STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes Jensen H Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.381	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 Storm

- 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
S1.000	40.105	0.334	120.0	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	18.300	0.153	120.0	0.026	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	12.396#	0.103	120.0	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	1.984#	0.017	120.0	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit	
S3.001	4.214#	0.035	120.0	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.001	8.077#	0.067	120.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.002	15.225#	0.127	120.0	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)
S1.000	50.00	5.73	34.100	0.005	0.0	0.0	0.0	0.92	16.2	1.0
S1.001	50.00	6.06	33.768	0.031	0.0	0.0	0.0	0.92	16.2	5.7
S2.000	50.00	5.23	34.400	0.008	0.0	0.0	0.0	0.92	16.2	1.5
S3.000	50.00	5.04	34.352	0.009	0.0	0.0	0.0	0.92	16.2	1.6
S3.001	50.00	5.11	34.335	0.015	0.0	0.0	0.0	0.92	16.2	2.7
S2.001	50.00	5.37	34.295	0.023	0.0	0.0	0.0	0.92	16.2	4.2
S2.002	50.00	5.65	34.228	0.023	0.0	0.0	0.0	0.92	16.2	4.2

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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
S2.003	11.741#	0.098	120.0	0.012	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.004	16.444#	0.137	120.0	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	1.273#	0.011	120.0	0.021	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	10.734#	0.107	100.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S4.001	0.906#	0.009	100.0	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.000	5.830#	0.058	100.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S5.001	0.906#	0.009	100.0	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	2.580#	0.011	225.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.000	24.349#	0.108	225.0	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	
S6.001	4.441#	0.020	225.0	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.000	3.739#	0.037	100.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.001	3.559#	0.036	100.0	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.002	20.874#	0.209	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.003	2.534#	0.017	150.0	0.021	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.000	10.841#	0.108	100.0	0.000	5.00	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)
S2.003	50.00	5.86	34.100	0.035	0.0	0.0	0.0	0.92	16.2	6.3
S2.004	50.00	6.16	34.002	0.039	0.0	0.0	0.0	0.92	16.2	7.0
S1.002	50.00	6.19	33.622	0.091	0.0	0.0	0.0	0.92	16.2«	16.4
S4.000	50.00	5.18	34.290	0.000	0.0	0.0	0.0	1.00	17.8	0.0
S4.001	50.00	5.19	34.290	0.009	0.0	0.0	0.0	1.00	17.8	1.7
S5.000	50.00	5.10	34.360	0.000	0.0	0.0	0.0	1.00	17.8	0.0
S5.001	50.00	5.11	34.360	0.009	0.0	0.0	0.0	1.00	17.8	1.5
S1.003	50.00	6.23	33.615	0.109	0.0	0.0	0.0	0.87	34.5	19.6
S6.000	50.00	5.47	33.212	0.013	0.0	0.0	0.0	0.87	34.5	2.4
S6.001	50.00	5.55	33.104	0.026	0.0	0.0	0.0	0.87	34.5	4.7
S7.000	50.00	5.06	34.100	0.000	0.0	0.0	0.0	1.00	17.8	0.0
S7.001	50.00	5.12	34.100	0.003	0.0	0.0	0.0	1.00	17.8	0.5
S7.002	50.00	5.47	34.100	0.003	0.0	0.0	0.0	1.00	17.8	0.5
S7.003	50.00	5.52	34.100	0.024	0.0	0.0	0.0	0.82	14.5	4.3
S8.000	50.00	5.18	34.022	0.000	0.0	0.0	0.0	1.00	17.8	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
S8.001	2.056#	0.014	150.0	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.004	4.480#	0.030	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S6.002	0.520#	0.002	225.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	6.151	0.003	2050.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	11.844#	0.118	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	3.118#	0.031	100.0	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)
S8.001	50.00	5.22	34.022	0.006	0.0	0.0	0.0	0.82	14.5	1.1
S7.004	50.00	5.61	34.010	0.030	0.0	0.0	0.0	0.82	14.5	5.4
S6.002	50.00	5.62	33.085	0.056	0.0	0.0	0.0	0.87	34.5	10.1
S1.004	50.00	6.54	33.030	0.164	0.0	0.0	0.0	0.34	23.9«	29.7
S1.005	50.00	6.73	33.027	0.164	0.0	0.0	0.0	1.00	17.8«	29.7
S1.006	50.00	6.79	32.948	0.164	0.0	0.0	0.0	1.00	17.8«	29.7

