STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.100	Add Flow / Climate Change (%)	0
Ratio R	0.392	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.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.183	4-8	0.071

Total Area Contributing (ha) = 0.254

Total Pipe Volume (m³) = 8.241

Network Design Table for Storm

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	9.785	0.058	170.0	0.040	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	24.573	0.145	169.0	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	16.102	0.095	169.5	0.017	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	19.621	0.222	88.4	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	5.043	0.030	168.1	0.015	5.00	0.0	0.600	o	225	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	50.00	5.16	64.993	0.040	0.0	0.0	0.0	1.00	39.8	5.4
1.001	50.00	5.57	64.935	0.080	0.0	0.0	0.0	1.00	39.9	10.8
2.000	50.00	5.27	65.287	0.017	0.0	0.0	0.0	1.00	39.8	2.3
2.001	50.00	5.50	65.192	0.023	0.0	0.0	0.0	1.39	55.3	3.1
3.000	50.00	5.08	65.000	0.015	0.0	0.0	0.0	1.01	40.0	2.0

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Network Design Table for Storm

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
2.002	4.252	0.180	23.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	15.300	0.090	170.0	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	29.104	0.171	170.2	0.040	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	9.426	0.055	171.4	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	1.484	0.009	164.9	0.003	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	11.129	0.065	170.0	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	38.200	0.225	170.0	0.030	5.00	0.0	0.600	o	225	Pipe/Conduit	
6.001	20.886	0.123	170.0	0.009	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	2.371	0.014	169.4	0.011	0.00	0.0	0.600	o	225	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)
2.002	50.00	5.53	64.970	0.038	0.0	0.0	0.0	2.70	107.5	5.1
1.002	50.00	5.83	64.790	0.141	0.0	0.0	0.0	1.00	39.8	19.1
4.000	50.00	5.49	64.882	0.040	0.0	0.0	0.0	1.00	39.7	5.4
5.000	50.00	5.16	64.756	0.010	0.0	0.0	0.0	1.00	39.6	1.4
5.001	50.00	5.18	64.701	0.013	0.0	0.0	0.0	1.02	40.4	1.8
1.003	50.00	6.01	64.691	0.204	0.0	0.0	0.0	1.00	39.8	27.6
6.000	50.00	5.64	64.961	0.030	0.0	0.0	0.0	1.00	39.8	4.1
6.001	50.00	5.98	64.736	0.039	0.0	0.0	0.0	1.00	39.8	5.3
1.004	50.00	6.05	64.513	0.254	0.0	0.0	0.0	1.00	39.8	34.4

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	65.900	0.907	Open Manhole	600	1.000	64.993	225				
2	65.800	0.865	Open Manhole	600	1.001	64.935	225	1.000	64.935	225	
3	65.900	0.613	Open Manhole	600	2.000	65.287	225				
4	65.900	0.708	Open Manhole	600	2.001	65.192	225	2.000	65.192	225	
5	65.695	0.695	Open Manhole	600	3.000	65.000	225				
6	65.673	0.703	Open Manhole	600	2.002	64.970	225	2.001	64.970	225	
								3.000	64.970	225	
7	65.625	0.835	Open Manhole	1200	1.002	64.790	225	1.001	64.790	225	
								2.002	64.790	225	
8	65.500	0.618	Open Manhole	600	4.000	64.882	225				
9	65.325	0.569	Open Manhole	600	5.000	64.756	225				
10	65.450	0.749	Open Manhole	1200	5.001	64.701	225	5.000	64.701	225	
11	65.460	0.769	Open Manhole	600	1.003	64.691	225	1.002	64.700	225	9
								4.000	64.711	225	20
								5.001	64.692	225	1
12	65.325	0.364	Open Manhole	600	6.000	64.961	225				
13	65.325	0.589	Open Manhole	600	6.001	64.736	225	6.000	64.736	225	
14	65.330	0.817	Open Manhole	1200	1.004	64.513	225	1.003	64.626	225	113
								6.001	64.613	225	100
	65.400	0.901	Open Manhole	0		OUTFALL		1.004	64.499	225	

No coordinates have been specified, layout information cannot be produced.

