STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 7866 SW01.SWS

Pipe Sizes 7866 SW01 Manhole Sizes 7866 SW01

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	0	Maximum Backdrop Height (m)	0.000
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)	400

Designed with Level Soffits

Network Design Table for 7866 SW01.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	30.736	0.375	82.0	0.084	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	32.110	0.399	80.5	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	24.292	0.145	167.5	0.078	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.003	37.911	0.255	148.7	0.078	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	25.557	0.106	241.1	0.078	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.000	15.945	0.094	169.6	0.084	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	31.421	0.218	144.1	0.078	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	67.048	0.326	205.7	0.078	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	15.767	0.105	150.2	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	15.163	0.101	150.1	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	13.882	0.093	149.3	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	17.523	0.117	149.8	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	10.136	0.068	149.1	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.011	22.664	0.151	150.1	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.012	13.667	0.091	150.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	5.29	45.500	0.084	0.0	0.0	0.0	1.74	122.9	0.0
1.001	0.00	5.60	45.125	0.162	0.0	0.0	0.0	1.75	124.0	0.0
1.002	0.00	5.89	44.651	0.240	0.0	0.0	0.0	1.40	154.3	0.0
1.003	0.00	6.32	44.506	0.318	0.0	0.0	0.0	1.48	163.9	0.0
1.004	0.00	6.68	44.251	0.396	0.0	0.0	0.0	1.16	128.4	0.0
2.000	0.00	5.27	46.187	0.084	0.0	0.0	0.0	1.00	39.8	0.0
2.001	0.00	5.75	46.093	0.162	0.0	0.0	0.0	1.09	43.2	0.0
1.005	0.00	7.57	44.145	0.636	0.0	0.0	0.0	1.26	139.1	0.0
1.006	0.00	7.73	43.819	0.714	0.0	0.0	0.0	1.66	263.5	0.0
1.007	0.00	7.88	43.714	0.792	0.0	0.0	0.0	1.66	263.5	0.0
1.008	0.00	8.02	43.613	0.870	0.0	0.0	0.0	1.66	264.3	0.0
1.009	0.00	8.20	43.520	0.948	0.0	0.0	0.0	1.66	263.9	0.0
1.010	0.00	8.30	43.403	1.026	0.0	0.0	0.0	1.66	264.5	0.0
1.011	0.00	8.52	43.335	1.104	0.0	0.0	0.0	1.66	263.6	0.0
1.012	0.00	8.66	43.184	1.104	0.0	0.0	0.0	1.66	263.5	0.0