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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	User	-	100	0.005	0.005	0.005
1.001	User	-	100	0.026	0.026	0.026
2.000	User	-	100	0.008	0.008	0.008
3.000	User	-	100	0.009	0.009	0.009
3.001	User	-	100	0.006	0.006	0.006
2.001	-	-	100	0.000	0.000	0.000
2.002	-	-	100	0.000	0.000	0.000
2.003	User	-	100	0.012	0.012	0.012
2.004	User	-	100	0.004	0.004	0.004
1.002	User	-	100	0.009	0.009	0.009
	User	-	100	0.011	0.011	0.021
4.000	-	-	100	0.000	0.000	0.000
4.001	User	-	100	0.009	0.009	0.009
5.000	-	-	100	0.000	0.000	0.000
5.001	User	-	100	0.009	0.009	0.009
1.003	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.013	0.013	0.013
6.001	User	-	100	0.013	0.013	0.013
7.000	-	-	100	0.000	0.000	0.000
7.001	User	-	100	0.003	0.003	0.003
7.002	-	-	100	0.000	0.000	0.000
7.003	User	-	100	0.021	0.021	0.021
8.000	-	-	100	0.000	0.000	0.000
8.001	User	-	100	0.006	0.006	0.006
7.004	-	-	100	0.000	0.000	0.000
6.002	-	-	100	0.000	0.000	0.000
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
				Total	Total	Total
				0.164	0.164	0.164

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)
S1.006	SEXCOMH.01	34.675	32.917	0.000	1200	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	1.000
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	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)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.381		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SSWMH.36, DS/PN: S1.005, Volume (m³): 2.5

Unit Reference	MD-SHE-0098-5000-1500-5000
Design Head (m)	1.500
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	98
Invert Level (m)	33.027
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	5.0
Flush-Flo™	0.431	4.9
Kick-Flo®	0.878	3.9
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	3.2	1.200	4.5	3.000	6.9	7.000	10.3
0.200	4.4	1.400	4.8	3.500	7.4	7.500	10.7
0.300	4.8	1.600	5.1	4.000	7.9	8.000	11.0
0.400	4.9	1.800	5.4	4.500	8.4	8.500	11.3
0.500	4.9	2.000	5.7	5.000	8.8	9.000	11.6
0.600	4.8	2.200	6.0	5.500	9.2	9.500	11.9
0.800	4.3	2.400	6.2	6.000	9.6		
1.000	4.1	2.600	6.5	6.500	10.0		

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Storage Structures for Storm

Cellular Storage Manhole: SSW.TANK, DS/PN: S1.004

Invert Level (m) 33.030 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	85.0	0.0	0.801	1.0	0.0
0.800	85.0	0.0			

