E.3 Appendix E.3 Half drain down test

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.300
Region	England and Wales	Ratio R	0.400
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)	30
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S1.000	S1	15 minute 30 year Winter I+0%	22.518	21.488	1.371	0.000	2.08		1.884
S1.001	S2	15 minute 30 year Winter I+0%	22.057	20.483	0.590	0.000	2.28		2.476
S1.002	S3	15 minute 30 year Winter I+0%	21.865	19.819	0.054	0.000	0.97		1.752
S1.003	S4	15 minute 30 year Winter I+0%	22.118	19.306	0.116	0.000	1.19		10.331
S1.004	S5	15 minute 30 year Winter I+0%	21.817	19.154	0.075	0.000	0.87		7.886
S1.005	S6	15 minute 30 year Winter I+0%	20.956	18.955	0.156	0.000	1.08		18.550
S1.006	S7	15 minute 30 year Winter I+0%	20.605	18.780	0.129	0.000	1.15		8.629
S2.000	S8	15 minute 30 year Winter I+0%	21.325	20.515	1.331	0.000	1.66		2.434
S2.001	S9	15 minute 30 year Winter I+0%	20.912	19.448	0.637	0.000	1.83		4.899
S1.007	S10	15 minute 30 year Winter I+0%	20.607	18.599	0.053	0.000	1.19		8.998
S1.008	S11-HW	15 minute 30 year Winter I+0%	19.100	18.279	-0.152	0.000	0.99		10.301
S1.009	S12-HW	360 minute 30 year Winter I+0%	19.100	18.150	0.525	0.000	0.35		1025.228
S1.010	S13-FCC	15 minute 30 year Winter I+0%	19.100	17.374	-0.146	0.000	0.27		0.116

PN	US/MH Name	Pipe Flow (l/s)	Status
S1.000	S1	204.7	SURCHARGED
S1.001	S2	205.2	SURCHARGED
S1.002	S3	402.6	SURCHARGED
S1.003	S4	556.3	SURCHARGED
S1.004	S5	524.0	SURCHARGED
S1.005	S6	526.5	SURCHARGED
S1.006	S7	534.0	SURCHARGED
S2.000	S8	316.9	SURCHARGED
S2.001	S9	337.5	SURCHARGED
S1.007	S10	812.7	SURCHARGED
S1.008	S11-HW	855.4	OK
S1.009	S12-HW	16.0	SURCHARGED
S1.010	S13-FCC	16.0	OK

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.300
Region	England and Wales	Ratio R	0.400
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)	30
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S3.000	S21	15 minute 30 year Winter I+0%	21.485	19.892	0.692	0.000	1.36		2.142
S3.001	S22	15 minute 30 year Winter I+0%	21.907	19.467	0.484	0.000	1.48		15.418
S3.002	S23	15 minute 30 year Winter I+0%	22.141	19.258	0.352	0.000	1.60		5.158
S3.003	S24	15 minute 30 year Winter I+0%	22.120	19.028	0.185	0.000	1.59		4.207
S3.004	S25	15 minute 30 year Winter I+0%	21.889	18.587	-0.192	0.000	0.69		2.068
S3.005	S26	15 minute 30 year Winter I+0%	19.142	17.633	0.318	0.000	0.97		9.067
S3.006	S27	15 minute 30 year Winter I+0%	17.565	16.414	0.438	0.000	1.36		10.519
S3.007	S28	15 minute 30 year Winter I+0%	17.370	15.902	0.202	0.000	0.97		4.491
S3.008	S29	15 minute 30 year Winter I+0%	15.500	14.818	0.268	0.000	1.47		7.804
S3.009	S30	15 minute 30 year Winter I+0%	15.500	14.126	-0.173	0.000	0.78		1.163
S3.010	S31	15 minute 30 year Winter I+0%	15.413	13.124	0.088	0.000	0.95		3.839
S3.011	S32	15 minute 30 year Winter I+0%	13.001	12.420	0.145	0.000	0.92		7.213
S3.012	S33-HW	15 minute 30 year Winter I+0%	12.300	11.730	0.105	0.000	1.31		8.222
S4.000	S34	15 minute 30 year Winter I+0%	15.426	14.121	-0.104	0.000	0.55		0.132
S4.001	S35	15 minute 30 year Winter I+0%	14.950	13.867	0.080	0.000	1.11		0.981
S4.002	S36	15 minute 30 year Winter I+0%	14.679	13.550	0.034	0.000	1.06		0.763
S5.000	S37	15 minute 30 year Winter I+0%	15.057	13.853	-0.002	0.000	0.99		0.247
S4.003	S38	15 minute 30 year Winter I+0%	14.400	13.040	-0.160	0.000	0.44		0.226
S4.004	S39	480 minute 30 year Winter I+0%	12.300	11.373	0.273	0.000	0.17		1.155
S3.013	S40-HW	480 minute 30 year Winter I+0%	12.300	11.370	0.545	0.000	0.97		1680.414
S3.014	S41-FCC	180 minute 30 year Summer I+0%	12.300	10.704	-0.082	0.000	0.73		0.363

PN	US/MH Name	Pipe Flow (l/s)	Status
S3.000	S21	346.9	SURCHARGED
S3.001	S22	356.3	SURCHARGED
S3.002	S23	370.0	SURCHARGED
S3.003	S24	372.7	SURCHARGED
S3.004	S25	401.3	OK
S3.005	S26	566.5	SURCHARGED
S3.006	S27	551.4	SURCHARGED

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

PN	US/MH Name	Pipe Flow (l/s)	Status
S3.007	S28	564.9	SURCHARGED
S3.008	S29	565.9	SURCHARGED
S3.009	S30	569.7	OK
S3.010	S31	1054.6	SURCHARGED
S3.011	S32	1049.4	SURCHARGED
S3.012	S33-HW	1045.7	SURCHARGED
S4.000	S34	28.7	OK
S4.001	S35	56.1	SURCHARGED
S4.002	S36	54.6	SURCHARGED
S5.000	S37	55.3	OK
S4.003	S38	107.6	OK
S4.004	S39	12.7	SURCHARGED
S3.013	S40-HW	24.6	SURCHARGED
S3.014	S41-FCC	24.6	OK

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 19.300	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.400	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)	30
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S6.000	S42	15 minute 30 year Winter I+0%	14.880	13.888	0.208	0.000	0.40		0.399
S6.001	S43	15 minute 30 year Winter I+0%	15.257	13.884	0.304	0.000	1.14		0.752
S7.000	S44	15 minute 30 year Winter I+0%	14.159	12.627	0.052	0.000	1.31		0.712
S6.002	S45	15 minute 30 year Winter I+0%	14.500	12.400	-0.103	0.000	0.92		2.326
S8.000	S46	15 minute 30 year Winter I+0%	13.338	12.000	-0.100	0.000	0.23		0.050
S6.003	S47	15 minute 30 year Winter I+0%	13.741	11.878	-0.114	0.000	0.83		2.012
S6.004	S48	15 minute 30 year Winter I+0%	13.248	11.591	0.061	0.000	0.80		3.260
S9.000	S49	15 minute 30 year Winter I+0%	12.524	11.562	0.363	0.000	1.61		0.913
S6.005	S50	15 minute 30 year Winter I+0%	12.882	11.331	0.224	0.000	1.06		6.910
S6.006	S51	15 minute 30 year Winter I+0%	11.843	10.811	0.144	0.000	1.42		14.121
S6.007	S52	15 minute 30 year Winter I+0%	11.731	10.273	-0.227	0.000	0.70		2.898
S6.008	S53	15 minute 30 year Winter I+0%	10.625	9.655	-0.057	0.000	0.70		4.241
S10.000	S54	15 minute 30 year Winter I+0%	9.611	9.189	0.524	0.000	1.11		1.280
S6.009	S55	15 minute 30 year Winter I+0%	9.477	9.097	0.476	0.000	1.52		10.924
S6.010	S56-HW	15 minute 30 year Winter I+0%	9.350	8.538	0.007	0.000	1.11		5.453
S11.000	S57	15 minute 30 year Winter I+0%	9.408	8.670	0.282	0.000	1.52		1.040
S11.001	S58-HW	15 minute 30 year Winter I+0%	9.350	8.446	0.135	0.000	1.23		3.059
S6.011	S59-HW	360 minute 30 year Winter I+0%	9.350	8.441	0.616	0.000	0.75		1144.962
S6.012	S60-FCC	120 minute 30 year Winter I+0%	9.350	7.671	-0.116	0.000	0.47		0.266

PN	US/MH Name	Pipe Flow (l/s)	Status
S6.000	S42	5.3	SURCHARGED
S6.001	S43	30.5	SURCHARGED
S7.000	S44	211.3	SURCHARGED
S6.002	S45	293.8	OK
S8.000	S46	3.1	OK
S6.003	S47	295.1	OK
S6.004	S48	292.2	SURCHARGED
S9.000	S49	275.1	SURCHARGED
S6.005	S50	579.1	SURCHARGED

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

PN	US/MH Name	Pipe Flow (l/s)	Status
S6.006	S51	582.0	SURCHARGED
S6.007	S52	579.4	OK
S6.008	S53	660.1	OK
S10.000	S54	116.2	FLOOD RISK
S6.009	S55	744.8	FLOOD RISK
S6.010	S56-HW	742.7	SURCHARGED
S11.000	S57	257.3	SURCHARGED
S11.001	S58-HW	256.3	SURCHARGED
S6.011	S59-HW	17.2	SURCHARGED
S6.012	S60-FCC	17.2	OK

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 19.300	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.400	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)	30
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S12.000	S61	15 minute 30 year Winter I+0%	10.475	9.535	0.699	0.000	0.62		1.124
S13.000	S62	15 minute 30 year Winter I+0%	9.919	9.665	0.846	0.000	1.56		1.291
S12.001	S63	15 minute 30 year Winter I+0%	10.269	9.432	0.715	0.000	2.11		3.323
S12.002	S64	15 minute 30 year Winter I+0%	10.098	8.932	0.334	0.000	1.45		2.177
S14.000	S65	15 minute 30 year Winter I+0%	9.577	8.733	0.146	0.000	0.12		0.414
S12.003	S66	15 minute 30 year Winter I+0%	9.928	8.733	0.233	0.000	0.80		2.987
S15.000	S67	15 minute 30 year Winter I+0%	9.614	8.611	0.333	0.000	0.83		0.710
S12.004	S68	15 minute 30 year Winter I+0%	9.437	8.533	0.343	0.000	1.13		9.781
S16.000	S69	15 minute 30 year Winter I+0%	8.700	8.151	0.233	0.000	1.19		0.971
S12.005	S70	15 minute 30 year Winter I+0%	8.628	8.110	0.229	0.000	1.80		10.714
S12.006	S71	15 minute 30 year Winter I+0%	8.400	7.845	0.020	0.000	0.78		3.499
S12.007	S72-HW	15 minute 30 year Winter I+0%	8.400	7.571	0.196	0.000	1.77		6.467
S17.000	S73	15 minute 30 year Winter I+0%	8.096	7.706	-0.221	0.000	0.51		0.320
S17.001	S74-HW	360 minute 30 year Winter I+0%	8.400	7.515	0.235	0.000	0.19		2.467
S18.000	S75	15 minute 30 year Winter I+0%	9.058	7.621	-0.104	0.000	0.56		0.131
S18.001	S76	360 minute 30 year Winter I+0%	8.621	7.516	-0.115	0.000	0.06		0.185
S18.002	S77-HW	360 minute 30 year Winter I+0%	8.400	7.515	0.440	0.000	0.09		2.657
S12.008	S78-HW	360 minute 30 year Winter I+0%	8.400	7.514	0.539	0.000	0.45		749.554
S12.009	S79-FCC	15 minute 30 year Winter I+0%	8.400	6.810	-0.130	0.000	0.37		0.202

PN	US/MH Name	Pipe Flow (l/s)	Status
S12.000	S61	48.1	SURCHARGED
S13.000	S62	118.4	FLOOD RISK
S12.001	S63	164.5	SURCHARGED
S12.002	S64	178.1	SURCHARGED
S14.000	S65	4.3	SURCHARGED
S12.003	S66	189.8	SURCHARGED
S15.000	S67	51.1	SURCHARGED
S12.004	S68	256.1	SURCHARGED
S16.000	S69	158.6	SURCHARGED

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

PN	US/MH Name	Pipe Flow (l/s)	Status
S12.005	S70	396.5	SURCHARGED
S12.006	S71	393.6	SURCHARGED
S12.007	S72-HW	390.8	SURCHARGED
S17.000	S73	230.1	FLOOD RISK
S17.001	S74-HW	31.6	SURCHARGED
S18.000	S75	24.0	OK
S18.001	S76	3.3	OK
S18.002	S77-HW	3.0	SURCHARGED
S12.008	S78-HW	11.2	SURCHARGED
S12.009	S79-FCC	11.2	OK

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 19.300	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.400	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)	30
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S19.000	S81	15 minute 30 year Winter I+0%	11.588	9.717	-0.158	0.000	0.62		0.303
S19.001	S82-HW	480 minute 30 year Winter I+0%	10.400	9.519	0.334	0.000	0.15		4.239
S20.000	S83	480 minute 30 year Winter I+0%	10.246	9.519	0.184	0.000	0.06		0.793
S20.001	S84-HW	480 minute 30 year Winter I+0%	10.400	9.518	0.313	0.000	0.07		3.096
S21.000	S85	480 minute 30 year Winter I+0%	11.106	9.518	0.038	0.000	0.01		0.291
S21.001	S86-HW	480 minute 30 year Winter I+0%	10.400	9.518	0.454	0.000	0.01		2.382
S22.000	S87	480 minute 30 year Winter I+0%	11.482	9.518	0.064	0.000	0.01		0.321
S22.001	S88-HW	480 minute 30 year Winter I+0%	10.400	9.518	0.480	0.000	0.00		2.398
S19.002	S89-HW	480 minute 30 year Winter I+0%	10.400	9.518	0.322	0.000	0.03		245.010
S19.003	S90-FCC	240 minute 30 year Summer I+0%	10.400	8.775	-0.100	0.000	0.24		0.091
S19.004	S91	960 minute 30 year Summer I+0%	9.631	8.638	-0.100	0.000	0.24		0.143
S19.005	S92	360 minute 30 year Winter I+0%	9.435	8.471	-0.099	0.000	0.26		0.089

PN	US/MH Name	Pipe Flow (l/s)	Status
S19.000	S81	147.4	OK
S19.001	S82-HW	16.0	SURCHARGED
S20.000	S83	8.5	SURCHARGED
S20.001	S84-HW	8.3	SURCHARGED
S21.000	S85	0.5	SURCHARGED
S21.001	S86-HW	0.2	SURCHARGED
S22.000	S87	0.4	SURCHARGED
S22.001	S88-HW	0.1	SURCHARGED
S19.002	S89-HW	3.3	SURCHARGED
S19.003	S90-FCC	3.3	OK
S19.004	S91	3.3	OK
S19.005	S92	3.3	OK

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.300
Region	England and Wales	Ratio R	0.400
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)	30
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S23.000	S101	15 minute 30 year Winter I+0%	12.500	12.501	0.879	1.278	1.85		2.605
S24.000	S102	15 minute 30 year Winter I+0%	19.241	17.928	-0.072	0.000	0.90		0.253
S24.001	S103	15 minute 30 year Winter I+0%	14.359	13.218	0.077	0.000	0.72		1.048
S24.002	S104	15 minute 30 year Winter I+0%	13.641	12.649	0.912	0.000	1.75		5.589
S24.003	S105	15 minute 30 year Winter I+0%	13.319	11.967	0.450	0.000	1.48		25.161
S23.001	S106	15 minute 30 year Winter I+0%	13.852	11.509	0.213	0.000	1.16		31.432
S25.000	S107	15 minute 30 year Winter I+0%	14.955	13.635	-0.120	0.000	0.77		0.358
S23.002	S108	30 minute 30 year Winter I+0%	12.525	11.091	0.046	0.000	2.71		32.848
S23.003	S109-HW	360 minute 30 year Winter I+0%	12.087	11.024	0.000	0.000	0.28		6.217
S26.000	S110	15 minute 30 year Winter I+0%	24.830	23.494	-0.136	0.000	0.55		0.180
S26.001	S111	15 minute 30 year Winter I+0%	22.533	21.734	-0.190	0.000	0.47		0.334
S27.000	S112	15 minute 30 year Winter I+0%	22.636	21.786	0.342	0.000	1.12		0.551
S26.002	S113	15 minute 30 year Winter I+0%	21.713	19.996	-0.179	0.000	0.53		0.508
S26.003	S114	15 minute 30 year Winter I+0%	20.806	19.307	-0.118	0.000	0.78		0.867
S26.004	S115	15 minute 30 year Winter I+0%	19.230	16.740	-0.042	0.000	1.00		1.105
S26.005	S116	15 minute 30 year Winter I+0%	18.520	16.209	-0.059	0.000	1.00		0.978
S26.006	S117	15 minute 30 year Winter I+0%	17.852	15.570	-0.202	0.000	0.57		0.491
S26.007	S118	15 minute 30 year Winter I+0%	14.898	13.041	0.162	0.000	0.83		2.714
S26.008	S119	15 minute 30 year Winter I+0%	14.653	12.696	0.303	0.000	1.39		3.404
S26.009	S120	15 minute 30 year Winter I+0%	14.649	12.363	0.141	0.000	1.38		2.910
S28.000	S121	15 minute 30 year Winter I+0%	15.443	14.136	-0.139	0.000	0.31		0.092
S29.000	S122	15 minute 30 year Winter I+0%	13.500	12.191	-0.159	0.000	0.87		0.770
S26.010	S123	15 minute 30 year Winter I+0%	14.852	11.999	-0.051	0.000	0.99		6.051
S26.011	S124	15 minute 30 year Winter I+0%	12.749	11.762	-0.038	0.000	0.74		9.010
S26.012	S125	15 minute 30 year Winter I+0%	11.979	11.470	0.235	0.000	1.32		26.078
S26.013	S126-HW	15 minute 30 year Winter I+0%	11.900	11.200	0.101	0.000	1.37		7.629
S30.000	S127	15 minute 30 year Winter I+0%	12.599	11.595	0.163	0.000	1.04		0.870
S30.001	S128-HW	15 minute 30 year Winter I+0%	11.900	11.045	0.096	0.000	1.29		3.342
S23.004	S129-HW	480 minute 30 year Winter I+0%	11.900	10.949	-0.301	0.000	0.06		2260.385
S23.005	S130-FCC	480 minute 30 year Winter I+0%	11.900	10.337	-0.134	0.000	0.59		0.854

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

PN	US/MH Name	Pipe Flow (l/s)	Status
S23.000	S101	114.2	FLOOD
S24.000	S102	220.7	OK
S24.001	S103	255.8	SURCHARGED
S24.002	S104	356.4	SURCHARGED
S24.003	S105	301.5	SURCHARGED
S23.001	S106	335.8	SURCHARGED
S25.000	S107	255.3	OK
S23.002	S108	404.8	SURCHARGED
S23.003	S109-HW	110.0	OK
S26.000	S110	73.9	OK
S26.001	S111	126.2	OK
S27.000	S112	33.6	SURCHARGED
S26.002	S113	159.6	OK
S26.003	S114	237.1	OK
S26.004	S115	265.7	OK
S26.005	S116	264.0	OK
S26.006	S117	315.6	OK
S26.007	S118	325.7	SURCHARGED
S26.008	S119	325.4	SURCHARGED
S26.009	S120	323.7	SURCHARGED
S28.000	S121	41.4	OK
S29.000	S122	477.1	OK
S26.010	S123	778.6	OK
S26.011	S124	758.2	OK
S26.012	S125	801.6	SURCHARGED
S26.013	S126-HW	798.9	SURCHARGED
S30.000	S127	405.7	SURCHARGED
S30.001	S128-HW	392.5	SURCHARGED
S23.004	S129-HW	33.8	OK
S23.005	S130-FCC	33.8	OK

