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)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.336	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	0.222	4-8	0.021

Total Area Contributing (ha) = 0.243

Total Pipe Volume (m³) = 72.351

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
S1.000	5.705	0.274	20.8	0.015	3.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	7.935	0.636	12.5	0.013	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	5.185	0.472	11.0	0.034	3.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	11.551	0.120	96.3	0.012	3.00	0.0	0.600	o	150	Pipe/Conduit	
S3.001	6.471	0.060	107.9	0.025	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	16.936	0.280	60.5	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	11.912	0.040	297.8	0.000	3.00	0.0	0.600	o	1500	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)
S1.000	50.00	3.04	85.010	0.015	0.0	0.0	0.0	2.22	39.2	2.0
S1.001	50.00	3.09	84.736	0.028	0.0	0.0	0.0	2.87	50.7	3.8
S2.000	50.00	3.03	82.822	0.034	0.0	0.0	0.0	3.06	54.0	4.6
S3.000	50.00	3.19	82.950	0.012	0.0	0.0	0.0	1.02	18.1	1.6
S3.001	50.00	3.30	82.830	0.037	0.0	0.0	0.0	0.97	17.1	5.0
S1.002	50.00	3.52	82.350	0.110	0.0	0.0	0.0	1.30	22.9	14.9
S4.000	50.00	3.08	80.920	0.000	0.0	0.0	0.0	2.48	4383.4	0.0

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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
S5.000	6.156	0.214	28.8	0.045	3.00	0.0	0.600	o	150	Pipe/Conduit	
S4.001	12.706	0.040	317.7	0.020	0.00	0.0	0.600	o	1500	Pipe/Conduit	
S6.000	5.655	1.560	3.6	0.011	3.00	0.0	0.600	o	150	Pipe/Conduit	
S4.002	7.941	0.020	397.0	0.000	0.00	0.0	0.600	o	1500	Pipe/Conduit	
S1.003	6.810	0.020	340.5	0.020	0.00	0.0	0.600	o	1500	Pipe/Conduit	
S7.000	4.430	0.040	110.7	0.037	4.00	0.0	0.600	o	150	Pipe/Conduit	
S1.004	13.025	0.138	94.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	9.204	0.092	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	23.130	2.130	10.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.007	14.172	1.349	10.5	0.000	0.00	0.0	0.600	o	150	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)
S5.000	50.00	3.05	84.184	0.045	0.0	0.0	0.0	1.88	33.3	6.1
S4.001	50.00	3.17	80.880	0.065	0.0	0.0	0.0	2.40	4243.5	8.8
S6.000	50.00	3.02	83.750	0.011	0.0	0.0	0.0	5.33	94.2	1.5
S4.002	50.00	3.23	80.840	0.076	0.0	0.0	0.0	2.15	3793.2	10.3
S1.003	50.00	3.57	80.820	0.206	0.0	0.0	0.0	2.32	4097.9	27.9
S7.000	50.00	4.08	82.430	0.037	0.0	0.0	0.0	0.95	16.9	5.0
S1.004	50.00	4.24	80.800	0.243	0.0	0.0	0.0	1.35	53.5	32.9
S1.005	50.00	4.36	80.662	0.243	0.0	0.0	0.0	1.31	52.0	32.9
S1.006	50.00	4.48	80.570	0.243	0.0	0.0	0.0	3.08	54.3	32.9
S1.007	50.00	4.56	78.440	0.243	0.0	0.0	0.0	3.13	55.3	32.9