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)
S1.000	SSWMH.01	0.095	0.701	0.000	0.796
S1.001	SSWMH.06	0.132	0.314	0.000	0.446
S2.000	SSWMH.09	0.095	0.211	0.000	0.307
S3.000	SSWMH.10	0.123	0.027	0.000	0.150
S3.001	SSWMH.11	0.114	0.067	0.000	0.180
S2.001	SSWMH.12	0.138	0.135	0.000	0.272
S2.002	SSWMH.13	0.089	0.261	0.000	0.350
S2.003	SSWMH.14	0.111	0.200	0.000	0.311
S2.004	SSWMH.15	0.150	0.281	0.000	0.431
S1.002	SSWMH.20	0.429	0.012	0.000	0.441
S4.000	SSWMH.23	0.095	0.182	0.000	0.277
S4.001	SSWMH.24	0.111	0.007	0.000	0.118
S5.000	SSWMH.21	0.095	0.095	0.000	0.190
S5.001	SSWMH.22	0.105	0.007	0.000	0.112
S1.003	SSWMH.25	0.406	0.067	0.000	0.473
S6.000	SSWMH.26	0.283	0.944	0.000	1.227
S6.001	SSWMH.27	0.498	0.153	0.000	0.651
S7.000	SSWMH.30	0.105	0.058	0.000	0.164
S7.001	SSWMH.31	0.097	0.055	0.000	0.152
S7.002	SSWMH.32	0.111	0.361	0.000	0.472
S7.003	SSWMH.33	0.119	0.037	0.000	0.156
S8.000	SSWMH.28	0.095	0.184	0.000	0.279
S8.001	SSWMH.29	0.125	0.028	0.000	0.154
S7.004	SSWMH.34	0.159	0.070	0.000	0.229
S6.002	SSWMH.35	0.515	-0.015	0.000	0.499
S1.004	SSW.TANK	2.115	0.350	65.646	68.111
S1.005	SSWMH.36	2.197	0.188	0.000	2.386
S1.006	SCOMH.01	2.151	0.034	0.000	2.185
Total		10.862	5.012	65.646	81.520

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2 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	1.000
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	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 0.381
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
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, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SSWMH.01	15 Winter	2	+40%	30/15 Summer			
S1.001	SSWMH.06	15 Winter	2	+40%	30/15 Summer			
S2.000	SSWMH.09	15 Winter	2	+40%	100/15 Summer			
S3.000	SSWMH.10	15 Winter	2	+40%	100/15 Summer			
S3.001	SSWMH.11	15 Winter	2	+40%	100/15 Summer			
S2.001	SSWMH.12	15 Winter	2	+40%	100/15 Summer			
S2.002	SSWMH.13	15 Winter	2	+40%	30/15 Summer			
S2.003	SSWMH.14	15 Winter	2	+40%	30/15 Summer			
S2.004	SSWMH.15	15 Winter	2	+40%	30/15 Summer			
S1.002	SSWMH.20	15 Winter	2	+40%	2/15 Summer			
S4.000	SSWMH.23	15 Winter	2	+40%				
S4.001	SSWMH.24	15 Winter	2	+40%				
S5.000	SSWMH.21	15 Winter	2	+40%				
S5.001	SSWMH.22	15 Winter	2	+40%				
S1.003	SSWMH.25	15 Winter	2	+40%	30/15 Summer			
S6.000	SSWMH.26	15 Winter	2	+40%	30/30 Winter			
S6.001	SSWMH.27	60 Winter	2	+40%	30/15 Winter			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	SSWMH.01	34.128	-0.122	0.000	0.08			1.2	OK
S1.001	SSWMH.06	33.868	-0.050	0.000	0.39			5.8	OK
S2.000	SSWMH.09	34.436	-0.114	0.000	0.13			1.9	OK
S3.000	SSWMH.10	34.395	-0.107	0.000	0.18			1.9	OK
S3.001	SSWMH.11	34.387	-0.098	0.000	0.26			3.1	OK
S2.001	SSWMH.12	34.357	-0.088	0.000	0.35			4.9	OK
S2.002	SSWMH.13	34.288	-0.090	0.000	0.33			5.0	OK
S2.003	SSWMH.14	34.174	-0.076	0.000	0.49			7.2	OK
S2.004	SSWMH.15	34.079	-0.073	0.000	0.52			7.8	OK
S1.002	SSWMH.20	33.840	0.068	0.000	1.59			17.3	SURCHARGED
S4.000	SSWMH.23	34.331	-0.109	0.000	0.00			0.0	OK
S4.001	SSWMH.24	34.331	-0.109	0.000	0.16			1.8	OK
S5.000	SSWMH.21	34.399	-0.111	0.000	0.00			0.0	OK
S5.001	SSWMH.22	34.399	-0.111	0.000	0.15			1.6	OK
S1.003	SSWMH.25	33.761	-0.079	0.000	0.74			20.6	OK
S6.000	SSWMH.26	33.258	-0.179	0.000	0.09			2.9	OK
S6.001	SSWMH.27	33.247	-0.082	0.000	0.12			2.9	OK