Network Design Table for 7866 SW01.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.013	29.036	0.710	40.9	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.000	14.160	0.083	170.6	0.084	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	19.369	0.116	167.3	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	17.616	0.105	167.1	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.003	20.499	0.800	25.6	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.004	27.938	0.116	241.9	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.005	18.637	0.077	241.9	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.014	45.715	1.876	24.4	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	7.126	0.042	169.7	0.084	5.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	15.695	0.093	169.7	0.078	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.002	12.372	0.158	78.3	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.003	45.308	1.079	42.0	0.078	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.004	16.773	0.070	239.6	0.078	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.015	15.379	0.042	366.2	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.016	72.858	0.364	200.2	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.017	12.111	0.733	16.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.018	56.795	0.777	73.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.019	52.602	0.323	162.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.020	21.416	0.641	33.4	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)
1.013	0.00	8.81	43.093	1.182	0.0	0.0	0.0	3.19	506.8	0.0
3.000	0.00	5.20	43.831	0.084	0.0	0.0	0.0	1.20	84.9	0.0
3.001	0.00	5.46	43.748	0.162	0.0	0.0	0.0	1.21	85.7	0.0
3.002	0.00	5.70	43.632	0.240	0.0	0.0	0.0	1.21	85.8	0.0
3.003	0.00	5.81	43.527	0.318	0.0	0.0	0.0	3.12	220.4	0.0
3.004	0.00	6.28	42.727	0.396	0.0	0.0	0.0	1.01	71.1	0.0
3.005	0.00	6.59	42.611	0.474	0.0	0.0	0.0	1.01	71.1	0.0
1.014	0.00	9.00	42.383	1.734	0.0	0.0	0.0	4.13	657.2	0.0
4.000	0.00	5.12	42.175	0.084	0.0	0.0	0.0	1.00	39.8	0.0
4.001	0.00	5.38	42.133	0.162	0.0	0.0	0.0	1.00	39.8	0.0
4.002	0.00	5.50	41.966	0.240	0.0	0.0	0.0	1.78	125.7	0.0
4.003	0.00	5.81	41.808	0.318	0.0	0.0	0.0	2.43	172.0	0.0
4.004	0.00	6.05	40.654	0.396	0.0	0.0	0.0	1.17	128.8	0.0
1.015	0.00	9.22	40.434	2.130	0.0	0.0	0.0	1.16	252.1	0.0
1.016	0.00	9.99	39.500	2.130	0.0	0.0	0.0	1.58	341.9	0.0
1.017	0.00	10.05	39.136	2.130	0.0	0.0	0.0	3.24	128.6	0.0
1.018	0.00	10.67	38.403	2.130	0.0	0.0	0.0	1.53	60.9	0.0
1.019	0.00	11.53	37.626	2.130	0.0	0.0	0.0	1.02	40.6	0.0
1.020	0.00	11.68	37.303	2.130	0.0	0.0	0.0	2.27	90.3	0.0

Manhole Schedules for 7866 SW01.SWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	47.417	1.917	Open Manhole	1500	1.000	45.500	300				
2	47.042	1.917	Open Manhole	1500	1.001	45.125	300	1.000	45.125	300	
3	46.643	1.992	Open Manhole	1500	1.002	44.651	375	1.001	44.726	300	
4	46.623	2.117	Open Manhole	1500	1.003	44.506	375	1.002	44.506	375	
5	46.986	2.735	Open Manhole	1500	1.004	44.251	375	1.003	44.251	375	
6	47.612	1.425	Open Manhole	1500	2.000	46.187	225				
7	47.574	1.481	Open Manhole	1500	2.001	46.093	225	2.000	46.093	225	
8	47.300	3.155	Open Manhole	1500	1.005	44.145	375	1.004	44.145	375	
								2.001	45.875	225	1580
9	48.143	4.324	Open Manhole	1500	1.006	43.819	450	1.005	43.819	375	
10	48.332	4.618	Open Manhole	1500	1.007	43.714	450	1.006	43.714	450	
11	48.369	4.756	Open Manhole	1500	1.008	43.613	450	1.007	43.613	450	
12	48.176	4.656	Open Manhole	1500	1.009	43.520	450	1.008	43.520	450	
13	47.731	4.328	Open Manhole	1500	1.010	43.403	450	1.009	43.403	450	
14	47.460	4.125	Open Manhole	1500	1.011	43.335	450	1.010	43.335	450	
15	46.831	3.647	Open Manhole	1500	1.012	43.184	450	1.011	43.184	450	
16	46.306	3.213	Open Manhole	1500	1.013	43.093	450	1.012	43.093	450	
17	45.256	1.425	Open Manhole	1500	3.000	43.831	300				
18	45.669	1.921	Open Manhole	1200	3.001	43.748	300	3.000	43.748	300	
19	45.822	2.190	Open Manhole	1200	3.002	43.632	300	3.001	43.632	300	
20	45.687	2.160	Open Manhole	1200	3.003	43.527	300	3.002	43.527	300	
21	45.428	2.701	Open Manhole	1200	3.004	42.727	300	3.003	42.727	300	
22	45.122	2.511	Open Manhole	1200	3.005	42.611	300	3.004	42.611	300	
23	45.184	2.801	Open Manhole	1500	1.014	42.383	450	1.013	42.383	450	
								3.005	42.534	300	1
24	43.600	1.425	Open Manhole	1500	4.000	42.175	225				
25	43.950	1.817	Open Manhole	1200	4.001	42.133	225	4.000	42.133	225	
26	43.672	1.706	Open Manhole	1500	4.002	41.966	300	4.001	42.041	225	
27	43.307	1.499	Open Manhole	1500	4.003	41.808	300	4.002	41.808	300	
28	42.228	1.574	Open Manhole	1500	4.004	40.654	375	4.003	40.729	300	
29	42.336	1.902	Open Manhole	1800	1.015	40.434	525	1.014	40.507	450	
								4.004	40.584	375	
30	41.984	2.484	Junction		1.016	39.500	525	1.015	40.392	525	892
31	41.089	1.953	Open Manhole	2400	1.017	39.136	225	1.016	39.136	525	
32	39.828	1.425	Open Manhole	1200	1.018	38.403	225	1.017	38.403	225	
33	39.051	1.425	Open Manhole	1200	1.019	37.626	225	1.018	37.626	225	
34	38.728	1.426	Open Manhole	1200	1.020	37.303	225	1.019	37.303	225	
35	38.087	1.425	Open Manhole	0		OUTFALL		1.020	36.662	225	

