STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW 01

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	21.000	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.423	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Network Design Table for SW 01

« - 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

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)

Network Design Table for SW 01

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	34.058	0.582	58.5	0.070	8.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	24.586	0.759	32.4	0.070	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	34.074	0.575	59.3	0.070	8.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	27.923	0.144	193.9	0.070	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	57.413	1.406	40.8	0.120	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.003	16.545	0.899	18.4	0.070	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.000	19.765	0.338	58.5	0.000	8.00	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)
3.000	45.99	8.33	100.383	0.070	0.0	0.0	0.0	1.71	68.1	8.7
3.001	45.50	8.51	99.801	0.140	0.0	0.0	0.0	2.31	91.7	17.3
4.000	45.99	8.33	99.761	0.070	0.0	0.0	0.0	1.70	67.7	8.7
4.001	44.86	8.75	99.111	0.140	0.0	0.0	0.0	1.13	79.6	17.0
3.002	43.86	9.13	98.967	0.400	0.0	0.0	0.0	2.47	174.4	47.5
3.003	43.70	9.20	97.486	0.470	0.0	0.0	0.0	4.24	468.4	55.6
5.000	46.22	8.25	99.909	0.000	0.0	0.0	0.0	1.32	23.3	0.0

Network Design Table for SW 01

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
5.001	24.688	0.412	59.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.002	91.895	2.347	39.2	0.120	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.004	51.787	0.348	148.8	0.120	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.000	65.905	1.358	48.5	0.120	8.00	0.0	0.600	o	225	Pipe/Conduit	
7.000	45.278	0.824	54.9	0.070	8.00	0.0	0.600	o	225	Pipe/Conduit	
6.001	24.686	0.291	84.8	0.070	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)
5.001	45.35	8.57	99.571	0.000	0.0	0.0	0.0	1.30	23.0	0.0
5.002	43.46	9.30	99.084	0.120	0.0	0.0	0.0	2.10	83.4	14.1
3.004	42.08	9.88	96.587	0.710	0.0	0.0	0.0	1.48	163.8	80.9
6.000	45.30	8.58	98.038	0.120	0.0	0.0	0.0	1.88	74.8	14.7
7.000	45.73	8.43	97.504	0.070	0.0	0.0	0.0	1.77	70.3	8.7
6.001	44.66	8.82	96.605	0.260	0.0	0.0	0.0	1.71	120.7	31.4

Network Design Table for SW 01

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
3.005	50.361	0.262	192.2	0.120	0.00	0.0	0.600	o	450	Pipe/Conduit	
8.000	11.555	0.206	56.1	0.070	8.00	0.0	0.600	o	225	Pipe/Conduit	
8.001	45.073	2.439	18.5	0.070	0.00	0.0	0.600	o	225	Pipe/Conduit	
9.000	50.267	0.402	125.0	0.070	8.00	0.0	0.600	o	225	Pipe/Conduit	
3.006	22.753	0.645	35.3	0.120	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.007	15.198	0.758	20.1	0.070	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.005	40.82	10.45	96.164	1.090	0.0	0.0	0.0	1.46	232.7	120.5
8.000	46.62	8.11	98.772	0.070	0.0	0.0	0.0	1.75	69.6	8.8
8.001	45.93	8.36	98.566	0.140	0.0	0.0	0.0	3.06	121.6	17.4
9.000	44.94	8.72	96.529	0.070	0.0	0.0	0.0	1.17	46.4	8.5
3.006	40.59	10.56	95.902	1.420	0.0	0.0	0.0	3.43	545.8	156.1
3.007	40.49	10.61	95.107	1.490	0.0	0.0	0.0	5.45	1542.3	163.4

Network Design Table for SW 01

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
10.000	56.042	0.958	58.5	0.000	8.00	0.0	0.600	o	225	Pipe/Conduit	
10.001	52.016	0.222	234.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
11.000	12.583	0.102	123.4	0.000	8.00	0.0	0.600	o	225	Pipe/Conduit	
12.000	28.282	0.484	58.4	0.000	8.00	0.0	0.600	o	225	Pipe/Conduit	
11.001	12.386	0.673	18.4	0.120	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)
10.000	45.40	8.55	96.414	0.000	0.0	0.0	0.0	1.71	68.1	0.0
10.001	42.81	9.57	95.456	0.000	0.0	0.0	0.0	0.85	33.8	0.0
11.000	46.43	8.18	96.089	0.000	0.0	0.0	0.0	1.18	46.8	0.0
12.000	46.15	8.27	96.268	0.000	0.0	0.0	0.0	1.71	68.2	0.0
11.001	45.99	8.33	95.988	0.120	0.0	0.0	0.0	3.68	260.3	14.9

Network Design Table for SW 01

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
13.000	33.131	0.566	58.5	0.000	8.00	0.0	0.600	o	225	Pipe/Conduit	
14.000	32.095	0.814	39.4	0.000	8.00	0.0	0.600	o	225	Pipe/Conduit	
13.001	43.410	1.848	23.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
15.000	17.446	0.439	39.7	0.120	8.00	0.0	0.600	o	300	Pipe/Conduit	
15.001	37.313	1.055	35.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
13.002	50.469	2.666	18.9	0.120	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)
13.000	46.02	8.32	98.633	0.000	0.0	0.0	0.0	1.71	68.1	0.0
14.000	46.21	8.26	98.881	0.000	0.0	0.0	0.0	2.09	83.1	0.0
13.001	45.28	8.59	98.067	0.000	0.0	0.0	0.0	2.71	107.8	0.0
15.000	46.61	8.12	97.638	0.120	0.0	0.0	0.0	2.50	176.8	15.1
15.001	46.03	8.32	97.124	0.120	0.0	0.0	0.0	3.06	337.5	15.1
13.002	44.75	8.79	96.069	0.240	0.0	0.0	0.0	4.18	461.8	29.1