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 19.300	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.400	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)	30
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S31.000	S1	15 minute 30 year Winter I+0%	18.000	17.451	1.573	0.000	1.66		3.963
S31.001	S2	15 minute 30 year Winter I+0%	18.080	17.173	1.357	0.000	1.45		8.587
S31.002	S3	15 minute 30 year Winter I+0%	18.379	16.896	1.189	0.000	1.80		12.485
S31.003	S4	15 minute 30 year Winter I+0%	18.573	16.621	0.959	0.000	1.91		6.407
S31.004	S5	15 minute 30 year Winter I+0%	18.797	16.348	0.723	0.000	1.61		5.213
S32.000	S6	15 minute 30 year Winter I+0%	20.228	16.299	0.573	0.000	1.20		1.931
S31.005	S7	15 minute 30 year Winter I+0%	19.304	16.036	0.498	0.000	1.60		14.289
S31.006	S8	15 minute 30 year Winter I+0%	18.479	15.696	0.231	0.000	1.66		11.435
S31.007	S9	15 minute 30 year Winter I+0%	17.676	14.975	-0.425	0.000	0.54		3.913
S31.008	S10	15 minute 30 year Winter I+0%	16.153	13.852	-0.475	0.000	0.45		3.199
S31.009	S131	15 minute 30 year Winter I+0%	13.700	11.528	-0.034	0.000	0.78		13.119
S31.010	S132-HW	15 minute 30 year Winter I+0%	11.700	11.250	0.000	0.000	0.99		13.207
S33.000	S133-HW	15 minute 30 year Winter I+0%	11.700	10.967	0.017	0.000	1.00		1.940
S34.000	S134	15 minute 30 year Winter I+0%	13.500	11.523	0.647	0.000	1.64		2.063
S34.001	S135-HW	15 minute 30 year Winter I+0%	11.700	11.096	0.371	0.000	1.69		5.137
S31.011	S136-HW	240 minute 30 year Winter I+0%	11.700	10.740	-0.310	0.000	0.04		2208.906
S31.012	S137-FCC	360 minute 30 year Winter I+0%	11.700	10.011	-0.296	0.000	0.10		0.343
S31.013	S138-HW	240 minute 30 year Winter I+0%	10.000	9.227	0.438	0.000	0.38		2.049
S35.000	S139	15 minute 30 year Winter I+0%	10.000	9.341	0.241	0.000	1.18		1.345
S35.001	S140-HW	240 minute 30 year Winter I+0%	10.000	9.123	0.247	0.000	0.28		11.819
S31.014	S141-HW	240 minute 30 year Winter I+0%	10.000	9.121	-0.004	0.000	0.12		311.523
S31.015	S142-FCC	240 minute 30 year Winter I+0%	9.730	8.459	-0.183	0.000	0.52		0.847

PN	US/MH Name	Pipe Flow (l/s)	Status
S31.000	S1	670.0	SURCHARGED
S31.001	S2	666.8	SURCHARGED
S31.002	S3	661.8	SURCHARGED
S31.003	S4	662.4	SURCHARGED
S31.004	S5	705.1	SURCHARGED
S32.000	S6	398.6	SURCHARGED

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

PN	US/MH Name	Pipe Flow (l/s)	Status
S31.005	S7	1068.5	SURCHARGED
S31.006	S8	1073.7	SURCHARGED
S31.007	S9	1261.2	OK
S31.008	S10	1257.9	OK
S31.009	S131	1197.1	OK
S31.010	S132-HW	1144.1	OK
S33.000	S133-HW	483.6	SURCHARGED
S34.000	S134	488.5	SURCHARGED
S34.001	S135-HW	488.2	SURCHARGED
S31.011	S136-HW	45.8	OK
S31.012	S137-FCC	45.8	OK
S31.013	S138-HW	45.8	SURCHARGED
S35.000	S139	340.2	SURCHARGED
S35.001	S140-HW	64.1	SURCHARGED
S31.014	S141-HW	56.9	OK
S31.015	S142-FCC	56.9	OK

E.4 Appendix E.4 Urban Creep models

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network A

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Network A

« - 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
S1.000	22.066	0.224	98.7	0.693	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	12.700	0.129	98.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	65.554	0.575	114.0	0.824	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.003	20.215	0.111	181.4	0.637	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.004	50.722	0.280	181.2	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.005	21.694	0.148	146.6	0.048	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.006	16.255	0.105	154.8	0.038	0.00	0.0	0.600	o	675	Pipe/Conduit	
S2.000	32.658	0.373	87.6	1.085	5.00	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)
S1.000	52.06	5.23	19.817	0.693	0.0	0.0	9.8	1.58	111.9	107.5
S1.001	51.47	5.37	19.593	0.693	0.0	0.0	9.8	1.58	112.0	107.5
S1.002	49.33	5.89	19.240	1.517	0.0	0.0	20.3	2.10	454.0	222.9
S1.003	48.66	6.06	18.515	2.153	0.0	0.0	28.4	1.94	695.2	312.2
S1.004	47.08	6.50	18.404	2.153	0.0	0.0	28.4	1.94	695.7	312.2
S1.005	46.50	6.66	18.124	2.202	0.0	0.0	28.4	2.16	773.9	312.2
S1.006	46.06	6.79	17.976	2.240	0.0	0.0	28.4	2.10	753.0	312.2
S2.000	51.84	5.28	18.809	1.085	0.0	0.0	15.2	1.94	214.0	167.5

Network Design Table for Network A

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S2.001	22.764	0.265	85.9	0.066	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.007	25.780	0.190	135.7	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.008	39.042	0.206	189.5	0.332	0.00	0.0	0.600	o	825	Pipe/Conduit	
S1.009	7.764	0.105	73.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.010	18.637	0.295	63.2	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)
S2.001	51.01	5.47	18.436	1.150	0.0	0.0	15.9	1.96	216.0	174.8
S1.007	45.47	6.97	17.796	3.390	0.0	0.0	41.7	2.40	1060.7	459.2
S1.008	44.51	7.27	17.606	3.722	0.0	0.0	44.9	2.15	1151.1	493.5
S1.009	44.25	7.36	17.400	3.722	0.0	0.0	44.9	1.52	60.5«	493.5
S1.010	43.69	7.55	17.295	3.722	0.0	0.0	44.9	1.65	65.5«	493.5

Manhole Schedules for Network A

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	22.518	2.701	Open Manhole	1200	S1.000	19.817	300				
S2	22.057	2.464	Open Manhole	1200	S1.001	19.593	300	S1.000	19.593	300	
S3	21.865	2.625	Open Manhole	1500	S1.002	19.240	525	S1.001	19.464	300	
S4	22.118	3.603	Open Manhole	1500	S1.003	18.515	675	S1.002	18.665	525	
S5	21.817	3.414	Open Manhole	1500	S1.004	18.404	675	S1.003	18.404	675	
S6	20.956	2.832	Open Manhole	1500	S1.005	18.124	675	S1.004	18.124	675	
S7	20.605	2.629	Open Manhole	1500	S1.006	17.976	675	S1.005	17.976	675	
S8	21.325	2.516	Open Manhole	1350	S2.000	18.809	375				
S9	20.912	2.476	Open Manhole	1350	S2.001	18.436	375	S2.000	18.436	375	
S10	20.607	2.811	Open Manhole	1800	S1.007	17.796	750	S1.006	17.871	675	
								S2.001	18.171	375	
S11-HW	19.100	1.494	Open Manhole	1800	S1.008	17.606	825	S1.007	17.606	750	
S12-HW	19.100	1.700	Open Manhole	1800	S1.009	17.400	225	S1.008	17.400	825	
S13-FCC	19.100	1.805	Open Manhole	1200	S1.010	17.295	225	S1.009	17.295	225	
S	18.000	1.000	Open Manhole	0		OUTFALL		S1.010	17.000	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	580750.698	198481.497	580750.698	198481.497	Required	
S2	580754.914	198503.157	580754.914	198503.157	Required	
S3	580754.472	198515.850	580754.472	198515.850	Required	
S4	580732.480	198577.605	580732.480	198577.605	Required	
S5	580732.526	198597.819	580732.526	198597.819	Required	
S6	580751.896	198644.697	580751.896	198644.697	Required	

Manhole Schedules for Network A

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S7	580754.868	198666.187	580754.868	198666.187	Required	
S8	580721.887	198727.074	580721.887	198727.074	Required	
S9	580744.440	198703.455	580744.440	198703.455	Required	
S10	580752.904	198682.323	580752.904	198682.323	Required	
S11-HW	580727.584	198677.477	580727.584	198677.477	Required	
S12-HW	580689.220	198684.724	580689.220	198684.724	Required	
S13-FCC	580681.552	198685.934	580681.552	198685.934	Required	
S	580663.242	198689.408			No Entry	

Area Summary for Network A

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Residential	66	0.899	0.593	0.593
	Classification	Hardstanding	100	0.100	0.100	0.693
1.001	-	-	100	0.000	0.000	0.000
1.002	Classification	Residential	66	1.104	0.729	0.729
	Classification	Hardstanding	100	0.095	0.095	0.824
1.003	Classification	Residential	66	0.770	0.508	0.508
	Classification	Hardstanding	100	0.129	0.129	0.637
1.004	-	-	100	0.000	0.000	0.000
1.005	Classification	Hardstanding	100	0.048	0.048	0.048
1.006	Classification	Hardstanding	100	0.038	0.038	0.038
2.000	Classification	Residential	66	1.545	1.020	1.020
	Classification	Hardstanding	100	0.065	0.065	1.085
2.001	Classification	Hardstanding	100	0.066	0.066	0.066
1.007	-	-	100	0.000	0.000	0.000
1.008	Classification	Ponds	80	0.285	0.228	0.228
	Classification	Landscape	20	0.516	0.103	0.332
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				5.660	3.722	3.722

Free Flowing Outfall Details for Network A

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.010	S	18.000	17.000	0.000	0	0

Simulation Criteria for Network A

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model FSR Return Period (years) 1

Synthetic Rainfall Details

Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.400	Cv (Winter)	0.840
Ratio R	0.400	Storm Duration (mins)	30
Profile Type	Summer		

Online Controls for Network A

Hydro-Brake® Optimum Manhole: S12-HW, DS/PN: S1.009, Volume (m³): 24.2

Unit Reference	MD-SHE-0174-1600-1400-1600
Design Head (m)	1.400
Design Flow (l/s)	16.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	174
Invert Level (m)	17.400
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)	1.400	16.0	Kick-Flo®	0.911	13.1
Flush-Flo™	0.416	16.0	Mean Flow over Head Range	-	13.8

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	6.2	1.200	14.9	3.000	23.0	7.000	34.6
0.200	14.7	1.400	16.0	3.500	24.8	7.500	35.8
0.300	15.7	1.600	17.0	4.000	26.4	8.000	36.9
0.400	16.0	1.800	18.0	4.500	28.0	8.500	38.0
0.500	15.9	2.000	19.0	5.000	29.4	9.000	39.1
0.600	15.7	2.200	19.8	5.500	30.8	9.500	40.1
0.800	14.6	2.400	20.7	6.000	32.1		
1.000	13.6	2.600	21.5	6.500	33.4		

Storage Structures for Network A

Tank or Pond Manhole: S12-HW, DS/PN: S1.009

Invert Level (m) 17.600

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1651.0	1.200	2487.0	1.500	2707.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network A

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S1.001	S2	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S1.002	S3	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S1.003	S4	15 Winter	1	+0%	30/15 Summer			
S1.004	S5	15 Winter	1	+0%	30/15 Summer			
S1.005	S6	15 Winter	1	+0%	30/15 Summer			
S1.006	S7	15 Winter	1	+0%	30/15 Summer			
S2.000	S8	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S2.001	S9	15 Winter	1	+0%	30/15 Summer			
S1.007	S10	15 Winter	1	+0%	30/15 Summer			
S1.008	S11-HW	15 Winter	1	+0%	30/15 Winter			
S1.009	S12-HW	180 Winter	1	+0%	1/15 Summer			
S1.010	S13-FCC	120 Winter	1	+0%				

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network A

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	20.056	-0.061	0.000	0.94		92.8	OK	5
S1.001	S2	19.860	-0.033	0.000	1.00		90.0	OK	3
S1.002	S3	19.479	-0.286	0.000	0.42		176.3	OK	2
S1.003	S4	18.862	-0.328	0.000	0.52		244.1	OK	
S1.004	S5	18.703	-0.376	0.000	0.40		241.2	OK	
S1.005	S6	18.463	-0.336	0.000	0.50		245.7	OK	
S1.006	S7	18.328	-0.323	0.000	0.53		247.4	OK	
S2.000	S8	19.057	-0.127	0.000	0.75		143.8	OK	5
S2.001	S9	18.700	-0.111	0.000	0.82		151.7	OK	
S1.007	S10	18.190	-0.356	0.000	0.55		372.6	OK	
S1.008	S11-HW	18.005	-0.426	0.000	0.47		402.0	OK	
S1.009	S12-HW	17.815	0.190	0.000	0.35		16.0	SURCHARGED	
S1.010	S13-FCC	17.374	-0.146	0.000	0.27		16.0	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S1.001	S2	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S1.002	S3	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S1.003	S4	15 Winter	30	+0%	30/15 Summer			
S1.004	S5	15 Winter	30	+0%	30/15 Summer			
S1.005	S6	15 Winter	30	+0%	30/15 Summer			
S1.006	S7	15 Winter	30	+0%	30/15 Summer			
S2.000	S8	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S2.001	S9	15 Winter	30	+0%	30/15 Summer			
S1.007	S10	15 Winter	30	+0%	30/15 Summer			
S1.008	S11-HW	15 Winter	30	+0%	30/15 Winter			
S1.009	S12-HW	360 Winter	30	+0%	1/15 Summer			
S1.010	S13-FCC	360 Summer	30	+0%				

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	21.845	1.728	0.000	2.23		219.4	SURCHARGED	5
S1.001	S2	20.724	0.831	0.000	2.43		218.8	SURCHARGED	3
S1.002	S3	20.040	0.275	0.000	1.05		434.8	SURCHARGED	2
S1.003	S4	19.532	0.342	0.000	1.26		586.9	SURCHARGED	
S1.004	S5	19.346	0.267	0.000	0.90		536.8	SURCHARGED	
S1.005	S6	19.126	0.327	0.000	1.12		548.3	SURCHARGED	
S1.006	S7	18.942	0.291	0.000	1.19		555.1	SURCHARGED	
S2.000	S8	20.856	1.672	0.000	1.80		343.8	SURCHARGED	5
S2.001	S9	19.616	0.805	0.000	1.97		363.4	SURCHARGED	
S1.007	S10	18.751	0.205	0.000	1.25		853.9	SURCHARGED	
S1.008	S11-HW	18.432	0.001	0.000	1.06		907.8	SURCHARGED	
S1.009	S12-HW	18.199	0.574	0.000	0.35		16.0	SURCHARGED	
S1.010	S13-FCC	17.374	-0.146	0.000	0.27		16.0	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S1.001	S2	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S1.002	S3	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S1.003	S4	15 Winter	100	+40%	30/15 Summer			
S1.004	S5	15 Winter	100	+40%	30/15 Summer			
S1.005	S6	15 Winter	100	+40%	30/15 Summer			
S1.006	S7	15 Winter	100	+40%	30/15 Summer			
S2.000	S8	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S2.001	S9	15 Winter	100	+40%	30/15 Summer			
S1.007	S10	15 Winter	100	+40%	30/15 Summer			
S1.008	S11-HW	720 Winter	100	+40%	30/15 Winter			
S1.009	S12-HW	720 Winter	100	+40%	1/15 Summer			
S1.010	S13-FCC	15 Summer	100	+40%				

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	22.581	2.464	62.383	2.40		236.9	FLOOD	5
S1.001	S2	22.064	2.171	7.165	2.58		232.0	FLOOD	3
S1.002	S3	21.870	2.105	4.705	1.30		541.1	FLOOD	2
S1.003	S4	21.129	1.939	0.000	1.78		830.3	SURCHARGED	
S1.004	S5	20.722	1.643	0.000	1.36		813.8	SURCHARGED	
S1.005	S6	20.226	1.427	0.000	1.70		831.3	SURCHARGED	
S1.006	S7	19.795	1.144	0.000	1.82		849.5	SURCHARGED	
S2.000	S8	21.396	2.212	71.574	1.93		367.5	FLOOD	5
S2.001	S9	20.333	1.522	0.000	2.20		406.2	SURCHARGED	
S1.007	S10	19.336	0.790	0.000	1.78		1211.6	SURCHARGED	
S1.008	S11-HW	18.755	0.324	0.000	0.20		173.2	SURCHARGED	
S1.009	S12-HW	18.753	1.128	0.000	0.35		16.0	SURCHARGED	
S1.010	S13-FCC	17.374	-0.146	0.000	0.27		16.0	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network B

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Network B

« - 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
S3.000	64.524	0.217	297.3	1.244	5.00	0.0	0.600	o	525	Pipe/Conduit	
S3.001	18.206	0.077	236.4	0.043	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.002	15.168	0.064	237.0	0.039	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.003	14.445	0.064	225.7	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.004	90.545	1.465	61.8	0.155	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.005	79.930	1.339	59.7	0.957	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.006	16.578	0.278	59.6	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.007	66.393	1.150	57.7	0.164	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.008	7.749	0.251	30.9	0.000	0.00	0.0	0.600	o	525	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)
S3.000	49.55	5.83	18.675	1.244	0.0	0.0	16.7	1.29	280.1	183.6
S3.001	48.74	6.04	18.458	1.287	0.0	0.0	17.0	1.45	314.4	186.8
S3.002	48.09	6.21	18.381	1.326	0.0	0.0	17.3	1.45	314.0	189.9
S3.003	47.50	6.38	18.318	1.326	0.0	0.0	17.3	1.49	321.9	189.9
S3.004	45.68	6.91	18.254	1.481	0.0	0.0	18.3	2.85	617.6	201.5
S3.005	44.23	7.36	16.790	2.438	0.0	0.0	29.2	2.90	628.4	321.2
S3.006	43.94	7.46	15.451	2.438	0.0	0.0	29.2	2.90	628.8	321.2
S3.007	42.85	7.83	15.175	2.602	0.0	0.0	30.2	2.95	639.1	332.2
S3.008	42.76	7.87	14.025	2.602	0.0	0.0	30.2	4.04	875.0	332.2