PIPELINE SCHEDULES for 7866 SW01.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	1	47.417	45.500	1.617	Open Manhole	1500
1.001	o	300	2	47.042	45.125	1.617	Open Manhole	1500
1.002	o	375	3	46.643	44.651	1.617	Open Manhole	1500
1.003	o	375	4	46.623	44.506	1.742	Open Manhole	1500
1.004	o	375	5	46.986	44.251	2.360	Open Manhole	1500
2.000	o	225	6	47.612	46.187	1.200	Open Manhole	1500
2.001	o	225	7	47.574	46.093	1.256	Open Manhole	1500
1.005	o	375	8	47.300	44.145	2.780	Open Manhole	1500
1.006	o	450	9	48.143	43.819	3.874	Open Manhole	1500
1.007	o	450	10	48.332	43.714	4.168	Open Manhole	1500
1.008	o	450	11	48.369	43.613	4.306	Open Manhole	1500
1.009	o	450	12	48.176	43.520	4.206	Open Manhole	1500
1.010	o	450	13	47.731	43.403	3.878	Open Manhole	1500
1.011	o	450	14	47.460	43.335	3.675	Open Manhole	1500
1.012	o	450	15	46.831	43.184	3.197	Open Manhole	1500
1.013	o	450	16	46.306	43.093	2.763	Open Manhole	1500
3.000	o	300	17	45.256	43.831	1.125	Open Manhole	1500
3.001	o	300	18	45.669	43.748	1.621	Open Manhole	1200
3.002	o	300	19	45.822	43.632	1.890	Open Manhole	1200
3.003	o	300	20	45.687	43.527	1.860	Open Manhole	1200
3.004	o	300	21	45.428	42.727	2.401	Open Manhole	1200
3.005	o	300	22	45.122	42.611	2.211	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	30.736	82.0	2	47.042	45.125	1.617	Open Manhole	1500
1.001	32.110	80.5	3	46.643	44.726	1.617	Open Manhole	1500
1.002	24.292	167.5	4	46.623	44.506	1.742	Open Manhole	1500
1.003	37.911	148.7	5	46.986	44.251	2.360	Open Manhole	1500
1.004	25.557	241.1	8	47.300	44.145	2.780	Open Manhole	1500
2.000	15.945	169.6	7	47.574	46.093	1.256	Open Manhole	1500
2.001	31.421	144.1	8	47.300	45.875	1.200	Open Manhole	1500
1.005	67.048	205.7	9	48.143	43.819	3.949	Open Manhole	1500
1.006	15.767	150.2	10	48.332	43.714	4.168	Open Manhole	1500
1.007	15.163	150.1	11	48.369	43.613	4.306	Open Manhole	1500
1.008	13.882	149.3	12	48.176	43.520	4.206	Open Manhole	1500
1.009	17.523	149.8	13	47.731	43.403	3.878	Open Manhole	1500
1.010	10.136	149.1	14	47.460	43.335	3.675	Open Manhole	1500
1.011	22.664	150.1	15	46.831	43.184	3.197	Open Manhole	1500
1.012	13.667	150.2	16	46.306	43.093	2.763	Open Manhole	1500
1.013	29.036	40.9	23	45.184	42.383	2.351	Open Manhole	1500
3.000	14.160	170.6	18	45.669	43.748	1.621	Open Manhole	1200
3.001	19.369	167.3	19	45.822	43.632	1.890	Open Manhole	1200
3.002	17.616	167.1	20	45.687	43.527	1.860	Open Manhole	1200
3.003	20.499	25.6	21	45.428	42.727	2.401	Open Manhole	1200
3.004	27.938	241.9	22	45.122	42.611	2.211	Open Manhole	1200
3.005	18.637	241.9	23	45.184	42.534	2.350	Open Manhole	1500