Network Design Table for SW 01

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
16.000	33.681	3.353	10.0	0.120	8.00	0.0	0.600	o	225	Pipe/Conduit	
17.000	13.098	0.245	53.5	0.000	8.00	0.0	0.600	o	225	Pipe/Conduit	
17.001	43.822	0.846	51.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
17.002	11.356	2.557	4.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
16.001	26.562	0.831	32.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
13.003	45.749	0.142	322.2	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)
16.000	46.55	8.14	97.737	0.120	0.0	0.0	0.0	4.15	165.1	15.1
17.000	46.59	8.12	98.032	0.000	0.0	0.0	0.0	1.79	71.3	0.0
17.001	45.46	8.52	97.787	0.000	0.0	0.0	0.0	1.82	72.4	0.0
17.002	45.38	8.55	96.941	0.000	0.0	0.0	0.0	6.25	248.6	0.0
16.001	44.96	8.71	94.309	0.120	0.0	0.0	0.0	2.79	197.3	15.1
13.003	43.05	9.47	93.328	0.360	0.0	0.0	0.0	1.13	179.3	42.0

Network Design Table for SW 01

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
10.002	16.953	0.058	292.3	0.120	0.00	0.0	0.600	o	450	Pipe/Conduit	
10.003	14.643	0.058	252.5	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.008	41.847	0.001	41846.7	0.240	0.00	0.0	0.600	o	900	Pipe/Conduit	
3.009	5.305	0.001	5304.7	0.240	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.010	23.396	0.080	292.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.011	20.601	0.211	97.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.012	15.899	0.078	203.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.013	9.981	0.050	199.6	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)
10.002	42.25	9.80	95.315	0.600	0.0	0.0	0.0	1.18	188.3	68.7
10.003	41.82	10.00	95.257	0.600	0.0	0.0	0.0	1.27	202.8	68.7
3.008	32.63	15.46	95.200	2.330	0.0	0.0	0.0	0.14	91.5«	205.9
3.009	32.10	15.89	95.199	2.570	0.0	0.0	0.0	0.21	14.6«	223.4
3.010	31.59	16.31	95.198	2.570	0.0	0.0	0.0	0.91	64.6«	223.4
3.011	31.34	16.53	95.118	2.570	0.0	0.0	0.0	1.59	112.5«	223.4
3.012	31.06	16.77	94.907	2.570	0.0	0.0	0.0	1.10	77.6«	223.4
3.013	30.89	16.92	94.829	2.570	0.0	0.0	0.0	1.11	78.4«	223.4

Manhole Schedules for SW 01

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)
S1.02	101.683	1.300	Open Manhole	1200	3.000	100.383	225				
S1.03	101.970	2.169	Open Manhole	1200	3.001	99.801	225	3.000	99.801	225	
S1.04	101.061	1.300	Open Manhole	1200	4.000	99.761	225				
S1.05	101.706	2.595	Open Manhole	1200	4.001	99.111	300	4.000	99.186	225	
S1.06	101.937	2.970	Open Manhole	1200	3.002	98.967	300	3.001	99.042	225	
								4.001	98.967	300	
S1.07	100.792	3.306	Open Manhole	1350	3.003	97.486	375	3.002	97.561	300	
S1.08	101.259	1.350	Open Manhole	1200	5.000	99.909	150				
S1.09	100.854	1.283	Open Manhole	1200	5.001	99.571	150	5.000	99.571	150	
S1.10	100.338	1.254	Open Manhole	1200	5.002	99.084	225	5.001	99.159	150	
S1.11	99.211	2.624	Open Manhole	1350	3.004	96.587	375	3.003	96.587	375	
								5.002	96.737	225	
S1.12	99.403	1.365	Open Manhole	1200	6.000	98.038	225				
S1.13	98.931	1.427	Open Manhole	1200	7.000	97.504	225				
S1.14	99.702	3.097	Open Manhole	1200	6.001	96.605	300	6.000	96.680	225	
								7.000	96.680	225	
S1.15	99.582	3.418	Open Manhole	1350	3.005	96.164	450	3.004	96.239	375	
								6.001	96.314	300	
S1.16	100.075	1.303	Open Manhole	1200	8.000	98.772	225				

Manhole Schedules for SW 01

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)
S1.17	99.804	1.238	Open Manhole	1200	8.001	98.566	225	8.000	98.566	225	
S1.18	97.811	1.282	Open Manhole	1200	9.000	96.529	225				
S1.19	99.000	3.098	Open Manhole	1350	3.006	95.902	450	3.005	95.902	450	
								8.001	96.127	225	
								9.000	96.127	225	
S1.20	96.700	1.593	Open Manhole	1500	3.007	95.107	600	3.006	95.257	450	
21	97.839	1.425	Open Manhole	1200	10.000	96.414	225				
S1.21	96.347	0.891	Open Manhole	1200	10.001	95.456	225	10.000	95.456	225	
S1.22	96.876	0.787	Open Manhole	1200	11.000	96.089	225				
S1.23	97.568	1.300	Open Manhole	1200	12.000	96.268	225				
S1.24	97.685	1.901	Open Manhole	1200	11.001	95.988	300	11.000	95.987	225	
								12.000	95.784	225	
S1.25	99.933	1.300	Open Manhole	1200	13.000	98.633	225				
S1.26	100.181	1.300	Open Manhole	1200	14.000	98.881	225				
S1.27	99.987	1.920	Open Manhole	1200	13.001	98.067	225	13.000	98.067	225	
								14.000	98.067	225	
S1.28	98.986	1.348	Open Manhole	1200	15.000	97.638	300				
S1.29	98.630	1.506	Open Manhole	1350	15.001	97.124	375	15.000	97.199	300	
S1.30	98.636	2.567	Open Manhole	1350	13.002	96.069	375	13.001	96.219	225	

