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)	100	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	0
Ratio R	0.300	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

Network Design Table for Storm

« - 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
S14.000	4.728	0.047	100.6	0.024	5.00	0.0	0.600	o	150	Pipe/Conduit	
S14.001	6.307	0.063	100.1	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
S14.002	28.289	0.283	100.0	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
S15.000	21.712	0.217	100.1	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit	
S15.001	15.653	0.171	91.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S16.000	20.838	0.388	53.7	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit	
S15.002	12.933	0.129	100.3	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)
S14.000	50.00	5.08	41.080	0.024	0.0	0.0	0.0	1.00	17.7	3.2
S14.001	50.00	5.18	41.033	0.034	0.0	0.0	0.0	1.00	17.7	4.6
S14.002	50.00	5.65	40.970	0.044	0.0	0.0	0.0	1.01	17.8	6.0
S15.000	50.00	5.36	41.850	0.012	0.0	0.0	0.0	1.00	17.8	1.6
S15.001	50.00	5.61	41.633	0.012	0.0	0.0	0.0	1.05	18.6	1.6
S16.000	50.00	5.25	41.850	0.012	0.0	0.0	0.0	1.38	24.3	1.6
S15.002	50.00	5.82	41.462	0.024	0.0	0.0	0.0	1.00	17.7	3.2

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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
S14.003	12.642	0.182	69.5	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
S17.000	18.874	0.189	99.9	0.019	5.00	1.0	0.600	o	150	Pipe/Conduit	
S17.001	14.989	0.189	79.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S18.000	18.760	0.239	78.5	0.019	5.00	1.0	0.600	o	150	Pipe/Conduit	
S17.002	43.546	0.363	120.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.004	7.237	0.043	168.3	0.038	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.005	10.365	0.085	121.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.000	13.652	0.274	49.8	0.024	5.00	0.0	0.600	o	150	Pipe/Conduit	
S14.006	10.567	0.105	100.6	0.038	0.00	0.0	0.600	o	225	Pipe/Conduit	
S20.000	5.935	0.097	61.2	0.034	5.00	0.0	0.600	o	225	Pipe/Conduit	
S20.001	12.693	0.100	126.9	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.000	11.083	0.106	104.6	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
S22.000	14.093	0.146	96.5	0.001	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)
S14.003	50.00	6.00	40.687	0.078	0.0	0.0	0.0	1.21	21.3	10.6
S17.000	50.00	5.31	40.523	0.019	1.0	0.0	0.0	1.01	17.8	3.6
S17.001	50.00	5.53	40.334	0.019	1.0	0.0	0.0	1.13	20.0	3.6
S18.000	50.00	5.28	40.400	0.019	1.0	0.0	0.0	1.14	20.1	3.6
S17.002	50.00	6.14	40.086	0.038	2.0	0.0	0.0	1.19	47.4	7.1
S14.004	50.00	6.26	39.723	0.154	2.0	0.0	0.0	1.00	40.0	22.9
S14.005	50.00	6.41	39.680	0.154	2.0	0.0	0.0	1.18	47.0	22.9
S19.000	50.00	5.16	41.690	0.024	0.0	0.0	0.0	1.43	25.2	3.2
S14.006	50.00	6.54	39.595	0.216	2.0	0.0	0.0	1.30	51.8	31.2
S20.000	50.00	5.06	41.058	0.034	0.0	0.0	0.0	1.67	66.6	4.6
S20.001	50.00	5.24	40.961	0.044	0.0	0.0	0.0	1.16	46.1	6.0
S21.000	50.00	5.19	41.920	0.018	0.0	0.0	0.0	0.98	17.4	2.4
S22.000	50.00	5.23	41.960	0.001	0.0	0.0	0.0	1.02	18.1	0.1

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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
S21.001	18.841	0.386	48.8	0.032	0.00	0.0	0.600	o	150	Pipe/Conduit	
S23.000	21.391	0.420	50.9	0.024	5.00	0.0	0.600	o	150	Pipe/Conduit	
S23.001	12.235	0.122	100.3	0.020	0.00	0.0	0.600	o	150	Pipe/Conduit	
S21.002	17.749	0.177	100.3	0.030	0.00	0.0	0.600	o	150	Pipe/Conduit	
S14.007	9.481	0.039	243.1	0.030	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.008	14.263	0.057	250.2	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
S24.000	8.204	0.100	82.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S14.009	8.178	0.033	247.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.010	8.164	0.033	247.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S25.000	11.082	0.111	99.8	0.058	5.00	0.0	0.600	o	150	Pipe/Conduit	
S25.001	8.250	0.049	168.4	0.020	0.00	0.0	0.600	o	150	Pipe/Conduit	
S26.000	5.966	0.060	99.4	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S26.001	4.958	0.050	99.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S26.002	9.930	0.099	100.3	0.034	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)
S21.001	50.00	5.45	41.814	0.051	0.0	0.0	0.0	1.44	25.5	6.9
S23.000	50.00	5.25	41.970	0.024	0.0	0.0	0.0	1.41	25.0	3.2
S23.001	50.00	5.46	41.550	0.044	0.0	0.0	0.0	1.00	17.7	6.0
S21.002	50.00	5.75	41.428	0.125	0.0	0.0	0.0	1.00	17.7	16.9
S14.007	50.00	6.70	39.433	0.415	2.0	0.0	0.0	1.00	71.0	58.2
S14.008	50.00	6.94	39.394	0.435	2.0	0.0	0.0	0.99	69.9	60.9
S24.000	50.00	5.12	40.750	0.000	0.0	0.0	0.0	1.11	19.6	0.0
S14.009	50.00	7.08	39.337	0.435	2.0	0.0	0.0	0.99	70.3	60.9
S14.010	50.00	7.22	39.304	0.435	2.0	0.0	0.0	1.00	70.3	60.9
S25.000	50.00	5.18	40.910	0.058	0.0	0.0	0.0	1.01	17.8	7.9
S25.001	50.00	5.36	40.799	0.078	0.0	0.0	0.0	0.77	13.6	10.6
S26.000	50.00	5.10	40.750	0.000	0.0	0.0	0.0	1.01	17.8	0.0
S26.001	50.00	5.18	40.690	0.000	0.0	0.0	0.0	1.01	17.8	0.0
S26.002	50.00	5.35	40.640	0.034	0.0	0.0	0.0	1.00	17.7	4.6

