STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for QD1776_SW 23 02 23.sws

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	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)	500

Designed with Level Soffits

Network Design Table for QD1776_SW 23 02 23.sws

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	26.265	1.225	21.4	0.040	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	22.209	0.900	24.7	0.063	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	30.423	1.450	21.0	0.126	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	20.491	1.100	18.6	0.114	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	23.535	1.190	19.8	0.026	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	39.488	0.715	55.2	0.075	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	7.290	0.100	72.9	0.111	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	63.911	4.105	15.6	0.060	0.00	0.0	0.600	o	375	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	50.00	4.20	104.425	0.040	0.0	0.0	0.0	2.18	38.6	5.4
1.001	50.00	4.38	103.200	0.103	0.0	0.0	0.0	2.04	36.0	13.9
1.002	50.00	4.56	102.225	0.229	0.0	0.0	0.0	2.87	114.1	31.0
1.003	50.00	4.65	100.700	0.343	0.0	0.0	0.0	3.66	258.7	46.4
1.004	49.63	4.76	99.600	0.369	0.0	0.0	0.0	3.55	251.0	49.6
2.000	50.00	4.37	99.200	0.075	0.0	0.0	0.0	1.76	70.1	10.2
1.005	49.39	4.82	98.335	0.555	0.0	0.0	0.0	2.12	234.6	74.2
1.006	48.45	5.05	98.235	0.615	0.0	0.0	0.0	4.61	509.4	80.7

Network Design Table for QD1776_SW 23 02 23.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
3.000	44.367	0.800	55.5	0.161	4.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	13.601	0.805	16.9	0.072	4.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	53.279	1.900	28.0	0.107	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	12.888	0.450	28.6	0.044	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.003	57.541	1.700	33.8	0.128	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.004	72.834	0.470	155.0	0.283	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.007	7.812	0.070	111.6	0.027	0.00	0.0	0.600	o	600	Pipe/Conduit	
5.000	76.872	2.340	32.9	0.188	4.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	31.530	1.200	26.3	0.206	4.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	28.580	1.000	28.6	0.119	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.002	33.395	1.000	33.4	0.103	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.003	21.008	0.125	168.1	0.133	0.00	0.0	0.600	o	675	Pipe/Conduit	
5.004	58.463	0.240	243.6	0.140	0.00	0.0	0.600	o	675	Pipe/Conduit	
5.005	20.216	0.070	288.8	0.132	0.00	0.0	0.600	o	675	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)
3.000	50.00	4.42	99.600	0.161	0.0	0.0	0.0	1.76	70.0	21.8
4.000	50.00	4.07	99.605	0.072	0.0	0.0	0.0	3.20	127.2	9.7
3.001	49.82	4.72	98.725	0.340	0.0	0.0	0.0	2.98	210.7	45.9
3.002	49.52	4.79	96.825	0.384	0.0	0.0	0.0	2.95	208.5	51.5
3.003	48.39	5.06	96.225	0.512	0.0	0.0	0.0	3.50	557.3	67.1
3.004	46.05	5.69	94.375	0.795	0.0	0.0	0.0	1.95	552.4	99.1
1.007	45.85	5.74	93.905	1.437	0.0	0.0	0.0	2.30	651.6	178.4
5.000	50.00	4.56	98.985	0.188	0.0	0.0	0.0	2.29	91.1	25.5
6.000	50.00	4.21	97.845	0.206	0.0	0.0	0.0	2.56	101.9	27.9
5.001	49.90	4.70	96.495	0.513	0.0	0.0	0.0	3.40	375.6	69.3
5.002	49.16	4.88	95.495	0.616	0.0	0.0	0.0	3.14	347.3	82.0
5.003	48.45	5.05	94.195	0.749	0.0	0.0	0.0	2.02	722.5	98.3
5.004	46.24	5.63	94.070	0.889	0.0	0.0	0.0	1.67	599.3	111.3
5.005	45.47	5.85	93.830	1.021	0.0	0.0	0.0	1.54	550.1	125.7