PN	US/MH Name	Level Exceeded
S1.000	SSWMH.01	
S1.001	SSWMH.06	
S2.000	SSWMH.09	
S3.000	SSWMH.10	
S3.001	SSWMH.11	
S2.001	SSWMH.12	
S2.002	SSWMH.13	
S2.003	SSWMH.14	
S2.004	SSWMH.15	
S1.002	SSWMH.20	
S4.000	SSWMH.23	
S4.001	SSWMH.24	
S5.000	SSWMH.21	
S5.001	SSWMH.22	
S1.003	SSWMH.25	
S6.000	SSWMH.26	
S6.001	SSWMH.27	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S7.000	SSWMH.30	15 Winter	2	+40%	100/15 Summer			
S7.001	SSWMH.31	15 Winter	2	+40%	100/15 Summer			
S7.002	SSWMH.32	15 Winter	2	+40%	100/15 Summer			
S7.003	SSWMH.33	15 Winter	2	+40%	100/15 Summer			
S8.000	SSWMH.28	15 Winter	2	+40%	30/15 Summer			
S8.001	SSWMH.29	15 Winter	2	+40%	30/15 Summer			
S7.004	SSWMH.34	15 Winter	2	+40%	30/15 Summer			
S6.002	SSWMH.35	60 Winter	2	+40%	30/15 Summer			
S1.004	SSW.TANK	60 Winter	2	+40%	30/15 Winter			
S1.005	SSWMH.36	60 Winter	2	+40%	2/15 Winter			
S1.006	SCOMH.01	60 Winter	2	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S7.000	SSWMH.30	34.170	-0.080	0.000	0.00			0.0	OK
S7.001	SSWMH.31	34.170	-0.080	0.000	0.04			0.5	OK
S7.002	SSWMH.32	34.169	-0.081	0.000	0.03			0.5	OK
S7.003	SSWMH.33	34.167	-0.083	0.000	0.41			4.4	OK
S8.000	SSWMH.28	34.087	-0.085	0.000	0.00			0.0	OK
S8.001	SSWMH.29	34.087	-0.085	0.000	0.10			1.1	OK
S7.004	SSWMH.34	34.086	-0.074	0.000	0.51			5.5	OK
S6.002	SSWMH.35	33.246	-0.064	0.000	0.21			6.2	OK
S1.004	SSW.TANK	33.246	-0.084	0.000	0.13		51	5.5	OK
S1.005	SSWMH.36	33.251	0.074	0.000	0.28			4.5	SURCHARGED
S1.006	SCOMH.01	33.014	-0.084	0.000	0.41			4.5	OK

PN	US/MH Name	Level Exceeded
S7.000	SSWMH.30	
S7.001	SSWMH.31	
S7.002	SSWMH.32	
S7.003	SSWMH.33	
S8.000	SSWMH.28	
S8.001	SSWMH.29	
S7.004	SSWMH.34	
S6.002	SSWMH.35	
S1.004	SSW.TANK	
S1.005	SSWMH.36	
S1.006	SCOMH.01	