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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
S26.003	16.519	0.169	97.7	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
S26.004	27.079	0.272	99.6	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
S26.005	23.267	0.233	99.9	0.020	0.00	0.0	0.600	o	150	Pipe/Conduit	
S25.002	14.439	0.446	32.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S27.000	12.336	0.179	68.9	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S14.011	20.488	0.084	243.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S28.000	18.683	0.215	86.9	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
S29.000	16.250	0.370	43.9	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit	
S30.000	21.515	0.370	58.1	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit	
S28.001	8.835	0.193	45.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S14.012	19.413	0.079	245.7	0.009	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.013	26.178	0.107	244.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.014	2.144	0.009	238.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.015	21.877	0.100	218.8	0.000	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)
S26.003	50.00	5.62	40.541	0.044	0.0	0.0	0.0	1.02	18.0	6.0
S26.004	50.00	6.06	40.372	0.049	0.0	0.0	0.0	1.01	17.8	6.6
S26.005	50.00	6.45	40.100	0.069	0.0	0.0	0.0	1.01	17.8	9.3
S25.002	50.00	6.59	39.867	0.147	0.0	0.0	0.0	1.78	31.4	19.9
S27.000	50.00	5.17	39.600	0.000	0.0	0.0	0.0	1.21	21.4	0.0
S14.011	50.00	7.56	39.271	0.582	2.0	0.0	0.0	1.00	70.8«	80.8
S28.000	50.00	5.29	40.210	0.021	0.0	0.0	0.0	1.08	19.1	2.8
S29.000	50.00	5.18	40.800	0.009	0.0	0.0	0.0	1.52	26.9	1.2
S30.000	50.00	5.27	39.900	0.009	0.0	0.0	0.0	1.32	23.4	1.2
S28.001	50.00	5.39	39.530	0.039	0.0	0.0	0.0	1.49	26.3	5.3
S14.012	50.00	7.88	39.187	0.630	2.0	0.0	0.0	1.00	70.6«	87.3
S14.013	50.00	8.32	39.108	0.630	2.0	0.0	0.0	1.00	70.7«	87.3
S14.014	50.00	8.35	39.001	0.630	2.0	0.0	0.0	1.01	71.7«	87.3
S14.015	50.00	8.77	38.992	0.630	2.0	0.0	0.0	0.88	35.0«	87.3

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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
S14.016	2.785	0.016	174.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.017	2.838	0.017	166.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.018	37.736	0.222	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.019	47.148	0.277	170.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.020	8.217	0.140	58.7	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)
S14.016	50.00	8.81	38.892	0.630	2.0	0.0	0.0	0.99	39.3«	87.3
S14.017	50.00	8.86	38.876	0.630	2.0	0.0	0.0	1.01	40.1«	87.3
S14.018	50.00	9.49	38.859	0.630	2.0	0.0	0.0	1.00	39.8«	87.3
S14.019	50.00	10.27	38.637	0.630	2.0	0.0	0.0	1.00	39.7«	87.3
S14.020	50.00	10.38	38.360	0.630	2.0	0.0	0.0	1.32	23.2«	87.3

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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	42.230	1.150	Open Manhole	1200	S14.000	41.080	150				
S2	42.200	1.167	Open Manhole	1200	S14.001	41.033	150	S14.000	41.033	150	
S3	42.280	1.310	Open Manhole	1200	S14.002	40.970	150	S14.001	40.970	150	
S4	43.000	1.150	Open Manhole	1200	S15.000	41.850	150				
S5	43.210	1.577	Open Manhole	1200	S15.001	41.633	150	S15.000	41.633	150	
S6	43.000	1.150	Open Manhole	1200	S16.000	41.850	150				
S7	42.910	1.448	Open Manhole	1200	S15.002	41.462	150	S15.001	41.462	150	
								S16.000	41.462	150	
S8	42.930	2.243	Open Manhole	1200	S14.003	40.687	150	S14.002	40.687	150	
								S15.002	41.333	150	646
S9	43.150	2.627	Open Manhole	1200	S17.000	40.523	150				
S10	43.150	2.816	Open Manhole	1200	S17.001	40.334	150	S17.000	40.334	150	
S11	43.150	2.750	Open Manhole	1200	S18.000	40.400	150				
S12	43.150	3.064	Open Manhole	1200	S17.002	40.086	225	S17.001	40.145	150	
								S18.000	40.161	150	
S13	42.920	3.197	Open Manhole	1200	S14.004	39.723	225	S14.003	40.505	150	707
								S17.002	39.723	225	
S14	42.770	3.090	Open Manhole	1200	S14.005	39.680	225	S14.004	39.680	225	
S15	42.840	1.150	Open Manhole	1200	S19.000	41.690	150				
S16	42.750	3.155	Open Manhole	1200	S14.006	39.595	225	S14.005	39.595	225	
								S19.000	41.416	150	1746
S17	42.310	1.252	Open Manhole	1200	S20.000	41.058	225				
S18	42.470	1.509	Open Manhole	1200	S20.001	40.961	225	S20.000	40.961	225	
S19	43.270	1.350	Open Manhole	1200	S21.000	41.920	150				
S20	43.310	1.350	Open Manhole	1200	S22.000	41.960	150				
S21	43.310	1.496	Open Manhole	1200	S21.001	41.814	150	S21.000	41.814	150	
								S22.000	41.814	150	
S22	43.320	1.350	Open Manhole	1200	S23.000	41.970	150				
S23	42.900	1.350	Open Manhole	1200	S23.001	41.550	150	S23.000	41.550	150	
S24	42.800	1.372	Open Manhole	1200	S21.002	41.428	150	S21.001	41.428	150	
								S23.001	41.428	150	
S25	42.700	3.267	Open Manhole	1200	S14.007	39.433	300	S14.006	39.490	225	
								S20.001	40.861	225	1353
								S21.002	41.251	150	1668
S26	42.510	3.116	Open Manhole	1200	S14.008	39.394	300	S14.007	39.394	300	
S27	42.200	1.450	Open Manhole	1200	S24.000	40.750	150				
S28	42.300	2.963	Open Manhole	1200	S14.009	39.337	300	S14.008	39.337	300	