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	1	65.900	64.993	0.682	Open Manhole	600
1.001	o	225	2	65.800	64.935	0.640	Open Manhole	600
2.000	o	225	3	65.900	65.287	0.388	Open Manhole	600
2.001	o	225	4	65.900	65.192	0.483	Open Manhole	600
3.000	o	225	5	65.695	65.000	0.470	Open Manhole	600
2.002	o	225	6	65.673	64.970	0.478	Open Manhole	600
1.002	o	225	7	65.625	64.790	0.610	Open Manhole	1200
4.000	o	225	8	65.500	64.882	0.393	Open Manhole	600
5.000	o	225	9	65.325	64.756	0.344	Open Manhole	600
5.001	o	225	10	65.450	64.701	0.524	Open Manhole	1200
1.003	o	225	11	65.460	64.691	0.544	Open Manhole	600
6.000	o	225	12	65.325	64.961	0.139	Open Manhole	600
6.001	o	225	13	65.325	64.736	0.364	Open Manhole	600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	9.785	170.0	2	65.800	64.935	0.640	Open Manhole	600
1.001	24.573	169.0	7	65.625	64.790	0.610	Open Manhole	1200
2.000	16.102	169.5	4	65.900	65.192	0.483	Open Manhole	600
2.001	19.621	88.4	6	65.673	64.970	0.478	Open Manhole	600
3.000	5.043	168.1	6	65.673	64.970	0.478	Open Manhole	600
2.002	4.252	23.6	7	65.625	64.790	0.610	Open Manhole	1200
1.002	15.300	170.0	11	65.460	64.700	0.535	Open Manhole	600
4.000	29.104	170.2	11	65.460	64.711	0.524	Open Manhole	600
5.000	9.426	171.4	10	65.450	64.701	0.524	Open Manhole	1200
5.001	1.484	164.9	11	65.460	64.692	0.543	Open Manhole	600
1.003	11.129	170.0	14	65.330	64.626	0.479	Open Manhole	1200
6.000	38.200	170.0	13	65.325	64.736	0.364	Open Manhole	600
6.001	20.886	170.0	14	65.330	64.613	0.492	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.004	o	225	14	65.330	64.513	0.592	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.004	2.371	169.4		65.400	64.499	0.676	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004		65.400	64.499	64.600	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	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	7
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.100	Storm Duration (mins)	30
Ratio R	0.392		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 14, DS/PN: 1.004, Volume (m³): 2.1

Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	109
Invert Level (m)	64.613
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.241	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

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	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

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Storage Structures for Storm

Porous Car Park Manhole: 1, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	7.2
Max Percolation (l/s)	9.6	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	65.500	Membrane Depth (mm)	250

Porous Car Park Manhole: 2, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	16.8
Max Percolation (l/s)	22.4	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	65.500	Membrane Depth (mm)	250

Porous Car Park Manhole: 5, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.3
Membrane Percolation (mm/hr)	1000	Length (m)	9.8
Max Percolation (l/s)	6.3	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	65.000	Membrane Depth (mm)	250

Porous Car Park Manhole: 7, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	6.4	Slope (1:X)	250.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	65.225	Membrane Depth (mm)	250

Porous Car Park Manhole: 8, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.4
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	13.3	Slope (1:X)	250.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	65.100	Membrane Depth (mm)	250

Porous Car Park Manhole: 9, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	28.7
Membrane Percolation (mm/hr)	1000	Safety Factor	2.0

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Porous Car Park Manhole: 9, DS/PN: 5.000

Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	65.000	Depression Storage (mm)	5
Width (m)	4.8	Evaporation (mm/day)	3
Length (m)	21.5	Membrane Depth (mm)	250

Cellular Storage Manhole: 11, DS/PN: 1.003

Invert Level (m)	64.700	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	220.0	220.0	0.401	0.0	243.8
0.400	220.0	243.7			

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.000	1	0.256	0.365	1.555	2.177
1.001	2	0.244	0.941	1.210	2.395
2.000	3	0.173	0.616	0.000	0.790
2.001	4	0.200	0.756	0.000	0.956
3.000	5	0.197	0.177	3.009	3.382
2.002	6	0.199	0.133	0.000	0.332
1.002	7	0.944	0.573	1.037	2.554
4.000	8	0.175	1.133	2.160	3.468
5.000	9	0.161	0.339	2.322	2.822
5.001	10	0.847	0.023	0.000	0.870
1.003	11	0.217	0.407	83.670	84.294
6.000	12	0.103	1.495	0.000	1.598
6.001	13	0.167	0.795	0.000	0.961
1.004	14	0.924	0.070	0.000	0.994
Total		4.808	7.824	94.962	107.594

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

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	7
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.389
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.100	Cv (Winter)	0.840

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%	100/15 Summer				65.051
1.001	2	15 Winter	1	+0%	100/15 Summer				65.012
2.000	3	15 Winter	1	+0%					65.323
2.001	4	15 Winter	1	+0%					65.226
3.000	5	15 Winter	1	+0%	100/15 Summer				65.035
2.002	6	15 Winter	1	+0%	100/15 Summer				65.010
1.002	7	15 Winter	1	+0%	30/15 Summer				64.896
4.000	8	15 Winter	1	+0%	100/120 Winter				64.937
5.000	9	30 Winter	1	+0%	100/30 Summer				64.779
5.001	10	60 Winter	1	+0%	100/15 Winter				64.759
1.003	11	60 Winter	1	+0%	100/15 Summer				64.759
6.000	12	15 Winter	1	+0%	100/120 Winter				65.008
6.001	13	15 Winter	1	+0%	100/15 Summer				64.789
1.004	14	60 Winter	1	+0%	1/15 Winter				64.747