Manhole Schedules for SW 01

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)
								15.001	96.069	375	
S1.31	99.087	1.350	Open Manhole	1200	16.000	97.737	225				
S1.32	99.332	1.300	Open Manhole	1200	17.000	98.032	225				
S1.33	99.087	1.300	Open Manhole	1200	17.001	97.787	225	17.000	97.787	225	
S1.34	98.241	1.300	Open Manhole	1200	17.002	96.941	225	17.001	96.941	225	
S1.35	98.225	3.916	Open Manhole	1200	16.001	94.309	300	16.000	94.384	225	
								17.002	94.384	225	
S1.36	97.776	4.448	Open Manhole	1350	13.003	93.328	450	13.002	93.403	375	
								16.001	93.478	300	
S1.37	97.000	3.814	Open Manhole	1350	10.002	95.315	450	10.001	95.234	225	
								11.001	95.315	300	
								13.003	93.186	450	
S1.38	97.000	1.743	Open Manhole	1350	10.003	95.257	450	10.002	95.257	450	
S1.39	97.000	2.651	Open Manhole	1800	3.008	95.200	900	3.007	94.349	600	
								10.003	95.199	450	
S1.40	97.000	1.801	Open Manhole	1800	3.009	95.199	300	3.008	95.199	900	
S1.41 FC	97.000	1.802	Open Manhole	1800	3.010	95.198	300	3.009	95.198	300	
S1.42	96.666	1.548	Open Manhole	1200	3.011	95.118	300	3.010	95.118	300	
S1.43	96.270	1.363	Junction		3.012	94.907	300	3.011	94.907	300	

Manhole Schedules for SW 01

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)
S1.44	96.270	1.441	Junction		3.013	94.829	300	3.012	94.829	300	
S1.O2	96.200	1.421	Open Manhole	1200		OUTFALL		3.013	94.779	300	

PIPELINE SCHEDULES for SW 01

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)
3.000	o	225	S1.02	101.683	100.383	1.075	Open Manhole	1200
3.001	o	225	S1.03	101.970	99.801	1.944	Open Manhole	1200
4.000	o	225	S1.04	101.061	99.761	1.075	Open Manhole	1200
4.001	o	300	S1.05	101.706	99.111	2.295	Open Manhole	1200
3.002	o	300	S1.06	101.937	98.967	2.670	Open Manhole	1200
3.003	o	375	S1.07	100.792	97.486	2.931	Open Manhole	1350

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)
3.000	34.058	58.5	S1.03	101.970	99.801	1.944	Open Manhole	1200
3.001	24.586	32.4	S1.06	101.937	99.042	2.670	Open Manhole	1200
4.000	34.074	59.3	S1.05	101.706	99.186	2.295	Open Manhole	1200
4.001	27.923	193.9	S1.06	101.937	98.967	2.670	Open Manhole	1200
3.002	57.413	40.8	S1.07	100.792	97.561	2.931	Open Manhole	1350
3.003	16.545	18.4	S1.11	99.211	96.587	2.249	Open Manhole	1350

PIPELINE SCHEDULES for SW 01

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)
5.000	o	150	S1.08	101.259	99.909	1.200	Open Manhole	1200
5.001	o	150	S1.09	100.854	99.571	1.133	Open Manhole	1200
5.002	o	225	S1.10	100.338	99.084	1.029	Open Manhole	1200
3.004	o	375	S1.11	99.211	96.587	2.249	Open Manhole	1350
6.000	o	225	S1.12	99.403	98.038	1.140	Open Manhole	1200
7.000	o	225	S1.13	98.931	97.504	1.202	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)
5.000	19.765	58.5	S1.09	100.854	99.571	1.133	Open Manhole	1200
5.001	24.688	59.9	S1.10	100.338	99.159	1.029	Open Manhole	1200
5.002	91.895	39.2	S1.11	99.211	96.737	2.249	Open Manhole	1350
3.004	51.787	148.8	S1.15	99.582	96.239	2.968	Open Manhole	1350
6.000	65.905	48.5	S1.14	99.702	96.680	2.797	Open Manhole	1200
7.000	45.278	54.9	S1.14	99.702	96.680	2.797	Open Manhole	1200

PIPELINE SCHEDULES for SW 01

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)
6.001	o	300	S1.14	99.702	96.605	2.797	Open Manhole	1200
3.005	o	450	S1.15	99.582	96.164	2.968	Open Manhole	1350
8.000	o	225	S1.16	100.075	98.772	1.078	Open Manhole	1200
8.001	o	225	S1.17	99.804	98.566	1.013	Open Manhole	1200
9.000	o	225	S1.18	97.811	96.529	1.057	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)
6.001	24.686	84.8	S1.15	99.582	96.314	2.968	Open Manhole	1350
3.005	50.361	192.2	S1.19	99.000	95.902	2.648	Open Manhole	1350
8.000	11.555	56.1	S1.17	99.804	98.566	1.013	Open Manhole	1200
8.001	45.073	18.5	S1.19	99.000	96.127	2.648	Open Manhole	1350
9.000	50.267	125.0	S1.19	99.000	96.127	2.648	Open Manhole	1350

PIPELINE SCHEDULES for SW 01

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)
3.006	o	450	S1.19	99.000	95.902	2.648	Open Manhole	1350
3.007	o	600	S1.20	96.700	95.107	0.993	Open Manhole	1500
10.000	o	225	21	97.839	96.414	1.200	Open Manhole	1200
10.001	o	225	S1.21	96.347	95.456	0.666	Open Manhole	1200
11.000	o	225	S1.22	96.876	96.089	0.562	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)
3.006	22.753	35.3	S1.20	96.700	95.257	0.993	Open Manhole	1500
3.007	15.198	20.1	S1.39	97.000	94.349	2.051	Open Manhole	1800
10.000	56.042	58.5	S1.21	96.347	95.456	0.666	Open Manhole	1200
10.001	52.016	234.3	S1.37	97.000	95.234	1.541	Open Manhole	1350
11.000	12.583	123.4	S1.24	97.685	95.987	1.473	Open Manhole	1200

PIPELINE SCHEDULES for SW 01

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)
12.000	o	225	S1.23	97.568	96.268	1.075	Open Manhole	1200
11.001	o	300	S1.24	97.685	95.988	1.397	Open Manhole	1200
13.000	o	225	S1.25	99.933	98.633	1.075	Open Manhole	1200
14.000	o	225	S1.26	100.181	98.881	1.075	Open Manhole	1200
13.001	o	225	S1.27	99.987	98.067	1.695	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)
12.000	28.282	58.4	S1.24	97.685	95.784	1.676	Open Manhole	1200
11.001	12.386	18.4	S1.37	97.000	95.315	1.385	Open Manhole	1350
13.000	33.131	58.5	S1.27	99.987	98.067	1.695	Open Manhole	1200
14.000	32.095	39.4	S1.27	99.987	98.067	1.695	Open Manhole	1200
13.001	43.410	23.5	S1.30	98.636	96.219	2.192	Open Manhole	1350