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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)
S2	86.360	1.350	Open Manhole	900	S1.000	85.010	150				
S3	86.236	1.500	Open Manhole	1200	S1.001	84.736	150	S1.000	84.736	150	
S7	85.627	2.805	Open Manhole	460	S2.000	82.822	150				
S9	84.336	1.386	Open Manhole	460	S3.000	82.950	150				
S10	85.191	2.361	Open Manhole	1200	S3.001	82.830	150	S3.000	82.830	150	
S4	85.601	3.251	Open Manhole	1200	S1.002	82.350	150	S1.001	84.100	150	1750
								S2.000	82.350	150	
								S3.001	82.770	150	420
S12	85.532	4.612	Open Manhole	2400	S4.000	80.920	1500				
S13	85.635	1.451	Open Manhole	460	S5.000	84.184	150				
S13	85.442	4.562	Open Manhole	2400	S4.001	80.880	1500	S4.000	80.880	1500	
								S5.000	83.970	150	1740
S19	85.420	1.670	Open Manhole	460	S6.000	83.750	150				
S17	85.442	4.602	Open Manhole	1500	S4.002	80.840	1500	S4.001	80.840	1500	
								S6.000	82.190	150	
S5	84.935	4.115	Open Manhole	2400	S1.003	80.820	1500	S1.002	82.070	150	
								S4.002	80.820	1500	
S16	83.614	1.184	Open Manhole	460	S7.000	82.430	150				
S6	84.354	3.554	Open Manhole	2400	S1.004	80.800	225	S1.003	80.800	1500	
								S7.000	82.390	150	1515
S7	83.579	2.917	Open Manhole	1200	S1.005	80.662	225	S1.004	80.662	225	
S8	82.587	2.017	Open Manhole	1200	S1.006	80.570	150	S1.005	80.570	225	
S9	79.944	1.504	Open Manhole	1200	S1.007	78.440	150	S1.006	78.440	150	
S	78.880	1.789	Open Manhole	0		OUTFALL		S1.007	77.091	150	

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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)
S1.000	o	150	S2	86.360	85.010	1.200	Open Manhole	900
S1.001	o	150	S3	86.236	84.736	1.350	Open Manhole	1200
S2.000	o	150	S7	85.627	82.822	2.655	Open Manhole	460
S3.000	o	150	S9	84.336	82.950	1.236	Open Manhole	460
S3.001	o	150	S10	85.191	82.830	2.211	Open Manhole	1200
S1.002	o	150	S4	85.601	82.350	3.101	Open Manhole	1200
S4.000	o	1500	S12	85.532	80.920	3.112	Open Manhole	2400
S5.000	o	150	S13	85.635	84.184	1.301	Open Manhole	460
S4.001	o	1500	S13	85.442	80.880	3.062	Open Manhole	2400
S6.000	o	150	S19	85.420	83.750	1.520	Open Manhole	460
S4.002	o	1500	S17	85.442	80.840	3.102	Open Manhole	1500
S1.003	o	1500	S5	84.935	80.820	2.615	Open Manhole	2400
S7.000	o	150	S16	83.614	82.430	1.034	Open Manhole	460
S1.004	o	225	S6	84.354	80.800	3.329	Open Manhole	2400
S1.005	o	225	S7	83.579	80.662	2.692	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)
S1.000	5.705	20.8	S3	86.236	84.736	1.350	Open Manhole	1200
S1.001	7.935	12.5	S4	85.601	84.100	1.351	Open Manhole	1200
S2.000	5.185	11.0	S4	85.601	82.350	3.101	Open Manhole	1200
S3.000	11.551	96.3	S10	85.191	82.830	2.211	Open Manhole	1200
S3.001	6.471	107.9	S4	85.601	82.770	2.681	Open Manhole	1200
S1.002	16.936	60.5	S5	84.935	82.070	2.715	Open Manhole	2400
S4.000	11.912	297.8	S13	85.442	80.880	3.062	Open Manhole	2400
S5.000	6.156	28.8	S13	85.442	83.970	1.322	Open Manhole	2400
S4.001	12.706	317.7	S17	85.442	80.840	3.102	Open Manhole	1500
S6.000	5.655	3.6	S17	85.442	82.190	3.102	Open Manhole	1500
S4.002	7.941	397.0	S5	84.935	80.820	2.615	Open Manhole	2400
S1.003	6.810	340.5	S6	84.354	80.800	2.054	Open Manhole	2400
S7.000	4.430	110.7	S6	84.354	82.390	1.814	Open Manhole	2400
S1.004	13.025	94.4	S7	83.579	80.662	2.692	Open Manhole	1200
S1.005	9.204	100.0	S8	82.587	80.570	1.792	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)
S1.006	o	150	S8	82.587	80.570	1.867	Open Manhole	1200
S1.007	o	150	S9	79.944	78.440	1.354	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)
S1.006	23.130	10.9	S9	79.944	78.440	1.354	Open Manhole	1200
S1.007	14.172	10.5	S	78.880	77.091	1.639	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.015	0.015	0.015
1.001	-	-	100	0.013	0.013	0.013
2.000	-	-	100	0.034	0.034	0.034
3.000	-	-	100	0.012	0.012	0.012
3.001	-	-	100	0.025	0.025	0.025
1.002	-	-	100	0.011	0.011	0.011
4.000	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.045	0.045	0.045
4.001	-	-	100	0.020	0.020	0.020
6.000	-	-	100	0.011	0.011	0.011
4.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.020	0.020	0.020
7.000	-	-	100	0.037	0.037	0.037
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	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
				Total	Total	Total
				0.243	0.243	0.243