Network Design Table for QD1776_SW 23 02 23.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
1.008	62.172	0.300	207.2	0.069	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.009	41.197	0.085	484.7	0.143	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.010	4.300#	0.010	430.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.011	2.638	0.015	175.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.012	5.283	0.010	528.3	0.000	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.013	19.813	0.045	440.3	0.000	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.014	47.077	0.195	241.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.015	10.024	0.425	23.6	0.000	0.00	0.0	0.600	o	300	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)
1.008	43.71	6.38	93.685	2.527	0.0	0.0	0.0	1.94	857.2	299.2
1.009	42.08	6.93	93.385	2.670	0.0	0.0	0.0	1.26	558.6	304.3
1.010	41.92	6.98	93.300	2.670	0.0	0.0	0.0	1.34	593.4	304.3
1.011	41.82	7.02	92.600	2.670	0.0	0.0	0.0	1.18	83.6«	304.3
1.012	41.64	7.08	91.985	2.670	0.0	0.0	0.0	1.36	862.8	304.3
1.013	41.02	7.31	91.975	2.670	0.0	0.0	0.0	1.49	945.8	304.3
1.014	39.03	8.08	91.880	2.670	0.0	0.0	0.0	1.01	71.2«	304.3
1.015	38.91	8.14	91.685	2.670	0.0	0.0	0.0	3.25	229.8«	304.3

Manhole Schedules for QD1776_SW 23 02 23.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)
S1	105.862	1.437	Open Manhole	1500	1.000	104.425	150				
S2	104.590	1.390	Open Manhole	1500	1.001	103.200	150	1.000	103.200	150	
S3	103.733	1.508	Open Manhole	1500	1.002	102.225	225	1.001	102.300	150	
S4	102.249	1.549	Open Manhole	1500	1.003	100.700	300	1.002	100.775	225	
S5	101.149	1.549	Open Manhole	1500	1.004	99.600	300	1.003	99.600	300	
S6	100.632	1.432	Open Manhole	1500	2.000	99.200	225				
S7	100.223	1.888	Open Manhole	1800	1.005	98.335	375	1.004	98.410	300	
								2.000	98.485	225	
S8	100.129	1.894	Open Manhole	1800	1.006	98.235	375	1.005	98.235	375	
S9	101.089	1.489	Open Manhole	1500	3.000	99.600	225				
S10	101.037	1.432	Open Manhole	1500	4.000	99.605	225				
S11	100.716	1.991	Open Manhole	1500	3.001	98.725	300	3.000	98.800	225	
								4.000	98.800	225	
S12	98.331	1.506	Open Manhole	1500	3.002	96.825	300	3.001	96.825	300	
S13	97.976	1.751	Open Manhole	1500	3.003	96.225	450	3.002	96.375	300	
S14	96.299	1.924	Open Manhole	1800	3.004	94.375	600	3.003	94.525	450	
S15	97.032	3.127	Open Manhole	2100	1.007	93.905	600	1.006	94.130	375	
								3.004	93.905	600	
S16	100.414	1.429	Open Manhole	1500	5.000	98.985	225				
S17	99.274	1.429	Open Manhole	1800	6.000	97.845	225				
S18	98.206	1.711	Open Manhole	1800	5.001	96.495	375	5.000	96.645	225	
								6.000	96.645	225	
S19	97.050	1.555	Open Manhole	1800	5.002	95.495	375	5.001	95.495	375	
S20	96.467	2.272	Open Manhole	1800	5.003	94.195	675	5.002	94.495	375	
S21	96.294	2.224	Open Manhole	1800	5.004	94.070	675	5.003	94.070	675	
S22	97.030	3.200	Open Manhole	1800	5.005	93.830	675	5.004	93.830	675	
S23	97.102	3.417	Open Manhole	2100	1.008	93.685	750	1.007	93.835	600	
								5.005	93.760	675	
S24	95.980	2.595	Open Manhole	2100	1.009	93.385	750	1.008	93.385	750	
S25	95.800	2.500	Open Manhole	1800	1.010	93.300	750	1.009	93.300	750	
TANK	95.800	3.200	Open Manhole	1800	1.011	92.600	300	1.010	93.290	750	1140
S25A	95.800	3.815	Open Manhole	1800	1.012	91.985	900	1.011	92.585	300	
S25B	95.800	3.825	Open Manhole	1800	1.013	91.975	900	1.012	91.975	900	
S26_FC	95.200	3.320	Open Manhole	2400	1.014	91.880	300	1.013	91.930	900	650
S27	95.000	3.315	Open Manhole	1200	1.015	91.685	300	1.014	91.685	300	
S28	92.500	1.240	Open Manhole	0		OUTFALL		1.015	91.260	300	

