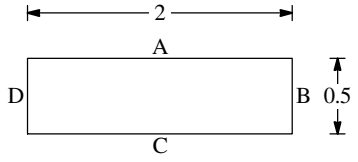
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Southside, Steeple Aston				SA1
Job No	Date	Ground Level (m)	Co-Ordinates ()	
BC340	15-11-17			
Contractor				Sheet
Brownfield Consultancy Ltd				1 of 1

STRATA				SAMPLES & TESTS		
				Depth	No	Remarks/Tests
Depth	No		DESCRIPTION			
0.00-0.20			Grass over TOPSOIL. (MADE GROUND)			
0.20-1.30			Dark brown very clayey sandy GRAVEL & COBBLE of sbangular and subrounded occasionally tabular limestone. Some minor spalling in the sidewalls initially. Possibly Made Ground / Reworked ground. (MADE GROUND)			
1.30-2.15			Firm brown occasionally grey sandy locally very sandy CLAY with abundant shell fragments. (OOLITE GROUP)			
2.15			No further progress due to encountering bedrock.			

Shoring/Support:
Stability: Sides stable.



GENERAL REMARKS

Soakaway Test undertaken. Groundwater not encountered. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client Rectory Homes Ltd	Method/ Plant Used JCB 3CX	Logged By JT

BROWNFIELD TP STEEP LOGS.GPJ GINT STD AGS 3_1.GDT 16/11/17

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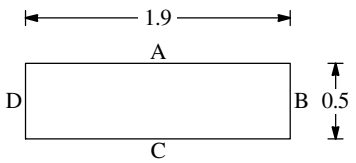
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Southside, Steeple Aston				SA2
Job No	Date	Ground Level (m)	Co-Ordinates ()	
BC340	15-11-17			
Contractor				Sheet
Brownfield Consultancy Ltd				1 of 1

STRATA				SAMPLES & TESTS		
				Depth	No	Remarks/Tests
Depth	No		DESCRIPTION			
0.00-0.20			Grass over TOPSOIL. (TOPSOIL)			
0.20-0.50			Soft brown sandy CLAY. Rare gravel of limestone. (OOLITE GROUP)			
0.50-0.90			Brown slightly clayey sandy GRAVEL & COBBLE of subangular and subrounded occasionally tabular limestone. (OOLITE GROUP)			

Shoring/Support:
Stability: Sides stable.



GENERAL REMARKS

Soakaway Test undertaken. Groundwater not encountered. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client Rectory Homes Ltd	Method/ Plant Used JCB 3CX	Logged By JT

BROWNFIELD TP STEEP LOGS.GPJ GINT STD AGS 3_1.GDT 16/11/17

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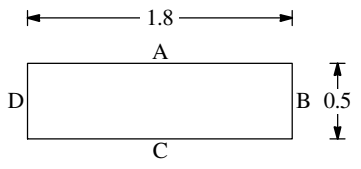
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Southside, Steeple Aston				SA3
Job No	Date	Ground Level (m)	Co-Ordinates ()	
BC340	15-11-17			
Contractor				Sheet
Brownfield Consultancy Ltd				1 of 1

STRATA				SAMPLES & TESTS		
				Depth	No	Remarks/Tests
Depth	No		DESCRIPTION			
0.00-0.15			Grass over TOPSOIL. (TOPSOIL)			
0.15-1.20			Soft becoming firm below 0.70m brown sandy locally very sandy CLAY with shell fragments, abundant in places. (OOLITE GROUP)			
1.20			No further progress due to encountering bedrock.			

Shoring/Support:
Stability: Sides stable.



GENERAL REMARKS

Soakaway Test undertaken. Groundwater not encountered. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client Rectory Homes Ltd	Method/ Plant Used JCB 3CX	Logged By JT

BROWNFIELD TP STEEP LOGS.GPJ GINT STD AGS 3_1.GDT 16/11/17

Brownfield Consultancy
The Cottage, Mill Lane
Fenny Compton, CV47 2YF
Phone: 07852881086

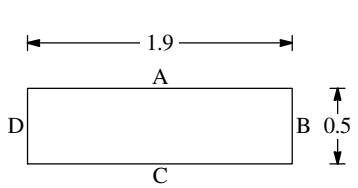
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Southside, Steeple Aston				SA4
Job No	Date	Ground Level (m)	Co-Ordinates ()	
BC340	15-11-17			
Contractor				Sheet
Brownfield Consultancy Ltd				1 of 1

STRATA				SAMPLES & TESTS		
				Depth	No	Remarks/Tests
Depth	No		DESCRIPTION			
0.00-0.10			Grass over TOPSOIL. (TOPSOIL)			
0.10-0.30			Soft brown sandy CLAY. Rare gravel of limestone. (OOLITE GROUP)			
0.30-1.40			Soft becoming firm below 0.90m brown sandy locally very sandy CLAY with shell fragments, abundant in places. (OOLITE GROUP)			
1.40			No further progress due to encountering bedrock.			

Shoring/Support:
Stability: Sides stable.



GENERAL REMARKS

Soakaway Test undertaken. Groundwater not encountered. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client Rectory Homes Ltd	Method/ Plant Used JCB 3CX	Logged By JT

BROWNFIELD TP STEEP LOGS.GPJ GINT STD AGS 3_1.GDT 16/11/17

Brownfield Consultancy
The Cottage, Mill Lane
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Phone: 07852881086

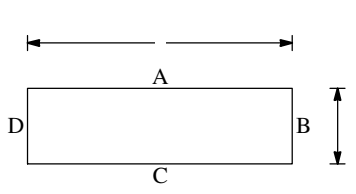
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Southside, Steeple Aston				**TP1**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
BC340	15-11-17			
Contractor				Sheet
Brownfield Consultancy Ltd				1 of 1

STRATA				SAMPLES & TESTS		
				Depth	No	Remarks/Tests
Depth	No		DESCRIPTION			
0.00-0.40			Grass over TOPSOIL. (TOPSOIL)			
0.40-2.20			Brown slightly clayey sandy GRAVEL & COBBLE of subangular and subrounded occasionally tabular limestone. Occasional boulder. (OOLITE GROUP) 1.00 Becoming very sandy below 1.00m.			
2.20-2.40			Firm brown sandy CLAY with abundant shell fragments. (OOLITE GROUP)			

Shoring/Support:
Stability: Sides stable.



GENERAL REMARKS

Groundwater not encountered. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client Rectory Homes Ltd	Method/ Plant Used JCB 3CX	Logged By JT

BROWNFIELD TP STEEP LOGS.GPJ GINT STD AGS 3_1.GDT 16/11/17

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Phone: 07852881086

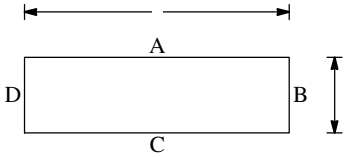
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Southside, Steeple Aston				**TP2**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
BC340	15-11-17			
Contractor				Sheet
Brownfield Consultancy Ltd				1 of 1

STRATA				SAMPLES & TESTS		
				Depth	No	Remarks/Tests
Depth	No		DESCRIPTION			
0.00-0.20			Grass over TOPSOIL. (TOPSOIL)			
0.20-1.00			Buff brown slightly clayey very sandy GRAVEL of subangular and subrounded fine to coarse limestone. (OOLITE GROUP)			
1.00-1.90			Firm brown sandy CLAY with shell fragments. Shell fragments abundant in places. (OOLITE GROUP)			
1.90			No further progress due to encountering bedrock.			