Network Design Table for Network B

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
S3.009	43.697	1.263	34.6	0.054	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.010	27.327	0.761	35.9	2.315	0.00	0.0	0.600	o	675	Pipe/Conduit	
S3.011	24.178	0.806	30.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S3.012	55.564	0.200	277.8	0.000	0.00	0.0	0.600	o	825	Pipe/Conduit	
S4.000	38.948	0.438	88.9	0.089	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.001	24.114	0.271	89.0	0.090	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.002	28.119	0.316	89.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S5.000	52.703	0.655	80.5	0.171	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.003	37.648	2.100	17.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.004	37.812	0.200	189.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.013	11.673	0.039	299.3	0.496	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.014	11.269	0.066	170.7	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)
S3.009	42.23	8.06	13.774	2.657	0.0	0.0	30.4	3.82	826.4	334.2
S3.010	41.95	8.16	12.361	4.971	0.0	0.0	56.5	4.38	1568.4	621.2
S3.011	41.72	8.24	11.600	4.971	0.0	0.0	56.5	4.80	1716.4	621.2
S3.012	40.38	8.77	10.800	4.971	0.0	0.0	56.5	1.78	949.5	621.2
S4.000	51.04	5.47	14.000	0.089	0.0	0.0	1.2	1.39	55.2	13.5
S4.001	49.84	5.76	13.562	0.179	0.0	0.0	2.4	1.39	55.1	26.6
S4.002	48.53	6.10	13.291	0.179	0.0	0.0	2.4	1.39	55.1	26.6
S5.000	50.48	5.60	13.630	0.171	0.0	0.0	2.3	1.46	58.0	25.8
S4.003	47.91	6.26	12.900	0.350	0.0	0.0	4.5	3.73	263.7	50.0
S4.004	45.98	6.82	10.800	0.350	0.0	0.0	4.5	1.14	80.6	50.0
S3.013	39.75	9.03	10.600	5.818	0.0	0.0	62.6	0.75	29.8«	688.9
S3.014	39.31	9.21	10.561	5.818	0.0	0.0	62.6	1.00	39.7«	688.9

Manhole Schedules for Network B

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)
S21	21.485	2.810	Open Manhole	1500	S3.000	18.675	525				
S22	21.907	3.449	Open Manhole	1500	S3.001	18.458	525	S3.000	18.458	525	
S23	22.141	3.760	Open Manhole	1500	S3.002	18.381	525	S3.001	18.381	525	
S24	22.120	3.803	Open Manhole	1500	S3.003	18.318	525	S3.002	18.317	525	
S25	21.889	3.635	Open Manhole	1500	S3.004	18.254	525	S3.003	18.254	525	
S26	19.142	2.353	Open Manhole	1500	S3.005	16.790	525	S3.004	16.789	525	
S27	17.565	2.114	Open Manhole	1500	S3.006	15.451	525	S3.005	15.451	525	
S28	17.370	2.197	Open Manhole	1500	S3.007	15.175	525	S3.006	15.173	525	
S29	15.500	1.475	Open Manhole	1500	S3.008	14.025	525	S3.007	14.025	525	
S30	15.500	1.726	Open Manhole	1500	S3.009	13.774	525	S3.008	13.774	525	
S31	15.413	3.052	Open Manhole	1500	S3.010	12.361	675	S3.009	12.511	525	
S32	13.001	1.401	Open Manhole	1500	S3.011	11.600	675	S3.010	11.600	675	
S33-HW	12.300	1.506	Open Manhole	1800	S3.012	10.800	825	S3.011	10.794	675	
S34	15.426	1.426	Open Manhole	1200	S4.000	14.000	225				
S35	14.950	1.388	Open Manhole	1200	S4.001	13.562	225	S4.000	13.562	225	
S36	14.679	1.388	Open Manhole	1200	S4.002	13.291	225	S4.001	13.291	225	
S37	15.057	1.427	Open Manhole	1200	S5.000	13.630	225				
S38	14.400	1.500	Open Manhole	1200	S4.003	12.900	300	S4.002	12.975	225	
								S5.000	12.975	225	
S39	12.300	1.500	Open Manhole	1200	S4.004	10.800	300	S4.003	10.800	300	
S40-HW	12.300	1.700	Open Manhole	1800	S3.013	10.600	225	S3.012	10.600	825	
								S4.004	10.600	300	
S41-FCC	12.300	1.739	Open Manhole	1200	S3.014	10.561	225	S3.013	10.561	225	
S	11.800	1.305	Open Manhole	0		OUTFALL		S3.014	10.495	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S21	580699.324	198753.430	580699.324	198753.430	Required	
S22	580652.091	198797.388	580652.091	198797.388	Required	

Manhole Schedules for Network B

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S23	580634.952	198803.528	580634.952	198803.528	Required	
S24	580619.837	198802.262	580619.837	198802.262	Required	
S25	580606.496	198796.724	580606.496	198796.724	Required	
S26	580535.762	198740.198	580535.762	198740.198	Required	
S27	580473.718	198689.806	580473.718	198689.806	Required	
S28	580463.039	198677.126	580463.039	198677.126	Required	
S29	580449.909	198612.044	580449.909	198612.044	Required	
S30	580447.348	198604.731	580447.348	198604.731	Required	
S31	580421.411	198569.564	580421.411	198569.564	Required	
S32	580400.199	198552.336	580400.199	198552.336	Required	
S33-HW	580377.205	198544.863	580377.205	198544.863	Required	
S34	580266.337	198583.801	580266.337	198583.801	Required	
S35	580303.953	198593.900	580303.953	198593.900	Required	
S36	580327.993	198592.012	580327.993	198592.012	Required	

Manhole Schedules for Network B

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S37	580407.224	198576.069	580407.224	198576.069	Required	
S38	580355.630	198586.826	580355.630	198586.826	Required	
S39	580337.334	198553.923	580337.334	198553.923	Required	
S40-HW	580329.124	198517.013	580329.124	198517.013	Required	
S41-FCC	580330.235	198505.393	580330.235	198505.393	Required	
S	580324.906	198495.464			No Entry	

Area Summary for Network B

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
3.000	Classification	Residential	66	1.693	1.118	1.118
	Classification	Hardstanding	100	0.126	0.126	1.244
3.001	Classification	Hardstanding	100	0.043	0.043	0.043
3.002	Classification	Hardstanding	100	0.039	0.039	0.039
3.003	-	-	100	0.000	0.000	0.000
3.004	Classification	Hardstanding	100	0.155	0.155	0.155
3.005	Classification	Residential	66	1.177	0.777	0.777
	Classification	Hardstanding	100	0.180	0.180	0.957
3.006	-	-	100	0.000	0.000	0.000
3.007	Classification	Hardstanding	100	0.164	0.164	0.164
3.008	-	-	100	0.000	0.000	0.000
3.009	Classification	Hardstanding	100	0.054	0.054	0.054
3.010	Classification	Residential	66	1.564	1.032	1.032
	Classification	Residential	66	1.943	1.282	2.315
3.011	-	-	100	0.000	0.000	0.000
3.012	-	-	100	0.000	0.000	0.000
4.000	Classification	Hardstanding	100	0.089	0.089	0.089
4.001	Classification	Hardstanding	100	0.090	0.090	0.090
4.002	-	-	100	0.000	0.000	0.000
5.000	Classification	Hardstanding	100	0.171	0.171	0.171
4.003	-	-	100	0.000	0.000	0.000
4.004	-	-	100	0.000	0.000	0.000
3.013	Classification	Ponds	80	0.441	0.353	0.353
	Classification	Landscape	20	0.719	0.144	0.496
3.014	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				8.650	5.818	5.818

Free Flowing Outfall Details for Network B

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S3.014	S	11.800	10.495	0.000	0	0

Simulation Criteria for Network B

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for Network B

Hydro-Brake® Optimum Manhole: S40-HW, DS/PN: S3.013, Volume (m³): 35.6

Unit Reference	MD-SHE-0212-2460-1400-2460
Design Head (m)	1.400
Design Flow (l/s)	24.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	212
Invert Level (m)	10.600
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	24.6	Kick-Flo®	0.952	20.5
Flush-Flo™	0.435	24.6	Mean Flow over Head Range	-	21.1

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	7.2	1.200	22.8	3.000	35.4	7.000	53.4
0.200	20.6	1.400	24.6	3.500	38.2	7.500	55.2
0.300	24.0	1.600	26.2	4.000	40.7	8.000	56.9
0.400	24.6	1.800	27.7	4.500	43.1	8.500	58.6
0.500	24.5	2.000	29.2	5.000	45.3	9.000	60.3
0.600	24.2	2.200	30.5	5.500	47.5	9.500	61.9
0.800	23.0	2.400	31.8	6.000	49.5		
1.000	20.9	2.600	33.1	6.500	51.5		

Storage Structures for Network B

Tank or Pond Manhole: S40-HW, DS/PN: S3.013

Invert Level (m) 10.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2649.0	1.200	3751.0	1.500	4176.0

Manhole Headloss for Network B

PN	US/MH Name	US/MH Headloss
S3.000	S21	0.500
S3.001	S22	0.500
S3.002	S23	0.500
S3.003	S24	0.500
S3.004	S25	0.500
S3.005	S26	0.500
S3.006	S27	0.500
S3.007	S28	0.500
S3.008	S29	0.500
S3.009	S30	0.500
S3.010	S31	0.500
S3.011	S32	0.500
S3.012	S33-HW	0.500
S4.000	S34	0.500
S4.001	S35	0.500
S4.002	S36	0.500
S5.000	S37	0.500
S4.003	S38	0.500
S4.004	S39	0.500
S3.013	S40-HW	0.500
S3.014	S41-FCC	0.500

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network B

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S3.000	S21	15 Winter	1	+0%	30/15 Summer	100/15 Summer			18.987
S3.001	S22	15 Winter	1	+0%	30/15 Summer				18.777
S3.002	S23	15 Winter	1	+0%	30/15 Summer				18.713
S3.003	S24	15 Winter	1	+0%	30/15 Summer				18.647
S3.004	S25	15 Winter	1	+0%	100/15 Summer				18.456
S3.005	S26	15 Winter	1	+0%	30/15 Summer	100/15 Summer			17.046
S3.006	S27	15 Winter	1	+0%	30/15 Summer	100/15 Summer			15.771
S3.007	S28	15 Winter	1	+0%	30/15 Summer				15.437
S3.008	S29	15 Winter	1	+0%	30/15 Summer	100/15 Summer			14.367
S3.009	S30	15 Winter	1	+0%	100/15 Summer				14.005
S3.010	S31	15 Winter	1	+0%	30/15 Summer				12.689
S3.011	S32	15 Winter	1	+0%	30/15 Summer	100/15 Summer			11.921
S3.012	S33-HW	15 Winter	1	+0%	30/15 Summer				11.283
S4.000	S34	15 Winter	1	+0%	100/15 Summer				14.073
S4.001	S35	15 Winter	1	+0%	30/15 Summer	100/15 Summer			13.666

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network B

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S21	-0.213	0.000	0.63		160.9	OK	5
S3.001	S22	-0.206	0.000	0.67		161.8	OK	
S3.002	S23	-0.193	0.000	0.72		166.8	OK	
S3.003	S24	-0.196	0.000	0.71		165.5	OK	
S3.004	S25	-0.323	0.000	0.31		179.6	OK	
S3.005	S26	-0.269	0.000	0.47		276.3	OK	6
S3.006	S27	-0.205	0.000	0.68		274.7	OK	6
S3.007	S28	-0.263	0.000	0.49		288.7	OK	
S3.008	S29	-0.183	0.000	0.75		289.3	OK	6
S3.009	S30	-0.294	0.000	0.40		293.1	OK	
S3.010	S31	-0.347	0.000	0.46		514.0	OK	
S3.011	S32	-0.354	0.000	0.45		513.1	OK	5
S3.012	S33-HW	-0.342	0.000	0.64		512.0	OK	
S4.000	S34	-0.152	0.000	0.22		11.7	OK	
S4.001	S35	-0.121	0.000	0.43		21.9	OK	2

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network B

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S4.002	S36	15 Winter	1	+0%	30/15 Summer			
S5.000	S37	15 Winter	1	+0%	100/15 Summer	100/15 Winter		
S4.003	S38	15 Winter	1	+0%				
S4.004	S39	240 Winter	1	+0%	30/15 Summer			
S3.013	S40-HW	240 Winter	1	+0%	1/15 Summer			
S3.014	S41-FCC	240 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.002	S36	13.394	-0.122	0.000	0.43		21.9	OK	
S5.000	S37	13.731	-0.124	0.000	0.41		22.8	OK	1
S4.003	S38	12.987	-0.213	0.000	0.18		44.9	OK	
S4.004	S39	11.033	-0.067	0.000	0.13		9.5	OK	
S3.013	S40-HW	11.031	0.206	0.000	0.93		23.7	SURCHARGED	
S3.014	S41-FCC	10.701	-0.085	0.000	0.70		23.7	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S3.000	S21	15 Winter	30	+0%	30/15 Summer	100/15 Summer			20.134
S3.001	S22	15 Winter	30	+0%	30/15 Summer				19.591
S3.002	S23	15 Winter	30	+0%	30/15 Summer				19.321
S3.003	S24	15 Summer	30	+0%	30/15 Summer				19.054
S3.004	S25	15 Winter	30	+0%	100/15 Summer				18.615
S3.005	S26	15 Winter	30	+0%	30/15 Summer	100/15 Summer			17.953
S3.006	S27	15 Winter	30	+0%	30/15 Summer	100/15 Summer			16.619
S3.007	S28	15 Winter	30	+0%	30/15 Summer				16.052
S3.008	S29	15 Winter	30	+0%	30/15 Summer	100/15 Summer			14.866
S3.009	S30	15 Winter	30	+0%	100/15 Summer				14.137
S3.010	S31	15 Winter	30	+0%	30/15 Summer				13.344
S3.011	S32	15 Winter	30	+0%	30/15 Summer	100/15 Summer			12.553
S3.012	S33-HW	15 Winter	30	+0%	30/15 Summer				11.775
S4.000	S34	15 Winter	30	+0%	100/15 Summer				14.121
S4.001	S35	15 Winter	30	+0%	30/15 Summer	100/15 Summer			13.867

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S21	0.934	0.000	1.48		379.1	SURCHARGED	5
S3.001	S22	0.608	0.000	1.62		389.1	SURCHARGED	
S3.002	S23	0.415	0.000	1.74		401.4	SURCHARGED	
S3.003	S24	0.211	0.000	1.64		384.5	SURCHARGED	
S3.004	S25	-0.164	0.000	0.75		434.1	OK	
S3.005	S26	0.638	0.000	1.02		597.7	SURCHARGED	6
S3.006	S27	0.643	0.000	1.42		576.3	SURCHARGED	6
S3.007	S28	0.352	0.000	1.01		591.5	SURCHARGED	
S3.008	S29	0.316	0.000	1.54		590.6	SURCHARGED	6
S3.009	S30	-0.162	0.000	0.82		593.7	OK	
S3.010	S31	0.308	0.000	1.01		1120.4	SURCHARGED	
S3.011	S32	0.278	0.000	0.98		1113.9	SURCHARGED	5
S3.012	S33-HW	0.150	0.000	1.39		1110.9	SURCHARGED	
S4.000	S34	-0.104	0.000	0.55		28.7	OK	
S4.001	S35	0.080	0.000	1.11		56.1	SURCHARGED	2

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S4.002	S36	15 Winter	30	+0%	30/15 Summer			
S5.000	S37	15 Winter	30	+0%	100/15 Summer	100/15 Winter		
S4.003	S38	15 Winter	30	+0%				
S4.004	S39	480 Winter	30	+0%	30/15 Summer			
S3.013	S40-HW	480 Winter	30	+0%	1/15 Summer			
S3.014	S41-FCC	600 Summer	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.002	S36	13.550	0.034	0.000	1.06		54.6	SURCHARGED	
S5.000	S37	13.853	-0.002	0.000	0.99		55.3	OK	1
S4.003	S38	13.040	-0.160	0.000	0.44		107.6	OK	
S4.004	S39	11.420	0.320	0.000	0.17		12.6	SURCHARGED	
S3.013	S40-HW	11.418	0.593	0.000	0.97		24.6	SURCHARGED	
S3.014	S41-FCC	10.704	-0.082	0.000	0.73		24.6	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S3.000	S21	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S3.001	S22	15 Summer	100	+40%	30/15 Summer			
S3.002	S23	15 Summer	100	+40%	30/15 Summer			
S3.003	S24	15 Winter	100	+40%	30/15 Summer			
S3.004	S25	15 Winter	100	+40%	100/15 Summer			
S3.005	S26	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S3.006	S27	30 Winter	100	+40%	30/15 Summer	100/15 Summer		
S3.007	S28	15 Winter	100	+40%	30/15 Summer			
S3.008	S29	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S3.009	S30	15 Winter	100	+40%	100/15 Summer			
S3.010	S31	15 Winter	100	+40%	30/15 Summer			
S3.011	S32	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S3.012	S33-HW	720 Winter	100	+40%	30/15 Summer			
S4.000	S34	15 Winter	100	+40%	100/15 Summer			
S4.001	S35	15 Winter	100	+40%	30/15 Summer	100/15 Summer		

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S21	21.555	2.355	69.944	1.99		507.9	FLOOD	5
S3.001	S22	21.432	2.449	0.000	2.11		506.7	SURCHARGED	
S3.002	S23	21.184	2.278	0.000	2.17		501.8	SURCHARGED	
S3.003	S24	20.870	2.027	0.000	1.95		457.1	SURCHARGED	
S3.004	S25	20.530	1.751	0.000	0.92		533.2	SURCHARGED	
S3.005	S26	19.219	1.904	77.445	1.15		673.5	FLOOD	6
S3.006	S27	17.588	1.612	23.504	1.57		637.0	FLOOD	6
S3.007	S28	17.084	1.384	0.000	1.13		658.7	FLOOD RISK	
S3.008	S29	15.546	0.996	46.135	2.04		782.9	FLOOD	6
S3.009	S30	15.214	0.915	0.000	1.08		783.2	FLOOD RISK	
S3.010	S31	14.718	1.682	0.000	1.46		1619.9	SURCHARGED	
S3.011	S32	13.064	0.789	62.807	1.18		1341.1	FLOOD	5
S3.012	S33-HW	12.003	0.378	0.000	0.30		237.8	FLOOD RISK	
S4.000	S34	15.361	1.136	0.000	0.91		47.6	FLOOD RISK	
S4.001	S35	14.951	1.164	0.554	1.75		88.8	FLOOD	2

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S4.002	S36	15 Winter	100	+40%	30/15 Summer			
S5.000	S37	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
S4.003	S38	15 Winter	100	+40%				
S4.004	S39	15 Winter	100	+40%	30/15 Summer			
S3.013	S40-HW	720 Winter	100	+40%	1/15 Summer			
S3.014	S41-FCC	8640 Summer	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.002	S36	14.129	0.613	0.000	1.72		88.3	SURCHARGED	
S5.000	S37	15.057	1.202	0.505	1.68		93.8	FLOOD	1
S4.003	S38	13.195	-0.005	0.000	0.72		175.6	OK	
S4.004	S39	12.138	1.038	0.000	2.32		173.3	FLOOD RISK	
S3.013	S40-HW	12.000	1.175	0.000	0.96		24.6	SURCHARGED	
S3.014	S41-FCC	10.704	-0.082	0.000	0.73		24.6	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network D

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Network D

« - 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
S6.000	15.037	0.100	150.4	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
S6.001	41.671	1.005	41.5	0.092	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.000	18.006	0.072	250.1	0.712	5.00	0.0	0.600	o	450	Pipe/Conduit	
S6.002	42.341	0.511	82.9	0.163	0.00	0.0	0.600	o	450	Pipe/Conduit	
S8.000	16.267	0.108	150.6	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S6.000	50.00	5.31	13.530	0.010	0.0	0.0	0.1	0.82	14.4	1.4
S6.001	49.88	5.75	13.430	0.102	0.0	0.0	1.4	1.57	27.7	15.2
S7.000	50.00	5.23	12.125	0.712	0.0	0.0	9.6	1.28	203.7	106.1
S6.002	48.64	6.07	12.053	0.977	0.0	0.0	12.9	2.23	355.4	141.6
S8.000	50.00	5.33	11.950	0.010	0.0	0.0	0.1	0.82	14.4	1.4