PIPELINE SCHEDULES for SW 01

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)
15.000	o	300	S1.28	98.986	97.638	1.048	Open Manhole	1200
15.001	o	375	S1.29	98.630	97.124	1.131	Open Manhole	1350
13.002	o	375	S1.30	98.636	96.069	2.192	Open Manhole	1350
16.000	o	225	S1.31	99.087	97.737	1.125	Open Manhole	1200
17.000	o	225	S1.32	99.332	98.032	1.075	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)
15.000	17.446	39.7	S1.29	98.630	97.199	1.131	Open Manhole	1350
15.001	37.313	35.4	S1.30	98.636	96.069	2.192	Open Manhole	1350
13.002	50.469	18.9	S1.36	97.776	93.403	3.998	Open Manhole	1350
16.000	33.681	10.0	S1.35	98.225	94.384	3.616	Open Manhole	1200
17.000	13.098	53.5	S1.33	99.087	97.787	1.075	Open Manhole	1200

PIPELINE SCHEDULES for SW 01

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)
17.001	o	225	S1.33	99.087	97.787	1.075	Open Manhole	1200
17.002	o	225	S1.34	98.241	96.941	1.075	Open Manhole	1200
16.001	o	300	S1.35	98.225	94.309	3.616	Open Manhole	1200
13.003	o	450	S1.36	97.776	93.328	3.998	Open Manhole	1350
10.002	o	450	S1.37	97.000	95.315	1.235	Open Manhole	1350
10.003	o	450	S1.38	97.000	95.257	1.293	Open Manhole	1350

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)
17.001	43.822	51.8	S1.34	98.241	96.941	1.075	Open Manhole	1200
17.002	11.356	4.4	S1.35	98.225	94.384	3.616	Open Manhole	1200
16.001	26.562	32.0	S1.36	97.776	93.478	3.998	Open Manhole	1350
13.003	45.749	322.2	S1.37	97.000	93.186	3.364	Open Manhole	1350
10.002	16.953	292.3	S1.38	97.000	95.257	1.293	Open Manhole	1350
10.003	14.643	252.5	S1.39	97.000	95.199	1.351	Open Manhole	1800

PIPELINE SCHEDULES for SW 01

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)
3.008	o	900	S1.39	97.000	95.200	0.900	Open Manhole	1800
3.009	o	300	S1.40	97.000	95.199	1.501	Open Manhole	1800
3.010	o	300	S1.41 FC	97.000	95.198	1.502	Open Manhole	1800
3.011	o	300	S1.42	96.666	95.118	1.248	Open Manhole	1200
3.012	o	300	S1.43	96.270	94.907	1.063	Junction	
3.013	o	300	S1.44	96.270	94.829	1.141	Junction	

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)
3.008	41.847	41846.7	S1.40	97.000	95.199	0.901	Open Manhole	1800
3.009	5.305	5304.7	S1.41 FC	97.000	95.198	1.502	Open Manhole	1800
3.010	23.396	292.5	S1.42	96.666	95.118	1.248	Open Manhole	1200
3.011	20.601	97.6	S1.43	96.270	94.907	1.063	Junction	
3.012	15.899	203.8	S1.44	96.270	94.829	1.141	Junction	
3.013	9.981	199.6	S1.O2	96.200	94.779	1.121	Open Manhole	1200

Area Summary for SW 01

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
3.000	-	-	100	0.070	0.070	0.070
3.001	-	-	100	0.070	0.070	0.070
4.000	-	-	100	0.070	0.070	0.070
4.001	-	-	100	0.070	0.070	0.070
3.002	-	-	100	0.120	0.120	0.120
3.003	-	-	100	0.070	0.070	0.070
5.000	-	-	100	0.000	0.000	0.000
5.001	-	-	100	0.000	0.000	0.000
5.002	-	-	100	0.120	0.120	0.120
3.004	-	-	100	0.120	0.120	0.120
6.000	-	-	100	0.120	0.120	0.120
7.000	-	-	100	0.070	0.070	0.070
6.001	-	-	100	0.070	0.070	0.070
3.005	-	-	100	0.120	0.120	0.120
8.000	-	-	100	0.070	0.070	0.070
8.001	-	-	100	0.070	0.070	0.070
9.000	-	-	100	0.070	0.070	0.070
3.006	-	-	100	0.120	0.120	0.120
3.007	-	-	100	0.070	0.070	0.070
10.000	-	-	100	0.000	0.000	0.000
10.001	-	-	100	0.000	0.000	0.000
11.000	-	-	100	0.000	0.000	0.000
12.000	-	-	100	0.000	0.000	0.000
11.001	-	-	100	0.120	0.120	0.120
13.000	-	-	100	0.000	0.000	0.000
14.000	-	-	100	0.000	0.000	0.000
13.001	-	-	100	0.000	0.000	0.000
15.000	-	-	100	0.120	0.120	0.120

Area Summary for SW 01

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
15.001	-	-	100	0.000	0.000	0.000
13.002	-	-	100	0.120	0.120	0.120
16.000	-	-	100	0.120	0.120	0.120
17.000	-	-	100	0.000	0.000	0.000
17.001	-	-	100	0.000	0.000	0.000
17.002	-	-	100	0.000	0.000	0.000
16.001	-	-	100	0.000	0.000	0.000
13.003	-	-	100	0.000	0.000	0.000
10.002	-	-	100	0.120	0.120	0.120
10.003	-	-	100	0.000	0.000	0.000
3.008	-	-	100	0.240	0.240	0.240
3.009	-	-	100	0.240	0.240	0.240
3.010	-	-	100	0.000	0.000	0.000
3.011	-	-	100	0.000	0.000	0.000
3.012	-	-	100	0.000	0.000	0.000
3.013	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				2.570	2.570	2.570