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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	1.000
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	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 0.381
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
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, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SSWMH.01	15 Winter	30	+40%	30/15 Summer			
S1.001	SSWMH.06	15 Winter	30	+40%	30/15 Summer			
S2.000	SSWMH.09	15 Winter	30	+40%	100/15 Summer			
S3.000	SSWMH.10	15 Winter	30	+40%	100/15 Summer			
S3.001	SSWMH.11	15 Winter	30	+40%	100/15 Summer			
S2.001	SSWMH.12	15 Winter	30	+40%	100/15 Summer			
S2.002	SSWMH.13	15 Winter	30	+40%	30/15 Summer			
S2.003	SSWMH.14	15 Winter	30	+40%	30/15 Summer			
S2.004	SSWMH.15	15 Winter	30	+40%	30/15 Summer			
S1.002	SSWMH.20	15 Winter	30	+40%	2/15 Summer			
S4.000	SSWMH.23	15 Winter	30	+40%				
S4.001	SSWMH.24	15 Summer	30	+40%				
S5.000	SSWMH.21	15 Summer	30	+40%				
S5.001	SSWMH.22	15 Summer	30	+40%				
S1.003	SSWMH.25	15 Winter	30	+40%	30/15 Summer			
S6.000	SSWMH.26	120 Winter	30	+40%	30/30 Winter			
S6.001	SSWMH.27	120 Winter	30	+40%	30/15 Winter			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	SSWMH.01	34.294	0.044	0.000	0.14			2.2	SURCHARGED
S1.001	SSWMH.06	34.278	0.360	0.000	0.78			11.7	SURCHARGED
S2.000	SSWMH.09	34.452	-0.098	0.000	0.24			3.6	OK
S3.000	SSWMH.10	34.442	-0.060	0.000	0.34			3.7	OK
S3.001	SSWMH.11	34.439	-0.046	0.000	0.54			6.4	OK
S2.001	SSWMH.12	34.429	-0.016	0.000	0.70			9.8	OK
S2.002	SSWMH.13	34.404	0.026	0.000	0.62			9.2	SURCHARGED
S2.003	SSWMH.14	34.366	0.116	0.000	0.90			13.2	SURCHARGED
S2.004	SSWMH.15	34.296	0.144	0.000	0.95			14.3	SURCHARGED
S1.002	SSWMH.20	34.182	0.410	0.000	3.01			32.7	SURCHARGED
S4.000	SSWMH.23	34.355	-0.085	0.000	0.00			0.0	OK
S4.001	SSWMH.24	34.355	-0.085	0.000	0.39			4.2	OK
S5.000	SSWMH.21	34.422	-0.088	0.000	0.00			0.0	OK
S5.001	SSWMH.22	34.422	-0.088	0.000	0.36			3.9	OK
S1.003	SSWMH.25	33.902	0.062	0.000	1.44			39.9	SURCHARGED
S6.000	SSWMH.26	33.517	0.080	0.000	0.06			1.7	SURCHARGED
S6.001	SSWMH.27	33.516	0.187	0.000	0.11			2.8	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	SSWMH.01	
S1.001	SSWMH.06	
S2.000	SSWMH.09	
S3.000	SSWMH.10	
S3.001	SSWMH.11	
S2.001	SSWMH.12	
S2.002	SSWMH.13	
S2.003	SSWMH.14	
S2.004	SSWMH.15	
S1.002	SSWMH.20	
S4.000	SSWMH.23	
S4.001	SSWMH.24	
S5.000	SSWMH.21	
S5.001	SSWMH.22	
S1.003	SSWMH.25	
S6.000	SSWMH.26	
S6.001	SSWMH.27	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S7.000	SSWMH.30	15 Winter	30	+40%	100/15 Summer			
S7.001	SSWMH.31	15 Winter	30	+40%	100/15 Summer			
S7.002	SSWMH.32	15 Winter	30	+40%	100/15 Summer			
S7.003	SSWMH.33	15 Winter	30	+40%	100/15 Summer			
S8.000	SSWMH.28	15 Summer	30	+40%	30/15 Summer			
S8.001	SSWMH.29	15 Summer	30	+40%	30/15 Summer			
S7.004	SSWMH.34	15 Winter	30	+40%	30/15 Summer			
S6.002	SSWMH.35	120 Winter	30	+40%	30/15 Summer			
S1.004	SSW.TANK	120 Winter	30	+40%	30/15 Winter			
S1.005	SSWMH.36	120 Winter	30	+40%	2/15 Winter			
S1.006	SCOMH.01	180 Winter	30	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S7.000	SSWMH.30	34.226	-0.024	0.000	0.00			0.1	OK
S7.001	SSWMH.31	34.226	-0.024	0.000	0.10			1.2	OK
S7.002	SSWMH.32	34.225	-0.025	0.000	0.08			1.3	OK
S7.003	SSWMH.33	34.219	-0.031	0.000	0.98			10.6	OK
S8.000	SSWMH.28	34.173	0.001	0.000	0.01			0.1	SURCHARGED
S8.001	SSWMH.29	34.172	0.000	0.000	0.25			2.8	SURCHARGED
S7.004	SSWMH.34	34.169	0.009	0.000	1.23			13.3	SURCHARGED
S6.002	SSWMH.35	33.515	0.205	0.000	0.23			6.9	SURCHARGED
S1.004	SSW.TANK	33.515	0.185	0.000	0.13		94	5.6	SURCHARGED
S1.005	SSWMH.36	33.532	0.355	0.000	0.30			4.9	SURCHARGED
S1.006	SCOMH.01	33.017	-0.081	0.000	0.44			4.9	OK