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)
S1.007	S	78.880	77.091	0.000	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	0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 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)	19.000	Storm Duration (mins)	30
Ratio R	0.339		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S6, DS/PN: S1.004, Volume (m³): 23.9

Unit Reference	MD-SHE-0089-5000-2200-5000
Design Head (m)	2.200
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	89
Invert Level (m)	80.800
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	5.0	Kick-Flo®	0.801	3.1
Flush-Flo™	0.391	3.9	Mean Flow over Head Range	-	3.9

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)	Depth (m)	Flow (l/s)
0.100	2.8	0.800	3.1	2.000	4.8	4.000	6.6	7.000	8.6
0.200	3.6	1.000	3.5	2.200	5.0	4.500	7.0	7.500	8.9
0.300	3.9	1.200	3.8	2.400	5.2	5.000	7.3	8.000	9.2
0.400	3.9	1.400	4.0	2.600	5.4	5.500	7.7	8.500	9.4
0.500	3.9	1.600	4.3	3.000	5.8	6.000	8.0	9.000	9.7
0.600	3.8	1.800	4.5	3.500	6.2	6.500	8.3	9.500	10.0

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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	0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 19.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.339	Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S2	15 Summer	1	+0%					85.036	-0.124	0.000
S1.001	S3	15 Summer	1	+0%					84.765	-0.121	0.000
S2.000	S7	15 Summer	1	+0%	30/15 Summer				82.857	-0.115	0.000
S3.000	S9	15 Summer	1	+0%	100/15 Summer				82.984	-0.116	0.000
S3.001	S10	15 Summer	1	+0%	30/15 Summer				82.886	-0.094	0.000
S1.002	S4	15 Summer	1	+0%	30/15 Summer				82.441	-0.059	0.000
S4.000	S12	60 Winter	1	+0%	100/60 Winter				81.249	-1.171	0.000
S5.000	S13	15 Summer	1	+0%	100/15 Summer				84.235	-0.099	0.000
S4.001	S13	60 Winter	1	+0%	100/60 Winter				81.249	-1.131	0.000
S6.000	S19	15 Summer	1	+0%					83.765	-0.135	0.000
S4.002	S17	60 Winter	1	+0%	100/60 Winter				81.249	-1.091	0.000
S1.003	S5	60 Winter	1	+0%	100/60 Winter				81.249	-1.071	0.000
S7.000	S16	15 Winter	1	+0%	100/15 Summer				82.495	-0.085	0.000
S1.004	S6	60 Winter	1	+0%	1/15 Summer				81.249	0.224	0.000
S1.005	S7	120 Winter	1	+0%					80.708	-0.179	0.000
S1.006	S8	30 Winter	1	+0%					80.597	-0.123	0.000
S1.007	S9	30 Winter	1	+0%					78.467	-0.123	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S2	0.07		2.3	OK	
S1.001	S3	0.08		3.5	OK	
S2.000	S7	0.12		5.2	OK	
S3.000	S9	0.11		1.8	OK	
S3.001	S10	0.30		4.3	OK	
S1.002	S4	0.65		13.8	OK	
S4.000	S12	0.00		0.6	OK	
S5.000	S13	0.25		6.9	OK	
S4.001	S13	0.00		1.8	OK	
S6.000	S19	0.02		1.7	OK	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.002	S17	0.00		2.6	OK	
S1.003	S5	0.00		4.7	OK	
S7.000	S16	0.40		5.0	OK	
S1.004	S6	0.08		3.9	SURCHARGED	
S1.005	S7	0.09		3.9	OK	
S1.006	S8	0.08		3.9	OK	
S1.007	S9	0.08		3.9	OK	