Free Flowing Outfall Details for SW 01

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
3.013	S1.O2	96.200	94.779	0.000	1200	0

Simulation Criteria for SW 01

Volumetric Runoff Coeff	0.840	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	4.000	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	M5-60 (mm)	21.000	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.423	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Winter	Storm Duration (mins)	15

Online Controls for SW 01

Complex Manhole: S1.40, DS/PN: 3.009, Volume (m³): 30.1

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0114-5000-0400-5000	Sump Available	Yes
Design Head (m)	0.400	Diameter (mm)	114
Design Flow (l/s)	5.0	Invert Level (m)	95.199
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	5.0	Kick-Flo®	0.312	4.5
Flush-Flo™	0.169	5.0	Mean Flow over Head Range	-	4.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.0	0.600	6.0	1.600	9.6	2.600	12.0	5.000	16.4	7.500	20.2
0.200	5.0	0.800	6.9	1.800	10.1	3.000	12.9	5.500	17.3	8.000	20.9
0.300	4.6	1.000	7.7	2.000	10.6	3.500	13.9	6.000	18.0	8.500	21.5
0.400	5.0	1.200	8.3	2.200	11.1	4.000	14.8	6.500	18.8	9.000	22.1
0.500	5.5	1.400	9.0	2.400	11.6	4.500	15.6	7.000	19.5	9.500	22.7

Orifice

Diameter (m) 0.225 Discharge Coefficient 0.600 Invert Level (m) 96.129

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	4.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	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	FEH	D3 (1km)	0.297
FEH Rainfall Version	1999	E (1km)	0.307
Site Location	GB 568800 245850 TL 68800 45850	F (1km)	2.496
C (1km)	-0.024	Cv (Summer)	0.750
D1 (1km)	0.285	Cv (Winter)	0.840
D2 (1km)	0.289		

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status OFF
Analysis Timestep Fine DVD 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

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
3.000	S1.02	15 Winter	1	+0%	100/15 Summer	100/15 Summer			100.436	-0.172	0.000	0.13		8.1
3.001	S1.03	15 Winter	1	+0%	100/15 Summer				99.869	-0.157	0.000	0.20		16.5
4.000	S1.04	15 Winter	1	+0%	100/15 Summer	100/15 Summer			99.814	-0.172	0.000	0.13		8.1
4.001	S1.05	15 Winter	1	+0%	30/15 Summer				99.208	-0.203	0.000	0.23		16.3
3.002	S1.06	15 Winter	1	+0%	30/15 Summer				99.076	-0.191	0.000	0.29		47.3
3.003	S1.07	15 Winter	1	+0%	30/15 Summer				97.582	-0.279	0.000	0.15		55.7
5.000	S1.08	360 Winter	1	+0%	100/15 Summer				99.909	-0.150	0.000	0.00		0.0
5.001	S1.09	360 Winter	1	+0%	100/15 Summer				99.571	-0.150	0.000	0.00		0.0
5.002	S1.10	15 Winter	1	+0%	100/15 Summer	100/15 Summer			99.149	-0.160	0.000	0.18		14.7
3.004	S1.11	15 Winter	1	+0%	30/15 Summer	100/15 Summer			96.788	-0.174	0.000	0.55		83.7
6.000	S1.12	15 Winter	1	+0%	30/15 Winter	100/15 Summer			98.105	-0.158	0.000	0.19		13.8
7.000	S1.13	15 Winter	1	+0%	30/15 Summer	100/15 Summer			97.556	-0.173	0.000	0.12		8.1
6.001	S1.14	15 Winter	1	+0%	30/15 Summer				96.713	-0.192	0.000	0.28		29.8
3.005	S1.15	15 Winter	1	+0%	30/15 Summer				96.416	-0.198	0.000	0.59		124.9
8.000	S1.16	15 Winter	1	+0%	100/15 Summer				98.827	-0.170	0.000	0.14		8.1
8.001	S1.17	15 Winter	1	+0%	100/15 Summer				98.623	-0.168	0.000	0.14		16.6
9.000	S1.18	15 Winter	1	+0%	30/15 Summer	100/15 Summer			96.594	-0.160	0.000	0.18		8.1
3.006	S1.19	15 Winter	1	+0%	30/15 Summer				96.089	-0.263	0.000	0.36		161.3
3.007	S1.20	15 Winter	1	+0%	1/15 Summer	100/15 Summer			95.908	0.201	0.000	0.19		168.5
10.000	21	360 Winter	1	+0%					96.414	-0.225	0.000	0.00		0.0
10.001	S1.21	15 Winter	1	+0%	1/15 Winter	100/15 Summer			95.767	0.086	0.000	0.14		4.5
11.000	S1.22	360 Winter	1	+0%	30/15 Summer	100/15 Summer			96.089	-0.225	0.000	0.00		0.0
12.000	S1.23	360 Winter	1	+0%	100/15 Summer				96.268	-0.225	0.000	0.00		0.0
11.001	S1.24	15 Winter	1	+0%	30/15 Summer				96.041	-0.247	0.000	0.07		14.9
13.000	S1.25	360 Winter	1	+0%					98.633	-0.225	0.000	0.00		0.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Status	Level Exceeded
3.000	S1.02	OK	2
3.001	S1.03	OK	
4.000	S1.04	OK	4
4.001	S1.05	OK	
3.002	S1.06	OK	
3.003	S1.07	OK	
5.000	S1.08	OK	
5.001	S1.09	OK	
5.002	S1.10	OK	2
3.004	S1.11	OK	4
6.000	S1.12	OK	4
7.000	S1.13	OK	4
6.001	S1.14	OK	
3.005	S1.15	OK	
8.000	S1.16	OK	
8.001	S1.17	OK	
9.000	S1.18	OK	4
3.006	S1.19	OK	
3.007	S1.20	SURCHARGED	2
10.000	21	OK	
10.001	S1.21	SURCHARGED	12
11.000	S1.22	OK	2
12.000	S1.23	OK	
11.001	S1.24	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Status	Level Exceeded
13.000	S1.25	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
14.000	S1.26	360 Winter	1	+0%					98.881	-0.225	0.000	0.00		0.0	OK
13.001	S1.27	360 Winter	1	+0%					98.067	-0.225	0.000	0.00		0.0	OK
15.000	S1.28	15 Winter	1	+0%	100/15 Winter				97.699	-0.239	0.000	0.09		13.9	OK
15.001	S1.29	15 Winter	1	+0%	100/15 Summer				97.175	-0.324	0.000	0.05		13.9	OK
13.002	S1.30	15 Winter	1	+0%	30/15 Summer				96.132	-0.312	0.000	0.07		28.3	OK
16.000	S1.31	15 Winter	1	+0%	100/15 Summer				97.782	-0.180	0.000	0.09		13.9	OK
17.000	S1.32	360 Winter	1	+0%					98.032	-0.225	0.000	0.00		0.0	OK
17.001	S1.33	360 Winter	1	+0%					97.787	-0.225	0.000	0.00		0.0	OK
17.002	S1.34	360 Winter	1	+0%	100/15 Summer				96.941	-0.225	0.000	0.00		0.0	OK
16.001	S1.35	15 Winter	1	+0%	1/15 Summer				95.814	1.205	0.000	0.06		11.0	SURCHARGED
13.003	S1.36	15 Winter	1	+0%	1/15 Summer				95.803	2.025	0.000	0.17		27.3	SURCHARGED
10.002	S1.37	15 Winter	1	+0%	1/15 Winter				95.770	0.005	0.000	0.26		38.2	SURCHARGED
10.003	S1.38	15 Winter	1	+0%	1/15 Winter				95.728	0.021	0.000	0.27		41.5	SURCHARGED
3.008	S1.39	15 Winter	1	+0%	30/15 Summer				95.621	-0.479	0.000	0.44		199.4	OK
3.009	S1.40	1440 Winter	1	+0%	30/15 Summer				95.496	-0.003	0.000	0.11		5.0	OK
3.010	S1.41 FC	720 Winter	1	+0%					95.257	-0.241	0.000	0.09		5.0	OK
3.011	S1.42	240 Winter	1	+0%					95.161	-0.257	0.000	0.05		5.0	OK
3.012	S1.43	240 Winter	1	+0%					94.959	-0.248	0.000	0.07		5.0	OK*
3.013	S1.44	240 Winter	1	+0%					94.886	-0.243	0.000	0.08		5.0	OK*

