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 (%)	10
Ratio R	0.378	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	0	Maximum Backdrop Height (m)	20.000
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	1.408	4-8	0.607

Total Area Contributing (ha) = 2.015

Total Pipe Volume (m^3) = 139.085

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	39.832	0.133	299.5	0.327	5.00	0.0	0.600	o	600	Pipe/Conduit	
S1.001	46.300	0.155	298.7	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.002	56.993	0.191	298.4	0.099	0.00	0.0	0.600	o	600	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	0.00	5.47	120.333	0.327	0.0	0.0	0.0	1.40	396.4	0.0
S1.001	0.00	6.02	120.200	0.327	0.0	0.0	0.0	1.40	396.9	0.0
S1.002	0.00	6.70	120.045	0.426	0.0	0.0	0.0	1.40	397.1	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
S2.000	34.296	0.071	483.0	0.000	5.00	0.0	0.600	o	600	Pipe/Conduit	
S1.003	32.607	0.108	301.9	0.108	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.004	40.484	0.134	302.1	0.289	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.005	8.712	0.029	300.4	0.090	0.00	0.0	0.600	o	600	Pipe/Conduit	
S3.000	23.466	0.391	60.0	0.000	5.00	0.0	0.600	o	600	Pipe/Conduit	
S3.001	14.455	0.344	42.0	0.155	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.006	43.110	2.053	21.0	0.096	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.007	5.509	0.414	13.3	0.115	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.000	17.999	0.036	500.0	0.012	5.00	0.0	0.600	o	600	Pipe/Conduit	
S4.001	26.102	0.052	502.0	0.030	0.00	0.0	0.600	o	600	Pipe/Conduit	
S5.000	84.046	0.420	200.1	0.000	5.00	0.0	0.600	o	375	Pipe/Conduit	
S5.001	23.995	0.059	406.7	0.182	0.00	0.0	0.600	o	450	Pipe/Conduit	
S4.002	20.190	0.040	504.8	0.075	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.003	33.867	0.068	498.0	0.396	0.00	0.0	0.600	o	600	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)
S2.000	0.00	5.52	119.925	0.000	0.0	0.0	0.0	1.10	311.4	0.0
S1.003	0.00	7.09	119.854	0.534	0.0	0.0	0.0	1.40	394.8	0.0
S1.004	0.00	7.57	119.746	0.823	0.0	0.0	0.0	1.40	394.6	0.0
S1.005	0.00	7.68	119.612	0.914	0.0	0.0	0.0	1.40	395.8	0.0
S3.000	0.00	5.12	120.318	0.000	0.0	0.0	0.0	3.15	889.9	0.0
S3.001	0.00	5.19	119.927	0.155	0.0	0.0	0.0	3.76	1064.2	0.0
S1.006	0.00	7.81	119.583	1.164	0.0	0.0	0.0	5.33	1507.0	0.0
S1.007	0.00	7.82	117.530	1.279	0.0	0.0	0.0	6.70	1894.1	0.0
S4.000	0.00	5.28	117.312	0.012	0.0	0.0	0.0	1.08	306.0	0.0
S4.001	0.00	5.68	117.276	0.042	0.0	0.0	0.0	1.08	305.4	0.0
S5.000	0.00	6.10	117.928	0.000	0.0	0.0	0.0	1.28	141.1	0.0
S5.001	0.00	6.50	117.433	0.182	0.0	0.0	0.0	1.00	159.3	0.0
S4.002	0.00	6.81	117.224	0.299	0.0	0.0	0.0	1.08	304.5	0.0
S4.003	0.00	7.33	117.184	0.695	0.0	0.0	0.0	1.08	306.6	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
S1.008	26.599	2.317	11.5	0.041	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)
S1.008	0.00	7.97	117.116	2.015	0.0	0.0	0.0	2.99	52.8	0.0

