STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for siphon and harvesting

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.357	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for siphon and harvesting

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	45.000#	0.000	0.0	0.247	5.00	0.0	0.600	\/	-4	Pipe/Conduit	
1.001	0.501	1.670	0.3	0.000	0.00	0.0	0.600	o	200	Pipe/Conduit	
1.002	5.390	0.054	99.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	51.315	0.128	400.9	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	15.000#	0.005	3000.0	0.245	5.00	0.0	0.600	\/	-4	Pipe/Conduit	
2.001	0.500#	1.667	0.3	0.000	0.00	0.0	0.600	o	200	Pipe/Conduit	
2.002	5.823	0.058	100.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	29.243	0.073	400.6	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	44.73	9.34	65.700	0.247	0.0	0.0	0.0	0.17	25.9«	39.9
1.001	44.73	9.34	65.680	0.247	0.0	0.0	0.0	22.35	702.0	39.9
1.002	44.56	9.41	63.206	0.247	0.0	0.0	0.0	1.31	52.0	39.9
1.003	42.61	10.26	62.927	0.247	0.0	0.0	0.0	1.01	160.5	39.9
2.000	50.00	5.78	65.600	0.245	0.0	0.0	0.0	0.32	48.2	44.2
2.001	50.00	5.78	65.580	0.245	0.0	0.0	0.0	22.35	702.1	44.2
2.002	50.00	5.85	63.211	0.245	0.0	0.0	0.0	1.30	51.9	44.2
1.004	41.58	10.74	62.799	0.492	0.0	0.0	0.0	1.01	160.6	73.9

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Network Design Table for siphon and harvesting

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	35.000#	0.032	1093.8	0.235	5.00	0.0	0.600	\/	-4	Pipe/Conduit	
3.001	0.500#	1.667	0.3	0.000	0.00	0.0	0.600	o	200	Pipe/Conduit	
3.002	6.390#	0.064	99.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	28.825	0.058	497.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
4.000	30.000#	0.007	4285.7	0.235	5.00	0.0	0.600	\/	-4	Pipe/Conduit	
4.001	0.500#	1.667	0.3	0.000	0.00	0.0	0.600	o	200	Pipe/Conduit	
4.002	7.509	0.059	127.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	20.000#	0.007	2857.1	0.116	5.00	0.0	0.600	\/	-4	Pipe/Conduit	
5.001	0.500#	1.667	0.3	0.000	0.00	0.0	0.600	o	160	Pipe/Conduit	
5.002	7.784	0.058	134.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.003	18.541	0.054	343.4	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	31.179	0.052	599.6	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.007	7.723	0.026	297.0	0.000	0.00	0.0	0.600	ooo	-1	Pipe/Conduit	
1.008	17.634	0.059	298.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	18.442	1.025	18.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	50.00	6.08	65.500	0.235	0.0	0.0	0.0	0.54	80.9	42.4
3.001	50.00	6.08	65.468	0.235	0.0	0.0	0.0	22.35	702.1	42.4
3.002	50.00	6.16	63.214	0.235	0.0	0.0	0.0	1.31	52.0	42.4
1.005	40.69	11.18	62.576	0.727	0.0	0.0	0.0	1.09	306.9	106.9
4.000	50.00	6.87	65.400	0.235	0.0	0.0	0.0	0.27	40.1«	42.5
4.001	50.00	6.87	65.268	0.235	0.0	0.0	0.0	22.35	702.1	42.5
4.002	50.00	6.98	63.211	0.235	0.0	0.0	0.0	1.16	46.0	42.5
5.000	50.00	6.01	65.700	0.116	0.0	0.0	0.0	0.33	49.5	20.9
5.001	50.00	6.01	65.680	0.116	0.0	0.0	0.0	19.36	389.2	20.9
5.002	50.00	6.13	63.220	0.116	0.0	0.0	0.0	1.13	44.8	20.9
4.003	50.00	7.26	62.898	0.351	0.0	0.0	0.0	1.09	173.6	63.4
1.006	39.82	11.64	62.368	1.079	0.0	0.0	0.0	1.14	501.7	155.1
1.007	39.60	11.76	62.316	1.079	0.0	0.0	0.0	1.09	410.9	155.1
1.008	39.01	12.08	61.471	1.079	0.0	0.0	0.0	0.90	63.9«	155.1
1.009	38.87	12.17	61.412	1.079	0.0	0.0	0.0	3.72	263.2	155.1