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Level Exceeded
14.000	S1.26	
13.001	S1.27	
15.000	S1.28	
15.001	S1.29	
13.002	S1.30	
16.000	S1.31	
17.000	S1.32	
17.001	S1.33	
17.002	S1.34	
16.001	S1.35	
13.003	S1.36	
10.002	S1.37	
10.003	S1.38	
3.008	S1.39	
3.009	S1.40	
3.010	S1.41 FC	
3.011	S1.42	
3.012	S1.43	
3.013	S1.44	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	4.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	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	FEH	D3 (1km)	0.297
FEH Rainfall Version	1999	E (1km)	0.307
Site Location	GB 568800 245850 TL 68800 45850	F (1km)	2.496
C (1km)	-0.024	Cv (Summer)	0.750
D1 (1km)	0.285	Cv (Winter)	0.840
D2 (1km)	0.289		

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status OFF
Analysis Timestep Fine DVD 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

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
3.000	S1.02	15 Winter	30	+0%	100/15 Summer	100/15 Summer			100.482	-0.126	0.000	0.40		25.7
3.001	S1.03	15 Winter	30	+0%	100/15 Summer				99.941	-0.085	0.000	0.69		57.9
4.000	S1.04	15 Winter	30	+0%	100/15 Summer	100/15 Summer			99.860	-0.126	0.000	0.40		25.7
4.001	S1.05	15 Winter	30	+0%	30/15 Summer				99.763	0.352	0.000	0.72		51.8
3.002	S1.06	15 Winter	30	+0%	30/15 Summer				99.671	0.404	0.000	0.90		148.6
3.003	S1.07	15 Winter	30	+0%	30/15 Summer				98.849	0.988	0.000	0.43		158.1
5.000	S1.08	360 Winter	30	+0%	100/15 Summer				99.909	-0.150	0.000	0.00		0.0
5.001	S1.09	360 Winter	30	+0%	100/15 Summer				99.571	-0.150	0.000	0.00		0.0
5.002	S1.10	15 Winter	30	+0%	100/15 Summer	100/15 Summer			99.277	-0.032	0.000	0.70		56.9
3.004	S1.11	15 Winter	30	+0%	30/15 Summer	100/15 Summer			98.529	1.567	0.000	1.50		227.4
6.000	S1.12	15 Winter	30	+0%	30/15 Winter	100/15 Summer			98.303	0.040	0.000	0.59		43.0
7.000	S1.13	15 Winter	30	+0%	30/15 Summer	100/15 Summer			97.993	0.264	0.000	0.41		27.5
6.001	S1.14	15 Winter	30	+0%	30/15 Summer				97.894	0.989	0.000	0.82		88.7
3.005	S1.15	15 Winter	30	+0%	30/15 Summer				97.742	1.128	0.000	1.60		337.6
8.000	S1.16	15 Winter	30	+0%	100/15 Summer				98.875	-0.122	0.000	0.43		25.7
8.001	S1.17	15 Winter	30	+0%	100/15 Summer				98.681	-0.110	0.000	0.50		58.4
9.000	S1.18	15 Winter	30	+0%	30/15 Summer	100/15 Summer			97.182	0.428	0.000	0.59		26.4
3.006	S1.19	15 Winter	30	+0%	30/15 Summer				97.078	0.726	0.000	0.97		438.0
3.007	S1.20	15 Summer	30	+0%	1/15 Summer	100/15 Summer			96.478	0.771	0.000	0.50		433.2
10.000	21	360 Winter	30	+0%					96.414	-0.225	0.000	0.00		0.0
10.001	S1.21	15 Winter	30	+0%	1/15 Winter	100/15 Summer			96.347	0.666	0.000	0.19		6.3
11.000	S1.22	15 Winter	30	+0%	30/15 Summer	100/15 Summer			96.486	0.172	0.000	0.04		1.6
12.000	S1.23	15 Winter	30	+0%	100/15 Summer				96.482	-0.011	0.000	0.02		1.4
11.001	S1.24	15 Winter	30	+0%	30/15 Summer				96.490	0.202	0.000	0.23		47.1
13.000	S1.25	360 Winter	30	+0%					98.633	-0.225	0.000	0.00		0.0