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.167	0.000	0.15		6	5.0	OK	
1.001	2	-0.148	0.000	0.25		7	9.1	OK	
2.000	3	-0.189	0.000	0.06			2.1	OK	
2.001	4	-0.191	0.000	0.05			2.7	OK	
3.000	5	-0.190	0.000	0.06		6	1.7	OK	
2.002	6	-0.185	0.000	0.07			4.3	OK	
1.002	7	-0.119	0.000	0.45		7	15.6	OK	
4.000	8	-0.170	0.000	0.13		6	4.9	OK	
5.000	9	-0.202	0.000	0.02		6	0.7	OK	
5.001	10	-0.167	0.000	0.02			0.7	OK	
1.003	11	-0.157	0.000	0.12		41	4.0	OK	
6.000	12	-0.178	0.000	0.10			3.6	OK	
6.001	13	-0.172	0.000	0.13			4.5	OK	
1.004	14	0.009	0.000	0.17			4.7	SURCHARGED	

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

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	7
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.389
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.100	Cv (Winter)	0.840

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%	100/15 Summer				65.111
1.001	2	15 Winter	30	+0%	100/15 Summer				65.095
2.000	3	15 Winter	30	+0%					65.344
2.001	4	15 Winter	30	+0%					65.249
3.000	5	15 Winter	30	+0%	100/15 Summer				65.059
2.002	6	15 Winter	30	+0%	100/15 Summer				65.044
1.002	7	15 Winter	30	+0%	30/15 Summer				65.035
4.000	8	15 Winter	30	+0%	100/120 Winter				64.971
5.000	9	120 Winter	30	+0%	100/30 Summer				64.898
5.001	10	120 Winter	30	+0%	100/15 Winter				64.897
1.003	11	120 Winter	30	+0%	100/15 Summer				64.897
6.000	12	15 Winter	30	+0%	100/120 Winter				65.036
6.001	13	15 Winter	30	+0%	100/15 Summer				64.931
1.004	14	15 Winter	30	+0%	1/15 Winter				64.915

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.107	0.000	0.36		5	11.9	OK	
1.001	2	-0.065	0.000	0.65		4	23.7	OK	
2.000	3	-0.168	0.000	0.15			5.1	OK	
2.001	4	-0.168	0.000	0.14			7.0	OK	
3.000	5	-0.166	0.000	0.15		6	4.3	OK	
2.002	6	-0.151	0.000	0.19			11.1	OK	
1.002	7	0.020	0.000	1.15		5	40.4	SURCHARGED	
4.000	8	-0.136	0.000	0.32		6	12.0	OK	
5.000	9	-0.083	0.000	0.03		73	0.9	OK	
5.001	10	-0.029	0.000	0.03			1.0	OK	
1.003	11	-0.019	0.000	0.14		96	4.8	OK	
6.000	12	-0.150	0.000	0.24			8.9	FLOOD RISK	
6.001	13	-0.030	0.000	0.25			8.9	OK	
1.004	14	0.177	0.000	0.18			5.0	SURCHARGED	

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

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	7
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.389
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.100	Cv (Winter)	0.840

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+40%	100/15 Summer				65.463
1.001	2	15 Winter	100	+40%	100/15 Summer				65.408
2.000	3	15 Winter	100	+40%					65.366
2.001	4	180 Winter	100	+40%					65.312
3.000	5	180 Winter	100	+40%	100/15 Summer				65.311
2.002	6	180 Winter	100	+40%	100/15 Summer				65.311
1.002	7	180 Winter	100	+40%	30/15 Summer				65.310
4.000	8	180 Winter	100	+40%	100/120 Winter				65.308
5.000	9	180 Winter	100	+40%	100/30 Summer				65.306
5.001	10	180 Winter	100	+40%	100/15 Winter				65.306
1.003	11	180 Winter	100	+40%	100/15 Summer				65.306
6.000	12	180 Winter	100	+40%	100/120 Winter				65.303
6.001	13	180 Winter	100	+40%	100/15 Summer				65.302
1.004	14	180 Winter	100	+40%	1/15 Winter				65.300

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.245	0.000	0.63		4	20.9	SURCHARGED	
1.001	2	0.247	0.000	1.13		5	41.5	SURCHARGED	
2.000	3	-0.146	0.000	0.26			9.3	OK	
2.001	4	-0.105	0.000	0.06			3.1	OK	
3.000	5	0.086	0.000	0.07		31	2.0	SURCHARGED	
2.002	6	0.116	0.000	0.09			5.2	SURCHARGED	
1.002	7	0.295	0.000	0.52		94	18.3	SURCHARGED	
4.000	8	0.201	0.000	0.14		22	5.3	FLOOD RISK	
5.000	9	0.325	0.000	0.04		80	1.3	FLOOD RISK	
5.001	10	0.380	0.000	0.05			1.4	FLOOD RISK	
1.003	11	0.390	0.000	0.16		216	5.3	FLOOD RISK	
6.000	12	0.117	0.000	0.11			4.1	FLOOD RISK	
6.001	13	0.341	0.000	0.13			4.6	FLOOD RISK	
1.004	14	0.562	0.000	0.18			5.0	FLOOD RISK	

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