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Area Summary for siphon and harvesting

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.247	0.247	0.247
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.245	0.245	0.245
2.001	-	-	100	0.000	0.000	0.000
2.002	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.235	0.235	0.235
3.001	-	-	100	0.000	0.000	0.000
3.002	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
4.000	User	-	100	0.235	0.235	0.235
4.001	-	-	100	0.000	0.000	0.000
4.002	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.116	0.116	0.116
5.001	-	-	100	0.000	0.000	0.000
5.002	-	-	100	0.000	0.000	0.000
4.003	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
1.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.079	1.079	1.079

Surcharged Outfall Details for siphon and harvesting

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009	SRH	64.301	60.387	59.300	0	0

Datum (m) 60.050 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
60	1.000	300	1.000	540	1.000	780	1.000	1020	1.000	1260	1.000
120	1.000	360	1.000	600	1.000	840	1.000	1080	1.000	1320	1.000
180	1.000	420	1.000	660	1.000	900	1.000	1140	1.000	1380	1.000
240	1.000	480	1.000	720	1.000	960	1.000	1200	1.000	1440	1.000

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Simulation Criteria for siphon and harvesting

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	6	Number of Time/Area Diagrams	0
Number of Offline Controls	5	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.357		

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Online Controls for siphon and harvesting

Siphon Manhole: SRHdp, DS/PN: 1.001, Volume (m³): 6.8

Invert Level (m) 65.680 Cut In Height (m) 0.025 Cut Out Height (m) 0.020

Depth (m)	Outflow (l/s)	Depth (m)	Outflow (l/s)
0.020	155.5300	0.200	155.5300
0.100	155.5300	0.260	155.5300

Siphon Manhole: SRHdp, DS/PN: 2.001, Volume (m³): 2.3

Invert Level (m) 65.580 Cut In Height (m) 0.025 Cut Out Height (m) 0.020

Depth (m)	Outflow (l/s)	Depth (m)	Outflow (l/s)
0.020	155.5300	0.200	155.5300
0.100	155.5300	0.260	155.5300

Siphon Manhole: SRHdp, DS/PN: 3.001, Volume (m³): 5.3

Invert Level (m) 65.468 Cut In Height (m) 0.025 Cut Out Height (m) 0.020

Depth (m)	Outflow (l/s)	Depth (m)	Outflow (l/s)
0.020	155.5300	0.200	155.5300
0.100	155.5300	0.260	155.5300

Siphon Manhole: SRHdp, DS/PN: 4.001, Volume (m³): 4.5

Invert Level (m) 65.268 Cut In Height (m) 0.025 Cut Out Height (m) 0.020

Depth (m)	Outflow (l/s)	Depth (m)	Outflow (l/s)
0.020	155.5300	0.200	155.5300
0.100	155.5300	0.260	155.5300

Siphon Manhole: SRHdp, DS/PN: 5.001, Volume (m³): 3.0

Invert Level (m) 65.680 Cut In Height (m) 0.025 Cut Out Height (m) 0.020

Depth (m)	Outflow (l/s)	Depth (m)	Outflow (l/s)
0.020	77.7300	0.200	77.7300
0.100	77.7300	0.260	77.7300

Hydro-Brake® Optimum Manhole: SRH6, DS/PN: 1.009, Volume (m³): 6.3

Unit Reference MD-SHE-0181-1810-1600-1810
Design Head (m) 1.600

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Hydro-Brake® Optimum Manhole: SRH6, DS/PN: 1.009, Volume (m³): 6.3