Network Design Table for Network D

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
S6.003	27.721	0.462	60.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S6.004	20.469	0.423	48.4	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S9.000	18.437	0.092	200.4	0.956	5.00	0.0	0.600	o	450	Pipe/Conduit	
S6.005	54.935	0.440	124.9	0.130	0.00	0.0	0.600	o	600	Pipe/Conduit	
S6.006	18.477	0.167	110.6	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S6.007	39.647	0.788	50.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S6.008	43.425	1.091	39.8	0.415	0.00	0.0	0.600	o	600	Pipe/Conduit	
S10.000	7.595	0.044	172.6	0.403	5.00	0.0	0.600	o	375	Pipe/Conduit	
S6.009	14.439	0.240	60.2	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S6.010	35.442	0.181	195.8	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S11.000	15.383	0.077	199.8	0.879	5.00	0.0	0.600	o	450	Pipe/Conduit	
S11.001	51.557	0.261	197.5	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S6.011	12.900	0.038	339.5	0.326	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.012	21.255	0.125	170.0	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)
S6.003	47.99	6.24	11.542	0.987	0.0	0.0	12.9	2.63	418.0	141.6
S6.004	47.56	6.36	11.080	0.987	0.0	0.0	12.9	2.93	465.7	141.6
S9.000	50.00	5.21	10.749	0.956	0.0	0.0	12.9	1.43	227.8	142.3
S6.005	46.10	6.78	10.507	2.072	0.0	0.0	25.9	2.18	615.9	284.6
S6.006	45.66	6.91	10.067	2.072	0.0	0.0	25.9	2.31	654.5	284.6
S6.007	45.04	7.10	9.900	2.072	0.0	0.0	25.9	3.44	972.3	284.6
S6.008	44.46	7.29	9.112	2.487	0.0	0.0	29.9	3.87	1093.6	329.4
S10.000	50.00	5.09	8.290	0.403	0.0	0.0	5.5	1.38	152.0	60.1
S6.009	44.22	7.37	8.021	2.890	0.0	0.0	34.6	3.14	888.8	380.8
S6.010	43.34	7.66	7.781	2.890	0.0	0.0	34.6	2.00	882.0	380.8
S11.000	50.00	5.18	7.938	0.879	0.0	0.0	11.9	1.43	228.2	131.0
S11.001	49.78	5.77	7.861	0.879	0.0	0.0	11.9	1.44	229.5	131.0
S6.011	42.47	7.97	7.600	4.095	0.0	0.0	47.1	0.70	28.0«	518.2
S6.012	41.51	8.32	7.562	4.095	0.0	0.0	47.1	1.00	39.8«	518.2

Manhole Schedules for Network D

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)
S42	14.880	1.350	Open Manhole	1200	S6.000	13.530	150				
S43	15.257	1.827	Open Manhole	1200	S6.001	13.430	150	S6.000	13.430	150	
S44	14.159	2.034	Open Manhole	1350	S7.000	12.125	450				
S45	14.500	2.447	Open Manhole	1350	S6.002	12.053	450	S6.001	12.425	150	72
								S7.000	12.053	450	
S46	13.338	1.388	Open Manhole	1200	S8.000	11.950	150				
S47	13.741	2.199	Open Manhole	1350	S6.003	11.542	450	S6.002	11.542	450	
								S8.000	11.842	150	
S48	13.248	2.168	Open Manhole	1350	S6.004	11.080	450	S6.003	11.080	450	
S49	12.524	1.775	Open Manhole	1200	S9.000	10.749	450				
S50	12.882	2.375	Open Manhole	1500	S6.005	10.507	600	S6.004	10.657	450	
								S9.000	10.657	450	
S51	11.843	1.776	Open Manhole	1500	S6.006	10.067	600	S6.005	10.067	600	
S52	11.731	1.831	Open Manhole	1500	S6.007	9.900	600	S6.006	9.900	600	
S53	10.625	1.513	Open Manhole	1500	S6.008	9.112	600	S6.007	9.112	600	
S54	9.611	1.321	Open Manhole	1350	S10.000	8.290	375				
S55	9.477	1.456	Open Manhole	1500	S6.009	8.021	600	S6.008	8.021	600	
								S10.000	8.246	375	
S56-HW	9.350	1.569	Open Manhole	1800	S6.010	7.781	750	S6.009	7.781	600	
S57	9.408	1.470	Open Manhole	1350	S11.000	7.938	450				
S58-HW	9.350	1.489	Open Manhole	1350	S11.001	7.861	450	S11.000	7.861	450	
S59-HW	9.350	1.750	Open Manhole	1800	S6.011	7.600	225	S6.010	7.600	750	
								S11.001	7.600	450	
S60-FCC	9.350	1.788	Open Manhole	1200	S6.012	7.562	225	S6.011	7.562	225	
S	8.300	0.863	Open Manhole	0		OUTFALL		S6.012	7.437	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S42	580243.825	198559.146	580243.825	198559.146	Required	

Manhole Schedules for Network D

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S43	580239.478	198573.541	580239.478	198573.541	Required	
S44	580194.705	198579.570	580194.705	198579.570	Required	
S45	580199.385	198562.183	580199.385	198562.183	Required	
S46	580163.066	198535.419	580163.066	198535.419	Required	
S47	580158.536	198551.042	580158.536	198551.042	Required	
S48	580131.696	198544.107	580131.696	198544.107	Required	
S49	580111.768	198561.273	580111.768	198561.273	Required	
S50	580111.267	198542.843	580111.267	198542.843	Required	
S51	580056.334	198542.423	580056.334	198542.423	Required	
S52	580038.148	198539.153	580038.148	198539.153	Required	
S53	580028.134	198500.792	580028.134	198500.792	Required	
S54	580034.388	198462.442	580034.388	198462.442	Required	
S55	580028.734	198457.370	580028.734	198457.370	Required	
S56-HW	580036.484	198445.187	580036.484	198445.187	Required	

Manhole Schedules for Network D

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S57	580107.407	198443.314	580107.407	198443.314	Required	
S58-HW	580092.794	198438.507	580092.794	198438.507	Required	
S59-HW	580048.636	198411.894	580048.636	198411.894	Required	
S60-FCC	580046.438	198399.182	580046.438	198399.182	Required	
S	580044.186	198378.047			No Entry	

Area Summary for Network D

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
6.000	Classification	Hardstanding	100	0.010	0.010	0.010
6.001	Classification	Hardstanding	100	0.092	0.092	0.092
7.000	Classification	Residential	66	1.079	0.712	0.712
6.002	Classification	Hardstanding	100	0.163	0.163	0.163
8.000	Classification	Hardstanding	100	0.010	0.010	0.010
6.003	-	-	100	0.000	0.000	0.000
6.004	-	-	100	0.000	0.000	0.000
9.000	Classification	Residential	66	1.448	0.956	0.956
6.005	Classification	Hardstanding	100	0.130	0.130	0.130
6.006	-	-	100	0.000	0.000	0.000
6.007	-	-	100	0.000	0.000	0.000
6.008	Classification	Hardstanding	100	0.415	0.415	0.415
10.000	Classification	Residential	66	0.611	0.403	0.403
6.009	-	-	100	0.000	0.000	0.000
6.010	-	-	100	0.000	0.000	0.000
11.000	Classification	Residential	66	1.332	0.879	0.879
11.001	-	-	100	0.000	0.000	0.000
6.011	Classification	Ponds	80	0.292	0.233	0.233
	Classification	Landscape	20	0.460	0.092	0.326
6.012	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				6.042	4.095	4.095

Free Flowing Outfall Details for Network D

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S6.012	S	8.300	7.437	0.000	0	0

Simulation Criteria for Network D

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for Network D

Hydro-Brake® Optimum Manhole: S59-HW, DS/PN: S6.011, Volume (m³): 27.3

Unit Reference	MD-SHE-0179-1720-1450-1720
Design Head (m)	1.450
Design Flow (l/s)	17.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	179
Invert Level (m)	7.600
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)	1.450	17.2	Kick-Flo®	0.939	14.0
Flush-Flo™	0.429	17.2	Mean Flow over Head Range	-	14.9

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	6.3	1.200	15.7	3.000	24.3	7.000	36.6
0.200	15.6	1.400	16.9	3.500	26.2	7.500	37.8
0.300	16.8	1.600	18.0	4.000	27.9	8.000	39.0
0.400	17.2	1.800	19.1	4.500	29.6	8.500	40.2
0.500	17.1	2.000	20.0	5.000	31.1	9.000	41.3
0.600	16.9	2.200	21.0	5.500	32.6	9.500	42.4
0.800	15.9	2.400	21.9	6.000	34.0		
1.000	14.4	2.600	22.7	6.500	35.3		

Storage Structures for Network D

Tank or Pond Manhole: S59-HW, DS/PN: S6.011

Invert Level (m) 7.850

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1704.0	1.200	2532.0	1.500	2762.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network D

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S6.000	S42	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S6.001	S43	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S7.000	S44	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S6.002	S45	15 Winter	1	+0%	100/15 Summer			
S8.000	S46	15 Winter	1	+0%	100/15 Summer	100/15 Summer		
S6.003	S47	15 Winter	1	+0%	30/15 Winter			
S6.004	S48	15 Winter	1	+0%	30/15 Summer			
S9.000	S49	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S6.005	S50	15 Winter	1	+0%	30/15 Summer			
S6.006	S51	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S6.007	S52	15 Winter	1	+0%	100/15 Summer			
S6.008	S53	15 Winter	1	+0%	30/15 Winter	100/15 Summer		
S10.000	S54	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S6.009	S55	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S6.010	S56-HW	15 Winter	1	+0%	30/15 Summer			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network D

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S6.000	S42	13.561	-0.119	0.000	0.10		1.3	OK	4
S6.001	S43	13.500	-0.080	0.000	0.44		11.8	OK	2
S7.000	S44	12.376	-0.199	0.000	0.59		94.7	OK	4
S6.002	S45	12.250	-0.253	0.000	0.39		124.9	OK	
S8.000	S46	11.981	-0.119	0.000	0.10		1.3	OK	3
S6.003	S47	11.728	-0.264	0.000	0.36		126.6	OK	
S6.004	S48	11.261	-0.269	0.000	0.34		126.4	OK	
S9.000	S49	11.043	-0.156	0.000	0.74		126.9	OK	4
S6.005	S50	10.803	-0.304	0.000	0.48		263.1	OK	
S6.006	S51	10.419	-0.248	0.000	0.64		262.8	OK	1
S6.007	S52	10.132	-0.368	0.000	0.32		263.7	OK	
S6.008	S53	9.348	-0.364	0.000	0.32		305.7	OK	3
S10.000	S54	8.483	-0.182	0.000	0.52		54.0	OK	5
S6.009	S55	8.400	-0.221	0.000	0.72		351.8	OK	5
S6.010	S56-HW	8.167	-0.364	0.000	0.52		346.5	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network D

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S11.000	S57	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S11.001	S58-HW	15 Winter	1	+0%	30/15 Summer			
S6.011	S59-HW	240 Winter	1	+0%	1/15 Summer			
S6.012	S60-FCC	240 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S11.000	S57	8.218	-0.170	0.000	0.70		117.7	OK	4
S11.001	S58-HW	8.105	-0.206	0.000	0.56		116.1	OK	
S6.011	S59-HW	8.080	0.255	0.000	0.75		17.1	SURCHARGED	
S6.012	S60-FCC	7.671	-0.116	0.000	0.47		17.1	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S6.000	S42	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S6.001	S43	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S7.000	S44	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S6.002	S45	15 Winter	30	+0%	100/15 Summer			
S8.000	S46	15 Winter	30	+0%	100/15 Summer	100/15 Summer		
S6.003	S47	15 Winter	30	+0%	30/15 Winter			
S6.004	S48	15 Winter	30	+0%	30/15 Summer			
S9.000	S49	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S6.005	S50	15 Winter	30	+0%	30/15 Summer			
S6.006	S51	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S6.007	S52	15 Winter	30	+0%	100/15 Summer			
S6.008	S53	15 Winter	30	+0%	30/15 Winter	100/15 Summer		
S10.000	S54	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S6.009	S55	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S6.010	S56-HW	15 Winter	30	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S6.000	S42	13.888	0.208	0.000	0.40		5.3	SURCHARGED	4
S6.001	S43	13.884	0.304	0.000	1.14		30.5	SURCHARGED	2
S7.000	S44	12.658	0.083	0.000	1.44		232.3	SURCHARGED	4
S6.002	S45	12.446	-0.057	0.000	0.98		311.1	OK	
S8.000	S46	12.012	-0.088	0.000	0.23		3.1	OK	3
S6.003	S47	12.003	0.011	0.000	0.85		302.0	SURCHARGED	
S6.004	S48	11.682	0.152	0.000	0.86		314.7	SURCHARGED	
S9.000	S49	11.699	0.500	0.000	1.76		300.4	SURCHARGED	4
S6.005	S50	11.420	0.313	0.000	1.12		609.1	SURCHARGED	
S6.006	S51	10.849	0.182	0.000	1.50		613.5	SURCHARGED	1
S6.007	S52	10.286	-0.214	0.000	0.74		611.6	OK	
S6.008	S53	9.787	0.075	0.000	0.73		691.3	SURCHARGED	3
S10.000	S54	9.265	0.600	0.000	1.22		127.1	SURCHARGED	5
S6.009	S55	9.178	0.557	0.000	1.59		781.7	FLOOD RISK	5
S6.010	S56-HW	8.562	0.031	0.000	1.17		779.6	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S11.000	S57	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S11.001	S58-HW	15 Winter	30	+0%	30/15 Summer			
S6.011	S59-HW	360 Winter	30	+0%	1/15 Summer			
S6.012	S60-FCC	480 Winter	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S11.000	S57	8.801	0.413	0.000	1.67		283.2	SURCHARGED	4
S11.001	S58-HW	8.531	0.220	0.000	1.35		281.8	SURCHARGED	
S6.011	S59-HW	8.490	0.665	0.000	0.75		17.2	SURCHARGED	
S6.012	S60-FCC	7.671	-0.116	0.000	0.47		17.2	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S6.000	S42	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S6.001	S43	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S7.000	S44	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S6.002	S45	15 Summer	100	+40%	100/15 Summer			
S8.000	S46	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
S6.003	S47	15 Summer	100	+40%	30/15 Winter			
S6.004	S48	15 Winter	100	+40%	30/15 Summer			
S9.000	S49	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S6.005	S50	30 Summer	100	+40%	30/15 Summer			
S6.006	S51	15 Summer	100	+40%	30/15 Summer	100/15 Summer		
S6.007	S52	15 Summer	100	+40%	100/15 Summer			
S6.008	S53	15 Winter	100	+40%	30/15 Winter	100/15 Summer		
S10.000	S54	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S6.009	S55	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S6.010	S56-HW	720 Winter	100	+40%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S6.000	S42	14.885	1.205	5.250	2.27		30.3	FLOOD	4
S6.001	S43	15.257	1.677	0.347	1.32		35.5	FLOOD	2
S7.000	S44	14.187	1.612	28.607	1.91		309.0	FLOOD	4
S6.002	S45	14.051	1.548	0.000	1.30		412.0	SURCHARGED	
S8.000	S46	13.338	1.238	0.289	0.70		9.3	FLOOD	3
S6.003	S47	13.366	1.374	0.000	1.06		375.8	SURCHARGED	
S6.004	S48	12.853	1.323	0.000	1.03		376.5	SURCHARGED	
S9.000	S49	12.581	1.382	56.457	2.53		433.0	FLOOD	4
S6.005	S50	12.443	1.336	0.000	1.35		733.6	SURCHARGED	
S6.006	S51	11.843	1.176	0.165	1.79		731.7	FLOOD	1
S6.007	S52	11.298	0.798	0.000	0.88		730.6	SURCHARGED	
S6.008	S53	10.629	0.917	3.444	1.01		953.2	FLOOD	3
S10.000	S54	9.626	0.961	14.905	1.91		199.5	FLOOD	5
S6.009	S55	9.507	0.886	30.042	1.88		922.1	FLOOD	5
S6.010	S56-HW	9.092	0.561	0.000	0.21		137.7	FLOOD RISK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S11.000	S57	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S11.001	S58-HW	720 Winter	100	+40%	30/15 Summer			
S6.011	S59-HW	720 Winter	100	+40%	1/15 Summer			
S6.012	S60-FCC	720 Winter	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S11.000	S57	9.433	1.045	24.255	2.31		390.1	FLOOD	4
S11.001	S58-HW	9.093	0.782	0.000	0.20		41.7	FLOOD RISK	
S6.011	S59-HW	9.090	1.265	0.000	0.76		17.2	FLOOD RISK	
S6.012	S60-FCC	7.671	-0.116	0.000	0.48		17.2	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network E

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Network E

« - 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
S12.000	17.890	0.119	150.3	0.170	5.00	0.0	0.600	o	300	Pipe/Conduit	
S13.000	15.370	0.102	150.7	0.418	5.00	0.0	0.600	o	300	Pipe/Conduit	
S12.001	17.827	0.119	149.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S12.002	14.771	0.098	150.7	0.056	0.00	0.0	0.600	o	375	Pipe/Conduit	
S14.000	14.705	0.087	169.0	0.008	5.00	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)
S12.000	52.05	5.23	8.536	0.170	0.0	0.0	2.4	1.28	90.5	26.3
S13.000	52.20	5.20	8.519	0.418	0.0	0.0	5.9	1.28	90.4	65.0
S12.001	51.05	5.46	8.417	0.588	0.0	0.0	8.1	1.28	90.6	89.4
S12.002	50.35	5.63	8.223	0.643	0.0	0.0	8.8	1.47	162.7	96.5
S14.000	52.00	5.24	8.362	0.008	0.0	0.0	0.1	1.00	39.9	1.3

Network Design Table for Network E

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
S12.003	46.607	0.310	150.3	0.061	0.00	0.0	0.600	o	450	Pipe/Conduit	
S15.000	21.926	0.088	249.2	0.191	5.00	0.0	0.600	o	300	Pipe/Conduit	
S12.004	52.128	0.309	168.7	0.101	0.00	0.0	0.600	o	450	Pipe/Conduit	
S16.000	10.963	0.037	296.3	0.534	5.00	0.0	0.600	o	450	Pipe/Conduit	
S12.005	13.989	0.056	249.8	0.046	0.00	0.0	0.600	o	525	Pipe/Conduit	
S12.006	28.931	0.450	64.3	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S12.007	35.043	0.100	350.4	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S17.000	14.730	0.647	22.8	0.770	5.00	0.0	0.600	o	450	Pipe/Conduit	
S17.001	16.341	0.082	199.3	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S18.000	8.891	0.094	94.6	0.073	5.00	0.0	0.600	o	225	Pipe/Conduit	
S18.001	52.444	0.556	94.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S18.002	20.379	0.100	203.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S12.008	10.507	0.035	300.2	0.234	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)
S12.003	48.51	6.10	8.050	0.712	0.0	0.0	9.4	1.66	263.3	103.0
S15.000	51.46	5.37	7.978	0.191	0.0	0.0	2.7	0.99	70.1	29.2
S12.004	46.52	6.66	7.740	1.004	0.0	0.0	12.7	1.56	248.5	139.2
S16.000	52.40	5.16	7.468	0.534	0.0	0.0	7.6	1.18	187.0	83.4
S12.005	45.96	6.82	7.356	1.585	0.0	0.0	19.7	1.41	305.8	216.9
S12.006	45.39	6.99	7.300	1.585	0.0	0.0	19.7	2.80	605.4	216.9
S12.007	43.87	7.48	6.850	1.585	0.0	0.0	19.7	1.19	257.8	216.9
S17.000	52.84	5.06	7.477	0.770	0.0	0.0	11.0	4.28	679.9	121.2
S17.001	51.99	5.25	6.830	0.770	0.0	0.0	11.0	1.44	228.5	121.2
S18.000	52.60	5.11	7.500	0.073	0.0	0.0	1.0	1.34	53.5	11.5
S18.001	49.84	5.76	7.406	0.073	0.0	0.0	1.0	1.35	53.5	11.5
S18.002	48.39	6.13	6.850	0.073	0.0	0.0	1.0	0.91	36.3	11.5
S12.008	43.18	7.72	6.750	2.661	0.0	0.0	31.1	0.75	29.8«	342.4