Manhole Schedules for QD1776_SW 23 02 23.sws

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	418351.667	425173.178	418351.667	425173.178	Required	
S2	418357.996	425147.687	418357.996	425147.687	Required	
S3	418367.084	425127.423	418367.084	425127.423	Required	
S4	418374.133	425097.828	418374.133	425097.828	Required	
S5	418375.635	425077.392	418375.635	425077.392	Required	
S6	418342.548	425045.109	418342.548	425045.109	Required	
S7	418380.914	425054.456	418380.914	425054.456	Required	
S8	418388.022	425056.073	418388.022	425056.073	Required	
S9	418309.347	425038.718	418309.347	425038.718	Required	
S10	418264.512	425041.033	418264.512	425041.033	Required	
S11	418266.405	425027.564	418266.405	425027.564	Required	
S12	418279.143	424975.830	418279.143	424975.830	Required	
S13	418282.224	424963.316	418282.224	424963.316	Required	
S14	418338.021	424977.379	418338.021	424977.379	Required	
S15	418408.552	424995.549	418408.552	424995.549	Required	

Manhole Schedules for QD1776_SW 23 02 23.sws

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S16	418419.487	425071.858	418419.487	425071.858	Required	
S17	418486.420	425118.964	418486.420	425118.964	Required	
S18	418494.537	425088.497	418494.537	425088.497	Required	
S19	418502.177	425060.957	418502.177	425060.957	Required	
S20	418510.163	425028.531	418510.163	425028.531	Required	
S21	418489.933	425022.864	418489.933	425022.864	Required	
S22	418433.406	425007.945	418433.406	425007.945	Required	
S23	418416.131	424997.443	418416.131	424997.443	Required	
S24	418431.205	424937.126	418431.205	424937.126	Required	
S25	418438.227	424896.532	418438.227	424896.532	Required	
TANK	418444.135	424869.280	418444.135	424869.280	Required	
S25A	418444.718	424866.707	418444.718	424866.707	Required	
S25B	418449.870	424867.874	418449.870	424867.874	Required	
S26_FC	418450.837	424887.663	418450.837	424887.663	Required	
S27	418488.819	424915.477	418488.819	424915.477	Required	

Manhole Schedules for QD1776_SW 23 02 23.sws

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S28	418490.331	424925.386			No Entry	

PIPELINE SCHEDULES for QD1776 SW 23 02 23.sws

Upstream Manhole

- Indicates pipe length does not match coordinates

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	150	S1	105.862	104.425	1.287	Open Manhole	1500
1.001	o	150	S2	104.590	103.200	1.240	Open Manhole	1500
1.002	o	225	S3	103.733	102.225	1.283	Open Manhole	1500
1.003	o	300	S4	102.249	100.700	1.249	Open Manhole	1500
1.004	o	300	S5	101.149	99.600	1.249	Open Manhole	1500
2.000	o	225	S6	100.632	99.200	1.207	Open Manhole	1500
1.005	o	375	S7	100.223	98.335	1.513	Open Manhole	1800
1.006	o	375	S8	100.129	98.235	1.519	Open Manhole	1800
3.000	o	225	S9	101.089	99.600	1.264	Open Manhole	1500
4.000	o	225	S10	101.037	99.605	1.207	Open Manhole	1500
3.001	o	300	S11	100.716	98.725	1.691	Open Manhole	1500
3.002	o	300	S12	98.331	96.825	1.206	Open Manhole	1500
3.003	o	450	S13	97.976	96.225	1.301	Open Manhole	1500
3.004	o	600	S14	96.299	94.375	1.324	Open Manhole	1800