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
								S24.000	40.650	150	1163
S29	42.200	2.896	Open Manhole	1200	S14.010	39.304	300	S14.009	39.304	300	
S30	42.260	1.350	Open Manhole	1200	S25.000	40.910	150				
S31	42.100	1.301	Open Manhole	1200	S25.001	40.799	150	S25.000	40.799	150	
S32	42.100	1.350	Open Manhole	1200	S26.000	40.750	150				
S33	42.000	1.310	Open Manhole	1200	S26.001	40.690	150	S26.000	40.690	150	
S34	42.000	1.360	Open Manhole	1200	S26.002	40.640	150	S26.001	40.640	150	
S35	42.100	1.559	Open Manhole	1200	S26.003	40.541	150	S26.002	40.541	150	
S36	42.100	1.728	Open Manhole	1200	S26.004	40.372	150	S26.003	40.372	150	
S37	42.100	2.000	Open Manhole	1200	S26.005	40.100	150	S26.004	40.100	150	
S38	42.100	2.233	Open Manhole	1200	S25.002	39.867	150	S25.001	40.750	150	883
								S26.005	39.867	150	
S39	42.300	2.700	Open Manhole	1200	S27.000	39.600	150				
S40	42.300	3.029	Open Manhole	1200	S14.011	39.271	300	S14.010	39.271	300	
								S25.002	39.421	150	
								S27.000	39.421	150	
S41	41.720	1.510	Open Manhole	1200	S28.000	40.210	150				
S42	42.150	1.350	Open Manhole	1200	S29.000	40.800	150				
S43	41.250	1.350	Open Manhole	1200	S30.000	39.900	150				
S44	42.100	2.570	Open Manhole	1200	S28.001	39.530	150	S28.000	39.995	150	465
								S29.000	40.430	150	900
								S30.000	39.530	150	
S45	42.000	2.813	Open Manhole	1200	S14.012	39.187	300	S14.011	39.187	300	
								S28.001	39.337	150	
S46	42.000	2.892	Open Manhole	1200	S14.013	39.108	300	S14.012	39.108	300	
S47	41.700	2.699	Open Manhole	1200	S14.014	39.001	300	S14.013	39.001	300	
S48	41.700	2.708	Open Manhole	1200	S14.015	38.992	225	S14.014	38.992	300	
S49	41.640	2.748	Open Manhole	1200	S14.016	38.892	225	S14.015	38.892	225	
S50	41.600	2.724	Open Manhole	1200	S14.017	38.876	225	S14.016	38.876	225	
S51	41.500	2.641	Open Manhole	1200	S14.018	38.859	225	S14.017	38.859	225	
S52	40.960	2.323	Open Manhole	1200	S14.019	38.637	225	S14.018	38.637	225	
S53	40.570	2.210	Open Manhole	1200	S14.020	38.360	150	S14.019	38.360	225	
SSOF1	41.300	3.080	Open Manhole	150		OUTFALL		S14.020	38.220	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)
S14.000	o	150	S1	42.230	41.080	1.000	Open Manhole	1200
S14.001	o	150	S2	42.200	41.033	1.017	Open Manhole	1200
S14.002	o	150	S3	42.280	40.970	1.160	Open Manhole	1200
S15.000	o	150	S4	43.000	41.850	1.000	Open Manhole	1200
S15.001	o	150	S5	43.210	41.633	1.427	Open Manhole	1200
S16.000	o	150	S6	43.000	41.850	1.000	Open Manhole	1200
S15.002	o	150	S7	42.910	41.462	1.298	Open Manhole	1200
S14.003	o	150	S8	42.930	40.687	2.093	Open Manhole	1200
S17.000	o	150	S9	43.150	40.523	2.477	Open Manhole	1200
S17.001	o	150	S10	43.150	40.334	2.666	Open Manhole	1200
S18.000	o	150	S11	43.150	40.400	2.600	Open Manhole	1200
S17.002	o	225	S12	43.150	40.086	2.839	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)
S14.000	4.728	100.6	S2	42.200	41.033	1.017	Open Manhole	1200
S14.001	6.307	100.1	S3	42.280	40.970	1.160	Open Manhole	1200
S14.002	28.289	100.0	S8	42.930	40.687	2.093	Open Manhole	1200
S15.000	21.712	100.1	S5	43.210	41.633	1.427	Open Manhole	1200
S15.001	15.653	91.5	S7	42.910	41.462	1.298	Open Manhole	1200
S16.000	20.838	53.7	S7	42.910	41.462	1.298	Open Manhole	1200
S15.002	12.933	100.3	S8	42.930	41.333	1.447	Open Manhole	1200
S14.003	12.642	69.5	S13	42.920	40.505	2.265	Open Manhole	1200
S17.000	18.874	99.9	S10	43.150	40.334	2.666	Open Manhole	1200
S17.001	14.989	79.3	S12	43.150	40.145	2.855	Open Manhole	1200
S18.000	18.760	78.5	S12	43.150	40.161	2.839	Open Manhole	1200
S17.002	43.546	120.0	S13	42.920	39.723	2.972	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)
S14.004	o	225	S13	42.920	39.723	2.972	Open Manhole	1200
S14.005	o	225	S14	42.770	39.680	2.865	Open Manhole	1200
S19.000	o	150	S15	42.840	41.690	1.000	Open Manhole	1200
S14.006	o	225	S16	42.750	39.595	2.930	Open Manhole	1200
S20.000	o	225	S17	42.310	41.058	1.027	Open Manhole	1200
S20.001	o	225	S18	42.470	40.961	1.284	Open Manhole	1200
S21.000	o	150	S19	43.270	41.920	1.200	Open Manhole	1200
S22.000	o	150	S20	43.310	41.960	1.200	Open Manhole	1200
S21.001	o	150	S21	43.310	41.814	1.346	Open Manhole	1200
S23.000	o	150	S22	43.320	41.970	1.200	Open Manhole	1200
S23.001	o	150	S23	42.900	41.550	1.200	Open Manhole	1200
S21.002	o	150	S24	42.800	41.428	1.222	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)
S14.004	7.237	168.3	S14	42.770	39.680	2.865	Open Manhole	1200
S14.005	10.365	121.9	S16	42.750	39.595	2.930	Open Manhole	1200
S19.000	13.652	49.8	S16	42.750	41.416	1.184	Open Manhole	1200
S14.006	10.567	100.6	S25	42.700	39.490	2.985	Open Manhole	1200
S20.000	5.935	61.2	S18	42.470	40.961	1.284	Open Manhole	1200
S20.001	12.693	126.9	S25	42.700	40.861	1.614	Open Manhole	1200
S21.000	11.083	104.6	S21	43.310	41.814	1.346	Open Manhole	1200
S22.000	14.093	96.5	S21	43.310	41.814	1.346	Open Manhole	1200
S21.001	18.841	48.8	S24	42.800	41.428	1.222	Open Manhole	1200
S23.000	21.391	50.9	S23	42.900	41.550	1.200	Open Manhole	1200
S23.001	12.235	100.3	S24	42.800	41.428	1.222	Open Manhole	1200
S21.002	17.749	100.3	S25	42.700	41.251	1.299	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)
S14.007	o	300	S25	42.700	39.433	2.967	Open Manhole	1200
S14.008	o	300	S26	42.510	39.394	2.816	Open Manhole	1200
S24.000	o	150	S27	42.200	40.750	1.300	Open Manhole	1200
S14.009	o	300	S28	42.300	39.337	2.663	Open Manhole	1200
S14.010	o	300	S29	42.200	39.304	2.596	Open Manhole	1200
S25.000	o	150	S30	42.260	40.910	1.200	Open Manhole	1200
S25.001	o	150	S31	42.100	40.799	1.151	Open Manhole	1200
S26.000	o	150	S32	42.100	40.750	1.200	Open Manhole	1200
S26.001	o	150	S33	42.000	40.690	1.160	Open Manhole	1200
S26.002	o	150	S34	42.000	40.640	1.210	Open Manhole	1200
S26.003	o	150	S35	42.100	40.541	1.409	Open Manhole	1200
S26.004	o	150	S36	42.100	40.372	1.578	Open Manhole	1200
S26.005	o	150	S37	42.100	40.100	1.850	Open Manhole	1200
S25.002	o	150	S38	42.100	39.867	2.083	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)
S14.007	9.481	243.1	S26	42.510	39.394	2.816	Open Manhole	1200
S14.008	14.263	250.2	S28	42.300	39.337	2.663	Open Manhole	1200
S24.000	8.204	82.0	S28	42.300	40.650	1.500	Open Manhole	1200
S14.009	8.178	247.8	S29	42.200	39.304	2.596	Open Manhole	1200
S14.010	8.164	247.4	S40	42.300	39.271	2.729	Open Manhole	1200
S25.000	11.082	99.8	S31	42.100	40.799	1.151	Open Manhole	1200
S25.001	8.250	168.4	S38	42.100	40.750	1.200	Open Manhole	1200
S26.000	5.966	99.4	S33	42.000	40.690	1.160	Open Manhole	1200
S26.001	4.958	99.2	S34	42.000	40.640	1.210	Open Manhole	1200
S26.002	9.930	100.3	S35	42.100	40.541	1.409	Open Manhole	1200
S26.003	16.519	97.7	S36	42.100	40.372	1.578	Open Manhole	1200
S26.004	27.079	99.6	S37	42.100	40.100	1.850	Open Manhole	1200
S26.005	23.267	99.9	S38	42.100	39.867	2.083	Open Manhole	1200
S25.002	14.439	32.4	S40	42.300	39.421	2.729	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)
S27.000	o	150	S39	42.300	39.600	2.550	Open Manhole	1200
S14.011	o	300	S40	42.300	39.271	2.729	Open Manhole	1200
S28.000	o	150	S41	41.720	40.210	1.360	Open Manhole	1200
S29.000	o	150	S42	42.150	40.800	1.200	Open Manhole	1200
S30.000	o	150	S43	41.250	39.900	1.200	Open Manhole	1200
S28.001	o	150	S44	42.100	39.530	2.420	Open Manhole	1200
S14.012	o	300	S45	42.000	39.187	2.513	Open Manhole	1200
S14.013	o	300	S46	42.000	39.108	2.592	Open Manhole	1200
S14.014	o	300	S47	41.700	39.001	2.399	Open Manhole	1200
S14.015	o	225	S48	41.700	38.992	2.483	Open Manhole	1200
S14.016	o	225	S49	41.640	38.892	2.523	Open Manhole	1200
S14.017	o	225	S50	41.600	38.876	2.499	Open Manhole	1200
S14.018	o	225	S51	41.500	38.859	2.416	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)
S27.000	12.336	68.9	S40	42.300	39.421	2.729	Open Manhole	1200
S14.011	20.488	243.9	S45	42.000	39.187	2.513	Open Manhole	1200
S28.000	18.683	86.9	S44	42.100	39.995	1.955	Open Manhole	1200
S29.000	16.250	43.9	S44	42.100	40.430	1.520	Open Manhole	1200
S30.000	21.515	58.1	S44	42.100	39.530	2.420	Open Manhole	1200
S28.001	8.835	45.8	S45	42.000	39.337	2.513	Open Manhole	1200
S14.012	19.413	245.7	S46	42.000	39.108	2.592	Open Manhole	1200
S14.013	26.178	244.7	S47	41.700	39.001	2.399	Open Manhole	1200
S14.014	2.144	238.2	S48	41.700	38.992	2.408	Open Manhole	1200
S14.015	21.877	218.8	S49	41.640	38.892	2.523	Open Manhole	1200
S14.016	2.785	174.1	S50	41.600	38.876	2.499	Open Manhole	1200
S14.017	2.838	166.9	S51	41.500	38.859	2.416	Open Manhole	1200
S14.018	37.736	170.0	S52	40.960	38.637	2.098	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)
S14.019	o	225	S52	40.960	38.637	2.098	Open Manhole	1200
S14.020	o	150	S53	40.570	38.360	2.060	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)
S14.019	47.148	170.2	S53	40.570	38.360	1.985	Open Manhole	1200
S14.020	8.217	58.7	SSOF1	41.300	38.220	2.930	Open Manhole	150