Design Flow (l/s)	18.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	181
Invert Level (m)	61.412
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	18.1
Flush-Flo™	0.472	18.1
Kick-Flo®	1.021	14.6
Mean Flow over Head Range	-	15.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.4	1.200	15.8	3.000	24.4	7.000	36.7
0.200	16.1	1.400	17.0	3.500	26.3	7.500	38.0
0.300	17.5	1.600	18.1	4.000	28.0	8.000	39.2
0.400	18.0	1.800	19.1	4.500	29.7	8.500	40.3
0.500	18.1	2.000	20.1	5.000	31.2	9.000	41.5
0.600	17.9	2.200	21.1	5.500	32.7	9.500	42.6
0.800	17.2	2.400	21.9	6.000	34.1		
1.000	15.0	2.600	22.8	6.500	35.4		

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Offline Controls for siphon and harvesting

Depth/Flow Relationship Manhole: SRHdp, DS/PN: 1.001, Loop to PN: 1.002

Invert Level (m) 65.680

Depth (m)	Flow (l/s)
0.020	0.5000

Depth/Flow Relationship Manhole: SRHdp, DS/PN: 2.001, Loop to PN: 2.002

Invert Level (m) 65.580

Depth (m)	Flow (l/s)
0.020	0.5000

Depth/Flow Relationship Manhole: SRHdp, DS/PN: 3.001, Loop to PN: 3.002

Invert Level (m) 65.468

Depth (m)	Flow (l/s)
0.020	0.5000

Depth/Flow Relationship Manhole: SRHdp, DS/PN: 4.001, Loop to PN: 4.002

Invert Level (m) 65.580

Depth (m)	Flow (l/s)
0.020	0.5000

Depth/Flow Relationship Manhole: SRHdp, DS/PN: 5.001, Loop to PN: 5.002

Invert Level (m) 65.680

Depth (m)	Flow (l/s)
0.500	0.5000

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Storage Structures for siphon and harvesting

Cellular Storage Manhole: SRHtank, DS/PN: 1.008

Invert Level (m) 61.471 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	467.0	0.0	1.393	0.0	0.0
1.392	467.0	0.0			

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 6 Number of Time/Area Diagrams 0
Number of Offline Controls 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 18.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	SRHgutter	15 Summer	1	+0%			
1.001	SRHdp	60 Summer	1	+0%			1/15 Summer
1.002	SRHsiphon gf	15 Summer	1	+0%	1/15 Summer		
1.003	SRH1	15 Summer	1	+0%	100/15 Summer		
2.000	SRHgutter	15 Summer	1	+0%	100/15 Summer		
2.001	SRHdp	360 Winter	1	+0%	100/15 Summer		1/15 Summer
2.002	SRHsiphon gf	15 Summer	1	+0%	1/15 Summer		
1.004	SRH2	15 Summer	1	+0%	30/15 Summer		
3.000	SRHgutter	15 Summer	1	+0%	100/15 Summer		
3.001	SRHdp	60 Winter	1	+0%			1/15 Summer
3.002	SRHsiphon gf	15 Summer	1	+0%	30/15 Summer		
1.005	SRH3	15 Summer	1	+0%	100/15 Summer		
4.000	SRHgutter	15 Summer	1	+0%	100/15 Summer		
4.001	SRHdp	960 Winter	1	+0%			
4.002	SRHsiphon gf	15 Summer	1	+0%	30/15 Summer		
5.000	SRHgutter	15 Summer	1	+0%			
5.001	SRHdp	120 Summer	1	+0%			1/15 Summer
5.002	SRHsiphon gf	15 Summer	1	+0%	30/15 Summer		