Network Design Table for Network E

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
S12.009	6.372	0.037	172.2	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)
S12.009	42.87	7.83	6.715	2.661	0.0	0.0	31.1	0.99	39.5«	342.4

Manhole Schedules for Network E

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)
S61	10.475	1.939	Open Manhole	1200	S12.000	8.536	300				
S62	9.919	1.400	Open Manhole	1200	S13.000	8.519	300				
S63	10.269	1.852	Open Manhole	1200	S12.001	8.417	300	S12.000	8.417	300	
								S13.000	8.417	300	
S64	10.098	1.875	Open Manhole	1350	S12.002	8.223	375	S12.001	8.298	300	
S65	9.577	1.215	Open Manhole	1200	S14.000	8.362	225				
S66	9.928	1.878	Open Manhole	1350	S12.003	8.050	450	S12.002	8.125	375	
								S14.000	8.275	225	
S67	9.614	1.636	Open Manhole	1200	S15.000	7.978	300				
S68	9.437	1.697	Open Manhole	1350	S12.004	7.740	450	S12.003	7.740	450	
								S15.000	7.890	300	
S69	8.700	1.232	Open Manhole	1350	S16.000	7.468	450				
S70	8.628	1.272	Open Manhole	1500	S12.005	7.356	525	S12.004	7.431	450	
								S16.000	7.431	450	
S71	8.400	1.100	Open Manhole	1500	S12.006	7.300	525	S12.005	7.300	525	
S72-HW	8.400	1.550	Open Manhole	1500	S12.007	6.850	525	S12.006	6.850	525	
S73	8.096	0.619	Open Manhole	1350	S17.000	7.477	450				
S74-HW	8.400	1.570	Open Manhole	1350	S17.001	6.830	450	S17.000	6.830	450	
S75	9.058	1.558	Open Manhole	1200	S18.000	7.500	225				
S76	8.621	1.215	Open Manhole	1200	S18.001	7.406	225	S18.000	7.406	225	
S77-HW	8.400	1.550	Open Manhole	1200	S18.002	6.850	225	S18.001	6.850	225	
S78-HW	8.400	1.652	Open Manhole	1500	S12.008	6.750	225	S12.007	6.750	525	
								S17.001	6.748	450	
								S18.002	6.750	225	
S79-FCC	8.400	1.685	Open Manhole	1200	S12.009	6.715	225	S12.008	6.715	225	
S	8.000	1.322	Open Manhole	0		OUTFALL		S12.009	6.678	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S61	580212.446	198216.308	580212.446	198216.308	Required	

Manhole Schedules for Network E

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S62	580194.683	198200.406	580194.683	198200.406	Required	
S63	580194.564	198215.776	580194.564	198215.776	Required	
S64	580177.440	198220.734	580177.440	198220.734	Required	
S65	580154.382	198221.441	580154.382	198221.441	Required	
S66	580166.151	198230.259	580166.151	198230.259	Required	
S67	580172.285	198266.029	580172.285	198266.029	Required	
S68	580152.152	198274.714	580152.152	198274.714	Required	
S69	580105.376	198254.023	580105.376	198254.023	Required	
S70	580101.111	198264.123	580101.111	198264.123	Required	
S71	580095.470	198276.924	580095.470	198276.924	Required	
S72-HW	580083.806	198303.400	580083.806	198303.400	Required	
S73	580093.578	198342.952	580093.578	198342.952	Required	
S74-HW	580079.367	198339.079	580079.367	198339.079	Required	
S75	580145.144	198323.847	580145.144	198323.847	Required	

Manhole Schedules for Network E

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S76	580136.258	198324.125	580136.258	198324.125	Required	
S77-HW	580083.873	198326.622	580083.873	198326.622	Required	
S78-HW	580064.380	198332.566	580064.380	198332.566	Required	
S79-FCC	580055.565	198326.848	580055.565	198326.848	Required	
S	580050.589	198322.867			No Entry	

Area Summary for Network E

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
12.000	Classification	Residential	66	0.179	0.118	0.118
	Classification	Hardstanding	100	0.051	0.051	0.170
13.000	Classification	Residential	66	0.620	0.409	0.409
	Classification	Hardstanding	100	0.009	0.009	0.418
12.001	-	-	100	0.000	0.000	0.000
12.002	Classification	Hardstanding	100	0.056	0.056	0.056
14.000	Classification	Hardstanding	100	0.008	0.008	0.008
12.003	Classification	Hardstanding	100	0.061	0.061	0.061
15.000	Classification	Residential	66	0.289	0.191	0.191
12.004	Classification	Hardstanding	100	0.101	0.101	0.101
16.000	Classification	Residential	66	0.810	0.534	0.534
12.005	Classification	Hardstanding	100	0.046	0.046	0.046
12.006	-	-	100	0.000	0.000	0.000
12.007	-	-	100	0.000	0.000	0.000
17.000	Classification	Residential	66	1.166	0.770	0.770
17.001	-	-	100	0.000	0.000	0.000
18.000	Classification	Hardstanding	100	0.073	0.073	0.073
18.001	-	-	100	0.000	0.000	0.000
18.002	-	-	100	0.000	0.000	0.000
12.008	Classification	Landscape	20	0.276	0.055	0.055
	Classification	Ponds	80	0.224	0.179	0.234
12.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				3.969	2.661	2.661

Free Flowing Outfall Details for Network E

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S12.009	S	8.000	6.678	0.000	0	0

Simulation Criteria for Network E

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Simulation Criteria for Network E

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for Network E

Hydro-Brake® Optimum Manhole: S78-HW, DS/PN: S12.008, Volume (m³): 13.3

Unit Reference	MD-SHE-0148-1120-1350-1120
Design Head (m)	1.350
Design Flow (l/s)	11.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	148
Invert Level (m)	6.750
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	11.2	Kick-Flo®	0.858	9.0
Flush-Flo™	0.395	11.2	Mean Flow over Head Range	-	9.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	1.200	10.6	3.000	16.3	7.000	24.5
0.200	10.4	1.400	11.4	3.500	17.6	7.500	25.4
0.300	11.0	1.600	12.1	4.000	18.8	8.000	26.2
0.400	11.2	1.800	12.8	4.500	19.8	8.500	26.9
0.500	11.1	2.000	13.5	5.000	20.9	9.000	27.7
0.600	10.9	2.200	14.1	5.500	21.8	9.500	28.4
0.800	9.8	2.400	14.7	6.000	22.8		
1.000	9.7	2.600	15.3	6.500	23.7		

Storage Structures for Network E

Tank or Pond Manhole: S78-HW, DS/PN: S12.008

Invert Level (m) 6.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1013.0	1.200	1830.0	1.500	2056.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network E

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S12.000	S61	15 Winter	1	+0%	30/15 Summer			
S13.000	S62	15 Winter	1	+0%	30/15 Summer	30/15 Winter		
S12.001	S63	15 Winter	1	+0%	30/15 Summer			
S12.002	S64	15 Winter	1	+0%	30/15 Summer			
S14.000	S65	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S12.003	S66	15 Winter	1	+0%	30/15 Summer			
S15.000	S67	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S12.004	S68	15 Winter	1	+0%	30/15 Summer			
S16.000	S69	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S12.005	S70	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S12.006	S71	15 Winter	1	+0%	30/15 Summer			
S12.007	S72-HW	15 Winter	1	+0%	30/15 Summer			
S17.000	S73	15 Winter	1	+0%	100/15 Summer	100/15 Summer		
S17.001	S74-HW	240 Winter	1	+0%	30/15 Summer			
S18.000	S75	15 Winter	1	+0%	100/15 Winter			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network E

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S12.000	S61	8.684	-0.152	0.000	0.29		22.3	OK	
S13.000	S62	8.717	-0.102	0.000	0.73		55.8	OK	7
S12.001	S63	8.662	-0.055	0.000	1.00		77.7	OK	
S12.002	S64	8.451	-0.147	0.000	0.68		83.8	OK	
S14.000	S65	8.388	-0.199	0.000	0.03		1.1	OK	2
S12.003	S66	8.243	-0.257	0.000	0.38		90.6	OK	
S15.000	S67	8.113	-0.165	0.000	0.41		25.1	OK	2
S12.004	S68	7.980	-0.210	0.000	0.54		123.3	OK	
S16.000	S69	7.749	-0.169	0.000	0.53		70.3	OK	5
S12.005	S70	7.730	-0.151	0.000	0.85		188.0	OK	4
S12.006	S71	7.521	-0.304	0.000	0.37		187.4	OK	
S12.007	S72-HW	7.224	-0.151	0.000	0.84		185.9	OK	
S17.000	S73	7.623	-0.304	0.000	0.23		103.1	OK	6
S17.001	S74-HW	7.157	-0.123	0.000	0.12		20.9	OK	
S18.000	S75	7.573	-0.152	0.000	0.23		9.8	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network E

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S18.001	S76	15 Winter	1	+0%	100/30 Winter				7.473
S18.002	S77-HW	240 Winter	1	+0%	1/30 Winter				7.157
S12.008	S78-HW	240 Winter	1	+0%	1/15 Summer				7.156
S12.009	S79-FCC	240 Winter	1	+0%					6.810

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S18.001	S76	-0.158	0.000	0.19		9.6	OK	
S18.002	S77-HW	0.082	0.000	0.05		1.8	SURCHARGED	
S12.008	S78-HW	0.181	0.000	0.44		11.1	SURCHARGED	
S12.009	S79-FCC	-0.130	0.000	0.37		11.1	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S12.000	S61	15 Winter	30	+0%	30/15 Summer			
S13.000	S62	15 Winter	30	+0%	30/15 Summer	30/15 Winter		
S12.001	S63	15 Winter	30	+0%	30/15 Summer			
S12.002	S64	15 Winter	30	+0%	30/15 Summer			
S14.000	S65	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S12.003	S66	15 Winter	30	+0%	30/15 Summer			
S15.000	S67	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S12.004	S68	15 Winter	30	+0%	30/15 Summer			
S16.000	S69	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S12.005	S70	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S12.006	S71	15 Winter	30	+0%	30/15 Summer			
S12.007	S72-HW	15 Winter	30	+0%	30/15 Summer			
S17.000	S73	15 Winter	30	+0%	100/15 Summer	100/15 Summer		
S17.001	S74-HW	480 Winter	30	+0%	30/15 Summer			
S18.000	S75	15 Winter	30	+0%	100/15 Winter			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S12.000	S61	9.783	0.947	0.000	0.64		49.9	SURCHARGED	
S13.000	S62	9.919	1.100	0.131	1.68		127.7	FLOOD	7
S12.001	S63	9.682	0.965	0.000	2.21		172.0	SURCHARGED	
S12.002	S64	9.124	0.526	0.000	1.51		184.5	SURCHARGED	
S14.000	S65	8.904	0.317	0.000	0.15		5.1	SURCHARGED	2
S12.003	S66	8.906	0.406	0.000	0.83		196.5	SURCHARGED	
S15.000	S67	8.772	0.494	0.000	0.90		55.4	SURCHARGED	2
S12.004	S68	8.695	0.505	0.000	1.18		267.9	SURCHARGED	
S16.000	S69	8.294	0.376	0.000	1.30		172.7	SURCHARGED	5
S12.005	S70	8.243	0.362	0.000	1.92		423.2	SURCHARGED	4
S12.006	S71	7.927	0.102	0.000	0.84		422.4	SURCHARGED	
S12.007	S72-HW	7.615	0.240	0.000	1.89		417.9	SURCHARGED	
S17.000	S73	7.719	-0.208	0.000	0.56		253.1	OK	6
S17.001	S74-HW	7.567	0.287	0.000	0.16		27.8	SURCHARGED	
S18.000	S75	7.621	-0.104	0.000	0.56		24.0	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S18.001	S76	480 Winter	30	+0%	100/30 Winter				7.567
S18.002	S77-HW	480 Winter	30	+0%	1/30 Winter				7.566
S12.008	S78-HW	480 Winter	30	+0%	1/15 Summer				7.566
S12.009	S79-FCC	720 Winter	30	+0%					6.810

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S18.001	S76	-0.064	0.000	0.05		2.7	OK	
S18.002	S77-HW	0.491	0.000	0.07		2.3	SURCHARGED	
S12.008	S78-HW	0.591	0.000	0.45		11.2	SURCHARGED	
S12.009	S79-FCC	-0.130	0.000	0.37		11.2	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S12.000	S61	15 Winter	100	+40%	30/15 Summer			
S13.000	S62	15 Winter	100	+40%	30/15 Summer	30/15 Winter		
S12.001	S63	15 Winter	100	+40%	30/15 Summer			
S12.002	S64	15 Winter	100	+40%	30/15 Summer			
S14.000	S65	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S12.003	S66	15 Winter	100	+40%	30/15 Summer			
S15.000	S67	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S12.004	S68	15 Summer	100	+40%	30/15 Summer			
S16.000	S69	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S12.005	S70	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S12.006	S71	30 Winter	100	+40%	30/15 Summer			
S12.007	S72-HW	720 Winter	100	+40%	30/15 Summer			
S17.000	S73	720 Winter	100	+40%	100/15 Summer	100/15 Summer		
S17.001	S74-HW	720 Winter	100	+40%	30/15 Summer			
S18.000	S75	720 Winter	100	+40%	100/15 Winter			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S12.000	S61	10.143	1.307	0.000	1.28		99.8	SURCHARGED	
S13.000	S62	9.977	1.158	57.795	1.70		128.9	FLOOD	7
S12.001	S63	9.938	1.221	0.000	2.32		180.7	SURCHARGED	
S12.002	S64	9.712	1.114	0.000	1.57		192.8	SURCHARGED	
S14.000	S65	9.578	0.991	0.259	0.26		8.9	FLOOD	2
S12.003	S66	9.580	1.080	0.000	0.81		191.7	SURCHARGED	
S15.000	S67	9.615	1.337	1.106	1.79		110.8	FLOOD	2
S12.004	S68	9.381	1.191	0.000	1.51		342.9	FLOOD RISK	
S16.000	S69	8.728	0.810	28.233	1.68		223.3	FLOOD	5
S12.005	S70	8.635	0.754	7.538	2.27		500.5	FLOOD	4
S12.006	S71	8.255	0.430	0.000	0.99		499.3	FLOOD RISK	
S12.007	S72-HW	8.108	0.733	0.000	0.33		72.7	FLOOD RISK	
S17.000	S73	8.107	0.180	11.467	0.08		36.3	FLOOD	6
S17.001	S74-HW	8.106	0.826	0.000	0.21		36.1	FLOOD RISK	
S18.000	S75	8.108	0.383	0.000	0.08		3.4	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S18.001	S76	720 Winter	100	+40%	100/30 Winter				8.107
S18.002	S77-HW	720 Winter	100	+40%	1/30 Winter				8.106
S12.008	S78-HW	720 Winter	100	+40%	1/15 Summer				8.105
S12.009	S79-FCC	720 Winter	100	+40%					6.810

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S18.001	S76	0.476	0.000	0.06		3.3	SURCHARGED	
S18.002	S77-HW	1.031	0.000	0.10		3.1	FLOOD RISK	
S12.008	S78-HW	1.130	0.000	0.45		11.2	FLOOD RISK	
S12.009	S79-FCC	-0.130	0.000	0.38		11.2	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network F

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.300	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Network F

« - 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
S19.000	40.458	0.690	58.6	0.498	5.00	0.0	0.600	o	375	Pipe/Conduit	
S19.001	12.851	0.064	200.8	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S20.000	20.528	0.130	157.9	0.237	5.00	0.0	0.600	o	375	Pipe/Conduit	
S20.001	16.719	0.084	199.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S21.000	41.983	0.416	100.9	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	
S21.001	18.550	0.093	199.5	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)
S19.000	51.57	5.28	9.500	0.498	0.0	0.0	6.9	2.37	261.8	76.4
S19.001	50.84	5.45	8.810	0.498	0.0	0.0	6.9	1.27	140.8	76.4
S20.000	51.77	5.24	8.960	0.237	0.0	0.0	3.3	1.44	159.0	36.6
S20.001	50.83	5.46	8.830	0.237	0.0	0.0	3.3	1.28	141.4	36.6
S21.000	50.49	5.54	9.255	0.013	0.0	0.0	0.2	1.30	51.7	1.9
S21.001	49.14	5.87	8.839	0.013	0.0	0.0	0.2	0.92	36.7	1.9

Network Design Table for Network F

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
S22.000	41.602	0.416	100.0	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	
S22.001	13.392	0.067	199.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.002	6.449	0.021	307.1	0.106	0.00	0.0	0.600	o	450	Pipe/Conduit	
S19.003	25.090	0.167	150.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S19.004	25.252	0.168	150.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S19.005	10.674	0.071	150.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S22.000	50.52	5.53	9.229	0.010	0.0	0.0	0.1	1.31	52.0	1.5
S22.001	49.53	5.77	8.813	0.010	0.0	0.0	0.1	0.92	36.6	1.5
S19.002	48.78	5.97	8.746	0.863	0.0	0.0	11.4	1.15	183.7	125.4
S19.003	46.90	6.48	8.725	0.863	0.0	0.0	11.4	0.82	14.4«	125.4
S19.004	45.17	6.99	8.588	0.863	0.0	0.0	11.4	0.82	14.4«	125.4
S19.005	44.48	7.21	8.420	0.863	0.0	0.0	11.4	0.82	14.4«	125.4

Manhole Schedules for Network F

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)
S81	11.588	2.088	Open Manhole	1350	S19.000	9.500	375				
S82-HW	10.400	1.590	Open Manhole	1350	S19.001	8.810	375	S19.000	8.810	375	
S83	10.246	1.286	Open Manhole	1350	S20.000	8.960	375				
S84-HW	10.400	1.570	Open Manhole	1350	S20.001	8.830	375	S20.000	8.830	375	
S85	11.106	1.851	Open Manhole	1200	S21.000	9.255	225				
S86-HW	10.400	1.561	Open Manhole	1200	S21.001	8.839	225	S21.000	8.839	225	
S87	11.482	2.253	Open Manhole	1200	S22.000	9.229	225				
S88-HW	10.400	1.587	Open Manhole	1200	S22.001	8.813	225	S22.000	8.813	225	
S89-HW	10.400	1.654	Open Manhole	1350	S19.002	8.746	450	S19.001	8.746	375	
								S20.001	8.746	375	
								S21.001	8.746	225	
								S22.001	8.746	225	
S90-FCC	10.400	1.675	Open Manhole	1350	S19.003	8.725	150	S19.002	8.725	450	
S91	9.631	1.073	Open Manhole	1200	S19.004	8.588	150	S19.003	8.558	150	
S92	9.435	1.015	Open Manhole	1200	S19.005	8.420	150	S19.004	8.420	150	
S	9.198	0.849	Open Manhole	0		OUTFALL		S19.005	8.349	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S81	579940.105	198553.868	579940.105	198553.868	Required	
S82-HW	579938.549	198513.440	579938.549	198513.440	Required	
S83	579901.233	198488.844	579901.233	198488.844	Required	
S84-HW	579918.051	198500.615	579918.051	198500.615	Required	
S85	579876.303	198516.870	579876.303	198516.870	Required	