PIPELINE SCHEDULES for 7866 SW01.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.014	o	450	23	45.184	42.383	2.351	Open Manhole	1500
4.000	o	225	24	43.600	42.175	1.200	Open Manhole	1500
4.001	o	225	25	43.950	42.133	1.592	Open Manhole	1200
4.002	o	300	26	43.672	41.966	1.406	Open Manhole	1500
4.003	o	300	27	43.307	41.808	1.199	Open Manhole	1500
4.004	o	375	28	42.228	40.654	1.199	Open Manhole	1500
1.015	o	525	29	42.336	40.434	1.377	Open Manhole	1800
1.016	o	525	30	41.984	39.500	1.959	Junction	
1.017	o	225	31	41.089	39.136	1.728	Open Manhole	2400
1.018	o	225	32	39.828	38.403	1.200	Open Manhole	1200
1.019	o	225	33	39.051	37.626	1.200	Open Manhole	1200
1.020	o	225	34	38.728	37.303	1.201	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.014	45.715	24.4	29	42.336	40.507	1.379	Open Manhole	1800
4.000	7.126	169.7	25	43.950	42.133	1.592	Open Manhole	1200
4.001	15.695	169.7	26	43.672	42.041	1.407	Open Manhole	1500
4.002	12.372	78.3	27	43.307	41.808	1.199	Open Manhole	1500
4.003	45.308	42.0	28	42.228	40.729	1.199	Open Manhole	1500
4.004	16.773	239.6	29	42.336	40.584	1.377	Open Manhole	1800
1.015	15.379	366.2	30	41.984	40.392	1.067	Junction	
1.016	72.858	200.2	31	41.089	39.136	1.428	Open Manhole	2400
1.017	12.111	16.5	32	39.828	38.403	1.200	Open Manhole	1200
1.018	56.795	73.1	33	39.051	37.626	1.200	Open Manhole	1200
1.019	52.602	162.9	34	38.728	37.303	1.201	Open Manhole	1200
1.020	21.416	33.4	35	38.087	36.662	1.200	Open Manhole	0

Free Flowing Outfall Details for 7866 SW01.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.020	35	38.087	36.662	0.000	0	0

Simulation Criteria for 7866 SW01.SWS

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 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)	17.000	Storm Duration (mins)	30
Ratio R	0.350		

Online Controls for 7866 SW01.SWS

Hydro-Brake® Optimum Manhole: 31, DS/PN: 1.017, Volume (m³): 24.3

Unit Reference	MD-SHE-0164-1350-1200-1350
Design Head (m)	1.200
Design Flow (l/s)	13.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	164
Invert Level (m)	39.136
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)	1.200	13.5	Kick-Flo®	0.796	11.1
Flush-Flo™	0.360	13.5	Mean Flow over Head Range	-	11.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.9	0.800	11.2	2.000	17.2	4.000	24.0	7.000	31.4
0.200	12.7	1.000	12.4	2.200	18.0	4.500	25.4	7.500	32.4
0.300	13.4	1.200	13.5	2.400	18.8	5.000	26.7	8.000	33.5
0.400	13.5	1.400	14.5	2.600	19.5	5.500	27.9	8.500	34.5
0.500	13.3	1.600	15.5	3.000	20.9	6.000	29.1	9.000	35.4
0.600	12.9	1.800	16.4	3.500	22.5	6.500	30.3	9.500	36.4