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
14.000	-	-	100	0.024	0.024	0.024
14.001	-	-	100	0.010	0.010	0.010
14.002	-	-	100	0.010	0.010	0.010
15.000	-	-	100	0.012	0.012	0.012
15.001	-	-	100	0.000	0.000	0.000
16.000	-	-	100	0.012	0.012	0.012
15.002	-	-	100	0.000	0.000	0.000
14.003	-	-	100	0.010	0.010	0.010
17.000	-	-	100	0.019	0.019	0.019
17.001	-	-	100	0.000	0.000	0.000
18.000	-	-	100	0.019	0.019	0.019
17.002	-	-	100	0.000	0.000	0.000
14.004	-	-	100	0.038	0.038	0.038
14.005	-	-	100	0.000	0.000	0.000
19.000	-	-	100	0.024	0.024	0.024
14.006	-	-	100	0.038	0.038	0.038
20.000	-	-	100	0.034	0.034	0.034
20.001	-	-	100	0.010	0.010	0.010
21.000	-	-	100	0.018	0.018	0.018
22.000	-	-	100	0.001	0.001	0.001
21.001	-	-	100	0.032	0.032	0.032
23.000	-	-	100	0.024	0.024	0.024
23.001	-	-	100	0.020	0.020	0.020
21.002	-	-	100	0.030	0.030	0.030
14.007	-	-	100	0.030	0.030	0.030
14.008	-	-	100	0.020	0.020	0.020
24.000	-	-	100	0.000	0.000	0.000
14.009	-	-	100	0.000	0.000	0.000
14.010	-	-	100	0.000	0.000	0.000
25.000	-	-	100	0.058	0.058	0.058
25.001	-	-	100	0.020	0.020	0.020
26.000	-	-	100	0.000	0.000	0.000
26.001	-	-	100	0.000	0.000	0.000
26.002	-	-	100	0.034	0.034	0.034
26.003	-	-	100	0.010	0.010	0.010
26.004	-	-	100	0.005	0.005	0.005
26.005	-	-	100	0.020	0.020	0.020
25.002	-	-	100	0.000	0.000	0.000
27.000	-	-	100	0.000	0.000	0.000
14.011	-	-	100	0.000	0.000	0.000
28.000	-	-	100	0.021	0.021	0.021
29.000	-	-	100	0.009	0.009	0.009
30.000	-	-	100	0.009	0.009	0.009
28.001	-	-	100	0.000	0.000	0.000
14.012	-	-	100	0.009	0.009	0.009
14.013	-	-	100	0.000	0.000	0.000
14.014	-	-	100	0.000	0.000	0.000
14.015	-	-	100	0.000	0.000	0.000
14.016	-	-	100	0.000	0.000	0.000
14.017	-	-	100	0.000	0.000	0.000