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SRHgutter		65.793	-0.167	0.000	0.46		37.1	FLOOD RISK*
1.001	SRHdp	72	65.705	-0.175	0.000	0.18	0.5	25.9	FLOOD RISK*
1.002	SRHsiphon gf		63.440	0.009	0.000	1.14		37.4	SURCHARGED*
1.003	SRH1		63.096	-0.281	0.000	0.25		35.9	OK
2.000	SRHgutter		65.718	-0.142	0.000	0.59		36.8	FLOOD RISK*
2.001	SRHdp	72	65.605	-0.175	0.000	0.04	0.5	5.5	OK*
2.002	SRHsiphon gf		63.440	0.004	0.000	1.08		36.7	SURCHARGED*
1.004	SRH2		63.025	-0.224	0.000	0.50		68.2	OK
3.000	SRHgutter		65.616	-0.144	0.000	0.50		35.5	OK
3.001	SRHdp	72	65.493	-0.175	0.000	0.12	0.5	17.7	OK*
3.002	SRHsiphon gf		63.401	-0.038	0.000	0.99		35.5	OK*
1.005	SRH3		62.840	-0.336	0.000	0.40		98.4	OK
4.000	SRHgutter		65.516	-0.144	0.000	0.55		35.8	OK
4.001	SRHdp	0	65.293	-0.175	0.000	0.02	0.0	2.9	OK*
4.002	SRHsiphon gf		63.436	0.000	0.000	1.03		35.1	OK*
5.000	SRHgutter		65.771	-0.189	0.000	0.33		17.6	FLOOD RISK*
5.001	SRHdp	72	65.705	-0.135	0.000	0.09	0.0	8.6	FLOOD RISK*
5.002	SRHsiphon gf		63.337	-0.108	0.000	0.52		17.6	OK*

PN	US/MH Name	Level Exceeded
1.000	SRHgutter	
1.001	SRHdp	
1.002	SRHsiphon gf	3
1.003	SRH1	
2.000	SRHgutter	
2.001	SRHdp	
2.002	SRHsiphon gf	
1.004	SRH2	
3.000	SRHgutter	
3.001	SRHdp	
3.002	SRHsiphon gf	
1.005	SRH3	
4.000	SRHgutter	
4.001	SRHdp	
4.002	SRHsiphon gf	
5.000	SRHgutter	
5.001	SRHdp	
5.002	SRHsiphon gf	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.003	SRH5	15 Summer	1	+0%	100/15 Summer				63.092
1.006	SRH4	15 Summer	1	+0%	100/15 Summer				62.685
1.007	SRH6a	15 Summer	1	+0%	100/15 Summer				62.521
1.008	SRHtank	180 Summer	1	+0%	30/15 Summer				61.696
1.009	SRH6	180 Summer	1	+0%	30/15 Summer				61.673

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.003	SRH5	-0.256	0.000	0.38		53.0	OK	
1.006	SRH4	-0.433	0.000	0.37		144.2	OK	
1.007	SRH6a	-0.195	0.000	0.52		144.4	OK	
1.008	SRHtank	-0.075	0.000	0.31		17.2	OK	
1.009	SRH6	-0.039	0.000	0.08		17.1	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 6 Number of Time/Area Diagrams 0
Number of Offline Controls 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 18.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	SRHgutter	15 Summer	30	+0%			
1.001	SRHdp	360 Summer	30	+0%			1/15 Summer
1.002	SRHsiphon gf	15 Summer	30	+0%	1/15 Summer		
1.003	SRH1	15 Summer	30	+0%	100/15 Summer		
2.000	SRHgutter	15 Summer	30	+0%	100/15 Summer		
2.001	SRHdp	720 Winter	30	+0%	100/15 Summer		1/15 Summer
2.002	SRHsiphon gf	15 Summer	30	+0%	1/15 Summer		
1.004	SRH2	15 Summer	30	+0%	30/15 Summer		
3.000	SRHgutter	15 Summer	30	+0%	100/15 Summer		
3.001	SRHdp	30 Winter	30	+0%			1/15 Summer
3.002	SRHsiphon gf	15 Summer	30	+0%	30/15 Summer		
1.005	SRH3	15 Summer	30	+0%	100/15 Summer		
4.000	SRHgutter	15 Summer	30	+0%	100/15 Summer		
4.001	SRHdp	480 Winter	30	+0%			
4.002	SRHsiphon gf	15 Summer	30	+0%	30/15 Summer		
5.000	SRHgutter	15 Summer	30	+0%			
5.001	SRHdp	1440 Summer	30	+0%			1/15 Summer
5.002	SRHsiphon gf	15 Summer	30	+0%	30/15 Summer		