Shoring/Support:
Stability: Sides stable.



GENERAL REMARKS

Groundwater not encountered. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client Rectory Homes Ltd	Method/ Plant Used JCB 3CX	Logged By JT

BROWNFIELD TP STEEP LOGS.GPJ GINT STD AGS 3_1.GDT 16/11/17

Brownfield Consultancy
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Phone: 07852881086

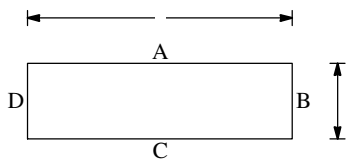
TRIAL PIT LOG

The Brownfield Consultancy

Project				TRIAL PIT No
Southside, Steeple Aston				TP3
Job No	Date	Ground Level (m)	Co-Ordinates ()	
BC340	15-11-17			
Contractor				Sheet
Brownfield Consultancy Ltd				1 of 1

STRATA				SAMPLES & TESTS		
				Depth	No	Remarks/Tests
Depth	No		DESCRIPTION			
0.00-0.20			Black humic TOPSOIL with timber. (MADE GROUND)			
0.20-0.90			Soft brown sandy CLAY. Rare gravel of limestone. (OOLITE GROUP)			
0.90-1.50			Brown slightly clayey sandy GRAVEL & COBBLE of subangular and subrounded occasionally tabular limestone. (OOLITE GROUP)			
1.50-3.00			Firm brown sandy CLAY with abundant shell fragments. (OOLITE GROUP)			

Shoring/Support:
Stability: Sides stable.



GENERAL REMARKS

Groundwater not encountered. Backfilled with arisings.

All dimensions in metres Scale 1:25	Client Rectory Homes Ltd	Method/ Plant Used JCB 3CX	Logged By JT

BROWNFIELD TP STEEP LOGS.GPJ GINT STD AGS 3_1.GDT 16/11/17

The Brownfield Consultancy	SOIL INFILTRATION TEST
Woodstock **Memorial Road** **Fenny Compton** **CV47 2XU** **Tel: 07852881086**	**Project:** Southside, Steeple Aston **Project No:** BC340

Test Location: SA1 Test No: 1 Date: 14.11.17

Water level during test

Time mins	Depth m bgl
0	1.270
9	1.360
15	1.380
26	1.410
50	1.470
65	1.520
98	1.600
130	1.680
145	1.700
196	1.800
245	1.900
287	1.980

Trial pit dimensions

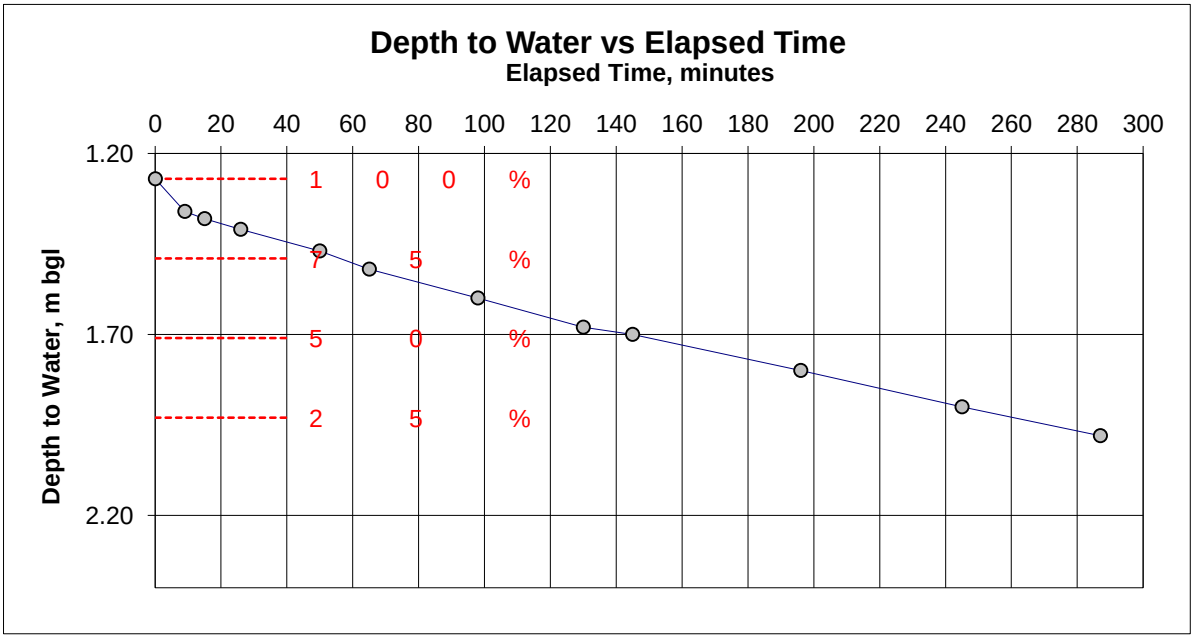
depth (m)	2.15
length (m)	2.00
width (m)	0.50

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins)	60
time at 25% effective depth (mins) (from graph)	280

Calculated Soil Infiltration Rate = 8.2E-06 m/sec



The Brownfield Consultancy	SOIL INFILTRATION TEST
Woodstock **Memorial Road** **Fenny Compton** **CV47 2XU** **Tel: 07852881086**	**Project:** Southside, Steeple Aston **Project No:** BC340