Storage Structures for 7866 SW01.SWS

Tank or Pond Manhole: 31, DS/PN: 1.017

Invert Level (m) 39.136

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	670.0	1.200	1240.0	2.400	0.0	3.600	0.0	4.800	0.0
0.200	760.0	1.400	1350.0	2.600	0.0	3.800	0.0	5.000	0.0
0.400	850.0	1.401	0.0	2.800	0.0	4.000	0.0		
0.600	940.0	1.800	0.0	3.000	0.0	4.200	0.0		
0.800	1040.0	2.000	0.0	3.200	0.0	4.400	0.0		
1.000	1140.0	2.200	0.0	3.400	0.0	4.600	0.0		

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.000	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.350	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	1	15 Winter	1	+0%	100/15 Summer				45.559	-0.241	0.000
1.001	2	15 Winter	1	+0%	100/15 Summer				45.202	-0.223	0.000
1.002	3	15 Winter	1	+0%	100/15 Summer				44.759	-0.267	0.000
1.003	4	15 Winter	1	+0%	100/15 Summer				44.622	-0.259	0.000
1.004	5	15 Winter	1	+0%	30/15 Summer				44.402	-0.224	0.000
2.000	6	15 Winter	1	+0%	100/15 Summer				46.266	-0.146	0.000
2.001	7	15 Winter	1	+0%	30/15 Winter				46.194	-0.124	0.000
1.005	8	15 Winter	1	+0%	30/15 Summer				44.324	-0.196	0.000
1.006	9	15 Winter	1	+0%	30/15 Summer				44.004	-0.265	0.000
1.007	10	15 Winter	1	+0%	30/15 Summer				43.910	-0.254	0.000
1.008	11	15 Winter	1	+0%	30/15 Summer				43.823	-0.240	0.000
1.009	12	15 Winter	1	+0%	30/15 Summer				43.724	-0.246	0.000
1.010	13	15 Winter	1	+0%	30/15 Summer				43.632	-0.221	0.000
1.011	14	15 Winter	1	+0%	30/15 Winter				43.539	-0.246	0.000
1.012	15	15 Winter	1	+0%	30/15 Summer				43.420	-0.214	0.000
1.013	16	15 Winter	1	+0%	100/15 Winter				43.237	-0.306	0.000
3.000	17	15 Winter	1	+0%	100/15 Summer				43.904	-0.227	0.000
3.001	18	15 Winter	1	+0%	100/15 Summer				43.845	-0.203	0.000
3.002	19	15 Winter	1	+0%	100/15 Summer				43.750	-0.182	0.000
3.003	20	15 Winter	1	+0%	100/15 Summer				43.607	-0.219	0.000
3.004	21	15 Winter	1	+0%	30/15 Summer				42.895	-0.132	0.000
3.005	22	15 Winter	1	+0%	30/15 Summer				42.802	-0.109	0.000
1.014	23	15 Winter	1	+0%	100/15 Summer				42.532	-0.301	0.000
4.000	24	15 Winter	1	+0%	30/15 Summer				42.265	-0.135	0.000
4.001	25	15 Winter	1	+0%	30/15 Summer				42.243	-0.115	0.000
4.002	26	15 Winter	1	+0%	100/15 Summer				42.066	-0.200	0.000
4.003	27	15 Winter	1	+0%	100/15 Summer				41.898	-0.210	0.000
4.004	28	15 Winter	1	+0%	30/15 Summer				40.907	-0.122	0.000