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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	0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 19.000	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.339	Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S2	15 Summer	30	+0%					85.052	-0.108	0.000
S1.001	S3	15 Summer	30	+0%					84.784	-0.102	0.000
S2.000	S7	15 Summer	30	+0%	30/15 Summer				82.992	0.020	0.000
S3.000	S9	15 Summer	30	+0%	100/15 Summer				83.012	-0.088	0.000
S3.001	S10	15 Summer	30	+0%	30/15 Summer				82.998	0.018	0.000
S1.002	S4	15 Summer	30	+0%	30/15 Summer				82.960	0.460	0.000
S4.000	S12	120 Winter	30	+0%	100/60 Winter				81.865	-0.555	0.000
S5.000	S13	15 Summer	30	+0%	100/15 Summer				84.269	-0.065	0.000
S4.001	S13	120 Winter	30	+0%	100/60 Winter				81.865	-0.515	0.000
S6.000	S19	15 Summer	30	+0%					83.772	-0.128	0.000
S4.002	S17	120 Winter	30	+0%	100/60 Winter				81.865	-0.475	0.000
S1.003	S5	120 Winter	30	+0%	100/60 Winter				81.865	-0.455	0.000
S7.000	S16	15 Winter	30	+0%	100/15 Summer				82.547	-0.033	0.000
S1.004	S6	120 Winter	30	+0%	1/15 Summer				81.866	0.841	0.000
S1.005	S7	15 Winter	30	+0%					80.708	-0.179	0.000
S1.006	S8	15 Summer	30	+0%					80.597	-0.123	0.000
S1.007	S9	15 Summer	30	+0%					78.467	-0.123	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S2	0.17		5.6	OK	
S1.001	S3	0.22		9.5	OK	
S2.000	S7	0.29		12.4	SURCHARGED	
S3.000	S9	0.27		4.5	OK	
S3.001	S10	0.86		12.4	SURCHARGED	
S1.002	S4	1.61		34.3	SURCHARGED	
S4.000	S12	0.00		1.3	OK	
S5.000	S13	0.60		16.8	OK	
S4.001	S13	0.00		4.4	OK	
S6.000	S19	0.05		4.1	OK	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.002	S17	0.00		4.1	OK	
S1.003	S5	0.00		4.9	OK	
S7.000	S16	0.97		12.1	OK	
S1.004	S6	0.08		3.9	SURCHARGED	
S1.005	S7	0.09		3.9	OK	
S1.006	S8	0.08		3.9	OK	
S1.007	S9	0.08		3.9	OK	

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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	0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 19.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.339	Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S2	15 Summer	100	+30%					85.066	-0.094	0.000
S1.001	S3	15 Summer	100	+30%					84.800	-0.086	0.000
S2.000	S7	15 Winter	100	+30%	30/15 Summer				83.941	0.969	0.000
S3.000	S9	15 Winter	100	+30%	100/15 Summer				83.956	0.856	0.000
S3.001	S10	15 Winter	100	+30%	30/15 Summer				83.934	0.954	0.000
S1.002	S4	15 Winter	100	+30%	30/15 Summer				83.860	1.360	0.000
S4.000	S12	120 Winter	100	+30%	100/60 Winter				83.016	0.596	0.000
S5.000	S13	15 Summer	100	+30%	100/15 Summer				84.342	0.008	0.000
S4.001	S13	120 Winter	100	+30%	100/60 Winter				83.016	0.636	0.000
S6.000	S19	15 Summer	100	+30%					83.780	-0.120	0.000
S4.002	S17	120 Winter	100	+30%	100/60 Winter				83.016	0.676	0.000
S1.003	S5	120 Winter	100	+30%	100/60 Winter				83.016	0.696	0.000
S7.000	S16	120 Winter	100	+30%	100/15 Summer				83.018	0.438	0.000
S1.004	S6	120 Winter	100	+30%	1/15 Summer				83.016	1.991	0.000
S1.005	S7	120 Winter	100	+30%					80.713	-0.174	0.000
S1.006	S8	120 Winter	100	+30%					80.601	-0.119	0.000
S1.007	S9	120 Winter	100	+30%					78.471	-0.119	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S2	0.29		9.4	OK	
S1.001	S3	0.37		16.1	OK	
S2.000	S7	0.43		18.6	SURCHARGED	
S3.000	S9	0.35		5.7	SURCHARGED	
S3.001	S10	1.30		18.8	SURCHARGED	
S1.002	S4	2.41		51.4	SURCHARGED	
S4.000	S12	0.00		1.0	SURCHARGED	
S5.000	S13	1.01		28.1	SURCHARGED	
S4.001	S13	0.00		2.4	SURCHARGED	
S6.000	S19	0.09		6.9	OK	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.002	S17	0.00		3.5	SURCHARGED	
S1.003	S5	0.00		4.8	SURCHARGED	
S7.000	S16	0.54		6.8	SURCHARGED	
S1.004	S6	0.11		5.0	SURCHARGED	
S1.005	S7	0.12		5.0	OK	
S1.006	S8	0.10		5.0	OK	
S1.007	S9	0.10		5.0	OK	

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