Test Location: SA2 Test No: 1 Date: 14.11.17

Water level during test

Time mins	Depth m bgl
0	0.570
8	0.680
26	0.720
42	0.760
55	0.800
70	0.840

Trial pit dimensions

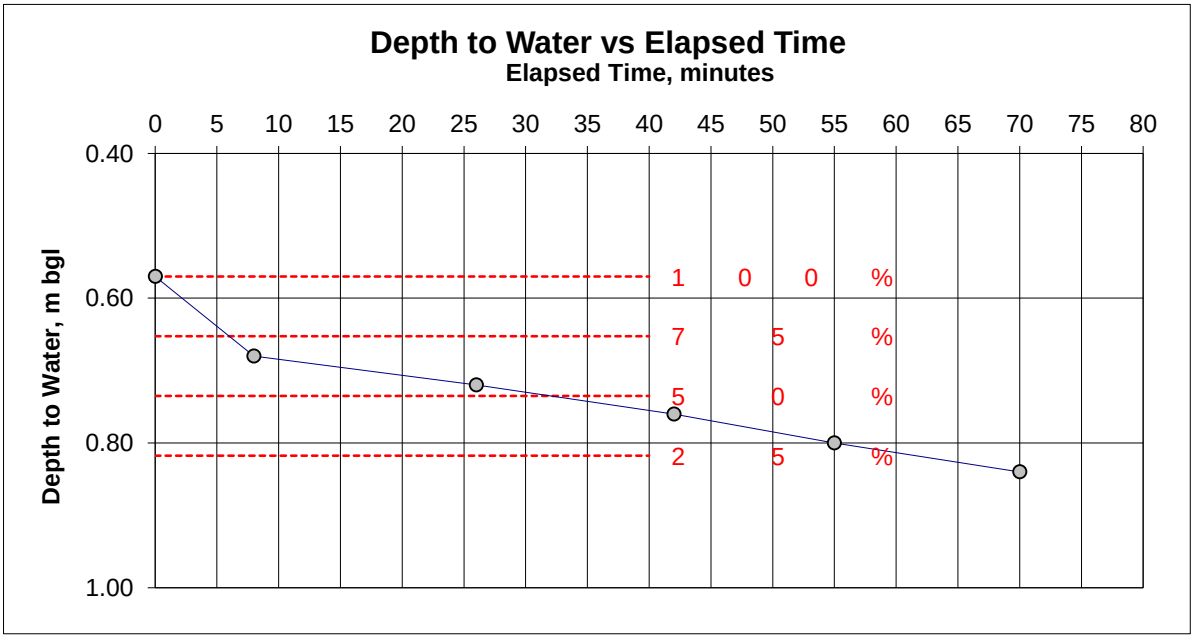
depth (m)	0.90
length (m)	1.90
width (m)	0.50

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 7
time at 25% effective depth (mins) 60
(from graph)

Calculated Soil Infiltration Rate = 2.4E-05 m/sec



The Brownfield Consultancy	SOIL INFILTRATION TEST
Woodstock **Memorial Road** **Fenny Compton** **CV47 2XU** **Tel: 07852881086**	**Project:** Southside, Steeple Aston **Project No:** BC340

Test Location: SA2 Test No: 2 Date: 14.11.17

Water level during test

Time mins	Depth m bgl
0	0.290
5	0.350
27	0.490
79	0.690
114	0.790
142	0.850

Trial pit dimensions

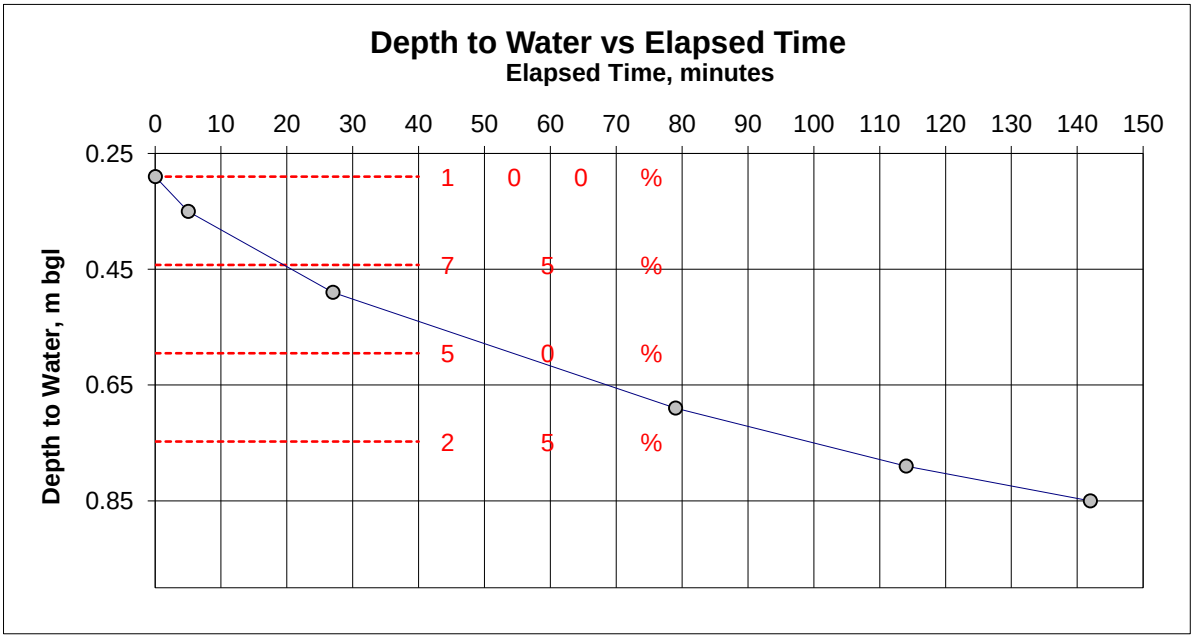
depth (m)	0.90
length (m)	1.90
width (m)	0.50

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate
Vp = volume of water from 75% to 25% effective depth
αp = Internal surface area at 50% effective depth
tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) 20
time at 25% effective depth (mins) 102
(from graph)

Calculated Soil Infiltration Rate = 2.2E-05 m/sec



The Brownfield Consultancy	SOIL INFILTRATION TEST
Woodstock **Memorial Road** **Fenny Compton** **CV47 2XU** **Tel: 07852881086**	**Project:** Southside, Steeple Aston **Project No:** BC340

Test Location: SA3 Test No: 1 Date: 14.11.17

Water level during test

Time mins	Depth m bgl
0	0.500
12	0.510
47	0.540
89	0.550
109	0.560
146	0.570

Trial pit dimensions

depth (m)	1.20
length (m)	1.80
width (m)	0.50

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate

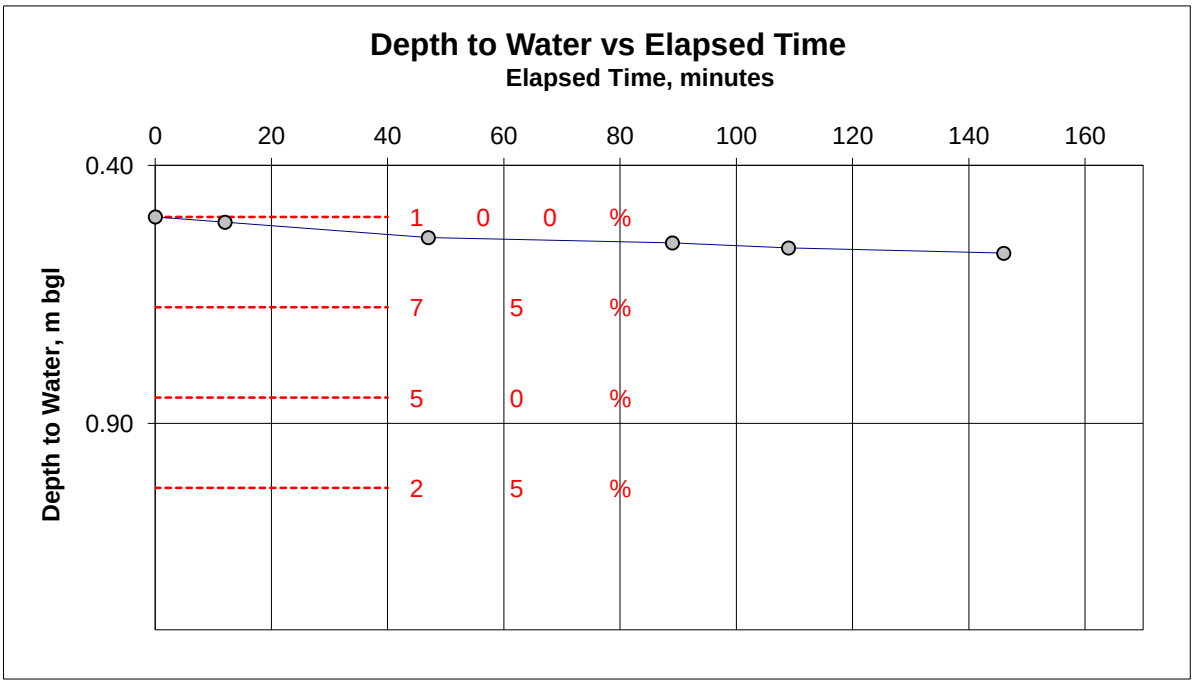
Vp = volume of water from 75% to 25% effective depth