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
14.018	-	-	100	0.000	0.000	0.000
14.019	-	-	100	0.000	0.000	0.000
14.020	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.630	0.630	0.630

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)
S14.020	SSOF1	41.300	38.220	38.300	150	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	1
Number of Online Controls	3	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)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.000	Storm Duration (mins)	30
Ratio R	0.300		

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Online Controls for Storm

Non Return Valve Manhole: S12, DS/PN: S17.002, Volume (m³): 4.0

Non Return Valve Manhole: S44, DS/PN: S28.001, Volume (m³): 3.8

Hydro-Brake® Optimum Manhole: S50, DS/PN: S14.017, Volume (m³): 3.1

Unit Reference	MD-SHE-0163-1550-2000-1550
Design Head (m)	2.000
Design Flow (l/s)	15.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	163
Invert Level (m)	38.876
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	15.5	Kick-Flo®	1.217	12.2
Flush-Flo™	0.580	15.5	Mean Flow over Head Range	-	13.5

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	5.8	1.200	12.5	3.000	18.8	7.000	28.2
0.200	13.0	1.400	13.1	3.500	20.2	7.500	29.2
0.300	14.4	1.600	13.9	4.000	21.6	8.000	30.1
0.400	15.1	1.800	14.7	4.500	22.8	8.500	31.0
0.500	15.4	2.000	15.5	5.000	24.0	9.000	31.8
0.600	15.5	2.200	16.2	5.500	25.1	9.500	32.7
0.800	15.2	2.400	16.9	6.000	26.2		
1.000	14.4	2.600	17.5	6.500	27.2		

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Storage Structures for Storm

Cellular Storage Manhole: S48, DS/PN: S14.015

Invert Level (m) 38.992 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	240.0	0.0	0.810	0.0	0.0
0.800	240.0	0.0			

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1 year Return Period Summary of Critical Results by Maximum Outflow (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 1
Number of Online Controls 3 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 0.300
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 17.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS 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, 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)
S14.000	S1	15 Winter	1	+0%	100/15 Summer				41.124
S14.001	S2	15 Winter	1	+0%	100/15 Summer				41.082
S14.002	S3	15 Winter	1	+0%	100/15 Summer				41.022
S15.000	S4	15 Winter	1	+0%					41.878
S15.001	S5	15 Winter	1	+0%					41.660
S16.000	S6	15 Winter	1	+0%					41.873
S15.002	S7	15 Winter	1	+0%					41.501
S14.003	S8	15 Winter	1	+0%	100/15 Summer				40.753
S17.000	S9	15 Winter	1	+0%	100/15 Summer				40.566
S17.001	S10	15 Winter	1	+0%	30/15 Winter				40.375
S18.000	S11	15 Winter	1	+0%	30/15 Winter				40.440
S17.002	S12	15 Winter	1	+0%	30/15 Summer				40.141
S14.004	S13	15 Winter	1	+0%	30/15 Summer				39.845
S14.005	S14	15 Winter	1	+0%	30/15 Summer				39.783
S19.000	S15	15 Winter	1	+0%					41.723
S14.006	S16	15 Winter	1	+0%	30/15 Summer				39.710
S20.000	S17	15 Winter	1	+0%					41.102
S20.001	S18	15 Winter	1	+0%	100/15 Winter				41.012

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S14.000	S1	-0.106	0.000	0.19		2.5	OK	
S14.001	S2	-0.101	0.000	0.23		3.5	OK	
S14.002	S3	-0.098	0.000	0.25		4.3	OK	
S15.000	S4	-0.122	0.000	0.08		1.3	OK	
S15.001	S5	-0.123	0.000	0.07		1.3	OK	
S16.000	S6	-0.127	0.000	0.06		1.3	OK	
S15.002	S7	-0.111	0.000	0.16		2.5	OK	
S14.003	S8	-0.084	0.000	0.39		7.7	OK	
S17.000	S9	-0.107	0.000	0.18		3.0	OK	
S17.001	S10	-0.109	0.000	0.16		3.0	OK	
S18.000	S11	-0.110	0.000	0.16		3.0	OK	
S17.002	S12	-0.170	0.000	0.13		6.0	OK	
S14.004	S13	-0.103	0.000	0.56		16.9	OK	
S14.005	S14	-0.122	0.000	0.43		17.0	OK	
S19.000	S15	-0.117	0.000	0.11		2.6	OK	
S14.006	S16	-0.110	0.000	0.51		22.4	OK	
S20.000	S17	-0.181	0.000	0.08		3.6	OK	
S20.001	S18	-0.174	0.000	0.11		4.5	OK	

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1 year Return Period Summary of Critical Results by Maximum Outflow (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)
S21.000	S19	15 Winter	1	+0%	100/15 Summer				41.955
S22.000	S20	15 Winter	1	+0%	100/15 Summer				41.965
S21.001	S21	15 Winter	1	+0%	100/15 Summer				41.860
S23.000	S22	15 Winter	1	+0%	100/15 Summer				42.003
S23.001	S23	15 Winter	1	+0%	30/15 Summer				41.604
S21.002	S24	15 Winter	1	+0%	30/15 Summer				41.524
S14.007	S25	15 Winter	1	+0%	30/15 Summer				39.629
S14.008	S26	15 Winter	1	+0%	30/15 Summer				39.588
S24.000	S27	360 Winter	1	+0%	100/15 Winter				40.750
S14.009	S28	15 Winter	1	+0%	30/15 Summer				39.544
S14.010	S29	15 Winter	1	+0%	30/15 Summer				39.518
S25.000	S30	15 Winter	1	+0%	30/15 Summer				40.975
S25.001	S31	15 Winter	1	+0%	30/15 Summer				40.890
S26.000	S32	360 Winter	1	+0%	100/15 Summer				40.750
S26.001	S33	360 Winter	1	+0%	100/15 Summer				40.690
S26.002	S34	15 Winter	1	+0%	100/15 Summer				40.685
S26.003	S35	15 Winter	1	+0%	100/15 Summer				40.591
S26.004	S36	15 Winter	1	+0%	30/15 Winter				40.424
S26.005	S37	15 Winter	1	+0%	30/15 Summer				40.163
S25.002	S38	15 Winter	1	+0%	30/15 Summer				39.940
S27.000	S39	360 Winter	1	+0%	30/15 Summer				39.600
S14.011	S40	15 Winter	1	+0%	30/15 Summer				39.493
S28.000	S41	15 Winter	1	+0%	100/15 Winter				40.245
S29.000	S42	15 Winter	1	+0%	100/180 Winter				40.819
S30.000	S43	15 Winter	1	+0%	100/15 Summer				39.920
S28.001	S44	15 Winter	1	+0%	30/15 Summer				39.573
S14.012	S45	15 Winter	1	+0%	30/15 Summer				39.420
S14.013	S46	15 Winter	1	+0%	30/15 Summer				39.356
S14.014	S47	15 Winter	1	+0%	30/15 Summer				39.281
S14.015	S48	180 Winter	1	+0%	30/15 Summer				39.171
S14.016	S49	120 Winter	1	+0%	1/60 Summer				39.167
S14.017	S50	120 Winter	1	+0%	1/30 Winter				39.171
S14.018	S51	120 Winter	1	+0%					38.949
S14.019	S52	120 Winter	1	+0%					38.724
S14.020	S53	120 Winter	1	+0%					38.445