PN	US/MH Name	Level Exceeded
S7.000	SSWMH.30	
S7.001	SSWMH.31	
S7.002	SSWMH.32	
S7.003	SSWMH.33	
S8.000	SSWMH.28	
S8.001	SSWMH.29	
S7.004	SSWMH.34	
S6.002	SSWMH.35	
S1.004	SSW.TANK	
S1.005	SSWMH.36	
S1.006	SCOMH.01	

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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	1.000
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	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 0.381
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
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, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SSWMH.01	15 Winter	100	+40%	30/15 Summer			
S1.001	SSWMH.06	15 Winter	100	+40%	30/15 Summer			
S2.000	SSWMH.09	15 Winter	100	+40%	100/15 Summer			
S3.000	SSWMH.10	15 Winter	100	+40%	100/15 Summer			
S3.001	SSWMH.11	15 Winter	100	+40%	100/15 Summer			
S2.001	SSWMH.12	15 Winter	100	+40%	100/15 Summer			
S2.002	SSWMH.13	15 Winter	100	+40%	30/15 Summer			
S2.003	SSWMH.14	15 Winter	100	+40%	30/15 Summer			
S2.004	SSWMH.15	15 Winter	100	+40%	30/15 Summer			
S1.002	SSWMH.20	15 Winter	100	+40%	2/15 Summer			
S4.000	SSWMH.23	15 Winter	100	+40%				
S4.001	SSWMH.24	15 Summer	100	+40%				
S5.000	SSWMH.21	15 Winter	100	+40%				
S5.001	SSWMH.22	15 Summer	100	+40%				
S1.003	SSWMH.25	15 Winter	100	+40%	30/15 Summer			
S6.000	SSWMH.26	120 Winter	100	+40%	30/30 Winter			
S6.001	SSWMH.27	120 Winter	100	+40%	30/15 Winter			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	SSWMH.01	34.585	0.335	0.000	0.19			2.9	FLOOD RISK
S1.001	SSWMH.06	34.566	0.648	0.000	1.04			15.8	FLOOD RISK
S2.000	SSWMH.09	34.800	0.250	0.000	0.28			4.1	FLOOD RISK
S3.000	SSWMH.10	34.801	0.299	0.000	0.38			4.2	SURCHARGED
S3.001	SSWMH.11	34.797	0.312	0.000	0.61			7.2	FLOOD RISK
S2.001	SSWMH.12	34.785	0.340	0.000	0.78			11.0	SURCHARGED
S2.002	SSWMH.13	34.747	0.369	0.000	0.77			11.5	FLOOD RISK
S2.003	SSWMH.14	34.687	0.437	0.000	1.07			15.7	FLOOD RISK
S2.004	SSWMH.15	34.573	0.421	0.000	1.15			17.3	SURCHARGED
S1.002	SSWMH.20	34.398	0.626	0.000	3.80			41.3	SURCHARGED
S4.000	SSWMH.23	34.365	-0.075	0.000	0.00			0.0	OK
S4.001	SSWMH.24	34.365	-0.075	0.000	0.50			5.5	OK