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	26.265	21.4	S2	104.590	103.200	1.240	Open Manhole	1500
1.001	22.209	24.7	S3	103.733	102.300	1.283	Open Manhole	1500
1.002	30.423	21.0	S4	102.249	100.775	1.249	Open Manhole	1500
1.003	20.491	18.6	S5	101.149	99.600	1.249	Open Manhole	1500
1.004	23.535	19.8	S7	100.223	98.410	1.513	Open Manhole	1800
2.000	39.488	55.2	S7	100.223	98.485	1.513	Open Manhole	1800
1.005	7.290	72.9	S8	100.129	98.235	1.519	Open Manhole	1800
1.006	63.911	15.6	S15	97.032	94.130	2.527	Open Manhole	2100
3.000	44.367	55.5	S11	100.716	98.800	1.691	Open Manhole	1500
4.000	13.601	16.9	S11	100.716	98.800	1.691	Open Manhole	1500
3.001	53.279	28.0	S12	98.331	96.825	1.206	Open Manhole	1500
3.002	12.888	28.6	S13	97.976	96.375	1.301	Open Manhole	1500
3.003	57.541	33.8	S14	96.299	94.525	1.324	Open Manhole	1800
3.004	72.834	155.0	S15	97.032	93.905	2.527	Open Manhole	2100

PIPELINE SCHEDULES for QD1776 SW 23 02 23.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)
1.007	o	600	S15	97.032	93.905	2.527	Open Manhole	2100
5.000	o	225	S16	100.414	98.985	1.204	Open Manhole	1500
6.000	o	225	S17	99.274	97.845	1.204	Open Manhole	1800
5.001	o	375	S18	98.206	96.495	1.336	Open Manhole	1800
5.002	o	375	S19	97.050	95.495	1.180	Open Manhole	1800
5.003	o	675	S20	96.467	94.195	1.597	Open Manhole	1800
5.004	o	675	S21	96.294	94.070	1.549	Open Manhole	1800
5.005	o	675	S22	97.030	93.830	2.525	Open Manhole	1800
1.008	o	750	S23	97.102	93.685	2.667	Open Manhole	2100
1.009	o	750	S24	95.980	93.385	1.845	Open Manhole	2100
1.010	o	750	S25	95.800	93.300	1.750	Open Manhole	1800
1.011	o	300	TANK	95.800	92.600	2.900	Open Manhole	1800
1.012	o	900	S25A	95.800	91.985	2.915	Open Manhole	1800
1.013	o	900	S25B	95.800	91.975	2.925	Open Manhole	1800
1.014	o	300	S26_FC	95.200	91.880	3.020	Open Manhole	2400
1.015	o	300	S27	95.000	91.685	3.015	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)
1.007	7.812	111.6	S23	97.102	93.835	2.667	Open Manhole	2100
5.000	76.872	32.9	S18	98.206	96.645	1.336	Open Manhole	1800
6.000	31.530	26.3	S18	98.206	96.645	1.336	Open Manhole	1800
5.001	28.580	28.6	S19	97.050	95.495	1.180	Open Manhole	1800
5.002	33.395	33.4	S20	96.467	94.495	1.597	Open Manhole	1800
5.003	21.008	168.1	S21	96.294	94.070	1.549	Open Manhole	1800
5.004	58.463	243.6	S22	97.030	93.830	2.525	Open Manhole	1800
5.005	20.216	288.8	S23	97.102	93.760	2.667	Open Manhole	2100
1.008	62.172	207.2	S24	95.980	93.385	1.845	Open Manhole	2100
1.009	41.197	484.7	S25	95.800	93.300	1.750	Open Manhole	1800
1.010	4.300#	430.0	TANK	95.800	93.290	1.760	Open Manhole	1800
1.011	2.638	175.9	S25A	95.800	92.585	2.915	Open Manhole	1800
1.012	5.283	528.3	S25B	95.800	91.975	2.925	Open Manhole	1800
1.013	19.813	440.3	S26_FC	95.200	91.930	2.370	Open Manhole	2400
1.014	47.077	241.4	S27	95.000	91.685	3.015	Open Manhole	1200
1.015	10.024	23.6	S28	92.500	91.260	0.940	Open Manhole	0