αp = Internal surface area at 50% effective depth

tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins)
time at 25% effective depth (mins)
(from graph)

Calculated Soil Infiltration Rate = - m/sec



The Brownfield Consultancy	**SOIL INFILTRATION TEST**
Woodstock **Memorial Road** **Fenny Compton** **CV47 2XU** **Tel: 07852881086**	**Project:** Southside, Steeple Aston **Project No:** BC340

Test Location: SA4 Test No: 1 Date: 14.11.17

Water level during test

Time mins	Depth m bgl
0	0.450
10	0.490
52	0.540
71	0.560
110	0.570
144	0.580

Trial pit dimensions

depth (m)	1.20
length (m)	1.80
width (m)	0.50

$$f = \frac{V_p}{\alpha_p \times t_p}$$

f = soil infiltration rate

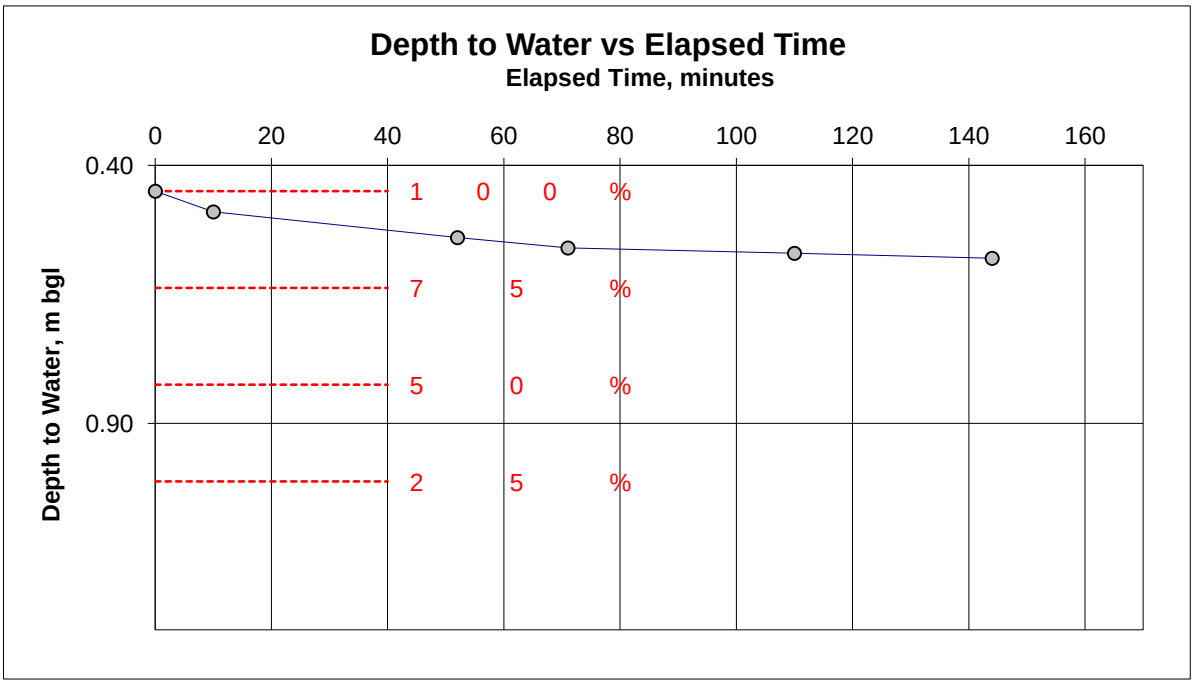
Vp = volume of water from 75% to 25% effective depth

αp = Internal surface area at 50% effective depth

tp = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins)
time at 25% effective depth (mins)
(from graph)

Calculated Soil Infiltration Rate = - m/sec



APPENDIX C
GREENFIELD / POST DEVELOPMENT RUNOFF CALCULATIONS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.315	Urban	0.000
SAAR (mm)	699	Region Number	Region 6

Results l/s

QBAR Rural	1.4
QBAR Urban	1.4
Q100 years	4.4
Q1 year	1.2
Q30 years	3.1
Q100 years	4.4

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.000
Ratio R	0.406
Areal Reduction Factor	1.00
Area (ha)	0.315
SAAR (mm)	699
CWI	104.820
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	45.89
Greenfield Runoff Volume (m^3)	89.828

Cascade Summary of Results for Area 1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Area 2.srcx	(None)

Half Drain Time : 280 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	128.651	0.401	0.0	0.5	0.5	8.9	O K
30 min Summer	128.710	0.460	0.0	0.6	0.6	11.7	Flood Risk
60 min Summer	128.757	0.507	0.0	0.6	0.6	14.2	Flood Risk
120 min Summer	128.790	0.540	0.0	0.6	0.6	16.0	Flood Risk
180 min Summer	128.797	0.547	0.0	0.6	0.6	16.4	Flood Risk
240 min Summer	128.796	0.546	0.0	0.6	0.6	16.3	Flood Risk
360 min Summer	128.789	0.539	0.0	0.6	0.6	15.9	Flood Risk
480 min Summer	128.781	0.531	0.0	0.6	0.6	15.5	Flood Risk
600 min Summer	128.771	0.521	0.0	0.6	0.6	14.9	Flood Risk
720 min Summer	128.761	0.511	0.0	0.6	0.6	14.4	Flood Risk
960 min Summer	128.741	0.491	0.0	0.6	0.6	13.3	Flood Risk
1440 min Summer	128.703	0.453	0.0	0.6	0.6	11.3	Flood Risk
2160 min Summer	128.653	0.403	0.0	0.5	0.5	8.9	O K
2880 min Summer	128.608	0.358	0.0	0.5	0.5	7.1	O K
4320 min Summer	128.536	0.286	0.0	0.4	0.4	4.5	O K
5760 min Summer	128.481	0.231	0.0	0.4	0.4	2.9	O K
7200 min Summer	128.439	0.189	0.0	0.4	0.4	2.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.874	0.0	9.2	18
30 min Summer	90.946	0.0	12.4	33
60 min Summer	56.713	0.0	15.6	62
120 min Summer	34.162	0.0	19.0	122
180 min Summer	25.057	0.0	21.0	180
240 min Summer	19.992	0.0	22.4	214
360 min Summer	14.500	0.0	24.4	274
480 min Summer	11.545	0.0	25.9	340
600 min Summer	9.667	0.0	27.1	408
720 min Summer	8.358	0.0	28.1	476
960 min Summer	6.638	0.0	29.8	614
1440 min Summer	4.791	0.0	32.2	880
2160 min Summer	3.452	0.0	34.6	1260
2880 min Summer	2.733	0.0	36.3	1640
4320 min Summer	1.964	0.0	38.8	2336
5760 min Summer	1.552	0.0	40.4	3056
7200 min Summer	1.292	0.0	41.7	3752