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	SRHgutter		65.848	-0.112	0.000	1.15		92.0	FLOOD RISK*
1.001	SRHdp	72	65.705	-0.175	0.000	0.14	0.5	20.1	FLOOD RISK*
1.002	SRHsiphon gf		63.806	0.375	0.000	2.79		91.5	SURCHARGED*
1.003	SRH1		63.354	-0.023	0.000	0.59		86.8	OK
2.000	SRHgutter		65.829	-0.031	0.000	1.46		90.4	FLOOD RISK*
2.001	SRHdp	72	65.605	-0.175	0.000	0.05	0.5	7.4	OK*
2.002	SRHsiphon gf		63.776	0.340	0.000	2.66		90.3	SURCHARGED*
1.004	SRH2		63.269	0.020	0.000	1.22		167.5	SURCHARGED
3.000	SRHgutter		65.723	-0.037	0.000	1.23		87.4	FLOOD RISK*
3.001	SRHdp	72	65.493	-0.175	0.000	0.45	0.5	64.6	OK*
3.002	SRHsiphon gf		63.759	0.320	0.000	2.44		86.9	SURCHARGED*
1.005	SRH3		63.048	-0.128	0.000	0.95		236.7	OK
4.000	SRHgutter		65.624	-0.036	0.000	1.34		87.8	OK
4.001	SRHdp	0	65.293	-0.175	0.000	0.07	0.0	10.2	OK*
4.002	SRHsiphon gf		63.756	0.320	0.000	2.54		86.9	SURCHARGED*
5.000	SRHgutter		65.833	-0.127	0.000	0.80		43.1	FLOOD RISK*
5.001	SRHdp	72	65.705	-0.135	0.000	0.04	0.0	3.6	FLOOD RISK*
5.002	SRHsiphon gf		63.470	0.025	0.000	1.27		43.1	SURCHARGED*

PN	US/MH Name	Level Exceeded
1.000	SRHgutter	
1.001	SRHdp	
1.002	SRHsiphon gf	3
1.003	SRH1	
2.000	SRHgutter	
2.001	SRHdp	
2.002	SRHsiphon gf	
1.004	SRH2	
3.000	SRHgutter	
3.001	SRHdp	
3.002	SRHsiphon gf	
1.005	SRH3	
4.000	SRHgutter	
4.001	SRHdp	
4.002	SRHsiphon gf	
5.000	SRHgutter	
5.001	SRHdp	
5.002	SRHsiphon gf	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.003	SRH5	15 Summer	30	+0%	100/15 Summer				63.245
1.006	SRH4	15 Summer	30	+0%	100/15 Summer				62.926
1.007	SRH6a	30 Summer	30	+0%	100/15 Summer				62.716
1.008	SRHtank	180 Summer	30	+0%	30/15 Summer				62.113
1.009	SRH6	180 Winter	30	+0%	30/15 Summer				62.366