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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)
S1	122.350	2.017	Open Manhole	1500	S1.000	120.333	600				
S2	122.800	2.600	Open Manhole	1500	S1.001	120.200	600	S1.000	120.200	600	
S3	122.800	2.755	Open Manhole	1500	S1.002	120.045	600	S1.001	120.045	600	
S4	122.400	2.475	Open Manhole	1500	S2.000	119.925	600				
S5	122.080	2.226	Open Manhole	1500	S1.003	119.854	600	S1.002	119.854	600	
								S2.000	119.854	600	
S6	121.750	2.004	Open Manhole	1500	S1.004	119.746	600	S1.003	119.746	600	
S7	121.600	1.988	Open Manhole	1500	S1.005	119.612	600	S1.004	119.612	600	
S8	122.540	2.222	Open Manhole	1500	S3.000	120.318	600				
S9	122.060	2.133	Open Manhole	1500	S3.001	119.927	600	S3.000	119.927	600	
S10	121.770	2.187	Open Manhole	1500	S1.006	119.583	600	S1.005	119.583	600	
								S3.001	119.583	600	
S11	121.700	4.170	Open Manhole	1500	S1.007	117.530	600	S1.006	117.530	600	
S12	121.050	3.738	Open Manhole	1500	S4.000	117.312	600				
S13	121.000	3.724	Open Manhole	1500	S4.001	117.276	600	S4.000	117.276	600	
S14	120.000	2.072	Open Manhole	1350	S5.000	117.928	375				
S15	121.200	3.767	Open Manhole	1350	S5.001	117.433	450	S5.000	117.508	375	
S16	122.300	5.076	Open Manhole	1500	S4.002	117.224	600	S4.001	117.224	600	
								S5.001	117.374	450	
S17	122.500	5.316	Open Manhole	1500	S4.003	117.184	600	S4.002	117.184	600	
S18	121.700	4.584	Open Manhole	1500	S1.008	117.116	150	S1.007	117.116	600	
								S4.003	117.116	600	
S19	121.500	6.701	Open Manhole	0		OUTFALL		S1.008	114.799	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	440556.146	349176.985	440556.146	349176.985	Required	
S2	440585.958	349150.568	440585.958	349150.568	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S3	440555.271	349115.898	440555.271	349115.898	Required	
S4	440543.443	349050.793	440543.443	349050.793	Required	
S5	440517.498	349073.221	440517.498	349073.221	Required	
S6	440493.434	349095.225	440493.434	349095.225	Required	
S7	440462.995	349121.916	440462.995	349121.916	Required	
S8	440493.810	349156.916	440493.810	349156.916	Required	
S9	440478.278	349139.326	440478.278	349139.326	Required	
S10	440468.711	349128.490	440468.711	349128.490	Required	
S11	440436.561	349157.211	440436.561	349157.211	Required	
S12	440481.114	349233.305	440481.114	349233.305	Required	
S13	440493.978	349220.717	440493.978	349220.717	Required	
S14	440486.028	349299.256	440486.028	349299.256	Required	
S15	440460.078	349219.317	440460.078	349219.317	Required	
S16	440476.233	349201.575	440476.233	349201.575	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S17	440462.507	349186.768	440462.507	349186.768	Required	
S18	440439.671	349161.758	440439.671	349161.758	Required	
S19	440419.638	349179.257			No Entry	



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Setting Out Information - True Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S1.000	S1	1500		440556.146	349176.985	440556.146	349176.985	
S1.001	S2	1500		440585.958	349150.568	440585.958	349150.568	
S1.002	S3	1500		440555.271	349115.898	440555.271	349115.898	
S2.000	S4	1500		440543.443	349050.793	440543.443	349050.793	
S1.003	S5	1500		440517.498	349073.221	440517.498	349073.221	
S1.004	S6	1500		440493.434	349095.225	440493.434	349095.225	
S1.005	S7	1500		440462.995	349121.916	440462.995	349121.916	
S3.000	S8	1500		440493.810	349156.916	440493.810	349156.916	
S3.001	S9	1500		440478.278	349139.326	440478.278	349139.326	
S1.006	S10	1500		440468.711	349128.490	440468.711	349128.490	
S1.007	S11	1500		440436.561	349157.211	440436.561	349157.211	
S4.000	S12	1500		440481.114	349233.305	440481.114	349233.305	
S4.001	S13	1500		440493.978	349220.717	440493.978	349220.717	
S5.000	S14	1350		440486.028	349299.256	440486.028	349299.256	

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Setting Out Information - True Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S5.001	S15	1350		440460.078	349219.317	440460.078	349219.317	
S4.002	S16	1500		440476.233	349201.575	440476.233	349201.575	
S4.003	S17	1500		440462.507	349186.768	440462.507	349186.768	
S1.008	S18	1500		440439.671	349161.758	440439.671	349161.758	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S1.008	S19	0		440419.638	349179.257	