Free Flowing Outfall Details for QD1776_SW 23 02 23.sws

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015	S28	92.500	91.260	90.360	0	0

Simulation Criteria for QD1776_SW 23 02 23.sws

Volumetric Runoff Coeff	0.840	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)	5000
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	360
Ratio R	0.350		

Online Controls for QD1776_SW 23 02 23.sws

Hydro-Brake® Optimum Manhole: S26_FC, DS/PN: 1.014, Volume (m³): 26.3

Unit Reference	MD-SHE-0196-2500-2560-2500
Design Head (m)	2.560
Design Flow (l/s)	25.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	196
Invert Level (m)	91.880
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.560	25.0
Flush-Flo™	0.743	25.0
Kick-Flo®	1.548	19.7
Mean Flow over Head Range	-	21.8

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	6.8	1.200	23.7	3.000	27.0	7.000	40.5
0.200	18.3	1.400	21.9	3.500	29.0	7.500	41.9
0.300	21.8	1.600	20.0	4.000	30.9	8.000	43.2
0.400	23.4	1.800	21.1	4.500	32.7	8.500	44.5
0.500	24.3	2.000	22.2	5.000	34.5	9.000	45.8
0.600	24.8	2.200	23.2	5.500	36.1	9.500	47.0
0.800	24.9	2.400	24.2	6.000	37.6		
1.000	24.5	2.600	25.2	6.500	39.1		

Storage Structures for QD1776 SW 23 02 23.sws

Cellular Storage Manhole: TANK, DS/PN: 1.011

Invert Level (m) 92.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.97
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	796.7	0.0	1.841	0.0	0.0
1.840	796.7	0.0			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	1	+0%	100/15 Summer				104.463
1.001	S2	15 Winter	1	+0%	100/15 Summer				103.262
1.002	S3	15 Winter	1	+0%	100/15 Summer				102.300
1.003	S4	15 Winter	1	+0%					100.782
1.004	S5	15 Winter	1	+0%	100/15 Summer				99.687
2.000	S6	15 Winter	1	+0%					99.258
1.005	S7	15 Winter	1	+0%	30/15 Summer				98.525
1.006	S8	15 Winter	1	+0%					98.330
3.000	S9	15 Winter	1	+0%	100/15 Summer				99.688
4.000	S10	15 Winter	1	+0%					99.650
3.001	S11	15 Winter	1	+0%					98.819
3.002	S12	15 Winter	1	+0%	100/15 Summer				96.934
3.003	S13	15 Winter	1	+0%					96.328
3.004	S14	15 Winter	1	+0%	100/15 Summer				94.548
1.007	S15	15 Winter	1	+0%	30/15 Summer				94.192
5.000	S16	15 Winter	1	+0%	100/15 Summer				99.067
6.000	S17	15 Winter	1	+0%	100/15 Summer				97.928
5.001	S18	15 Winter	1	+0%	100/15 Summer				96.609
5.002	S19	15 Winter	1	+0%	100/15 Summer				95.621