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S21.000	S19	-0.115	0.000	0.12		1.9	OK	
S22.000	S20	-0.145	0.000	0.01		0.1	OK	
S21.001	S21	-0.104	0.000	0.21		4.9	OK	
S23.000	S22	-0.117	0.000	0.11		2.6	OK	
S23.001	S23	-0.096	0.000	0.27		4.4	OK	
S21.002	S24	-0.054	0.000	0.73		12.1	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S14.007	S25	-0.104	0.000	0.75		41.0	OK	
S14.008	S26	-0.106	0.000	0.73		42.7	OK	
S24.000	S27	-0.150	0.000	0.00		0.0	OK	
S14.009	S28	-0.093	0.000	0.81		42.5	OK	
S14.010	S29	-0.086	0.000	0.80		42.2	OK	
S25.000	S30	-0.085	0.000	0.39		6.2	OK	
S25.001	S31	-0.059	0.000	0.67		8.0	OK	
S26.000	S32	-0.150	0.000	0.00		0.0	OK	
S26.001	S33	-0.150	0.000	0.00		0.0	OK	
S26.002	S34	-0.105	0.000	0.19		3.1	OK	
S26.003	S35	-0.100	0.000	0.24		4.0	OK	
S26.004	S36	-0.098	0.000	0.26		4.4	OK	
S26.005	S37	-0.087	0.000	0.36		6.1	OK	
S25.002	S38	-0.077	0.000	0.48		13.9	OK	
S27.000	S39	-0.150	0.000	0.00		0.0	OK	
S14.011	S40	-0.078	0.000	0.89		55.4	OK	
S28.000	S41	-0.115	0.000	0.12		2.2	OK	
S29.000	S42	-0.131	0.000	0.04		1.0	OK	
S30.000	S43	-0.130	0.000	0.04		0.9	OK	
S28.001	S44	-0.107	0.000	0.18		4.2	OK	
S14.012	S45	-0.067	0.000	0.96		58.7	OK	
S14.013	S46	-0.052	0.000	0.89		56.6	OK	
S14.014	S47	-0.020	0.000	1.00		53.7	OK	
S14.015	S48	-0.046	0.000	0.39		12.6	OK	
S14.016	S49	0.050	0.000	0.45		12.4	SURCHARGED	
S14.017	S50	0.070	0.000	0.46		12.4	SURCHARGED	
S14.018	S51	-0.135	0.000	0.33		12.4	OK	
S14.019	S52	-0.138	0.000	0.32		12.3	OK	
S14.020	S53	-0.065	0.000	0.61		12.3	OK	

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30 year Return Period Summary of Critical Results by Maximum Outflow (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 1
Number of Online Controls 3 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 0.300
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 17.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS 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, 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)
S14.000	S1	15 Winter	30	+0%	100/15 Summer				41.152
S14.001	S2	15 Winter	30	+0%	100/15 Summer				41.118
S14.002	S3	15 Winter	30	+0%	100/15 Summer				41.062
S15.000	S4	15 Winter	30	+0%					41.894
S15.001	S5	15 Winter	30	+0%					41.676
S16.000	S6	15 Winter	30	+0%					41.887
S15.002	S7	15 Winter	30	+0%					41.526
S14.003	S8	15 Winter	30	+0%	100/15 Summer				40.831
S17.000	S9	15 Winter	30	+0%	100/15 Summer				40.605
S17.001	S10	15 Winter	30	+0%	30/15 Winter				40.587
S18.000	S11	15 Winter	30	+0%	30/15 Winter				40.590
S17.002	S12	15 Winter	30	+0%	30/15 Summer				40.572
S14.004	S13	15 Winter	30	+0%	30/15 Summer				40.552
S14.005	S14	15 Winter	30	+0%	30/15 Summer				40.527
S19.000	S15	15 Winter	30	+0%					41.743
S14.006	S16	15 Winter	30	+0%	30/15 Summer				40.495
S20.000	S17	15 Winter	30	+0%					41.127
S20.001	S18	15 Winter	30	+0%	100/15 Winter				41.045

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S14.000	S1	-0.078	0.000	0.46		6.2	OK	
S14.001	S2	-0.065	0.000	0.60		8.9	OK	
S14.002	S3	-0.058	0.000	0.68		11.5	OK	
S15.000	S4	-0.106	0.000	0.18		3.1	OK	
S15.001	S5	-0.107	0.000	0.18		3.1	OK	
S16.000	S6	-0.113	0.000	0.14		3.1	OK	
S15.002	S7	-0.086	0.000	0.38		6.2	OK	
S14.003	S8	-0.006	0.000	1.00		19.4	OK	
S17.000	S9	-0.068	0.000	0.35		5.9	OK	
S17.001	S10	0.103	0.000	0.34		6.3	SURCHARGED	
S18.000	S11	0.040	0.000	0.31		5.9	SURCHARGED	
S17.002	S12	0.261	0.000	0.31		14.0	SURCHARGED	
S14.004	S13	0.604	0.000	0.90		26.9	SURCHARGED	
S14.005	S14	0.622	0.000	0.73		28.8	SURCHARGED	
S19.000	S15	-0.097	0.000	0.27		6.2	OK	
S14.006	S16	0.675	0.000	0.78		33.8	SURCHARGED	
S20.000	S17	-0.156	0.000	0.20		8.8	OK	
S20.001	S18	-0.141	0.000	0.29		11.5	OK	