Cascade Summary of Results for Area 1.srcx

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
8640 min Summer	128.406	0.156	0.0	0.3	0.3	1.3	O K
10080 min Summer	128.381	0.131	0.0	0.3	0.3	1.0	O K
15 min Winter	128.677	0.427	0.0	0.5	0.5	10.1	O K
30 min Winter	128.740	0.490	0.0	0.6	0.6	13.2	Flood Risk
60 min Winter	128.792	0.542	0.0	0.6	0.6	16.1	Flood Risk
120 min Winter	128.832	0.582	0.0	0.6	0.6	18.3	Flood Risk
180 min Winter	128.843	0.593	0.0	0.6	0.6	18.9	Flood Risk
240 min Winter	128.843	0.593	0.0	0.6	0.6	18.9	Flood Risk
360 min Winter	128.833	0.583	0.0	0.6	0.6	18.4	Flood Risk
480 min Winter	128.822	0.572	0.0	0.6	0.6	17.8	Flood Risk
600 min Winter	128.809	0.559	0.0	0.6	0.6	17.0	Flood Risk
720 min Winter	128.795	0.545	0.0	0.6	0.6	16.2	Flood Risk
960 min Winter	128.766	0.516	0.0	0.6	0.6	14.7	Flood Risk
1440 min Winter	128.713	0.463	0.0	0.6	0.6	11.8	Flood Risk
2160 min Winter	128.641	0.391	0.0	0.5	0.5	8.4	O K
2880 min Winter	128.579	0.329	0.0	0.5	0.5	6.0	O K
4320 min Winter	128.484	0.234	0.0	0.4	0.4	3.0	O K
5760 min Winter	128.419	0.169	0.0	0.3	0.3	1.6	O K
7200 min Winter	128.376	0.126	0.0	0.3	0.3	0.9	O K
8640 min Winter	128.348	0.098	0.0	0.2	0.2	0.5	O K
10080 min Winter	128.329	0.079	0.0	0.2	0.2	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.112	0.0	42.6	4416
10080 min Summer	0.980	0.0	43.3	5144
15 min Winter	138.874	0.0	10.4	18
30 min Winter	90.946	0.0	14.0	33
60 min Winter	56.713	0.0	17.6	62
120 min Winter	34.162	0.0	21.4	118
180 min Winter	25.057	0.0	23.6	176
240 min Winter	19.992	0.0	25.2	230
360 min Winter	14.500	0.0	27.4	290
480 min Winter	11.545	0.0	29.1	364
600 min Winter	9.667	0.0	30.5	442
720 min Winter	8.358	0.0	31.7	518
960 min Winter	6.638	0.0	33.5	664
1440 min Winter	4.791	0.0	36.2	940
2160 min Winter	3.452	0.0	39.0	1340
2880 min Winter	2.733	0.0	40.9	1700
4320 min Winter	1.964	0.0	43.7	2380
5760 min Winter	1.552	0.0	45.7	3064
7200 min Winter	1.292	0.0	47.1	3744
8640 min Winter	1.112	0.0	48.3	4416
10080 min Winter	0.980	0.0	49.2	5136

Cascade Model Details for Area 1.srcx

Storage is Online Cover Level (m) 129.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	13.6
Membrane Percolation (mm/hr)	1000	Length (m)	13.6
Max Percolation (l/s)	51.4	Slope (1:X)	27.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	128.250	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 128.250

Cascade Summary of Results for Area 2.srcx

Upstream Structures	Outflow To	Overflow To
Area 1.srcx Area 3.srcx	(None)	

Half Drain Time : 1126 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	127.919	0.269	0.0	0.4	0.4	20.9	O K
30 min Summer	127.963	0.313	0.0	0.5	0.5	28.2	O K
60 min Summer	128.007	0.357	0.0	0.5	0.5	35.9	O K
120 min Summer	128.051	0.401	0.0	0.5	0.5	43.7	O K
180 min Summer	128.078	0.428	0.0	0.5	0.5	48.2	O K
240 min Summer	128.096	0.446	0.0	0.6	0.6	51.4	O K
360 min Summer	128.121	0.471	0.0	0.6	0.6	55.9	Flood Risk
480 min Summer	128.140	0.490	0.0	0.6	0.6	59.2	Flood Risk
600 min Summer	128.155	0.505	0.0	0.6	0.6	61.7	Flood Risk
720 min Summer	128.166	0.516	0.0	0.6	0.6	63.6	Flood Risk
960 min Summer	128.179	0.529	0.0	0.6	0.6	65.9	Flood Risk
1440 min Summer	128.184	0.534	0.0	0.6	0.6	66.8	Flood Risk
2160 min Summer	128.169	0.519	0.0	0.6	0.6	64.2	Flood Risk
2880 min Summer	128.153	0.503	0.0	0.6	0.6	61.5	Flood Risk
4320 min Summer	128.122	0.472	0.0	0.6	0.6	55.9	Flood Risk
5760 min Summer	128.090	0.440	0.0	0.5	0.5	50.4	O K
7200 min Summer	128.059	0.409	0.0	0.5	0.5	45.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.874	0.0	29.3	189
30 min Summer	90.946	0.0	34.9	237
60 min Summer	56.713	0.0	50.5	284
120 min Summer	34.162	0.0	61.6	332
180 min Summer	25.057	0.0	68.0	364
240 min Summer	19.992	0.0	72.5	394
360 min Summer	14.500	0.0	76.9	446
480 min Summer	11.545	0.0	79.2	496
600 min Summer	9.667	0.0	80.5	604
720 min Summer	8.358	0.0	81.3	724
960 min Summer	6.638	0.0	81.9	962
1440 min Summer	4.791	0.0	80.7	1440
2160 min Summer	3.452	0.0	112.0	1776
2880 min Summer	2.733	0.0	117.5	2116
4320 min Summer	1.964	0.0	124.9	2852
5760 min Summer	1.552	0.0	130.0	3600
7200 min Summer	1.292	0.0	133.6	4344