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Setting Out Information - Site Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S1.000	S1	1500		440556.146	349176.985	440556.146	349176.985	
S1.001	S2	1500		440585.958	349150.568	440585.958	349150.568	
S1.002	S3	1500		440555.271	349115.898	440555.271	349115.898	
S2.000	S4	1500		440543.443	349050.793	440543.443	349050.793	
S1.003	S5	1500		440517.498	349073.221	440517.498	349073.221	
S1.004	S6	1500		440493.434	349095.225	440493.434	349095.225	
S1.005	S7	1500		440462.995	349121.916	440462.995	349121.916	
S3.000	S8	1500		440493.810	349156.916	440493.810	349156.916	
S3.001	S9	1500		440478.278	349139.326	440478.278	349139.326	
S1.006	S10	1500		440468.711	349128.490	440468.711	349128.490	
S1.007	S11	1500		440436.561	349157.211	440436.561	349157.211	
S4.000	S12	1500		440481.114	349233.305	440481.114	349233.305	
S4.001	S13	1500		440493.978	349220.717	440493.978	349220.717	
S5.000	S14	1350		440486.028	349299.256	440486.028	349299.256	

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Setting Out Information - Site Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S5.001	S15	1350		440460.078	349219.317	440460.078	349219.317	
S4.002	S16	1500		440476.233	349201.575	440476.233	349201.575	
S4.003	S17	1500		440462.507	349186.768	440462.507	349186.768	
S1.008	S18	1500		440439.671	349161.758	440439.671	349161.758	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S1.008	S19	0		440419.638	349179.257	

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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	0.327	0.327	0.327
1.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.099	0.099	0.099
2.000	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.081	0.081	0.081
	User	-	100	0.028	0.028	0.108
1.004	User	-	100	0.184	0.184	0.184
	User	-	100	0.074	0.074	0.258
	User	-	100	0.031	0.031	0.289
1.005	User	-	100	0.090	0.090	0.090
3.000	-	-	100	0.000	0.000	0.000
3.001	User	-	100	0.155	0.155	0.155
1.006	User	-	100	0.096	0.096	0.096
1.007	User	-	100	0.071	0.071	0.071
	User	-	100	0.043	0.043	0.115
4.000	User	-	100	0.012	0.012	0.012
4.001	User	-	100	0.012	0.012	0.012
	User	-	100	0.018	0.018	0.030
5.000	-	-	100	0.000	0.000	0.000
5.001	User	-	100	0.084	0.084	0.084
	User	-	100	0.098	0.098	0.182
4.002	User	-	100	0.022	0.022	0.022
	User	-	100	0.027	0.027	0.049
	User	-	100	0.026	0.026	0.075
4.003	User	-	100	0.095	0.095	0.095
	User	-	100	0.020	0.020	0.115
	User	-	100	0.257	0.257	0.371
	User	-	100	0.024	0.024	0.396
1.008	User	-	100	0.015	0.015	0.015
	User	-	100	0.026	0.026	0.041
				Total	Total	Total
				2.015	2.015	2.015

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.008	S19	121.500	114.799	0.000	0	0

Datum (m) 114.799 Offset (mins) 0

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Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
360	0.600	2160	0.600	3960	0.600	5760	0.600	7560	0.600	9360	0.600	11160	0.600
720	0.600	2520	0.600	4320	0.600	6120	0.600	7920	0.600	9720	0.600		
1080	0.600	2880	0.600	4680	0.600	6480	0.600	8280	0.600	10080	0.600		
1440	0.600	3240	0.600	5040	0.600	6840	0.600	8640	0.600	10440	0.600		
1800	0.600	3600	0.600	5400	0.600	7200	0.600	9000	0.600	10800	0.600		

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 2 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	0.378		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S18, DS/PN: S1.008, Volume (m³): 18.4

Unit Reference	MD-SHE-0130-1100-2500-1100
Design Head (m)	2.500
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	130
Invert Level (m)	117.116
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	11.0	Kick-Flo®	1.166	7.7
Flush-Flo™	0.568	9.7	Mean Flow over Head Range	-	9.0

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	4.7	1.200	7.8	3.000	12.0	7.000	17.9
0.200	8.2	1.400	8.4	3.500	12.9	7.500	18.6
0.300	9.1	1.600	8.9	4.000	13.7	8.000	19.1
0.400	9.5	1.800	9.4	4.500	14.5	8.500	19.7
0.500	9.7	2.000	9.9	5.000	15.3	9.000	20.2
0.600	9.7	2.200	10.3	5.500	16.0	9.500	20.8
0.800	9.5	2.400	10.8	6.000	16.7		
1.000	8.9	2.600	11.2	6.500	17.3		