S5.000	SSWMH.21	34.431	-0.079	0.000	0.00			0.0	OK
S5.001	SSWMH.22	34.431	-0.079	0.000	0.46			5.0	OK
S1.003	SSWMH.25	33.950	0.110	0.000	1.83			50.7	SURCHARGED
S6.000	SSWMH.26	33.737	0.300	0.000	0.07			2.3	SURCHARGED
S6.001	SSWMH.27	33.736	0.407	0.000	0.18			4.4	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	SSWMH.01	
S1.001	SSWMH.06	
S2.000	SSWMH.09	
S3.000	SSWMH.10	
S3.001	SSWMH.11	
S2.001	SSWMH.12	
S2.002	SSWMH.13	
S2.003	SSWMH.14	
S2.004	SSWMH.15	
S1.002	SSWMH.20	
S4.000	SSWMH.23	
S4.001	SSWMH.24	
S5.000	SSWMH.21	
S5.001	SSWMH.22	
S1.003	SSWMH.25	
S6.000	SSWMH.26	
S6.001	SSWMH.27	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S7.000	SSWMH.30	15 Summer	100	+40%	100/15 Summer			
S7.001	SSWMH.31	15 Winter	100	+40%	100/15 Summer			
S7.002	SSWMH.32	15 Summer	100	+40%	100/15 Summer			
S7.003	SSWMH.33	15 Winter	100	+40%	100/15 Summer			
S8.000	SSWMH.28	15 Winter	100	+40%	30/15 Summer			
S8.001	SSWMH.29	15 Summer	100	+40%	30/15 Summer			
S7.004	SSWMH.34	15 Summer	100	+40%	30/15 Summer			
S6.002	SSWMH.35	120 Winter	100	+40%	30/15 Summer			
S1.004	SSW.TANK	120 Winter	100	+40%	30/15 Winter			
S1.005	SSWMH.36	120 Winter	100	+40%	2/15 Winter			
S1.006	SCOMH.01	180 Summer	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S7.000	SSWMH.30	34.284	0.034	0.000	0.01			0.2	SURCHARGED
S7.001	SSWMH.31	34.284	0.034	0.000	0.13			1.6	SURCHARGED
S7.002	SSWMH.32	34.282	0.032	0.000	0.12			2.0	SURCHARGED
S7.003	SSWMH.33	34.274	0.024	0.000	1.27			13.7	SURCHARGED
S8.000	SSWMH.28	34.204	0.032	0.000	0.01			0.1	SURCHARGED
S8.001	SSWMH.29	34.204	0.032	0.000	0.32			3.5	SURCHARGED
S7.004	SSWMH.34	34.200	0.040	0.000	1.56			16.9	SURCHARGED
S6.002	SSWMH.35	33.735	0.425	0.000	0.33			9.8	SURCHARGED
S1.004	SSW.TANK	33.735	0.405	0.000	0.13		111	5.8	SURCHARGED
S1.005	SSWMH.36	33.752	0.575	0.000	0.30			4.9	SURCHARGED
S1.006	SCOMH.01	33.017	-0.081	0.000	0.44			4.9	OK

PN	US/MH Name	Level Exceeded
S7.000	SSWMH.30	
S7.001	SSWMH.31	
S7.002	SSWMH.32	
S7.003	SSWMH.33	
S8.000	SSWMH.28	
S8.001	SSWMH.29	
S7.004	SSWMH.34	
S6.002	SSWMH.35	
S1.004	SSW.TANK	
S1.005	SSWMH.36	
S1.006	SCOMH.01	

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