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.08		9.3	OK	
1.001	2	0.15		16.8	OK	
1.002	3	0.18		24.1	OK	
1.003	4	0.21		30.9	OK	
1.004	5	0.34		37.6	OK	
2.000	6	0.26		9.3	OK	
2.001	7	0.42		16.8	OK	
1.005	8	0.45		58.8	OK	
1.006	9	0.35		64.6	OK	
1.007	10	0.39		70.2	OK	
1.008	11	0.44		75.4	OK	
1.009	12	0.42		81.2	OK	
1.010	13	0.51		86.7	OK	
1.011	14	0.42		91.9	OK	
1.012	15	0.54		91.5	OK	
1.013	16	0.22		96.2	OK	
3.000	17	0.13		9.4	OK	
3.001	18	0.23		16.8	OK	
3.002	19	0.33		24.1	OK	
3.003	20	0.16		31.3	OK	
3.004	21	0.59		38.0	OK	
3.005	22	0.73		44.9	OK	
1.014	23	0.24		141.8	OK	
4.000	24	0.31		9.3	OK	
4.001	25	0.48		16.7	OK	
4.002	26	0.24		24.1	OK	
4.003	27	0.20		31.4	OK	
4.004	28	0.35		36.8	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)
1.015	29	15 Winter	1	+0%	30/15 Summer				40.873	-0.086	0.000
1.016	30	15 Winter	1	+0%	30/15 Summer				39.762	-0.263	0.000
1.017	31	360 Winter	1	+0%	1/120 Summer				39.416	0.056	0.000
1.018	32	360 Winter	1	+0%					38.473	-0.155	0.000
1.019	33	360 Winter	1	+0%					37.713	-0.138	0.000
1.020	34	360 Winter	1	+0%					37.361	-0.167	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.015	29	1.00		170.5	OK	
1.016	30	0.50		170.4	OK*	
1.017	31	0.11		12.6	SURCHARGED	
1.018	32	0.21		12.6	OK	
1.019	33	0.32		12.6	OK	
1.020	34	0.15		12.6	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.000	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.350	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	1	15 Winter	30	+0%	100/15 Summer				45.593	-0.207	0.000
1.001	2	15 Winter	30	+0%	100/15 Summer				45.258	-0.167	0.000
1.002	3	15 Winter	30	+0%	100/15 Summer				44.862	-0.164	0.000
1.003	4	15 Winter	30	+0%	100/15 Summer				44.815	-0.066	0.000
1.004	5	15 Winter	30	+0%	30/15 Summer				44.750	0.124	0.000
2.000	6	15 Winter	30	+0%	100/15 Summer				46.369	-0.043	0.000
2.001	7	15 Winter	30	+0%	30/15 Winter				46.327	0.009	0.000
1.005	8	15 Winter	30	+0%	30/15 Summer				44.666	0.146	0.000
1.006	9	15 Winter	30	+0%	30/15 Summer				44.363	0.094	0.000
1.007	10	15 Winter	30	+0%	30/15 Summer				44.245	0.081	0.000
1.008	11	15 Winter	30	+0%	30/15 Summer				44.116	0.053	0.000
1.009	12	15 Winter	30	+0%	30/15 Summer				44.006	0.036	0.000
1.010	13	15 Winter	30	+0%	30/15 Summer				43.888	0.035	0.000
1.011	14	15 Winter	30	+0%	30/15 Winter				43.785	0.000	0.000
1.012	15	15 Winter	30	+0%	30/15 Summer				43.652	0.018	0.000
1.013	16	15 Winter	30	+0%	100/15 Winter				43.319	-0.224	0.000
3.000	17	15 Winter	30	+0%	100/15 Summer				43.957	-0.174	0.000
3.001	18	15 Winter	30	+0%	100/15 Summer				43.920	-0.128	0.000
3.002	19	15 Winter	30	+0%	100/15 Summer				43.859	-0.073	0.000
3.003	20	15 Winter	30	+0%	100/15 Summer				43.671	-0.155	0.000
3.004	21	15 Winter	30	+0%	30/15 Summer				43.453	0.426	0.000
3.005	22	15 Winter	30	+0%	30/15 Summer				43.142	0.231	0.000
1.014	23	15 Winter	30	+0%	100/15 Summer				42.636	-0.197	0.000
4.000	24	15 Winter	30	+0%	30/15 Summer				42.462	0.062	0.000
4.001	25	15 Winter	30	+0%	30/15 Summer				42.404	0.046	0.000
4.002	26	15 Winter	30	+0%	100/15 Summer				42.146	-0.120	0.000
4.003	27	15 Winter	30	+0%	100/15 Summer				41.966	-0.142	0.000
4.004	28	15 Winter	30	+0%	30/15 Summer				41.314	0.285	0.000