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.003	SRH5	-0.103	0.000	0.94		130.3	OK	
1.006	SRH4	-0.192	0.000	0.89		348.0	OK	
1.007	SRH6a	0.000	0.000	1.17		325.5	OK	
1.008	SRHtank	0.342	0.000	0.51		27.7	SURCHARGED	
1.009	SRH6	0.654	0.000	0.08		18.0	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 6 Number of Time/Area Diagrams 0
Number of Offline Controls 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.357
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 18.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	SRHgutter	15 Summer	100	+45%				
1.001	SRHdp	15 Summer	100	+45%			1/15 Summer	72
1.002	SRHsiphon gf	15 Winter	100	+45%	1/15 Summer			
1.003	SRH1	15 Summer	100	+45%	100/15 Summer			
2.000	SRHgutter	15 Summer	100	+45%	100/15 Summer			
2.001	SRHdp	15 Summer	100	+45%	100/15 Summer		1/15 Summer	72
2.002	SRHsiphon gf	15 Winter	100	+45%	1/15 Summer			
1.004	SRH2	15 Summer	100	+45%	30/15 Summer			
3.000	SRHgutter	15 Summer	100	+45%	100/15 Summer			
3.001	SRHdp	15 Summer	100	+45%			1/15 Summer	72
3.002	SRHsiphon gf	15 Winter	100	+45%	30/15 Summer			
1.005	SRH3	15 Summer	100	+45%	100/15 Summer			
4.000	SRHgutter	15 Summer	100	+45%	100/15 Summer			
4.001	SRHdp	15 Summer	100	+45%				0
4.002	SRHsiphon gf	15 Winter	100	+45%	30/15 Summer			
5.000	SRHgutter	15 Summer	100	+45%				
5.001	SRHdp	15 Summer	100	+45%			1/15 Summer	72
5.002	SRHsiphon gf	15 Summer	100	+45%	30/15 Summer			

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SRHgutter	65.928	-0.032	0.000	2.09		168.2	FLOOD RISK*	
1.001	SRHdp	65.784	-0.096	0.000	1.08	0.5	155.5	FLOOD RISK*	
1.002	SRHsiphon gf	65.000	1.569	0.000	4.76		155.9	FLOOD RISK*	3
1.003	SRH1	63.929	0.552	0.000	1.05		152.8	SURCHARGED	
2.000	SRHgutter	65.948	0.088	0.000	2.74		169.7	FLOOD RISK*	
2.001	SRHdp	65.788	0.008	0.000	1.08	0.5	155.5	FLOOD RISK*	
2.002	SRHsiphon gf	64.113	0.677	0.000	4.54		154.2	FLOOD RISK*	
1.004	SRH2	63.779	0.530	0.000	2.21		303.7	SURCHARGED	
3.000	SRHgutter	65.849	0.089	0.000	2.31		163.4	FLOOD RISK*	
3.001	SRHdp	65.524	-0.144	0.000	1.08	0.5	155.5	OK*	
3.002	SRHsiphon gf	64.001	0.562	0.000	4.26		151.9	SURCHARGED*	
1.005	SRH3	63.420	0.244	0.000	1.81		450.4	SURCHARGED	
4.000	SRHgutter	65.756	0.096	0.000	2.50		163.8	FLOOD RISK*	
4.001	SRHdp	65.446	-0.022	0.000	1.08	0.0	155.5	OK*	
4.002	SRHsiphon gf	63.801	0.365	0.000	4.43		151.7	SURCHARGED*	
5.000	SRHgutter	65.911	-0.049	0.000	1.50		80.5	FLOOD RISK*	
5.001	SRHdp	65.729	-0.111	0.000	0.84	0.0	77.7	FLOOD RISK*	
5.002	SRHsiphon gf	63.748	0.303	0.000	2.29		77.8	SURCHARGED*	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for siphon and harvesting

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
4.003	SRH5	15 Summer	100	+45%	100/15 Summer				63.443
1.006	SRH4	15 Summer	100	+45%	100/15 Summer				63.217
1.007	SRH6a	240 Winter	100	+45%	100/15 Summer				62.970
1.008	SRHtank	240 Winter	100	+45%	30/15 Summer				62.970
1.009	SRH6	240 Winter	100	+45%	30/15 Summer				63.090

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.003	SRH5	0.095	0.000	1.68		233.3	SURCHARGED	
1.006	SRH4	0.099	0.000	1.70		664.0	SURCHARGED	
1.007	SRH6a	0.254	0.000	0.53		148.6	SURCHARGED	
1.008	SRHtank	1.199	0.000	0.51		27.9	SURCHARGED	
1.009	SRH6	1.378	0.000	0.08		17.8	SURCHARGED	

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