Cascade Summary of Results for Area 2.srcx

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
8640 min Summer	128.032	0.382	0.0	0.5	0.5	40.3	O K
10080 min Summer	128.007	0.357	0.0	0.5	0.5	36.0	O K
15 min Winter	127.936	0.286	0.0	0.4	0.4	23.7	O K
30 min Winter	127.984	0.334	0.0	0.5	0.5	32.0	O K
60 min Winter	128.033	0.383	0.0	0.5	0.5	40.5	O K
120 min Winter	128.083	0.433	0.0	0.5	0.5	49.2	O K
180 min Winter	128.112	0.462	0.0	0.6	0.6	54.3	Flood Risk
240 min Winter	128.133	0.483	0.0	0.6	0.6	57.9	Flood Risk
360 min Winter	128.162	0.512	0.0	0.6	0.6	63.0	Flood Risk
480 min Winter	128.184	0.534	0.0	0.6	0.6	66.7	Flood Risk
600 min Winter	128.200	0.550	0.0	0.6	0.6	69.6	Flood Risk
720 min Winter	128.213	0.563	0.0	0.6	0.6	71.8	Flood Risk
960 min Winter	128.230	0.580	0.0	0.6	0.6	74.8	Flood Risk
1440 min Winter	128.241	0.591	0.0	0.6	0.6	76.8	Flood Risk
2160 min Winter	128.225	0.575	0.0	0.6	0.6	74.0	Flood Risk
2880 min Winter	128.205	0.555	0.0	0.6	0.6	70.5	Flood Risk
4320 min Winter	128.156	0.506	0.0	0.6	0.6	62.0	Flood Risk
5760 min Winter	128.106	0.456	0.0	0.6	0.6	53.3	Flood Risk
7200 min Winter	128.062	0.412	0.0	0.5	0.5	45.5	O K
8640 min Winter	128.023	0.373	0.0	0.5	0.5	38.8	O K
10080 min Winter	127.990	0.340	0.0	0.5	0.5	33.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.112	0.0	136.2	5104
10080 min Summer	0.980	0.0	138.1	5856
15 min Winter	138.874	0.0	31.9	206
30 min Winter	90.946	0.0	36.9	255
60 min Winter	56.713	0.0	57.1	300
120 min Winter	34.162	0.0	69.4	346
180 min Winter	25.057	0.0	76.0	378
240 min Winter	19.992	0.0	79.1	404
360 min Winter	14.500	0.0	82.6	452
480 min Winter	11.545	0.0	84.6	500
600 min Winter	9.667	0.0	85.8	602
720 min Winter	8.358	0.0	86.6	718
960 min Winter	6.638	0.0	87.0	952
1440 min Winter	4.791	0.0	85.7	1400
2160 min Winter	3.452	0.0	126.4	1888
2880 min Winter	2.733	0.0	132.7	2216
4320 min Winter	1.964	0.0	137.7	3024
5760 min Winter	1.552	0.0	147.3	3816
7200 min Winter	1.292	0.0	151.6	4616
8640 min Winter	1.112	0.0	154.8	5400
10080 min Winter	0.980	0.0	157.3	6152

Cascade Model Details for Area 2.srcx

Storage is Online Cover Level (m) 128.400

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	24.1
Membrane Percolation (mm/hr)	1000	Length (m)	24.1
Max Percolation (l/s)	161.3	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	127.650	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 127.650

Cascade Summary of Results for Area 3.srcx

Upstream Structures	Outflow To	Overflow To
Area 2.srcx Area 1.srcx	Area 4.srcx	(None)

Half Drain Time : 438 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	127.506	0.256	0.0	0.4	0.4	8.2	O K
30 min Summer	127.553	0.303	0.0	0.5	0.5	10.8	O K
60 min Summer	127.602	0.352	0.0	0.5	0.5	13.6	O K
120 min Summer	127.652	0.402	0.0	0.5	0.5	16.4	O K
180 min Summer	127.683	0.433	0.0	0.5	0.5	18.2	O K
240 min Summer	127.704	0.454	0.0	0.6	0.6	19.3	Flood Risk
360 min Summer	127.735	0.485	0.0	0.6	0.6	21.1	Flood Risk
480 min Summer	127.758	0.508	0.0	0.6	0.6	22.4	Flood Risk
600 min Summer	127.776	0.526	0.0	0.6	0.6	23.4	Flood Risk
720 min Summer	127.790	0.540	0.0	0.6	0.6	24.2	Flood Risk
960 min Summer	127.812	0.562	0.0	0.6	0.6	25.4	Flood Risk
1440 min Summer	127.837	0.587	0.0	0.6	0.6	26.8	Flood Risk
2160 min Summer	127.844	0.594	0.0	0.6	0.6	27.2	Flood Risk
2880 min Summer	127.831	0.581	0.0	0.6	0.6	26.5	Flood Risk
4320 min Summer	127.805	0.555	0.0	0.6	0.6	25.0	Flood Risk
5760 min Summer	127.781	0.531	0.0	0.6	0.6	23.7	Flood Risk
7200 min Summer	127.758	0.508	0.0	0.6	0.6	22.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.874	0.0	34.0	423
30 min Summer	90.946	0.0	37.8	493
60 min Summer	56.713	0.0	64.0	488
120 min Summer	34.162	0.0	78.0	124
180 min Summer	25.057	0.0	83.5	184
240 min Summer	19.992	0.0	86.1	244
360 min Summer	14.500	0.0	88.8	364
480 min Summer	11.545	0.0	90.2	484
600 min Summer	9.667	0.0	91.0	604
720 min Summer	8.358	0.0	91.3	724
960 min Summer	6.638	0.0	91.1	964
1440 min Summer	4.791	0.0	88.7	1442
2160 min Summer	3.452	0.0	142.0	2160
2880 min Summer	2.733	0.0	148.9	2568
4320 min Summer	1.964	0.0	150.9	3244
5760 min Summer	1.552	0.0	164.9	3984
7200 min Summer	1.292	0.0	169.4	4752