Manhole Schedules for Network F

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S86-HW	579916.837	198505.939	579916.837	198505.939	Required	
S87	579913.296	198551.307	579913.296	198551.307	Required	
S88-HW	579926.877	198511.984	579926.877	198511.984	Required	
S89-HW	579934.761	198501.159	579934.761	198501.159	Required	
S90-FCC	579937.256	198495.213	579937.256	198495.213	Required	
S91	579918.929	198478.076	579918.929	198478.076	Required	
S92	579897.877	198464.131	579897.877	198464.131	Required	
S	579888.978	198458.237			No Entry	

Area Summary for Network F

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
19.000	Classification	Residential	66	0.754	0.498	0.498
19.001	-	-	100	0.000	0.000	0.000
20.000	Classification	Hardstanding	100	0.237	0.237	0.237
20.001	-	-	100	0.000	0.000	0.000
21.000	Classification	Hardstanding	100	0.013	0.013	0.013
21.001	-	-	100	0.000	0.000	0.000
22.000	Classification	Hardstanding	100	0.010	0.010	0.010
22.001	-	-	100	0.000	0.000	0.000
19.002	Classification	Ponds	80	0.091	0.073	0.073
	Classification	Landscape	20	0.163	0.033	0.106
19.003	-	-	100	0.000	0.000	0.000
19.004	-	-	100	0.000	0.000	0.000
19.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.268	0.863	0.863

Free Flowing Outfall Details for Network F

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S19.005	S	9.198	8.349	0.000	0	0

Simulation Criteria for Network F

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for Network F

Hydro-Brake® Optimum Manhole: S89-HW, DS/PN: S19.002, Volume (m³): 6.5

Unit Reference	MD-SHE-0084-3500-1354-3500
Design Head (m)	1.354
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	84
Invert Level (m)	8.746
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.354	3.5	Kick-Flo®	0.747	2.7
Flush-Flo™	0.366	3.3	Mean Flow over Head Range	-	3.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5	1.200	3.3	3.000	5.1	7.000	7.5
0.200	3.1	1.400	3.5	3.500	5.4	7.500	7.8
0.300	3.3	1.600	3.8	4.000	5.8	8.000	8.0
0.400	3.3	1.800	4.0	4.500	6.1	8.500	8.3
0.500	3.3	2.000	4.2	5.000	6.4	9.000	8.5
0.600	3.1	2.200	4.4	5.500	6.7	9.500	8.7
0.800	2.7	2.400	4.6	6.000	7.0		
1.000	3.0	2.600	4.7	6.500	7.3		

Storage Structures for Network F

Tank or Pond Manhole: S89-HW, DS/PN: S19.002

Invert Level (m) 8.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	298.0	1.200	705.0	1.500	826.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network F

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S19.000	S81	15 Winter	1	+0%	100/15 Summer				9.636
S19.001	S82-HW	240 Winter	1	+0%	30/15 Summer				9.155
S20.000	S83	240 Winter	1	+0%	30/15 Winter				9.155
S20.001	S84-HW	240 Winter	1	+0%	30/15 Summer				9.154
S21.000	S85	15 Winter	1	+0%	30/180 Winter				9.282
S21.001	S86-HW	240 Winter	1	+0%	1/30 Winter				9.154
S22.000	S87	15 Winter	1	+0%	30/120 Winter				9.254
S22.001	S88-HW	240 Winter	1	+0%	1/15 Winter				9.154
S19.002	S89-HW	240 Winter	1	+0%	30/15 Summer				9.154
S19.003	S90-FCC	240 Winter	1	+0%					8.775
S19.004	S91	240 Winter	1	+0%					8.638
S19.005	S92	240 Winter	1	+0%					8.471

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network F

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S19.000	S81	-0.239	0.000	0.28		66.1	OK	
S19.001	S82-HW	-0.030	0.000	0.12		13.3	OK	
S20.000	S83	-0.180	0.000	0.05		6.4	OK	
S20.001	S84-HW	-0.051	0.000	0.05		6.0	OK	
S21.000	S85	-0.198	0.000	0.03		1.7	OK	
S21.001	S86-HW	0.090	0.000	0.00		0.1	SURCHARGED	
S22.000	S87	-0.200	0.000	0.03		1.3	OK	
S22.001	S88-HW	0.116	0.000	0.00		0.1	SURCHARGED	
S19.002	S89-HW	-0.042	0.000	0.03		3.3	OK	
S19.003	S90-FCC	-0.100	0.000	0.24		3.3	OK	
S19.004	S91	-0.100	0.000	0.24		3.3	OK	
S19.005	S92	-0.099	0.000	0.25		3.3	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S19.000	S81	15 Winter	30	+0%	100/15 Summer				9.731
S19.001	S82-HW	480 Winter	30	+0%	30/15 Summer				9.556
S20.000	S83	480 Winter	30	+0%	30/15 Winter				9.556
S20.001	S84-HW	480 Winter	30	+0%	30/15 Summer				9.556
S21.000	S85	480 Winter	30	+0%	30/180 Winter				9.555
S21.001	S86-HW	480 Winter	30	+0%	1/30 Winter				9.555
S22.000	S87	480 Winter	30	+0%	30/120 Winter				9.555
S22.001	S88-HW	480 Winter	30	+0%	1/15 Winter				9.555
S19.002	S89-HW	480 Winter	30	+0%	30/15 Summer				9.555
S19.003	S90-FCC	480 Winter	30	+0%					8.775
S19.004	S91	720 Summer	30	+0%					8.638
S19.005	S92	2160 Winter	30	+0%					8.471

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S19.000	S81	-0.144	0.000	0.68		162.1	OK	
S19.001	S82-HW	0.371	0.000	0.16		17.7	SURCHARGED	
S20.000	S83	0.221	0.000	0.06		8.5	SURCHARGED	
S20.001	S84-HW	0.351	0.000	0.07		8.3	SURCHARGED	
S21.000	S85	0.075	0.000	0.01		0.5	SURCHARGED	
S21.001	S86-HW	0.491	0.000	0.01		0.2	SURCHARGED	
S22.000	S87	0.101	0.000	0.01		0.4	SURCHARGED	
S22.001	S88-HW	0.517	0.000	0.01		0.2	SURCHARGED	
S19.002	S89-HW	0.359	0.000	0.03		3.3	SURCHARGED	
S19.003	S90-FCC	-0.100	0.000	0.24		3.3	OK	
S19.004	S91	-0.100	0.000	0.24		3.3	OK	
S19.005	S92	-0.099	0.000	0.26		3.3	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S19.000	S81	15 Winter	100	+40%	100/15 Summer				10.784
S19.001	S82-HW	720 Winter	100	+40%	30/15 Summer				10.052
S20.000	S83	720 Winter	100	+40%	30/15 Winter				10.052
S20.001	S84-HW	720 Winter	100	+40%	30/15 Summer				10.051
S21.000	S85	720 Winter	100	+40%	30/180 Winter				10.051
S21.001	S86-HW	720 Winter	100	+40%	1/30 Winter				10.051
S22.000	S87	720 Winter	100	+40%	30/120 Winter				10.050
S22.001	S88-HW	720 Winter	100	+40%	1/15 Winter				10.051
S19.002	S89-HW	720 Winter	100	+40%	30/15 Summer				10.051
S19.003	S90-FCC	720 Winter	100	+40%					8.775
S19.004	S91	720 Winter	100	+40%					8.638
S19.005	S92	720 Winter	100	+40%					8.472

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S19.000	S81	0.909	0.000	1.21		287.0	SURCHARGED	
S19.001	S82-HW	0.867	0.000	0.22		23.1	SURCHARGED	
S20.000	S83	0.717	0.000	0.08		11.2	FLOOD RISK	
S20.001	S84-HW	0.846	0.000	0.10		11.1	SURCHARGED	
S21.000	S85	0.571	0.000	0.01		0.5	SURCHARGED	
S21.001	S86-HW	0.987	0.000	0.01		0.4	SURCHARGED	
S22.000	S87	0.596	0.000	0.01		0.4	SURCHARGED	
S22.001	S88-HW	1.013	0.000	0.01		0.3	SURCHARGED	
S19.002	S89-HW	0.855	0.000	0.03		3.4	SURCHARGED	
S19.003	S90-FCC	-0.100	0.000	0.25		3.4	OK	
S19.004	S91	-0.100	0.000	0.25		3.4	OK	
S19.005	S92	-0.098	0.000	0.26		3.4	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network H

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Network H

« - 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
S23.000	97.731	0.426	229.4	0.305	5.00	0.0	0.600	o	300	Pipe/Conduit	
S24.000	96.910	4.934	19.6	0.733	5.00	0.0	0.600	o	300	Pipe/Conduit	
S24.001	36.860	1.404	26.3	0.110	0.00	0.0	0.600	o	375	Pipe/Conduit	
S24.002	109.814	0.220	499.2	0.544	0.00	0.0	0.600	o	525	Pipe/Conduit	
S24.003	110.564	0.221	500.3	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S23.001	125.435	0.251	499.7	0.100	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)
S23.000	46.80	6.58	11.422	0.305	0.0	0.0	3.9	1.03	73.1	42.5
S24.000	50.00	5.45	17.700	0.733	0.0	0.0	9.9	3.56	251.9	109.2
S24.001	50.00	5.63	12.766	0.843	0.0	0.0	11.4	3.55	391.9	125.6
S24.002	43.93	7.46	11.212	1.387	0.0	0.0	16.5	1.00	215.6	181.5
S24.003	39.07	9.32	10.992	1.387	0.0	0.0	16.5	0.99	215.3	181.5
S23.001	35.33	11.25	10.696	1.792	0.0	0.0	17.1	1.08	306.1	188.6

Network Design Table for Network H

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
S25.000	88.839	2.625	33.8	0.873	5.00	0.0	0.600	o	375	Pipe/Conduit	
S23.002	16.651	0.033	504.6	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S23.003	68.446	0.137	499.6	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S26.000	110.844	1.706	65.0	0.233	5.00	0.0	0.600	o	300	Pipe/Conduit	
S26.001	88.201	1.749	50.4	0.167	0.00	0.0	0.600	o	375	Pipe/Conduit	
S27.000	42.237	1.269	33.3	0.111	5.00	0.0	0.600	o	150	Pipe/Conduit	
S26.002	27.741	0.800	34.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S26.003	106.784	2.643	40.4	0.255	0.00	0.0	0.600	o	375	Pipe/Conduit	
S26.004	20.762	0.514	40.4	0.101	0.00	0.0	0.600	o	375	Pipe/Conduit	
S26.005	20.019	0.496	40.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S26.006	89.314	2.893	30.9	0.176	0.00	0.0	0.600	o	450	Pipe/Conduit	
S26.007	17.133	0.486	35.3	0.062	0.00	0.0	0.600	o	450	Pipe/Conduit	
S26.008	14.480	0.172	84.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S26.009	13.492	0.172	78.4	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S28.000	25.634	1.925	13.3	0.126	5.00	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)
S25.000	50.00	5.47	13.380	0.873	0.0	0.0	11.8	3.12	345.0	130.0
S23.002	34.93	11.49	10.370	2.665	0.0	0.0	25.2	1.16	415.1	277.3
S23.003	33.38	12.47	10.337	2.665	0.0	0.0	25.2	1.17	417.1	277.3
S26.000	49.10	5.95	23.330	0.233	0.0	0.0	3.1	1.95	138.1	34.2
S26.001	46.99	6.52	21.549	0.400	0.0	0.0	5.1	2.56	282.4	56.0
S27.000	50.00	5.40	21.294	0.111	0.0	0.0	1.5	1.75	30.9	16.5
S26.002	46.47	6.67	19.800	0.511	0.0	0.0	6.4	3.09	340.8	70.7
S26.003	44.45	7.29	19.050	0.766	0.0	0.0	9.2	2.86	315.7	101.4
S26.004	44.08	7.41	16.407	0.867	0.0	0.0	10.4	2.86	315.7	113.9
S26.005	43.73	7.53	15.893	0.867	0.0	0.0	10.4	2.86	315.8	113.9
S26.006	42.56	7.94	15.322	1.043	0.0	0.0	12.0	3.67	583.6	132.3
S26.007	42.33	8.02	12.429	1.105	0.0	0.0	12.7	3.43	546.0	139.4
S26.008	42.03	8.13	11.943	1.105	0.0	0.0	12.7	2.22	352.6	139.4
S26.009	41.77	8.23	11.772	1.105	0.0	0.0	12.7	2.30	365.4	139.4
S28.000	50.00	5.12	14.050	0.126	0.0	0.0	1.7	3.61	143.3	18.7

Network Design Table for Network H

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
S29.000	16.684	0.300	55.6	1.595	5.00	0.0	0.600	o	600	Pipe/Conduit	
S26.010	21.635	0.250	86.5	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S26.011	61.796	0.565	109.4	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S26.012	14.341	0.136	105.4	0.270	0.00	0.0	0.600	o	750	Pipe/Conduit	
S26.013	46.414	0.149	311.5	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S30.000	21.955	0.483	45.5	1.376	5.00	0.0	0.600	o	450	Pipe/Conduit	
S30.001	59.943	0.149	402.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S23.004	14.333	0.029	494.2	0.693	0.00	0.0	0.600	o	1050	Pipe/Conduit	
S23.005	25.656	0.086	298.3	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)
S29.000	50.00	5.09	11.750	1.595	0.0	0.0	21.6	3.27	924.6	237.6
S26.010	41.45	8.35	11.300	2.826	0.0	0.0	31.7	3.01	1329.5	349.0
S26.011	40.47	8.73	11.050	2.826	0.0	0.0	31.7	2.68	1182.0	349.0
S26.012	40.25	8.82	10.485	3.096	0.0	0.0	33.8	2.73	1203.9	371.3
S26.013	39.09	9.31	10.349	3.096	0.0	0.0	33.8	1.58	698.1	371.3
S30.000	50.00	5.12	10.982	1.376	0.0	0.0	18.6	3.02	480.6	205.0
S30.001	49.09	5.95	10.349	1.376	0.0	0.0	18.6	1.21	341.5	205.0
S23.004	33.15	12.62	10.200	7.830	0.0	0.0	70.3	1.54	1336.3	773.3
S23.005	32.47	13.09	10.171	7.830	0.0	0.0	70.3	0.91	64.0«	773.3

Manhole Schedules for Network H

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)
S101	12.600	1.178	Open Manhole	1200	S23.000	11.422	300				
S102	19.241	1.541	Open Manhole	1200	S24.000	17.700	300				
S103	14.359	1.593	Open Manhole	1350	S24.001	12.766	375	S24.000	12.766	300	
S104	13.641	2.429	Open Manhole	1500	S24.002	11.212	525	S24.001	11.362	375	
S105	13.319	2.327	Open Manhole	1500	S24.003	10.992	525	S24.002	10.992	525	
S106	13.852	3.156	Open Manhole	1500	S23.001	10.696	600	S23.000	10.996	300	
								S24.003	10.771	525	
S107	14.955	1.575	Open Manhole	1350	S25.000	13.380	375				
S108	12.525	2.155	Open Manhole	1500	S23.002	10.370	675	S23.001	10.445	600	
								S25.000	10.755	375	85
S109-HW	12.087	1.750	Open Manhole	1500	S23.003	10.337	675	S23.002	10.337	675	
S110	24.830	1.500	Open Manhole	1200	S26.000	23.330	300				
S111	22.533	0.984	Open Manhole	1350	S26.001	21.549	375	S26.000	21.624	300	
S112	22.636	1.342	Open Manhole	1200	S27.000	21.294	150				
S113	21.713	1.913	Open Manhole	1350	S26.002	19.800	375	S26.001	19.800	375	
								S27.000	20.025	150	
S114	20.806	1.806	Open Manhole	1350	S26.003	19.050	375	S26.002	19.000	375	
S115	19.230	2.823	Open Manhole	1350	S26.004	16.407	375	S26.003	16.407	375	
S116	18.520	2.627	Open Manhole	1350	S26.005	15.893	375	S26.004	15.893	375	
S117	17.852	2.530	Open Manhole	1350	S26.006	15.322	450	S26.005	15.397	375	
S118	14.898	2.469	Open Manhole	1350	S26.007	12.429	450	S26.006	12.429	450	
S119	14.653	2.710	Open Manhole	1350	S26.008	11.943	450	S26.007	11.943	450	
S120	14.649	2.878	Open Manhole	1350	S26.009	11.772	450	S26.008	11.771	450	
S121	15.443	1.393	Open Manhole	1200	S28.000	14.050	225				
S122	13.500	1.750	Open Manhole	1500	S29.000	11.750	600				
S123	14.852	3.552	Open Manhole	1800	S26.010	11.300	750	S26.009	11.600	450	
								S28.000	12.125	225	300
								S29.000	11.450	600	
S124	12.749	1.699	Open Manhole	1800	S26.011	11.050	750	S26.010	11.050	750	
S125	11.979	1.494	Open Manhole	1800	S26.012	10.485	750	S26.011	10.485	750	
S126-HW	11.900	1.551	Open Manhole	1800	S26.013	10.349	750	S26.012	10.349	750	
S127	12.599	1.617	Open Manhole	1350	S30.000	10.982	450				
S128-HW	11.900	1.551	Open Manhole	1500	S30.001	10.349	600	S30.000	10.499	450	
S129-HW	11.900	1.700	Open Manhole	1950	S23.004	10.200	1050	S23.003	10.200	675	

Manhole Schedules for Network H

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
								S26.013	10.200	750	
								S30.001	10.200	600	
S130-FCC	11.900	1.729	Open Manhole	1950	S23.005	10.171	300	S23.004	10.171	1050	
S	11.400	1.315	Open Manhole	0		OUTFALL		S23.005	10.085	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S101	580454.957	198180.099	580454.957	198180.099	Required	
S102	580653.902	198403.218	580653.902	198403.218	Required	
S103	580654.783	198306.312	580654.783	198306.312	Required	
S104	580639.634	198272.710	580639.634	198272.710	Required	
S105	580529.823	198271.894	580529.823	198271.894	Required	
S106	580419.263	198271.079	580419.263	198271.079	Required	
S107	580434.947	198331.505	580434.947	198331.505	Required	
S108	580362.513	198382.942	580362.513	198382.942	Required	
S109-HW	580358.914	198399.199	580358.914	198399.199	Required	
S110	580922.036	198357.426	580922.036	198357.426	Required	

Manhole Schedules for Network H

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S111	580815.472	198387.930	580815.472	198387.930	Required	
S112	580742.174	198452.773	580742.174	198452.773	Required	
S113	580730.657	198412.137	580730.657	198412.137	Required	
S114	580704.192	198420.453	580704.192	198420.453	Required	
S115	580619.042	198484.891	580619.042	198484.891	Required	
S116	580601.997	198496.745	580601.997	198496.745	Required	
S117	580582.753	198502.262	580582.753	198502.262	Required	
S118	580493.441	198501.550	580493.441	198501.550	Required	
S119	580476.465	198503.858	580476.465	198503.858	Required	
S120	580464.355	198511.796	580464.355	198511.796	Required	
S121	580442.335	198543.979	580442.335	198543.979	Required	
S122	580469.923	198530.441	580469.923	198530.441	Required	
S123	580455.530	198522.003	580455.530	198522.003	Required	
S124	580436.593	198511.540	580436.593	198511.540	Required	