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30 year Return Period Summary of Critical Results by Maximum Outflow (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)
S21.000	S19	15 Winter	30	+0%	100/15 Summer				41.979
S22.000	S20	15 Winter	30	+0%	100/15 Summer				41.972
S21.001	S21	15 Winter	30	+0%	100/15 Summer				41.957
S23.000	S22	15 Winter	30	+0%	100/15 Summer				42.023
S23.001	S23	15 Winter	30	+0%	30/15 Summer				41.925
S21.002	S24	15 Winter	30	+0%	30/15 Summer				41.878
S14.007	S25	15 Winter	30	+0%	30/15 Summer				40.439
S14.008	S26	15 Winter	30	+0%	30/15 Summer				40.368
S24.000	S27	360 Winter	30	+0%	100/15 Winter				40.750
S14.009	S28	15 Winter	30	+0%	30/15 Summer				40.285
S14.010	S29	15 Winter	30	+0%	30/15 Summer				40.206
S25.000	S30	15 Winter	30	+0%	30/15 Summer				41.117
S25.001	S31	15 Winter	30	+0%	30/15 Summer				41.026
S26.000	S32	360 Winter	30	+0%	100/15 Summer				40.750
S26.001	S33	15 Summer	30	+0%	100/15 Summer				40.708
S26.002	S34	15 Winter	30	+0%	100/15 Summer				40.724
S26.003	S35	15 Summer	30	+0%	100/15 Summer				40.637
S26.004	S36	15 Winter	30	+0%	30/15 Winter				40.595
S26.005	S37	15 Summer	30	+0%	30/15 Summer				40.473
S25.002	S38	15 Winter	30	+0%	30/15 Summer				40.465
S27.000	S39	15 Winter	30	+0%	30/15 Summer				40.124
S14.011	S40	15 Winter	30	+0%	30/15 Summer				40.126
S28.000	S41	15 Winter	30	+0%	100/15 Winter				40.267
S29.000	S42	15 Winter	30	+0%	100/180 Winter				40.831
S30.000	S43	15 Winter	30	+0%	100/15 Summer				39.944
S28.001	S44	15 Summer	30	+0%	30/15 Summer				39.884
S14.012	S45	15 Winter	30	+0%	30/15 Summer				39.924
S14.013	S46	15 Winter	30	+0%	30/15 Summer				39.711
S14.014	S47	15 Winter	30	+0%	30/15 Summer				39.440
S14.015	S48	180 Winter	30	+0%	30/15 Summer				39.495
S14.016	S49	180 Winter	30	+0%	1/60 Summer				39.701
S14.017	S50	60 Winter	30	+0%	1/30 Winter				39.524
S14.018	S51	60 Winter	30	+0%					38.959
S14.019	S52	60 Winter	30	+0%					38.735
S14.020	S53	60 Winter	30	+0%					38.456

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S21.000	S19	-0.091	0.000	0.30		4.7	OK	
S22.000	S20	-0.138	0.000	0.02		0.3	OK	
S21.001	S21	-0.007	0.000	0.53		12.7	OK	
S23.000	S22	-0.097	0.000	0.26		6.2	OK	
S23.001	S23	0.225	0.000	0.62		9.9	SURCHARGED	
S21.002	S24	0.300	0.000	1.64		27.2	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S14.007	S25	0.706	0.000	1.35		74.0	SURCHARGED	
S14.008	S26	0.674	0.000	1.30		75.5	SURCHARGED	
S24.000	S27	-0.150	0.000	0.00		0.0	OK	
S14.009	S28	0.648	0.000	1.39		73.3	SURCHARGED	
S14.010	S29	0.602	0.000	1.36		71.8	SURCHARGED	
S25.000	S30	0.057	0.000	0.91		14.5	SURCHARGED	
S25.001	S31	0.077	0.000	1.63		19.4	SURCHARGED	
S26.000	S32	-0.150	0.000	0.00		0.0	OK	
S26.001	S33	-0.132	0.000	0.01		0.1	OK	
S26.002	S34	-0.066	0.000	0.60		9.4	OK	
S26.003	S35	-0.054	0.000	0.73		12.2	OK	
S26.004	S36	0.073	0.000	0.76		13.0	SURCHARGED	
S26.005	S37	0.223	0.000	0.89		15.0	SURCHARGED	
S25.002	S38	0.448	0.000	0.95		27.4	SURCHARGED	
S27.000	S39	0.374	0.000	0.13		2.5	SURCHARGED	
S14.011	S40	0.555	0.000	1.54		95.6	SURCHARGED	
S28.000	S41	-0.093	0.000	0.30		5.4	OK	
S29.000	S42	-0.119	0.000	0.09		2.3	OK	
S30.000	S43	-0.106	0.000	0.11		2.3	OK	
S28.001	S44	0.204	0.000	0.40		9.3	SURCHARGED	
S14.012	S45	0.437	0.000	1.65		101.3	SURCHARGED	
S14.013	S46	0.303	0.000	1.59		100.7	SURCHARGED	
S14.014	S47	0.139	0.000	1.88		100.8	SURCHARGED	
S14.015	S48	0.278	0.000	0.70		22.3	SURCHARGED	
S14.016	S49	0.584	0.000	0.66		17.9	SURCHARGED	
S14.017	S50	0.423	0.000	0.55		14.9	SURCHARGED	
S14.018	S51	-0.125	0.000	0.40		14.9	OK	
S14.019	S52	-0.127	0.000	0.39		14.9	OK	
S14.020	S53	-0.054	0.000	0.73		14.8	OK	

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100 year Return Period Summary of Critical Results by Maximum Outflow (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 1
Number of Online Controls 3 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 0.300
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 17.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS 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, 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)
S14.000	S1	15 Winter	100	+30%	100/15 Summer				41.607
S14.001	S2	15 Summer	100	+30%	100/15 Summer				41.453
S14.002	S3	15 Winter	100	+30%	100/15 Summer				41.578
S15.000	S4	15 Winter	100	+30%					41.908
S15.001	S5	15 Winter	100	+30%					41.689
S16.000	S6	15 Winter	100	+30%					41.899
S15.002	S7	15 Winter	100	+30%					41.550
S14.003	S8	15 Summer	100	+30%	100/15 Summer				41.374
S17.000	S9	15 Summer	100	+30%	100/15 Summer				41.201
S17.001	S10	15 Summer	100	+30%	30/15 Winter				41.182
S18.000	S11	15 Summer	100	+30%	30/15 Winter				41.188
S17.002	S12	15 Winter	100	+30%	30/15 Summer				41.346
S14.004	S13	15 Winter	100	+30%	30/15 Summer				41.364
S14.005	S14	15 Winter	100	+30%	30/15 Summer				41.336
S19.000	S15	15 Winter	100	+30%					41.761
S14.006	S16	15 Winter	100	+30%	30/15 Summer				41.303
S20.000	S17	15 Winter	100	+30%					41.238
S20.001	S18	15 Winter	100	+30%	100/15 Winter				41.230