Cascade Summary of Results for Area 3.srcx

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
8640 min Summer	127.735	0.485	0.0	0.6	0.6	21.1	Flood Risk
10080 min Summer	127.712	0.462	0.0	0.6	0.6	19.8	Flood Risk
15 min Winter	127.524	0.274	0.0	0.4	0.4	9.2	O K
30 min Winter	127.577	0.327	0.0	0.5	0.5	12.2	O K
60 min Winter	127.631	0.381	0.0	0.5	0.5	15.2	O K
120 min Winter	127.689	0.439	0.0	0.5	0.5	18.5	O K
180 min Winter	127.724	0.474	0.0	0.6	0.6	20.4	Flood Risk
240 min Winter	127.747	0.497	0.0	0.6	0.6	21.8	Flood Risk
360 min Winter	127.782	0.532	0.0	0.6	0.6	23.7	Flood Risk
480 min Winter	127.807	0.557	0.0	0.6	0.6	25.2	Flood Risk
600 min Winter	127.828	0.578	0.0	0.6	0.6	26.3	Flood Risk
720 min Winter	127.844	0.594	0.0	0.6	0.6	27.2	Flood Risk
960 min Winter	127.869	0.619	0.0	0.7	0.7	28.7	Flood Risk
1440 min Winter	127.900	0.650	0.0	0.7	0.7	30.4	Flood Risk
2160 min Winter	127.914	0.664	0.0	0.7	0.7	31.2	Flood Risk
2880 min Winter	127.905	0.655	0.0	0.7	0.7	30.7	Flood Risk
4320 min Winter	127.870	0.620	0.0	0.7	0.7	28.7	Flood Risk
5760 min Winter	127.833	0.583	0.0	0.6	0.6	26.6	Flood Risk
7200 min Winter	127.794	0.544	0.0	0.6	0.6	24.4	Flood Risk
8640 min Winter	127.757	0.507	0.0	0.6	0.6	22.3	Flood Risk
10080 min Winter	127.721	0.471	0.0	0.6	0.6	20.3	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.112	0.0	172.7	5528
10080 min Summer	0.980	0.0	175.2	6264
15 min Winter	138.874	0.0	35.7	454
30 min Winter	90.946	0.0	39.5	493
60 min Winter	56.713	0.0	72.3	430
120 min Winter	34.162	0.0	84.9	124
180 min Winter	25.057	0.0	89.0	184
240 min Winter	19.992	0.0	91.2	242
360 min Winter	14.500	0.0	93.9	362
480 min Winter	11.545	0.0	95.3	482
600 min Winter	9.667	0.0	96.1	600
720 min Winter	8.358	0.0	96.4	718
960 min Winter	6.638	0.0	96.2	954
1440 min Winter	4.791	0.0	93.7	1426
2160 min Winter	3.452	0.0	160.1	2100
2880 min Winter	2.733	0.0	168.1	2708
4320 min Winter	1.964	0.0	162.9	3368
5760 min Winter	1.552	0.0	186.7	4200
7200 min Winter	1.292	0.0	192.1	5040
8640 min Winter	1.112	0.0	196.3	5800
10080 min Winter	0.980	0.0	199.5	6600

Cascade Model Details for Area 3.srcx

Storage is Online Cover Level (m) 128.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	13.7
Membrane Percolation (mm/hr)	1000	Length (m)	13.7
Max Percolation (l/s)	52.1	Slope (1:X)	62.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	127.250	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 127.250

Cascade Summary of Results for Area 4.srcx

Upstream Structures	Outflow To	Overflow To
Area 3.srcx Area 2.srcx Area 1.srcx	(None)	(None)

Half Drain Time : 116 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	126.534	0.284	0.8	0.4	1.3	8.8	O K
30 min Summer	126.576	0.326	0.9	0.5	1.3	11.5	O K
60 min Summer	126.612	0.362	0.9	0.5	1.4	13.8	O K
120 min Summer	126.633	0.383	0.9	0.5	1.4	15.2	O K
180 min Summer	126.636	0.386	0.9	0.5	1.4	15.3	O K
240 min Summer	126.634	0.384	0.9	0.5	1.4	15.2	O K
360 min Summer	126.626	0.376	0.9	0.5	1.4	14.7	O K
480 min Summer	126.617	0.367	0.9	0.5	1.4	14.2	O K
600 min Summer	126.608	0.358	0.9	0.5	1.4	13.5	O K
720 min Summer	126.598	0.348	0.9	0.5	1.4	12.9	O K
960 min Summer	126.580	0.330	0.9	0.5	1.3	11.8	O K
1440 min Summer	126.549	0.299	0.9	0.4	1.3	9.8	O K
2160 min Summer	126.519	0.269	0.8	0.4	1.2	7.9	O K
2880 min Summer	126.496	0.246	0.7	0.4	1.1	6.6	O K
4320 min Summer	126.463	0.213	0.6	0.4	1.0	5.0	O K
5760 min Summer	126.441	0.191	0.6	0.4	0.9	4.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.874	0.0	43.0	18
30 min Summer	90.946	0.0	49.9	33
60 min Summer	56.713	0.0	79.9	62
120 min Summer	34.162	0.0	97.4	120
180 min Summer	25.057	0.0	104.7	154
240 min Summer	19.992	0.0	108.4	184
360 min Summer	14.500	0.0	113.0	250
480 min Summer	11.545	0.0	115.9	320
600 min Summer	9.667	0.0	117.9	388
720 min Summer	8.358	0.0	119.2	456
960 min Summer	6.638	0.0	120.5	588
1440 min Summer	4.791	0.0	120.3	838
2160 min Summer	3.452	0.0	177.2	1212
2880 min Summer	2.733	0.0	185.9	1588
4320 min Summer	1.964	0.0	189.8	2332
5760 min Summer	1.552	0.0	205.9	3056

Cascade Summary of Results for Area 4.srcx

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
7200 min Summer	126.424	0.174	0.5	0.3	0.9	3.3	O K
8640 min Summer	126.411	0.161	0.5	0.3	0.8	2.9	O K
10080 min Summer	126.402	0.152	0.5	0.3	0.8	2.5	O K
15 min Winter	126.553	0.303	0.9	0.5	1.3	10.0	O K
30 min Winter	126.601	0.351	0.9	0.5	1.4	13.1	O K
60 min Winter	126.643	0.393	0.9	0.5	1.4	15.8	O K
120 min Winter	126.671	0.421	0.9	0.5	1.4	17.6	O K
180 min Winter	126.674	0.424	0.9	0.5	1.4	17.8	O K
240 min Winter	126.669	0.419	0.9	0.5	1.4	17.5	O K
360 min Winter	126.658	0.408	0.9	0.5	1.4	16.8	O K
480 min Winter	126.645	0.395	0.9	0.5	1.4	15.9	O K
600 min Winter	126.630	0.380	0.9	0.5	1.4	15.0	O K
720 min Winter	126.616	0.366	0.9	0.5	1.4	14.1	O K
960 min Winter	126.589	0.339	0.9	0.5	1.4	12.3	O K
1440 min Winter	126.546	0.296	0.9	0.4	1.3	9.6	O K
2160 min Winter	126.510	0.260	0.8	0.4	1.2	7.4	O K
2880 min Winter	126.484	0.234	0.7	0.4	1.1	6.0	O K
4320 min Winter	126.450	0.200	0.6	0.4	1.0	4.4	O K
5760 min Winter	126.428	0.178	0.5	0.3	0.9	3.5	O K
7200 min Winter	126.413	0.163	0.5	0.3	0.8	2.9	O K
8640 min Winter	126.401	0.151	0.5	0.3	0.8	2.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Summer	1.292	0.0	211.7	3816
8640 min Summer	1.112	0.0	215.9	4504
10080 min Summer	0.980	0.0	219.0	5248
15 min Winter	138.874	0.0	45.9	18
30 min Winter	90.946	0.0	53.1	32
60 min Winter	56.713	0.0	90.3	60
120 min Winter	34.162	0.0	106.4	118
180 min Winter	25.057	0.0	112.5	172
240 min Winter	19.992	0.0	116.3	200
360 min Winter	14.500	0.0	121.1	274
480 min Winter	11.545	0.0	124.2	350
600 min Winter	9.667	0.0	126.3	424
720 min Winter	8.358	0.0	127.7	498
960 min Winter	6.638	0.0	129.2	636
1440 min Winter	4.791	0.0	129.3	894
2160 min Winter	3.452	0.0	199.8	1296
2880 min Winter	2.733	0.0	209.8	1676
4320 min Winter	1.964	0.0	206.7	2464
5760 min Winter	1.552	0.0	233.1	3288
7200 min Winter	1.292	0.0	240.0	4104
8640 min Winter	1.112	0.0	245.2	4928