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.112	0.000	0.15			5.4	OK	
1.001	S2	-0.088	0.000	0.36			12.2	OK	
1.002	S3	-0.150	0.000	0.24			25.6	OK	
1.003	S4	-0.218	0.000	0.17			37.6	OK	
1.004	S5	-0.213	0.000	0.18			40.5	OK	
2.000	S6	-0.167	0.000	0.15			10.1	OK	
1.005	S7	-0.185	0.000	0.50			62.2	OK	
1.006	S8	-0.280	0.000	0.14			68.9	OK	
3.000	S9	-0.137	0.000	0.33			21.8	OK	
4.000	S10	-0.180	0.000	0.09			9.7	OK	
3.001	S11	-0.206	0.000	0.21			42.8	OK	
3.002	S12	-0.191	0.000	0.28			47.1	OK	
3.003	S13	-0.347	0.000	0.12			61.2	OK	
3.004	S14	-0.427	0.000	0.18			89.6	OK	
1.007	S15	-0.313	0.000	0.46			159.4	OK	
5.000	S16	-0.143	0.000	0.29			25.4	OK	
6.000	S17	-0.142	0.000	0.29			27.9	OK	
5.001	S18	-0.261	0.000	0.20			66.1	OK	
5.002	S19	-0.249	0.000	0.25			76.8	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.003	S20	15 Winter	1	+0%	100/15 Summer				94.398
5.004	S21	15 Winter	1	+0%	100/15 Summer				94.276
5.005	S22	15 Winter	1	+0%	30/15 Winter				94.076
1.008	S23	15 Winter	1	+0%	30/15 Summer				94.005
1.009	S24	15 Winter	1	+0%	30/15 Summer				93.865
1.010	S25	15 Winter	1	+0%	30/15 Summer				93.786
1.011	TANK	240 Winter	1	+0%	30/15 Summer				92.895
1.012	S25A	120 Winter	1	+0%	30/15 Summer				92.874
1.013	S25B	60 Winter	1	+0%	30/15 Summer				92.843
1.014	S26_FC	60 Winter	1	+0%	1/15 Summer				92.803
1.015	S27	960 Winter	1	+0%					91.763

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
5.003	S20	-0.472	0.000	0.19			90.4	OK	
5.004	S21	-0.469	0.000	0.20			103.5	OK	
5.005	S22	-0.429	0.000	0.29			115.4	OK	
1.008	S23	-0.430	0.000	0.37			274.5	OK	
1.009	S24	-0.270	0.000	0.58			264.8	OK	
1.010	S25	-0.264	0.000	0.74			261.0	OK	
1.011	TANK	-0.005	0.000	0.85		117	44.5	OK	
1.012	S25A	-0.011	0.000	0.10			48.3	OK	
1.013	S25B	-0.032	0.000	0.07			43.7	OK	
1.014	S26_FC	0.623	0.000	0.37			24.9	SURCHARGED	
1.015	S27	-0.222	0.000	0.15			24.9	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

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

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	30	+0%	100/15 Summer				104.487
1.001	S2	15 Summer	30	+0%	100/15 Summer				103.333
1.002	S3	15 Winter	30	+0%	100/15 Summer				102.366
1.003	S4	15 Winter	30	+0%					100.850
1.004	S5	15 Winter	30	+0%	100/15 Summer				99.759
2.000	S6	15 Winter	30	+0%					99.295
1.005	S7	15 Winter	30	+0%	30/15 Summer				98.812
1.006	S8	15 Summer	30	+0%					98.405
3.000	S9	15 Winter	30	+0%	100/15 Summer				99.753
4.000	S10	15 Winter	30	+0%					99.676
3.001	S11	15 Winter	30	+0%					98.886
3.002	S12	15 Winter	30	+0%	100/15 Summer				97.021
3.003	S13	15 Winter	30	+0%					96.403
3.004	S14	15 Winter	30	+0%	100/15 Summer				94.728
1.007	S15	15 Winter	30	+0%	30/15 Summer				94.628
5.000	S16	15 Winter	30	+0%	100/15 Summer				99.125