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Storage Structures for Storm

Tank or Pond Manhole: S12, DS/PN: S4.000

Invert Level (m) 117.312

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	705.0	1.200	705.0	1.201	0.0

Tank or Pond Manhole: S18, DS/PN: S1.008

Invert Level (m) 118.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	800.0	1.200	800.0	1.201	0.0

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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 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.372
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.900	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
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)	1, 30, 100
Climate Change (%)	0, 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	1	+0%					120.474
S1.001	S2	15 Winter	1	+0%					120.337
S1.002	S3	15 Winter	1	+0%					120.194
S2.000	S4	15 Winter	1	+0%					120.036
S1.003	S5	15 Winter	1	+0%					120.036
S1.004	S6	15 Winter	1	+0%	100/15 Winter				119.957
S1.005	S7	15 Winter	1	+0%	100/15 Summer				119.858
S3.000	S8	15 Summer	1	+0%					120.318
S3.001	S9	15 Winter	1	+0%					119.994
S1.006	S10	15 Winter	1	+0%					119.696
S1.007	S11	30 Winter	1	+0%	1/15 Summer				118.381
S4.000	S12	180 Winter	1	+0%	30/30 Winter				117.563
S4.001	S13	30 Winter	1	+0%	1/15 Summer				117.960

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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 (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.459	0.000	0.12			41.1	OK	
S1.001	S2	-0.463	0.000	0.12			40.0	OK	
S1.002	S3	-0.451	0.000	0.14			48.4	OK	
S2.000	S4	-0.489	0.000	0.00			0.6	OK	
S1.003	S5	-0.418	0.000	0.17			55.7	OK	
S1.004	S6	-0.389	0.000	0.23			78.1	OK	
S1.005	S7	-0.354	0.000	0.35			84.4	OK	
S3.000	S8	-0.600	0.000	0.00			0.0	OK	
S3.001	S9	-0.533	0.000	0.03			16.9	OK	
S1.006	S10	-0.487	0.000	0.08			103.6	OK	
S1.007	S11	0.251	0.000	0.17			111.1	SURCHARGED	
S4.000	S12	-0.349	0.000	0.05			8.9	OK	
S4.001	S13	0.084	0.000	0.05			11.1	SURCHARGED	

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1 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.	Water Level (m)
S5.000	S14	15 Winter	1	+0%	30/15 Summer				118.035
S5.001	S15	15 Winter	1	+0%	1/15 Summer				118.040
S4.002	S16	30 Summer	1	+0%	1/15 Summer				118.035
S4.003	S17	30 Summer	1	+0%	1/15 Summer				118.101
S1.008	S18	15 Winter	1	+0%	1/15 Summer				118.159

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
S5.000	S14	-0.268	0.000	0.00			0.5	OK	
S5.001	S15	0.157	0.000	0.17			22.5	SURCHARGED	
S4.002	S16	0.211	0.000	0.05			9.9	SURCHARGED	
S4.003	S17	0.317	0.000	0.04			9.7	SURCHARGED	
S1.008	S18	0.893	0.000	0.19			9.7	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	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 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.372
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.900	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
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)	1, 30, 100
Climate Change (%)	0, 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	30	+35%					120.602
S1.001	S2	15 Winter	30	+35%					120.472
S1.002	S3	15 Winter	30	+35%					120.396
S2.000	S4	15 Winter	30	+35%					120.342
S1.003	S5	15 Winter	30	+35%					120.342
S1.004	S6	15 Winter	30	+35%	100/15 Winter				120.273
S1.005	S7	15 Winter	30	+35%	100/15 Summer				120.185
S3.000	S8	15 Summer	30	+35%					120.318
S3.001	S9	15 Winter	30	+35%					120.064
S1.006	S10	15 Winter	30	+35%					119.795
S1.007	S11	15 Summer	30	+35%	1/15 Summer				119.086
S4.000	S12	600 Winter	30	+35%	30/30 Winter				118.801
S4.001	S13	600 Winter	30	+35%	1/15 Summer				118.804