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.20		22.8	OK	
1.001	2	0.40		44.8	OK	
1.002	3	0.50		66.1	OK	
1.003	4	0.56		83.7	OK	
1.004	5	0.79		87.6	SURCHARGED	
2.000	6	0.63		22.1	OK	
2.001	7	1.03		41.7	SURCHARGED	
1.005	8	1.05		137.7	SURCHARGED	
1.006	9	0.78		142.6	SURCHARGED	
1.007	10	0.84		151.3	SURCHARGED	
1.008	11	0.94		161.3	SURCHARGED	
1.009	12	0.89		172.0	SURCHARGED	
1.010	13	1.07		181.3	SURCHARGED	
1.011	14	0.88		191.7	SURCHARGED	
1.012	15	1.14		193.9	SURCHARGED	
1.013	16	0.49		212.1	OK	
3.000	17	0.33		22.9	OK	
3.001	18	0.60		44.9	OK	
3.002	19	0.90		66.3	OK	
3.003	20	0.45		87.4	OK	
3.004	21	1.64		105.2	SURCHARGED	
3.005	22	1.99		122.5	SURCHARGED	
1.014	23	0.59		351.5	OK	
4.000	24	0.77		22.9	SURCHARGED	
4.001	25	1.24		43.5	SURCHARGED	
4.002	26	0.64		64.1	OK	
4.003	27	0.53		85.2	OK	
4.004	28	0.97		101.8	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.015	29	15 Winter	30	+0%	30/15 Summer				41.230	0.271	0.000
1.016	30	15 Winter	30	+0%	30/15 Summer				40.253	0.228	0.000
1.017	31	360 Winter	30	+0%	1/120 Summer				39.823	0.463	0.000
1.018	32	1440 Winter	30	+0%					38.475	-0.153	0.000
1.019	33	1440 Summer	30	+0%					37.716	-0.135	0.000
1.020	34	1440 Summer	30	+0%					37.363	-0.165	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.015	29	2.62		447.2	SURCHARGED	
1.016	30	1.28		437.5	SURCHARGED*	
1.017	31	0.12		13.3	SURCHARGED	
1.018	32	0.23		13.3	OK	
1.019	33	0.34		13.3	OK	
1.020	34	0.16		13.3	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.000	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.350	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	1	15 Winter	100	+40%	100/15 Summer				46.588	0.788	0.000
1.001	2	15 Winter	100	+40%	100/15 Summer				46.531	1.106	0.000
1.002	3	15 Winter	100	+40%	100/15 Summer				46.385	1.359	0.000
1.003	4	15 Winter	100	+40%	100/15 Summer				46.269	1.388	0.000
1.004	5	15 Winter	100	+40%	30/15 Summer				46.142	1.516	0.000
2.000	6	15 Winter	100	+40%	100/15 Summer				46.899	0.487	0.000
2.001	7	15 Winter	100	+40%	30/15 Winter				46.788	0.470	0.000
1.005	8	15 Winter	100	+40%	30/15 Summer				46.044	1.524	0.000
1.006	9	15 Winter	100	+40%	30/15 Summer				45.377	1.108	0.000
1.007	10	15 Winter	100	+40%	30/15 Summer				45.243	1.079	0.000
1.008	11	15 Winter	100	+40%	30/15 Summer				45.071	1.008	0.000
1.009	12	15 Winter	100	+40%	30/15 Summer				44.873	0.903	0.000
1.010	13	15 Winter	100	+40%	30/15 Summer				44.636	0.783	0.000
1.011	14	15 Winter	100	+40%	30/15 Winter				44.352	0.567	0.000
1.012	15	15 Winter	100	+40%	30/15 Summer				44.016	0.382	0.000
1.013	16	15 Winter	100	+40%	100/15 Winter				43.688	0.145	0.000
3.000	17	15 Winter	100	+40%	100/15 Summer				44.926	0.795	0.000
3.001	18	15 Winter	100	+40%	100/15 Summer				44.845	0.797	0.000
3.002	19	15 Winter	100	+40%	100/15 Summer				44.758	0.825	0.000
3.003	20	15 Winter	100	+40%	100/15 Summer				44.606	0.779	0.000
3.004	21	15 Winter	100	+40%	30/15 Summer				44.316	1.289	0.000
3.005	22	15 Winter	100	+40%	30/15 Summer				43.788	0.877	0.000
1.014	23	15 Winter	100	+40%	100/15 Summer				43.241	0.408	0.000
4.000	24	15 Winter	100	+40%	30/15 Summer				43.029	0.629	0.000
4.001	25	15 Winter	100	+40%	30/15 Summer				42.969	0.611	0.000
4.002	26	15 Winter	100	+40%	100/15 Summer				42.634	0.368	0.000
4.003	27	15 Winter	100	+40%	100/15 Summer				42.481	0.373	0.000
4.004	28	15 Winter	100	+40%	30/15 Summer				41.863	0.834	0.000