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S14.000	S1	0.377	0.000	0.65		8.8	SURCHARGED	
S14.001	S2	0.270	0.000	0.82		12.3	SURCHARGED	
S14.002	S3	0.458	0.000	0.85		14.5	SURCHARGED	
S15.000	S4	-0.092	0.000	0.31		5.1	OK	
S15.001	S5	-0.094	0.000	0.30		5.2	OK	
S16.000	S6	-0.101	0.000	0.23		5.2	OK	
S15.002	S7	-0.062	0.000	0.64		10.3	OK	
S14.003	S8	0.537	0.000	1.19		23.1	SURCHARGED	
S17.000	S9	0.528	0.000	0.50		8.4	SURCHARGED	
S17.001	S10	0.698	0.000	0.60		11.1	SURCHARGED	
S18.000	S11	0.638	0.000	0.43		8.1	SURCHARGED	
S17.002	S12	1.035	0.000	0.51		22.8	SURCHARGED	
S14.004	S13	1.416	0.000	1.26		37.5	SURCHARGED	
S14.005	S14	1.431	0.000	1.02		40.4	SURCHARGED	
S19.000	S15	-0.079	0.000	0.45		10.4	OK	
S14.006	S16	1.483	0.000	1.03		44.7	SURCHARGED	
S20.000	S17	-0.045	0.000	0.34		14.8	OK	
S20.001	S18	0.044	0.000	0.48		19.2	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Outflow (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)
S21.000	S19	15 Summer	100	+30%	100/15 Summer				42.360
S22.000	S20	15 Winter	100	+30%	100/15 Summer				42.414
S21.001	S21	15 Winter	100	+30%	100/15 Summer				42.414
S23.000	S22	15 Summer	100	+30%	100/15 Summer				42.345
S23.001	S23	15 Winter	100	+30%	30/15 Summer				42.359
S21.002	S24	15 Winter	100	+30%	30/15 Summer				42.270
S14.007	S25	15 Winter	100	+30%	30/15 Summer				41.214
S14.008	S26	15 Winter	100	+30%	30/15 Summer				41.086
S24.000	S27	15 Winter	100	+30%	100/15 Winter				40.937
S14.009	S28	15 Winter	100	+30%	30/15 Summer				40.938
S14.010	S29	15 Winter	100	+30%	30/15 Summer				40.800
S25.000	S30	15 Winter	100	+30%	30/15 Summer				41.501
S25.001	S31	15 Summer	100	+30%	30/15 Summer				41.238
S26.000	S32	15 Winter	100	+30%	100/15 Summer				41.257
S26.001	S33	15 Winter	100	+30%	100/15 Summer				41.257
S26.002	S34	15 Summer	100	+30%	100/15 Summer				41.130
S26.003	S35	15 Summer	100	+30%	100/15 Summer				41.117
S26.004	S36	15 Summer	100	+30%	30/15 Winter				41.095
S26.005	S37	15 Winter	100	+30%	30/15 Summer				41.192
S25.002	S38	15 Summer	100	+30%	30/15 Summer				41.033
S27.000	S39	15 Winter	100	+30%	30/15 Summer				40.668
S14.011	S40	15 Winter	100	+30%	30/15 Summer				40.667
S28.000	S41	15 Winter	100	+30%	100/15 Winter				40.385
S29.000	S42	15 Winter	100	+30%	100/180 Winter				40.840
S30.000	S43	15 Summer	100	+30%	100/15 Summer				40.296
S28.001	S44	15 Summer	100	+30%	30/15 Summer				40.290
S14.012	S45	15 Winter	100	+30%	30/15 Summer				40.346
S14.013	S46	30 Winter	100	+30%	30/15 Summer				40.011
S14.014	S47	15 Winter	100	+30%	30/15 Summer				39.545
S14.015	S48	180 Winter	100	+30%	30/15 Summer				40.953
S14.016	S49	180 Winter	100	+30%	1/60 Summer				40.920
S14.017	S50	480 Winter	100	+30%	1/30 Winter				41.349
S14.018	S51	480 Winter	100	+30%					38.963
S14.019	S52	480 Winter	100	+30%					38.740
S14.020	S53	480 Winter	100	+30%					38.465

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S21.000	S19	0.290	0.000	0.39		6.0	SURCHARGED	
S22.000	S20	0.304	0.000	0.15		2.4	SURCHARGED	
S21.001	S21	0.450	0.000	0.62		14.8	SURCHARGED	
S23.000	S22	0.225	0.000	0.35		8.2	SURCHARGED	
S23.001	S23	0.659	0.000	0.86		13.9	SURCHARGED	
S21.002	S24	0.692	0.000	2.22		36.7	SURCHARGED	

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PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S14.007	S25	1.481	0.000	1.79		98.3	SURCHARGED	
S14.008	S26	1.392	0.000	1.74		101.4	SURCHARGED	
S24.000	S27	0.037	0.000	0.07		1.3	SURCHARGED	
S14.009	S28	1.301	0.000	1.83		96.5	SURCHARGED	
S14.010	S29	1.196	0.000	1.79		94.2	SURCHARGED	
S25.000	S30	0.441	0.000	1.40		22.4	SURCHARGED	
S25.001	S31	0.289	0.000	2.46		29.2	SURCHARGED	
S26.000	S32	0.357	0.000	0.14		2.1	SURCHARGED	
S26.001	S33	0.417	0.000	0.34		4.7	SURCHARGED	
S26.002	S34	0.340	0.000	0.86		13.6	SURCHARGED	
S26.003	S35	0.426	0.000	0.96		16.1	SURCHARGED	
S26.004	S36	0.573	0.000	0.84		14.2	SURCHARGED	
S26.005	S37	0.942	0.000	0.97		16.3	SURCHARGED	
S25.002	S38	1.016	0.000	1.15		33.1	SURCHARGED	
S27.000	S39	0.918	0.000	0.13		2.5	SURCHARGED	
S14.011	S40	1.096	0.000	1.97		121.7	SURCHARGED	
S28.000	S41	0.025	0.000	0.51		9.0	SURCHARGED	
S29.000	S42	-0.110	0.000	0.16		3.9	OK	
S30.000	S43	0.246	0.000	0.16		3.6	SURCHARGED	
S28.001	S44	0.610	0.000	0.48		11.2	SURCHARGED	
S14.012	S45	0.859	0.000	2.12		129.9	SURCHARGED	
S14.013	S46	0.603	0.000	2.04		129.6	SURCHARGED	
S14.014	S47	0.244	0.000	2.42		129.6	SURCHARGED	
S14.015	S48	1.736	0.000	0.89		28.5	SURCHARGED	
S14.016	S49	1.803	0.000	0.82		22.5	SURCHARGED	
S14.017	S50	2.248	0.000	0.58		15.9	FLOOD RISK	
S14.018	S51	-0.121	0.000	0.43		16.0	OK	
S14.019	S52	-0.122	0.000	0.42		16.1	OK	
S14.020	S53	-0.045	0.000	0.80		16.1	OK	

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