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Status	Level Exceeded
3.000	S1.02	OK	2
3.001	S1.03	OK	
4.000	S1.04	OK	4
4.001	S1.05	SURCHARGED	
3.002	S1.06	SURCHARGED	
3.003	S1.07	SURCHARGED	
5.000	S1.08	OK	
5.001	S1.09	OK	
5.002	S1.10	OK	2
3.004	S1.11	SURCHARGED	4
6.000	S1.12	SURCHARGED	4
7.000	S1.13	SURCHARGED	4
6.001	S1.14	SURCHARGED	
3.005	S1.15	SURCHARGED	
8.000	S1.16	OK	
8.001	S1.17	OK	
9.000	S1.18	SURCHARGED	4
3.006	S1.19	SURCHARGED	
3.007	S1.20	FLOOD RISK	2
10.000	21	OK	
10.001	S1.21	FLOOD RISK	12
11.000	S1.22	SURCHARGED	2
12.000	S1.23	OK	
11.001	S1.24	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Status	Level Exceeded
13.000	S1.25	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
14.000	S1.26	360 Winter	30	+0%					98.881	-0.225	0.000	0.00		0.0	OK
13.001	S1.27	360 Winter	30	+0%					98.067	-0.225	0.000	0.00		0.0	OK
15.000	S1.28	15 Winter	30	+0%	100/15 Winter				97.748	-0.190	0.000	0.29		44.1	OK
15.001	S1.29	15 Winter	30	+0%	100/15 Summer				97.218	-0.281	0.000	0.14		44.1	OK
13.002	S1.30	15 Winter	30	+0%	30/15 Summer				96.754	0.310	0.000	0.20		85.0	SURCHARGED
16.000	S1.31	15 Winter	30	+0%	100/15 Summer				97.818	-0.144	0.000	0.28		44.1	OK
17.000	S1.32	360 Winter	30	+0%					98.032	-0.225	0.000	0.00		0.0	OK
17.001	S1.33	360 Winter	30	+0%					97.787	-0.225	0.000	0.00		0.0	OK
17.002	S1.34	360 Winter	30	+0%	100/15 Summer				96.941	-0.225	0.000	0.00		0.0	OK
16.001	S1.35	15 Winter	30	+0%	1/15 Summer				96.595	1.986	0.000	0.25		44.3	SURCHARGED
13.003	S1.36	15 Winter	30	+0%	1/15 Summer				96.495	2.717	0.000	0.79		127.2	SURCHARGED
10.002	S1.37	15 Winter	30	+0%	1/15 Winter				96.398	0.633	0.000	1.32		195.0	SURCHARGED
10.003	S1.38	15 Winter	30	+0%	1/15 Winter				96.272	0.565	0.000	1.26		194.9	SURCHARGED
3.008	S1.39	15 Winter	30	+0%	30/15 Summer				96.150	0.050	0.000	1.59		718.2	SURCHARGED
3.009	S1.40	960 Winter	30	+0%	30/15 Summer				95.922	0.423	0.000	0.14		6.3	SURCHARGED
3.010	S1.41 FC	960 Winter	30	+0%					95.264	-0.234	0.000	0.11		6.3	OK
3.011	S1.42	960 Winter	30	+0%					95.167	-0.251	0.000	0.06		6.3	OK
3.012	S1.43	960 Winter	30	+0%					94.967	-0.240	0.000	0.09		6.3	OK*
3.013	S1.44	960 Winter	30	+0%					94.893	-0.236	0.000	0.10		6.3	OK*

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Level Exceeded
14.000	S1.26	
13.001	S1.27	
15.000	S1.28	
15.001	S1.29	
13.002	S1.30	
16.000	S1.31	
17.000	S1.32	
17.001	S1.33	
17.002	S1.34	
16.001	S1.35	
13.003	S1.36	
10.002	S1.37	
10.003	S1.38	
3.008	S1.39	
3.009	S1.40	
3.010	S1.41 FC	
3.011	S1.42	
3.012	S1.43	
3.013	S1.44	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	4.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	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	FEH	D3 (1km)	0.297
FEH Rainfall Version	1999	E (1km)	0.307
Site Location	GB 568800 245850 TL 68800 45850	F (1km)	2.496
C (1km)	-0.024	Cv (Summer)	0.750
D1 (1km)	0.285	Cv (Winter)	0.840
D2 (1km)	0.289		