Cascade Summary of Results for Area 4.srcx

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
10080 min Winter	126.392	0.142	0.4	0.3	0.7	2.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	0.980	0.0	249.3	5744

Cascade Model Details for Area 4.srcx

Storage is Online Cover Level (m) 127.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.02952	Width (m)	14.6
Membrane Percolation (mm/hr)	1000	Length (m)	14.6
Max Percolation (l/s)	59.2	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	126.250	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 126.250

APPENDIX D
PROPOSED FOUL & SURFACE WATER DRAINAGE STRATEGY

Diffuser Cells
Cellular polypropylene unit, Charcon 'Permavoid' or similar wrapped in a permeable geotextile membrane laid within stone sub-base of permeable block paving (private drives & parking spaces only)

Flow Control Orifices 20mm to maximize storage on site.

Bin collection point

Full height concrete baffles to maximise storage.

Bin collection point

Development foul drainage to connect to existing foul manhole.

Existing foul drainage system on South Side road.

Typical foul water drainage

Typical surface water drainage.

Access Road:
Black Macadam with a permeable stone sub-base and gullies to permavoids providing infiltration and conveyance to areas of higher infiltration. 0.75m deep.

Indicative finished floor level, subject to change.

Private Drives:
Permeable Block Paving, underlined with a permeable stone sub-base, providing infiltration. 0.75m deep.

Planted buffer strip to rear & eastern boundaries

Development boundary

SOUTH SIDE

The Lodge

Cherry Trees

The Croft
Southside Cottage

EX0801
CL 127.640
IL 124.930

SW1
CL 129.00
IL 128.25

SW2
CL 128.40
IL 127.65

SW3
CL 127.50
IL 127.25

HW1
CL 127.750
IL 125.193

F128.40
DN100 @ 1/35
F127.90
DN100 @ 1/80
F127.70
DN100 @ 1/80
F127.40
DN100 @ 1/35
F126.14
DN100 @ 1/80
F126.40

FFL 129.150
FFL 128.650
FFL 128.500
FFL 128.250
FFL 128.150
FFL 127.150

1
2
3
4
5
6

Construction Notes:

1. Do not scale from this drawing.
2. All dimensions in metres unless noted otherwise.
3. All levels relate to ordnance datum.
4. This drawing is based on the latest Architectural planning layout and shall be read in conjunction with all other relevant longitudinal sections and construction drawings.
5. Any discrepancies with any of the drawings shall be reported to an MJA Consulting Engineer.
6. The level and location of all existing services shall be verified on site by the Contractor before commencing any construction work.
7. Contractor must comply with all current legislation relating to CDM, Health and Safety and COSHH.
8. All material in excess of 20kg (i.e. kerbs, manhole units cover etc.) shall be mechanically lifted and laid where possible at all times.
9. Manholes, sewers, headwalls and other structures intended to convey surface water or sewerage are to be constructed in accordance with the Water Authorities Association specification "Sewers for Adoption" 7th edition and to Thames Water specification and addendum.

Key:

- Private Foul sewer with MH
- Private Surface Water Sewer
- Private Foul I.C & drain
- Permavoid Diffuser Cell [PV]
- Permeable Block Paving
- Black Macadam

PRELIMINARY FOR PLANNING

REV. No.	DATE	DESCRIPTION	INITIALS
A	20.12.17	Site layout amended, drainage updated to suit.	CP

Client: Rectory Homes

Project: Land at South Side, Steeple Aston

Title: Drainage Strategy

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CIVIL AND STRUCTURAL ENGINEERS
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Abingdon, Oxon, OX14 3NB
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Scale: 1:150@A0
Date: Nov 17
Drawing No.: 5634:01
Rev.: A
Checked: CP
Drawn: SS

APPENDIX E
SUDS COMPATIBILITY MATRIX

SuDS Type	Description	Suitable for this site	Comments
Green Roofs	Green roofs comprise a multi-layered system that covers the roof of a building with vegetation cover over a drainage layer. They are designed to intercept and retain rainfall, reducing the volume of runoff and attenuating	✗	Living Roofs would not be technically feasible at this develoment due to factors such as loadings, steep roof pitch of proposed dwellings, visual impact and high maintenance burden to homeowners.
Rainwater Harvesting	Re-using rainwater for non-potable purposes such as irrigation and toilet flushing.	✗	Rainwater harvesting cannot be relied upon to guarantee a reduction in the volume of water leaving the site as it relies upon tanks having available capacity. During intense/prolonged periods of rainfall it is likely that the tanks will be full and will overflow into the system. These systems can also be a high maintenance burden for residential home owners. Cost benifit of system is not recoverd unitl 10-15years.
Soakaways	Soakaways provide stormwater attenuation, stormwater treatment and groundwater recharge.	✓	Initial site desk study shows that this site is likely suitabel for onsite infiltration via soakaways. This will be confirmed with infiltration testing to BRE265 and groundwater monitoring.
Filter Strip / Trenches / Swales	Filter strips are linear grassed or vegetated strips of land / channels designed to accept runoff as overland sheet flow from impermeable surfaces usually located adjacent road or parking areas and used to treat infiltrated or convey runoff.	✓	Potentially for conveyance only, may be insufficient open space to incorporate effectively on this development.
Permeable Paving	Pervious pavements provide a pavement suitable for pedestrian and vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored before infiltration to the ground, reuse, or discharge to a watercourse or other drainage system.	✓	Potentially on private drives / parking areas/ roads . This would improve water quality into the receiving waterbody.
Bio Retention	Bioretention areas are shallow landscaped depressions which are typically under-drained and rely on engineered soils and enhanced vegetation and filtration to remove pollution and reduce runoff downstream. They are aimed at managing and treating runoff from frequent rainfall events.	✓	A bio retention pond could be utilised at this development if the receiving waterbody is considered sensitive and additional treatment is required. May be insufficient open space to incorporate effectively on this development as POS is limited.
Ponds / Basins	Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge.	✓	A pond / basin can be utilised at this development to provide attenuation and improvements in water quality. May be insufficient open space to incorporate effectively on this development as POS is limited.
Underground Storage	Underground large diameter Concrete pipes or Geocellular Tanks to reduce and attenuate peak flows	✓	Underground storage tanks can be utilised at this development if required.

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