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

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
1.000	S1	-0.088	0.000	0.36			13.3	OK	
1.001	S2	-0.017	0.000	1.00			34.0	OK	
1.002	S3	-0.084	0.000	0.71			75.7	OK	
1.003	S4	-0.150	0.000	0.50			113.3	OK	
1.004	S5	-0.141	0.000	0.55			121.8	OK	
2.000	S6	-0.130	0.000	0.37			24.8	OK	
1.005	S7	0.102	0.000	1.47			182.2	SURCHARGED	
1.006	S8	-0.205	0.000	0.42			200.0	OK	
3.000	S9	-0.072	0.000	0.79			53.0	OK	
4.000	S10	-0.154	0.000	0.22			23.9	OK	
3.001	S11	-0.139	0.000	0.56			111.6	OK	
3.002	S12	-0.104	0.000	0.75			125.5	OK	
3.003	S13	-0.272	0.000	0.32			165.6	OK	
3.004	S14	-0.247	0.000	0.49			246.9	OK	
1.007	S15	0.123	0.000	1.20			415.4	SURCHARGED	
5.000	S16	-0.085	0.000	0.69			61.5	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
6.000	S17	15 Winter	30	+0%	100/15 Summer				97.986
5.001	S18	15 Winter	30	+0%	100/15 Summer				96.686
5.002	S19	15 Winter	30	+0%	100/15 Summer				95.717
5.003	S20	15 Winter	30	+0%	100/15 Summer				94.693
5.004	S21	15 Winter	30	+0%	100/15 Summer				94.653
5.005	S22	15 Winter	30	+0%	30/15 Winter				94.536
1.008	S23	15 Winter	30	+0%	30/15 Summer				94.494
1.009	S24	15 Winter	30	+0%	30/15 Summer				94.307
1.010	S25	15 Winter	30	+0%	30/15 Summer				94.165
1.011	TANK	240 Winter	30	+0%	30/15 Summer				93.514
1.012	S25A	240 Winter	30	+0%	30/15 Summer				93.555
1.013	S25B	240 Winter	30	+0%	30/15 Summer				93.565
1.014	S26_FC	240 Winter	30	+0%	1/15 Summer				93.570
1.015	S27	1440 Winter	30	+0%					91.763

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
6.000	S17	-0.084	0.000	0.72			68.2	OK	
5.001	S18	-0.184	0.000	0.51			168.9	OK	
5.002	S19	-0.153	0.000	0.65			202.7	OK	
5.003	S20	-0.177	0.000	0.53			246.0	OK	
5.004	S21	-0.092	0.000	0.51			267.7	OK	
5.005	S22	0.031	0.000	0.61			246.1	SURCHARGED	
1.008	S23	0.059	0.000	0.86			637.9	SURCHARGED	
1.009	S24	0.172	0.000	1.38			632.8	SURCHARGED	
1.010	S25	0.115	0.000	1.77			622.6	SURCHARGED	
1.011	TANK	0.614	0.000	1.58			82.3	SURCHARGED	
1.012	S25A	0.670	0.000	0.14			71.1	SURCHARGED	
1.013	S25B	0.690	0.000	0.09			52.3	SURCHARGED	
1.014	S26_FC	1.390	0.000	0.37			24.9	SURCHARGED	
1.015	S27	-0.222	0.000	0.15			24.9	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

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

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

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	100	+30%	100/15 Summer				104.622
1.001	S2	15 Winter	100	+30%	100/15 Summer				104.324
1.002	S3	15 Winter	100	+30%	100/15 Summer				102.619
1.003	S4	15 Winter	100	+30%					100.900
1.004	S5	15 Winter	100	+30%	100/15 Summer				99.969
2.000	S6	15 Winter	100	+30%					99.396
1.005	S7	15 Winter	100	+30%	30/15 Summer				99.127
1.006	S8	15 Winter	100	+30%					98.459
3.000	S9	15 Winter	100	+30%	100/15 Summer				100.370
4.000	S10	15 Winter	100	+30%					99.698
3.001	S11	15 Winter	100	+30%					98.954
3.002	S12	15 Winter	100	+30%	100/15 Summer				97.342
3.003	S13	15 Winter	100	+30%					96.596
3.004	S14	15 Winter	100	+30%	100/15 Summer				96.204
1.007	S15	15 Winter	100	+30%	30/15 Summer				95.979
5.000	S16	15 Winter	100	+30%	100/15 Summer				99.723