Manhole Schedules for Network H

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S125	580384.831	198477.785	580384.831	198477.785	Required	
S126-HW	580373.546	198468.936	580373.546	198468.936	Required	
S127	580408.189	198445.247	580408.189	198445.247	Required	
S128-HW	580386.262	198446.338	580386.262	198446.338	Required	
S129-HW	580327.953	198460.242	580327.953	198460.242	Required	
S130-FCC	580317.635	198470.191	580317.635	198470.191	Required	
S	580293.122	198477.765			No Entry	

Area Summary for Network H

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
23.000	-	-	100	0.305	0.305	0.305
24.000	Classification	Residential	66	0.337	0.222	0.222
	Classification	Residential	66	0.466	0.307	0.530
	Classification	Hardstanding	100	0.203	0.203	0.733
24.001	-	-	100	0.110	0.110	0.110
24.002	Classification	Residential	66	0.824	0.544	0.544
24.003	-	-	100	0.000	0.000	0.000
23.001	-	-	100	0.100	0.100	0.100
25.000	Classification	Residential	66	1.323	0.873	0.873
23.002	-	-	100	0.000	0.000	0.000
23.003	-	-	100	0.000	0.000	0.000
26.000	Classification	Hardstanding	100	0.233	0.233	0.233
26.001	Classification	Hardstanding	100	0.167	0.167	0.167
27.000	Classification	Hardstanding	100	0.111	0.111	0.111
26.002	-	-	100	0.000	0.000	0.000
26.003	Classification	Hardstanding	100	0.091	0.091	0.091
	Classification	Hardstanding	100	0.164	0.164	0.255
26.004	Classification	Hardstanding	100	0.101	0.101	0.101
26.005	-	-	100	0.000	0.000	0.000
26.006	Classification	Hardstanding	100	0.176	0.176	0.176
26.007	Classification	Hardstanding	100	0.062	0.062	0.062
26.008	-	-	100	0.000	0.000	0.000
26.009	-	-	100	0.000	0.000	0.000
28.000	Classification	Hardstanding	100	0.126	0.126	0.126
29.000	Classification	Residential	66	2.417	1.595	1.595
26.010	-	-	100	0.000	0.000	0.000
26.011	-	-	100	0.000	0.000	0.000
26.012	Classification	Residential	66	0.409	0.270	0.270
26.013	-	-	100	0.000	0.000	0.000
30.000	Classification	Residential	66	2.085	1.376	1.376
30.001	-	-	100	0.000	0.000	0.000
23.004	Classification	Landscape	20	1.288	0.258	0.258
	Classification	Ponds	80	0.545	0.436	0.693
23.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				11.642	7.830	7.830

Free Flowing Outfall Details for Network H

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S23.005	S	11.400	10.085	0.000	0	0

Simulation Criteria for Network H

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for Network H

Hydro-Brake® Optimum Manhole: S129-HW, DS/PN: S23.004, Volume (m³): 65.1

Unit Reference	MD-SHE-0245-3390-1400-3390
Design Head (m)	1.400
Design Flow (l/s)	33.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	245
Invert Level (m)	10.200
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	33.9	Kick-Flo®	0.978	28.5
Flush-Flo™	0.451	33.9	Mean Flow over Head Range	-	28.8

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	8.0	1.200	31.5	3.000	48.9	7.000	73.7
0.200	24.9	1.400	33.9	3.500	52.7	7.500	76.3
0.300	33.0	1.600	36.1	4.000	56.2	8.000	78.7
0.400	33.8	1.800	38.2	4.500	59.5	8.500	81.1
0.500	33.8	2.000	40.2	5.000	62.6	9.000	83.3
0.600	33.5	2.200	42.1	5.500	65.6	9.500	85.6
0.800	32.1	2.400	43.9	6.000	68.4		
1.000	28.8	2.600	45.6	6.500	71.1		

Storage Structures for Network H

Tank or Pond Manhole: S129-HW, DS/PN: S23.004

Invert Level (m) 10.400

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3757.0	1.200	4896.0	1.500	5203.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network H

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S23.000	S101	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S24.000	S102	15 Winter	1	+0%	100/15 Summer	100/15 Summer		
S24.001	S103	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S24.002	S104	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S24.003	S105	15 Winter	1	+0%	30/15 Summer			
S23.001	S106	15 Winter	1	+0%	30/15 Summer			
S25.000	S107	15 Winter	1	+0%	100/15 Summer	100/15 Summer		
S23.002	S108	30 Winter	1	+0%	30/15 Summer			
S23.003	S109-HW	30 Winter	1	+0%	30/15 Winter			
S26.000	S110	15 Winter	1	+0%	100/15 Winter			
S26.001	S111	15 Winter	1	+0%	100/15 Summer			
S27.000	S112	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S26.002	S113	15 Winter	1	+0%	100/15 Summer			
S26.003	S114	15 Winter	1	+0%	100/15 Summer	100/15 Summer		
S26.004	S115	15 Winter	1	+0%	100/15 Summer			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network H

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S23.000	S101	11.587	-0.135	0.000	0.58		40.7	OK	6
S24.000	S102	17.833	-0.167	0.000	0.39		96.3	OK	5
S24.001	S103	12.910	-0.231	0.000	0.31		109.2	OK	5
S24.002	S104	11.573	-0.164	0.000	0.73		148.7	OK	6
S24.003	S105	11.316	-0.201	0.000	0.64		130.2	OK	
S23.001	S106	11.014	-0.282	0.000	0.51		148.0	OK	
S25.000	S107	13.535	-0.220	0.000	0.35		115.4	OK	4
S23.002	S108	10.823	-0.222	0.000	0.78		184.5	OK	
S23.003	S109-HW	10.673	-0.339	0.000	0.49		183.3	OK	
S26.000	S110	23.428	-0.202	0.000	0.23		30.7	OK	
S26.001	S111	21.658	-0.266	0.000	0.18		48.8	OK	
S27.000	S112	21.369	-0.075	0.000	0.49		14.7	OK	4
S26.002	S113	19.917	-0.258	0.000	0.21		63.3	OK	
S26.003	S114	19.190	-0.235	0.000	0.30		89.7	OK	2
S26.004	S115	16.568	-0.214	0.000	0.38		100.5	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network H

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S26.005	S116	15 Winter	1	+0%	100/15 Summer			
S26.006	S117	15 Winter	1	+0%	100/15 Summer			
S26.007	S118	15 Winter	1	+0%	30/15 Summer			
S26.008	S119	15 Winter	1	+0%	30/15 Summer			
S26.009	S120	15 Winter	1	+0%	30/15 Summer			
S28.000	S121	15 Winter	1	+0%				
S29.000	S122	15 Winter	1	+0%	30/15 Winter	100/15 Summer		
S26.010	S123	15 Winter	1	+0%	30/15 Winter			
S26.011	S124	15 Winter	1	+0%	30/15 Winter			
S26.012	S125	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S26.013	S126-HW	15 Winter	1	+0%	30/15 Summer			
S30.000	S127	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S30.001	S128-HW	15 Winter	1	+0%	30/15 Summer			
S23.004	S129-HW	360 Winter	1	+0%	100/120 Winter			
S23.005	S130-FCC	360 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S26.005	S116	16.054	-0.214	0.000	0.38		100.8	OK	
S26.006	S117	15.464	-0.308	0.000	0.21		118.4	OK	
S26.007	S118	12.602	-0.277	0.000	0.32		124.4	OK	
S26.008	S119	12.177	-0.216	0.000	0.53		123.6	OK	
S26.009	S120	12.006	-0.216	0.000	0.53		124.2	OK	
S28.000	S121	14.103	-0.172	0.000	0.13		16.9	OK	
S29.000	S122	12.011	-0.339	0.000	0.39		214.0	OK	4
S26.010	S123	11.643	-0.407	0.000	0.42		332.6	OK	
S26.011	S124	11.342	-0.458	0.000	0.32		328.7	OK	
S26.012	S125	10.901	-0.334	0.000	0.59		358.8	OK	4
S26.013	S126-HW	10.774	-0.325	0.000	0.61		353.2	OK	
S30.000	S127	11.201	-0.231	0.000	0.47		184.6	OK	4
S30.001	S128-HW	10.689	-0.260	0.000	0.58		177.9	OK	
S23.004	S129-HW	10.626	-0.624	0.000	0.06		32.4	OK	
S23.005	S130-FCC	10.332	-0.139	0.000	0.56		32.4	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S23.000	S101	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S24.000	S102	15 Winter	30	+0%	100/15 Summer	100/15 Summer		
S24.001	S103	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S24.002	S104	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S24.003	S105	15 Winter	30	+0%	30/15 Summer			
S23.001	S106	15 Winter	30	+0%	30/15 Summer			
S25.000	S107	15 Winter	30	+0%	100/15 Summer	100/15 Summer		
S23.002	S108	30 Winter	30	+0%	30/15 Summer			
S23.003	S109-HW	30 Winter	30	+0%	30/15 Winter			
S26.000	S110	15 Winter	30	+0%	100/15 Winter			
S26.001	S111	15 Winter	30	+0%	100/15 Summer			
S27.000	S112	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S26.002	S113	15 Winter	30	+0%	100/15 Summer			
S26.003	S114	15 Winter	30	+0%	100/15 Summer	100/15 Summer		
S26.004	S115	15 Winter	30	+0%	100/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S23.000	S101	12.125	0.403	0.000	1.30		92.1	SURCHARGED	6
S24.000	S102	17.995	-0.005	0.000	0.97		236.7	OK	5
S24.001	S103	13.286	0.145	0.000	0.76		269.1	SURCHARGED	5
S24.002	S104	12.687	0.950	0.000	1.76		359.3	SURCHARGED	6
S24.003	S105	12.062	0.545	0.000	1.53		311.3	SURCHARGED	
S23.001	S106	11.491	0.195	0.000	1.17		337.0	SURCHARGED	
S25.000	S107	13.653	-0.102	0.000	0.85		280.8	OK	4
S23.002	S108	11.091	0.046	0.000	1.81		425.1	SURCHARGED	
S23.003	S109-HW	11.019	0.007	0.000	1.14		422.8	SURCHARGED	
S26.000	S110	23.494	-0.136	0.000	0.55		73.9	OK	
S26.001	S111	21.734	-0.190	0.000	0.47		126.2	OK	
S27.000	S112	21.786	0.342	0.000	1.12		33.6	SURCHARGED	4
S26.002	S113	19.996	-0.179	0.000	0.53		159.6	OK	
S26.003	S114	19.307	-0.118	0.000	0.78		237.1	OK	2
S26.004	S115	16.740	-0.042	0.000	1.00		265.7	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S26.005	S116	15 Winter	30	+0%	100/15 Summer			
S26.006	S117	15 Winter	30	+0%	100/15 Summer			
S26.007	S118	15 Winter	30	+0%	30/15 Summer			
S26.008	S119	15 Winter	30	+0%	30/15 Summer			
S26.009	S120	15 Winter	30	+0%	30/15 Summer			
S28.000	S121	15 Winter	30	+0%				
S29.000	S122	15 Winter	30	+0%	30/15 Winter	100/15 Summer		
S26.010	S123	15 Winter	30	+0%	30/15 Winter			
S26.011	S124	15 Winter	30	+0%	30/15 Winter			
S26.012	S125	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S26.013	S126-HW	15 Winter	30	+0%	30/15 Summer			
S30.000	S127	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S30.001	S128-HW	15 Winter	30	+0%	30/15 Summer			
S23.004	S129-HW	480 Winter	30	+0%	100/120 Winter			
S23.005	S130-FCC	480 Winter	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S26.005	S116	16.209	-0.059	0.000	1.00		264.0	OK	
S26.006	S117	15.570	-0.202	0.000	0.57		315.6	OK	
S26.007	S118	13.082	0.203	0.000	0.82		321.3	SURCHARGED	
S26.008	S119	12.753	0.360	0.000	1.38		322.6	SURCHARGED	
S26.009	S120	12.424	0.202	0.000	1.39		326.1	SURCHARGED	
S28.000	S121	14.136	-0.139	0.000	0.31		41.4	OK	
S29.000	S122	12.351	0.001	0.000	0.95		522.0	SURCHARGED	4
S26.010	S123	12.114	0.064	0.000	1.03		805.5	SURCHARGED	
S26.011	S124	11.850	0.050	0.000	0.77		794.7	SURCHARGED	
S26.012	S125	11.533	0.298	0.000	1.39		842.1	SURCHARGED	4
S26.013	S126-HW	11.233	0.134	0.000	1.44		840.5	SURCHARGED	
S30.000	S127	11.764	0.332	0.000	1.14		445.0	SURCHARGED	4
S30.001	S128-HW	11.100	0.151	0.000	1.41		430.1	SURCHARGED	
S23.004	S129-HW	10.992	-0.258	0.000	0.06		33.8	OK	
S23.005	S130-FCC	10.337	-0.134	0.000	0.59		33.8	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S23.000	S101	30 Winter	100	+40%	30/15 Summer	100/15 Summer		
S24.000	S102	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
S24.001	S103	30 Winter	100	+40%	30/15 Summer	100/15 Summer		
S24.002	S104	30 Winter	100	+40%	30/15 Summer	100/15 Summer		
S24.003	S105	15 Winter	100	+40%	30/15 Summer			
S23.001	S106	30 Winter	100	+40%	30/15 Summer			
S25.000	S107	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
S23.002	S108	30 Winter	100	+40%	30/15 Summer			
S23.003	S109-HW	720 Winter	100	+40%	30/15 Winter			
S26.000	S110	15 Winter	100	+40%	100/15 Winter			
S26.001	S111	15 Winter	100	+40%	100/15 Summer			
S27.000	S112	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S26.002	S113	15 Winter	100	+40%	100/15 Summer			
S26.003	S114	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
S26.004	S115	15 Winter	100	+40%	100/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S23.000	S101	12.622	0.900	22.405	1.47		104.4	FLOOD	6
S24.000	S102	19.282	1.282	40.680	1.04		253.6	FLOOD	5
S24.001	S103	14.373	1.232	14.070	0.76		268.6	FLOOD	5
S24.002	S104	13.682	1.945	41.301	1.99		405.3	FLOOD	6
S24.003	S105	13.102	1.585	0.000	1.94		396.2	FLOOD RISK	
S23.001	S106	12.428	1.132	0.000	1.60		462.6	SURCHARGED	
S25.000	S107	14.976	1.221	20.955	1.20		395.0	FLOOD	4
S23.002	S108	11.838	0.793	0.000	3.33		782.2	SURCHARGED	
S23.003	S109-HW	11.570	0.558	0.000	0.34		125.0	SURCHARGED	
S26.000	S110	23.748	0.118	0.000	0.98		132.1	SURCHARGED	
S26.001	S111	22.196	0.272	0.000	0.80		215.6	SURCHARGED	
S27.000	S112	22.642	1.198	6.169	1.40		41.9	FLOOD	4
S26.002	S113	21.282	1.107	0.000	0.76		227.9	SURCHARGED	
S26.003	S114	20.808	1.383	2.173	1.05		317.6	FLOOD	2
S26.004	S115	18.173	1.391	0.000	1.30		346.3	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S26.005	S116	15 Winter	100	+40%	100/15 Summer			
S26.006	S117	15 Winter	100	+40%	100/15 Summer			
S26.007	S118	15 Winter	100	+40%	30/15 Summer			
S26.008	S119	15 Winter	100	+40%	30/15 Summer			
S26.009	S120	15 Winter	100	+40%	30/15 Summer			
S28.000	S121	15 Winter	100	+40%				
S29.000	S122	15 Winter	100	+40%	30/15 Winter	100/15 Summer		
S26.010	S123	15 Winter	100	+40%	30/15 Winter			
S26.011	S124	15 Winter	100	+40%	30/15 Winter			
S26.012	S125	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S26.013	S126-HW	720 Winter	100	+40%	30/15 Summer			
S30.000	S127	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S30.001	S128-HW	720 Winter	100	+40%	30/15 Summer			
S23.004	S129-HW	720 Winter	100	+40%	100/120 Winter			
S23.005	S130-FCC	2880 Winter	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S26.005	S116	17.328	1.060	0.000	1.32		350.4	SURCHARGED	
S26.006	S117	16.496	0.724	0.000	0.74		408.0	SURCHARGED	
S26.007	S118	14.897	2.018	0.000	1.09		426.9	FLOOD RISK	
S26.008	S119	14.318	1.925	0.000	1.83		428.1	SURCHARGED	
S26.009	S120	13.739	1.517	0.000	1.85		433.2	SURCHARGED	
S28.000	S121	14.172	-0.103	0.000	0.57		75.1	OK	
S29.000	S122	13.547	1.197	47.037	1.37		754.5	FLOOD	4
S26.010	S123	13.161	1.111	0.000	1.42		1107.8	SURCHARGED	
S26.011	S124	12.658	0.858	0.000	1.08		1106.8	FLOOD RISK	
S26.012	S125	12.001	0.766	21.918	1.87		1134.3	FLOOD	4
S26.013	S126-HW	11.570	0.471	0.000	0.25		148.6	SURCHARGED	
S30.000	S127	12.633	1.201	33.549	1.60		626.1	FLOOD	4
S30.001	S128-HW	11.569	0.620	0.000	0.21		65.3	SURCHARGED	
S23.004	S129-HW	11.567	0.317	0.000	0.06		33.8	SURCHARGED	
S23.005	S130-FCC	10.337	-0.134	0.000	0.59		33.8	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network I

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Network I

« - 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
S31.000	15.486	0.062	249.8	2.344	5.00	0.0	0.600	o	675	Pipe/Conduit	
S31.001	27.209	0.109	249.6	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S31.002	11.357	0.045	252.4	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S31.003	9.189	0.037	248.4	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S31.004	21.824	0.087	250.8	0.151	0.00	0.0	0.600	o	675	Pipe/Conduit	
S32.000	18.821	0.188	100.1	1.380	5.00	0.0	0.600	o	525	Pipe/Conduit	
S31.005	18.190	0.073	249.2	0.000	0.00	0.0	0.600	o	825	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)
S31.000	52.40	5.16	15.203	2.344	0.0	0.0	33.3	1.65	591.8	365.9
S31.001	51.20	5.43	15.141	2.344	0.0	0.0	33.3	1.65	592.0	365.9
S31.002	50.71	5.55	15.032	2.344	0.0	0.0	33.3	1.65	588.7	365.9
S31.003	50.33	5.64	14.987	2.344	0.0	0.0	33.3	1.66	593.5	365.9
S31.004	49.45	5.86	14.950	2.495	0.0	0.0	33.4	1.65	590.5	367.5
S32.000	52.47	5.14	15.201	1.380	0.0	0.0	19.6	2.24	484.6	215.7
S31.005	48.82	6.02	14.713	3.875	0.0	0.0	51.2	1.88	1003.0	563.5