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.33		36.9	SURCHARGED	
1.001	2	0.62		70.6	SURCHARGED	
1.002	3	0.60		79.6	FLOOD RISK	
1.003	4	0.62		91.3	SURCHARGED	
1.004	5	1.00		111.7	SURCHARGED	
2.000	6	1.10		38.6	SURCHARGED	
2.001	7	1.76		71.0	SURCHARGED	
1.005	8	1.46		191.1	SURCHARGED	
1.006	9	1.16		211.0	SURCHARGED	
1.007	10	1.29		230.5	SURCHARGED	
1.008	11	1.49		256.3	SURCHARGED	
1.009	12	1.46		282.1	SURCHARGED	
1.010	13	1.82		307.5	SURCHARGED	
1.011	14	1.53		332.4	SURCHARGED	
1.012	15	1.94		330.2	SURCHARGED	
1.013	16	0.79		343.6	SURCHARGED	
3.000	17	0.46		32.1	SURCHARGED	
3.001	18	0.79		59.1	SURCHARGED	
3.002	19	1.21		88.6	SURCHARGED	
3.003	20	0.62		118.7	SURCHARGED	
3.004	21	2.30		147.5	SURCHARGED	
3.005	22	2.88		177.3	SURCHARGED	
1.014	23	0.89		527.1	SURCHARGED	
4.000	24	1.21		36.2	SURCHARGED	
4.001	25	1.92		67.5	SURCHARGED	
4.002	26	0.97		97.0	SURCHARGED	
4.003	27	0.80		128.3	SURCHARGED	
4.004	28	1.48		155.8	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW01.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)
1.015	29	15 Winter	100	+40%	30/15 Summer				41.741	0.782	0.000
1.016	30	15 Winter	100	+40%	30/15 Summer				40.917	0.892	0.000
1.017	31	600 Winter	100	+40%	1/120 Summer				40.397	1.036	0.000
1.018	32	600 Winter	100	+40%					38.476	-0.151	0.000
1.019	33	600 Winter	100	+40%					37.718	-0.133	0.000
1.020	34	600 Winter	100	+40%					37.364	-0.163	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.015	29	3.88		662.4	SURCHARGED	
1.016	30	1.92		657.8	SURCHARGED*	
1.017	31	0.13		13.8	SURCHARGED	
1.018	32	0.24		13.8	OK	
1.019	33	0.35		13.8	OK	
1.020	34	0.17		13.8	OK	