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.047	0.000	0.59			21.6	SURCHARGED	
1.001	S2	0.974	0.000	1.41			47.9	FLOOD RISK	
1.002	S3	0.169	0.000	1.05			111.6	SURCHARGED	
1.003	S4	-0.100	0.000	0.77			172.8	OK	
1.004	S5	0.069	0.000	0.83			185.6	SURCHARGED	
2.000	S6	-0.029	0.000	0.60			40.2	OK	
1.005	S7	0.417	0.000	2.28			282.8	SURCHARGED	
1.006	S8	-0.151	0.000	0.65			312.8	OK	
3.000	S9	0.545	0.000	1.27			84.8	SURCHARGED	
4.000	S10	-0.132	0.000	0.36			40.1	OK	
3.001	S11	-0.071	0.000	0.90			179.6	OK	
3.002	S12	0.217	0.000	1.21			203.4	SURCHARGED	
3.003	S13	-0.079	0.000	0.51			263.1	OK	
3.004	S14	1.229	0.000	0.69			346.2	FLOOD RISK	
1.007	S15	1.474	0.000	1.87			648.8	SURCHARGED	
5.000	S16	0.513	0.000	1.09			96.2	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for QD1776_SW 23 02 23.sws

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
6.000	S17	15 Winter	100	+30%	100/15 Summer				98.482
5.001	S18	15 Winter	100	+30%	100/15 Summer				97.022
5.002	S19	15 Winter	100	+30%	100/15 Summer				96.567
5.003	S20	15 Winter	100	+30%	100/15 Summer				95.855
5.004	S21	15 Winter	100	+30%	100/15 Summer				95.809
5.005	S22	15 Winter	100	+30%	30/15 Winter				95.666
1.008	S23	15 Winter	100	+30%	30/15 Summer				95.596
1.009	S24	15 Winter	100	+30%	30/15 Summer				94.994
1.010	S25	15 Winter	100	+30%	30/15 Summer				94.489
1.011	TANK	360 Winter	100	+30%	30/15 Summer				94.275
1.012	S25A	360 Winter	100	+30%	30/15 Summer				94.269
1.013	S25B	360 Winter	100	+30%	30/15 Summer				94.269
1.014	S26_FC	360 Winter	100	+30%	1/15 Summer				94.268
1.015	S27	960 Winter	100	+30%					91.763

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
6.000	S17	0.412	0.000	1.13			107.9	SURCHARGED	
5.001	S18	0.152	0.000	0.80			263.9	SURCHARGED	
5.002	S19	0.697	0.000	0.96			297.5	SURCHARGED	
5.003	S20	0.985	0.000	0.75			348.7	SURCHARGED	
5.004	S21	1.064	0.000	0.68			356.0	SURCHARGED	
5.005	S22	1.161	0.000	1.00			401.5	SURCHARGED	
1.008	S23	1.161	0.000	1.42			1056.8	SURCHARGED	
1.009	S24	0.859	0.000	2.38			1089.6	SURCHARGED	
1.010	S25	0.439	0.000	3.10			1089.1	SURCHARGED	
1.011	TANK	1.375	0.000	1.55			80.8	SURCHARGED	
1.012	S25A	1.384	0.000	0.14			72.0	SURCHARGED	
1.013	S25B	1.394	0.000	0.09			52.8	SURCHARGED	
1.014	S26_FC	2.088	0.000	0.37			24.9	SURCHARGED	
1.015	S27	-0.222	0.000	0.15			24.9	OK	