Network Design Table for Network I

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
S31.006	16.334	0.065	251.3	0.000	0.00	0.0	0.600	o	825	Pipe/Conduit	
S31.007	45.388	1.073	42.3	0.788	0.00	0.0	0.600	o	900	Pipe/Conduit	
S31.008	116.955	2.765	42.3	0.000	0.00	0.0	0.600	o	900	Pipe/Conduit	
S31.009	19.481	0.462	42.2	0.000	0.00	0.0	0.600	o	900	Pipe/Conduit	
S31.010	101.510	0.200	507.5	0.000	0.00	0.0	0.600	o	1050	Pipe/Conduit	
S33.000	17.956	0.151	118.9	1.653	5.00	0.0	0.600	o	525	Pipe/Conduit	
S33.001	43.119	0.200	215.6	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S31.011	22.098	0.068	325.0	1.324	0.00	0.0	0.600	o	1050	Pipe/Conduit	
S31.012	21.413	1.518	14.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S31.013	22.273	0.114	195.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S34.000	49.903	0.224	222.8	1.172	5.00	0.0	0.600	o	525	Pipe/Conduit	
S34.001	9.922	0.051	194.5	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S31.014	10.313	0.033	312.5	0.079	0.00	0.0	0.600	o	825	Pipe/Conduit	
S31.015	84.768	0.283	299.5	0.000	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)
S31.006	48.27	6.17	14.640	3.875	0.0	0.0	51.2	1.87	998.7	563.5
S31.007	47.69	6.32	14.500	4.663	0.0	0.0	60.2	4.83	3069.6	662.5
S31.008	46.28	6.73	13.427	4.663	0.0	0.0	60.2	4.83	3069.6	662.5
S31.009	46.05	6.79	10.662	4.663	0.0	0.0	60.2	4.83	3074.4	662.5
S31.010	42.65	7.90	10.200	4.663	0.0	0.0	60.2	1.52	1318.5	662.5
S33.000	52.44	5.15	10.351	1.653	0.0	0.0	23.5	2.05	444.5	258.3
S33.001	50.41	5.62	10.200	1.653	0.0	0.0	23.5	1.52	329.4	258.3
S31.011	42.12	8.10	10.000	7.640	0.0	0.0	87.1	1.91	1650.5	958.5
S31.012	41.92	8.17	9.932	7.640	0.0	0.0	87.1	4.85	535.2«	958.5
S31.013	41.16	8.46	8.414	7.640	0.0	0.0	87.1	1.29	142.8«	958.5
S34.000	50.67	5.56	8.575	1.172	0.0	0.0	16.1	1.50	324.0	176.9
S34.001	50.24	5.66	8.351	1.172	0.0	0.0	16.1	1.60	346.9	176.9
S31.014	40.90	8.56	8.300	8.890	0.0	0.0	98.5	1.67	894.9«	1083.1
S31.015	37.80	9.92	8.267	8.890	0.0	0.0	98.5	1.04	115.0«	1083.1

Manhole Schedules for Network I

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	18.000	2.797	Open Manhole	1500	S31.000	15.203	675				
S2	18.080	2.939	Open Manhole	1500	S31.001	15.141	675	S31.000	15.141	675	
S3	18.379	3.347	Open Manhole	1500	S31.002	15.032	675	S31.001	15.032	675	
S4	18.573	3.586	Open Manhole	1500	S31.003	14.987	675	S31.002	14.987	675	
S5	18.797	3.847	Open Manhole	1500	S31.004	14.950	675	S31.003	14.950	675	
S6	20.228	5.027	Open Manhole	1500	S32.000	15.201	525				
S7	19.304	4.591	Open Manhole	1800	S31.005	14.713	825	S31.004	14.863	675	
								S32.000	15.013	525	
S8	18.479	3.839	Open Manhole	1800	S31.006	14.640	825	S31.005	14.640	825	
S9	17.676	3.176	Open Manhole	1800	S31.007	14.500	900	S31.006	14.575	825	
S10	16.153	2.726	Open Manhole	1800	S31.008	13.427	900	S31.007	13.427	900	
S131	13.700	3.038	Open Manhole	1800	S31.009	10.662	900	S31.008	10.662	900	
S132-HW	11.700	1.500	Open Manhole	1950	S31.010	10.200	1050	S31.009	10.200	900	
S134	13.500	3.149	Open Manhole	1500	S33.000	10.351	525				
S135-HW	11.700	1.500	Open Manhole	1500	S33.001	10.200	525	S33.000	10.200	525	
S136-HW	11.700	1.700	Open Manhole	1950	S31.011	10.000	1050	S31.010	10.000	1050	
								S33.001	10.000	525	
S137-FCC	11.700	1.768	Open Manhole	1950	S31.012	9.932	375	S31.011	9.932	1050	
S138-HW	10.000	1.586	Open Manhole	1350	S31.013	8.414	375	S31.012	8.414	375	
S139	10.000	1.425	Open Manhole	1500	S34.000	8.575	525				
S140-HW	10.000	1.649	Open Manhole	1500	S34.001	8.351	525	S34.000	8.351	525	
S141-HW	10.000	1.700	Open Manhole	1800	S31.014	8.300	825	S31.013	8.300	375	
								S34.001	8.300	525	
S142-FCC	9.730	1.463	Open Manhole	1800	S31.015	8.267	375	S31.014	8.267	825	
S15	9.000	1.016	Open Manhole	1350		OUTFALL		S31.015	7.984	375	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	581624.239	198223.799	581624.239	198223.799	Required	

Manhole Schedules for Network I

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S2	581609.369	198228.124	581609.369	198228.124	Required	
S3	581586.196	198242.384	581586.196	198242.384	Required	
S4	581575.173	198245.119	581575.173	198245.119	Required	
S5	581565.995	198244.662	581565.995	198244.662	Required	
S6	581537.454	198257.063	581537.454	198257.063	Required	
S7	581544.741	198239.709	581544.741	198239.709	Required	
S8	581542.974	198221.605	581542.974	198221.605	Required	
S9	581538.510	198205.893	581538.510	198205.893	Required	
S10	581581.112	198190.238	581581.112	198190.238	Required	
S131	581690.891	198149.899	581690.891	198149.899	Required	
S132-HW	581698.888	198132.135	581698.888	198132.135	Required	
S134	581777.916	198150.662	581777.916	198150.662	Required	
S135-HW	581777.797	198132.707	581777.797	198132.707	Required	
S136-HW	581792.146	198092.045	581792.146	198092.045	Required	

Manhole Schedules for Network I

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S137-FCC	581803.273	198072.953	581803.273	198072.953	Required	
S138-HW	581805.867	198051.698	581805.867	198051.698	Required	
S139	581758.357	198009.192	581758.357	198009.192	Required	
S140-HW	581802.338	198032.773	581802.338	198032.773	Required	
S141-HW	581811.938	198030.268	581811.938	198030.268	Required	
S142-FCC	581807.435	198020.990	581807.435	198020.990	Required	
S15	581728.933	197989.005			No Entry	

Area Summary for Network I

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
31.000	Classification	Residential	66	3.396	2.241	2.241
	Classification	Hardstanding	100	0.103	0.103	2.344
31.001	-	-	100	0.000	0.000	0.000
31.002	-	-	100	0.000	0.000	0.000
31.003	-	-	100	0.000	0.000	0.000
31.004	Classification	Hardstanding	100	0.151	0.151	0.151
32.000	Classification	Residential	66	2.048	1.352	1.352
	Classification	Hardstanding	100	0.028	0.028	1.380
31.005	-	-	100	0.000	0.000	0.000
31.006	-	-	100	0.000	0.000	0.000
31.007	Classification	Residential	66	1.194	0.788	0.788
31.008	-	-	100	0.000	0.000	0.000
31.009	-	-	100	0.000	0.000	0.000
31.010	-	-	100	0.000	0.000	0.000
33.000	Classification	Residential	66	2.505	1.653	1.653
33.001	-	-	100	0.000	0.000	0.000
31.011	Classification	Ponds	80	0.542	0.434	0.434
	Classification	Landscape	20	4.450	0.890	1.324
31.012	-	-	100	0.000	0.000	0.000
31.013	-	-	100	0.000	0.000	0.000
34.000	Classification	Residential	66	1.775	1.172	1.172
34.001	-	-	100	0.000	0.000	0.000
31.014	Classification	Ponds	80	0.099	0.079	0.079
31.015	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				16.291	8.890	8.890

Free Flowing Outfall Details for Network I

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S31.015	S15	9.000	7.984	0.000	1350	0

Simulation Criteria for Network I

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 2	Number of Storage Structures 2	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for Network I

Hydro-Brake® Optimum Manhole: S136-HW, DS/PN: S31.011, Volume (m³): 100.2

Unit Reference	MD-SHE-0242-3300-1400-3300
Design Head (m)	1.400
Design Flow (l/s)	33.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	242
Invert Level (m)	10.000
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	32.9	Kick-Flo®	0.977	27.7
Flush-Flo™	0.452	32.9	Mean Flow over Head Range	-	28.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.9	1.200	30.6	3.000	47.5	7.000	71.6
0.200	24.5	1.400	32.9	3.500	51.2	7.500	74.1
0.300	32.0	1.600	35.1	4.000	54.6	8.000	76.4
0.400	32.8	1.800	37.1	4.500	57.8	8.500	78.7
0.500	32.8	2.000	39.1	5.000	60.8	9.000	81.0
0.600	32.5	2.200	40.9	5.500	63.7	9.500	83.1
0.800	31.2	2.400	42.7	6.000	66.5		
1.000	28.0	2.600	44.3	6.500	69.1		

Hydro-Brake® Optimum Manhole: S141-HW, DS/PN: S31.014, Volume (m³): 8.4

Unit Reference	MD-SHE-0277-4500-1400-4500
Design Head (m)	1.400
Design Flow (l/s)	45.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	277
Invert Level (m)	8.300
Minimum Outlet Pipe Diameter (mm)	300

Hydro-Brake® Optimum Manhole: S141-HW, DS/PN: S31.014, Volume (m³): 8.4

Suggested Manhole Diameter (mm) 1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	45.0	Kick-Flo®	1.003	38.3
Flush-Flo™	0.478	44.9	Mean Flow over Head Range	-	37.9

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	8.7	1.200	41.8	3.000	65.0	7.000	98.2
0.200	28.5	1.400	45.0	3.500	70.1	7.500	101.5
0.300	43.3	1.600	48.0	4.000	74.8	8.000	104.8
0.400	44.7	1.800	50.8	4.500	79.2	8.500	107.9
0.500	44.9	2.000	53.4	5.000	83.3	9.000	111.0
0.600	44.6	2.200	56.0	5.500	87.3	9.500	113.9
0.800	43.0	2.400	58.4	6.000	91.1		
1.000	38.5	2.600	60.7	6.500	94.7		

Storage Structures for Network I

Tank or Pond Manhole: S136-HW, DS/PN: S31.011

Invert Level (m) 10.200

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3595.0	1.200	4982.0	1.500	5598.0

Tank or Pond Manhole: S141-HW, DS/PN: S31.014

Invert Level (m) 8.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	392.0	1.200	831.0	1.500	1006.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network I

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	2	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S31.000	S1	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S31.001	S2	15 Winter	1	+0%	30/15 Summer			
S31.002	S3	15 Winter	1	+0%	30/15 Summer			
S31.003	S4	15 Winter	1	+0%	30/15 Summer			
S31.004	S5	15 Winter	1	+0%	30/15 Summer			
S32.000	S6	15 Winter	1	+0%	30/15 Summer			
S31.005	S7	15 Winter	1	+0%	30/15 Summer			
S31.006	S8	15 Winter	1	+0%	30/15 Summer			
S31.007	S9	15 Winter	1	+0%				
S31.008	S10	15 Winter	1	+0%				
S31.009	S131	15 Winter	1	+0%	30/15 Winter			
S31.010	S132-HW	15 Winter	1	+0%	30/15 Winter			
S33.000	S134	15 Winter	1	+0%	30/15 Summer			
S33.001	S135-HW	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S31.011	S136-HW	240 Winter	1	+0%	100/120 Winter			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network I

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.000	S1	15.656	-0.222	0.000	0.78		313.9	OK	5
S31.001	S2	15.582	-0.234	0.000	0.67		308.1	OK	
S31.002	S3	15.514	-0.193	0.000	0.83		305.6	OK	
S31.003	S4	15.479	-0.183	0.000	0.87		302.4	OK	
S31.004	S5	15.383	-0.242	0.000	0.73		320.6	OK	
S32.000	S6	15.483	-0.243	0.000	0.56		185.3	OK	
S31.005	S7	15.242	-0.296	0.000	0.72		482.6	OK	
S31.006	S8	15.178	-0.287	0.000	0.75		486.8	OK	
S31.007	S9	14.800	-0.600	0.000	0.24		570.2	OK	
S31.008	S10	13.702	-0.625	0.000	0.20		561.5	OK	
S31.009	S131	11.041	-0.521	0.000	0.37		565.4	OK	
S31.010	S132-HW	10.717	-0.533	0.000	0.46		537.3	OK	
S33.000	S134	10.693	-0.183	0.000	0.74		221.7	OK	
S33.001	S135-HW	10.549	-0.176	0.000	0.76		219.4	OK	4
S31.011	S136-HW	10.407	-0.643	0.000	0.03		32.7	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Network I

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S31.012	S137-FCC	240 Winter	1	+0%				
S31.013	S138-HW	240 Winter	1	+0%	1/30 Summer			
S34.000	S139	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
S34.001	S140-HW	240 Winter	1	+0%	30/15 Summer			
S31.014	S141-HW	240 Winter	1	+0%	30/180 Winter			
S31.015	S142-FCC	240 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.012	S137-FCC	9.998	-0.309	0.000	0.07		32.7	OK	
S31.013	S138-HW	8.889	0.100	0.000	0.27		32.9	SURCHARGED	
S34.000	S139	8.853	-0.247	0.000	0.53		153.8	OK	4
S34.001	S140-HW	8.790	-0.086	0.000	0.13		30.3	OK	
S31.014	S141-HW	8.783	-0.342	0.000	0.09		43.9	OK	
S31.015	S142-FCC	8.431	-0.211	0.000	0.40		43.9	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	2	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S31.000	S1	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S31.001	S2	15 Winter	30	+0%	30/15 Summer			
S31.002	S3	15 Winter	30	+0%	30/15 Summer			
S31.003	S4	15 Winter	30	+0%	30/15 Summer			
S31.004	S5	15 Winter	30	+0%	30/15 Summer			
S32.000	S6	15 Winter	30	+0%	30/15 Summer			
S31.005	S7	15 Winter	30	+0%	30/15 Summer			
S31.006	S8	15 Winter	30	+0%	30/15 Summer			
S31.007	S9	15 Winter	30	+0%				
S31.008	S10	15 Winter	30	+0%				
S31.009	S131	15 Winter	30	+0%	30/15 Winter			
S31.010	S132-HW	15 Winter	30	+0%	30/15 Winter			
S33.000	S134	15 Winter	30	+0%	30/15 Summer			
S33.001	S135-HW	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S31.011	S136-HW	360 Winter	30	+0%	100/120 Winter			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.000	S1	17.841	1.963	0.000	1.81		731.0	FLOOD RISK	5
S31.001	S2	17.508	1.692	0.000	1.57		726.4	SURCHARGED	
S31.002	S3	17.178	1.471	0.000	1.96		720.7	SURCHARGED	
S31.003	S4	16.851	1.189	0.000	2.09		723.7	SURCHARGED	
S31.004	S5	16.526	0.901	0.000	1.74		765.6	SURCHARGED	
S32.000	S6	16.475	0.749	0.000	1.34		445.1	SURCHARGED	
S31.005	S7	16.159	0.621	0.000	1.74		1162.2	SURCHARGED	
S31.006	S8	15.757	0.292	0.000	1.81		1169.7	SURCHARGED	
S31.007	S9	15.001	-0.399	0.000	0.59		1375.4	OK	
S31.008	S10	13.875	-0.452	0.000	0.49		1371.6	OK	
S31.009	S131	11.651	0.089	0.000	0.89		1358.3	SURCHARGED	
S31.010	S132-HW	11.272	0.022	0.000	1.10		1274.9	SURCHARGED	
S33.000	S134	11.734	0.858	0.000	1.80		535.4	SURCHARGED	
S33.001	S135-HW	11.218	0.493	0.000	1.86		536.4	SURCHARGED	4
S31.011	S136-HW	10.781	-0.269	0.000	0.03		32.8	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S31.012	S137-FCC	30 Summer	30	+0%				
S31.013	S138-HW	240 Winter	30	+0%	1/30 Summer			
S34.000	S139	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
S34.001	S140-HW	240 Winter	30	+0%	30/15 Summer			
S31.014	S141-HW	240 Winter	30	+0%	30/180 Winter			
S31.015	S142-FCC	180 Summer	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.012	S137-FCC	9.998	-0.309	0.000	0.07		32.8	OK	
S31.013	S138-HW	9.244	0.455	0.000	0.27		32.4	SURCHARGED	
S34.000	S139	9.442	0.342	0.000	1.30		374.6	SURCHARGED	4
S34.001	S140-HW	9.140	0.264	0.000	0.31		70.9	SURCHARGED	
S31.014	S141-HW	9.138	0.013	0.000	0.09		44.9	SURCHARGED	
S31.015	S142-FCC	8.434	-0.208	0.000	0.41		44.9	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	2	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.300	Cv (Winter)	0.840

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

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, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S31.000	S1	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S31.001	S2	15 Winter	100	+40%	30/15 Summer			
S31.002	S3	15 Winter	100	+40%	30/15 Summer			
S31.003	S4	15 Summer	100	+40%	30/15 Summer			
S31.004	S5	15 Summer	100	+40%	30/15 Summer			
S32.000	S6	15 Winter	100	+40%	30/15 Summer			
S31.005	S7	15 Summer	100	+40%	30/15 Summer			
S31.006	S8	15 Summer	100	+40%	30/15 Summer			
S31.007	S9	15 Winter	100	+40%				
S31.008	S10	15 Winter	100	+40%				
S31.009	S131	15 Winter	100	+40%	30/15 Winter			
S31.010	S132-HW	15 Winter	100	+40%	30/15 Winter			
S33.000	S134	15 Winter	100	+40%	30/15 Summer			
S33.001	S135-HW	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S31.011	S136-HW	720 Winter	100	+40%	100/120 Winter			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.000	S1	18.171	2.293	170.533	1.99		804.3	FLOOD	5
S31.001	S2	17.850	2.034	0.000	1.75		808.6	FLOOD RISK	
S31.002	S3	17.592	1.885	0.000	2.20		811.7	SURCHARGED	
S31.003	S4	17.335	1.673	0.000	2.33		806.9	SURCHARGED	
S31.004	S5	17.092	1.467	0.000	1.90		834.5	SURCHARGED	
S32.000	S6	17.912	2.186	0.000	2.47		822.3	SURCHARGED	
S31.005	S7	16.733	1.195	0.000	2.30		1538.9	SURCHARGED	
S31.006	S8	16.054	0.589	0.000	2.38		1537.6	SURCHARGED	
S31.007	S9	15.135	-0.265	0.000	0.84		1952.9	OK	
S31.008	S10	13.985	-0.342	0.000	0.70		1951.5	OK	
S31.009	S131	12.297	0.735	0.000	1.26		1934.3	SURCHARGED	
S31.010	S132-HW	11.553	0.303	0.000	1.59		1840.9	FLOOD RISK	
S33.000	S134	13.436	2.560	0.000	3.28		979.3	FLOOD RISK	
S33.001	S135-HW	11.749	1.024	49.303	2.50		722.4	FLOOD	4
S31.011	S136-HW	11.349	0.299	0.000	0.03		32.8	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S31.012	S137-FCC	7200 Summer	100	+40%				
S31.013	S138-HW	360 Winter	100	+40%	1/30 Summer			
S34.000	S139	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S34.001	S140-HW	360 Winter	100	+40%	30/15 Summer			
S31.014	S141-HW	360 Winter	100	+40%	30/180 Winter			
S31.015	S142-FCC	15 Summer	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.012	S137-FCC	9.998	-0.309	0.000	0.07		32.8	OK	
S31.013	S138-HW	9.747	0.958	0.000	0.27		32.5	FLOOD RISK	
S34.000	S139	10.030	0.930	30.435	1.82		524.5	FLOOD	4
S34.001	S140-HW	9.643	0.767	0.000	0.42		96.2	SURCHARGED	
S31.014	S141-HW	9.641	0.516	0.000	0.09		44.9	SURCHARGED	
S31.015	S142-FCC	8.434	-0.208	0.000	0.41		44.9	OK	