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status OFF

Analysis Timestep Fine DVD 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

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
3.000	S1.02	15 Winter	100	+30%	100/15 Summer	100/15 Summer			101.689	1.081	5.915	0.97		61.9
3.001	S1.03	15 Winter	100	+30%	100/15 Summer				101.761	1.735	0.000	0.86		72.2
4.000	S1.04	15 Winter	100	+30%	100/15 Summer	100/15 Summer			101.078	1.092	17.009	1.14		72.5
4.001	S1.05	15 Winter	100	+30%	30/15 Summer				101.434	2.023	0.000	1.04		74.5
3.002	S1.06	15 Winter	100	+30%	30/15 Summer				101.412	2.145	0.000	1.11		183.7
3.003	S1.07	15 Winter	100	+30%	30/15 Summer				99.630	1.769	0.000	0.65		242.7
5.000	S1.08	15 Winter	100	+30%	100/15 Summer				100.344	0.285	0.000	0.21		4.6
5.001	S1.09	15 Winter	100	+30%	100/15 Summer				100.344	0.623	0.000	0.52		11.4
5.002	S1.10	15 Winter	100	+30%	100/15 Summer	100/15 Summer			100.345	1.036	6.205	0.74		60.0
3.004	S1.11	15 Winter	100	+30%	30/15 Summer	100/15 Summer			99.257	2.295	45.634	1.99		302.4
6.000	S1.12	15 Winter	100	+30%	30/15 Winter	100/15 Summer			99.413	1.150	9.543	0.86		62.4
7.000	S1.13	15 Winter	100	+30%	30/15 Summer	100/15 Summer			98.940	1.211	8.806	0.80		54.0
6.001	S1.14	15 Winter	100	+30%	30/15 Summer				99.006	2.101	0.000	1.09		117.1
3.005	S1.15	15 Summer	100	+30%	30/15 Summer				98.777	2.163	0.000	1.88		398.5
8.000	S1.16	15 Winter	100	+30%	100/15 Summer				99.483	0.486	0.000	0.96		56.7
8.001	S1.17	15 Winter	100	+30%	100/15 Summer				99.365	0.574	0.000	0.81		94.3
9.000	S1.18	15 Winter	100	+30%	30/15 Summer	100/15 Summer			97.819	1.065	8.569	1.28		56.8
3.006	S1.19	15 Winter	100	+30%	30/15 Summer				97.848	1.496	0.000	1.31		590.3
3.007	S1.20	15 Winter	100	+30%	1/15 Summer	100/15 Summer			96.703	0.996	3.097	0.73		639.7
10.000	21	360 Winter	100	+30%					96.414	-0.225	0.000	0.00		0.0
10.001	S1.21	15 Winter	100	+30%	1/15 Winter	100/15 Summer			96.369	0.688	22.550	1.03		33.3
11.000	S1.22	15 Winter	100	+30%	30/15 Summer	100/15 Summer			96.886	0.572	9.757	1.19		48.0
12.000	S1.23	15 Winter	100	+30%	100/15 Summer				97.094	0.601	0.000	0.06		3.8
11.001	S1.24	15 Winter	100	+30%	30/15 Summer				97.097	0.809	0.000	0.34		70.1
13.000	S1.25	360 Winter	100	+30%					98.633	-0.225	0.000	0.00		0.0

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Status	Level Exceeded
3.000	S1.02	FLOOD	2
3.001	S1.03	FLOOD RISK	
4.000	S1.04	FLOOD	4
4.001	S1.05	FLOOD RISK	
3.002	S1.06	SURCHARGED	
3.003	S1.07	SURCHARGED	
5.000	S1.08	SURCHARGED	
5.001	S1.09	SURCHARGED	
5.002	S1.10	FLOOD	2
3.004	S1.11	FLOOD	4
6.000	S1.12	FLOOD	4
7.000	S1.13	FLOOD	4
6.001	S1.14	SURCHARGED	
3.005	S1.15	SURCHARGED	
8.000	S1.16	SURCHARGED	
8.001	S1.17	SURCHARGED	
9.000	S1.18	FLOOD	4
3.006	S1.19	SURCHARGED	
3.007	S1.20	FLOOD	2
10.000	21	OK	
10.001	S1.21	FLOOD	12
11.000	S1.22	FLOOD	2
12.000	S1.23	SURCHARGED	
11.001	S1.24	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Status	Level Exceeded
13.000	S1.25	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

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)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
14.000	S1.26	360 Winter	100	+30%					98.881	-0.225	0.000	0.00		0.0	OK
13.001	S1.27	360 Winter	100	+30%					98.067	-0.225	0.000	0.00		0.0	OK
15.000	S1.28	15 Winter	100	+30%	100/15 Winter				98.067	0.129	0.000	0.59		89.8	SURCHARGED
15.001	S1.29	15 Winter	100	+30%	100/15 Summer				97.875	0.376	0.000	0.31		93.3	SURCHARGED
13.002	S1.30	15 Winter	100	+30%	30/15 Summer				97.609	1.165	0.000	0.38		164.0	SURCHARGED
16.000	S1.31	15 Winter	100	+30%	100/15 Summer				98.336	0.374	0.000	0.55		85.3	SURCHARGED
17.000	S1.32	360 Winter	100	+30%					98.032	-0.225	0.000	0.00		0.0	OK
17.001	S1.33	360 Winter	100	+30%					97.787	-0.225	0.000	0.00		0.0	OK
17.002	S1.34	15 Winter	100	+30%	100/15 Summer				97.451	0.285	0.000	0.03		5.9	SURCHARGED
16.001	S1.35	15 Winter	100	+30%	1/15 Summer				97.461	2.852	0.000	0.53		93.7	SURCHARGED
13.003	S1.36	15 Winter	100	+30%	1/15 Summer				97.217	3.439	0.000	1.47		237.0	SURCHARGED
10.002	S1.37	15 Winter	100	+30%	1/15 Winter				96.948	1.183	0.000	2.11		312.3	FLOOD RISK
10.003	S1.38	15 Winter	100	+30%	1/15 Winter				96.630	0.923	0.000	2.02		312.3	SURCHARGED
3.008	S1.39	720 Winter	100	+30%	30/15 Summer				96.360	0.260	0.000	0.24		107.5	SURCHARGED
3.009	S1.40	720 Winter	100	+30%	30/15 Summer				96.358	0.859	0.000	0.38		17.5	SURCHARGED
3.010	S1.41 FC	720 Winter	100	+30%					95.311	-0.187	0.000	0.31		17.5	OK
3.011	S1.42	720 Winter	100	+30%					95.203	-0.215	0.000	0.18		17.5	OK
3.012	S1.43	720 Winter	100	+30%					95.008	-0.199	0.000	0.25		17.5	OK*
3.013	S1.44	720 Winter	100	+30%					94.938	-0.191	0.000	0.29		17.5	OK*

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 01

PN	US/MH Name	Level Exceeded
14.000	S1.26	
13.001	S1.27	
15.000	S1.28	
15.001	S1.29	
13.002	S1.30	
16.000	S1.31	
17.000	S1.32	
17.001	S1.33	
17.002	S1.34	
16.001	S1.35	
13.003	S1.36	
10.002	S1.37	
10.003	S1.38	
3.008	S1.39	
3.009	S1.40	
3.010	S1.41 FC	
3.011	S1.42	
3.012	S1.43	
3.013	S1.44	