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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
S1.000	S1	-0.331	0.000	0.40			135.7	OK	
S1.001	S2	-0.328	0.000	0.37			128.9	OK	
S1.002	S3	-0.249	0.000	0.42			147.4	OK	
S2.000	S4	-0.183	0.000	0.01			1.5	OK	
S1.003	S5	-0.112	0.000	0.53			171.6	OK	
S1.004	S6	-0.073	0.000	0.68			228.8	OK	
S1.005	S7	-0.027	0.000	1.00			238.4	OK	
S3.000	S8	-0.600	0.000	0.00			0.0	OK	
S3.001	S9	-0.463	0.000	0.12			70.4	OK	
S1.006	S10	-0.388	0.000	0.26			339.6	OK	
S1.007	S11	0.956	0.000	0.58			375.6	SURCHARGED	
S4.000	S12	0.889	0.000	0.17			33.4	SURCHARGED	
S4.001	S13	0.928	0.000	0.12			28.7	SURCHARGED	

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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.	Water Level (m)
S5.000	S14	600 Winter	30	+35%	30/15 Summer				118.802
S5.001	S15	600 Winter	30	+35%	1/15 Summer				118.803
S4.002	S16	600 Winter	30	+35%	1/15 Summer				118.803
S4.003	S17	600 Winter	30	+35%	1/15 Summer				118.801
S1.008	S18	15 Winter	30	+35%	1/15 Summer				118.835

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
S5.000	S14	0.499	0.000	0.02			3.1	SURCHARGED	
S5.001	S15	0.920	0.000	0.22			29.4	SURCHARGED	
S4.002	S16	0.979	0.000	0.13			25.9	SURCHARGED	
S4.003	S17	1.017	0.000	0.08			21.5	SURCHARGED	
S1.008	S18	1.569	0.000	0.19			9.7	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	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 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.372
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.900	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
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)	1, 30, 100
Climate Change (%)	0, 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	100	+40%					120.670
S1.001	S2	15 Winter	100	+40%					120.598
S1.002	S3	15 Winter	100	+40%					120.539
S2.000	S4	15 Winter	100	+40%					120.454
S1.003	S5	15 Winter	100	+40%					120.454
S1.004	S6	15 Winter	100	+40%	100/15 Winter				120.372
S1.005	S7	15 Winter	100	+40%	100/15 Summer				120.244
S3.000	S8	15 Summer	100	+40%					120.318
S3.001	S9	15 Winter	100	+40%					120.087
S1.006	S10	15 Winter	100	+40%					119.832
S1.007	S11	720 Winter	100	+40%	1/15 Summer				119.270
S4.000	S12	720 Winter	100	+40%	30/30 Winter				119.270
S4.001	S13	720 Winter	100	+40%	1/15 Summer				119.270

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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 (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.263	0.000	0.54			181.3	OK	
S1.001	S2	-0.202	0.000	0.47			162.1	OK	
S1.002	S3	-0.106	0.000	0.52			184.2	OK	
S2.000	S4	-0.071	0.000	0.01			2.2	OK	
S1.003	S5	0.000	0.000	0.67			217.8	OK	
S1.004	S6	0.026	0.000	0.93			311.9	SURCHARGED	
S1.005	S7	0.032	0.000	1.44			343.7	SURCHARGED	
S3.000	S8	-0.600	0.000	0.00			0.0	OK	
S3.001	S9	-0.440	0.000	0.16			94.4	OK	
S1.006	S10	-0.351	0.000	0.35			451.3	OK	
S1.007	S11	1.140	0.000	0.13			85.3	SURCHARGED	
S4.000	S12	1.358	0.000	0.16			31.0	SURCHARGED	
S4.001	S13	1.394	0.000	0.12			28.7	SURCHARGED	

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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.	Water Level (m)
S5.000	S14	720 Winter	100	+40%	30/15 Summer				119.271
S5.001	S15	720 Winter	100	+40%	1/15 Summer				119.271
S4.002	S16	720 Winter	100	+40%	1/15 Summer				119.271
S4.003	S17	720 Winter	100	+40%	1/15 Summer				119.270
S1.008	S18	720 Winter	100	+40%	1/15 Summer				119.270

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
S5.000	S14	0.968	0.000	0.03			3.9	SURCHARGED	
S5.001	S15	1.388	0.000	0.25			33.6	SURCHARGED	
S4.002	S16	1.447	0.000	0.13			26.0	SURCHARGED	
S4.003	S17	1.486	0.000	0.10			26.3	SURCHARGED	
S1.008	S18	2.004	0.000	0.20			10.2	SURCHARGED	

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