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Micro Drainage	Network 2013.1.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	Add Flow / Climate Change (%)	10
M5-60 (mm)	19.400	Minimum Backdrop Height (m)	0.000
Ratio R	0.300	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	37.167	0.225	165.2	0.185	5.00	0.0	0.600	o	225
1.001	13.642	0.058	235.2	0.028	0.00	0.0	0.600	o	300
1.002	8.631	0.037	233.3	0.015	0.00	0.0	0.600	o	300
1.003	17.054	0.073	233.6	0.023	0.00	0.0	0.600	o	300
2.000	26.292	1.878	14.0	0.025	5.00	0.0	0.600	o	150
2.001	38.092	7.618	5.0	0.032	0.00	0.0	0.600	o	150
1.004	35.086	0.149	235.5	0.022	0.00	0.0	0.600	o	300
1.005	19.070	0.578	33.0	0.017	0.00	0.0	0.600	o	375
1.006	31.428	5.716	5.5	0.034	0.00	0.0	0.600	o	375
3.000	39.819	0.100	400.0	0.144	5.00	0.0	0.600	o	1500

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	43.86	5.61	202.560	0.185	0.0	0.0	2.2	1.01	40.3	24.2
1.001	43.15	5.83	202.260	0.213	0.0	0.0	2.5	1.02	72.2	27.4
1.002	42.72	5.97	202.202	0.228	0.0	0.0	2.6	1.03	72.5	29.0
1.003	41.90	6.25	202.165	0.251	0.0	0.0	2.8	1.02	72.4	31.3
2.000	45.36	5.16	212.338	0.025	0.0	0.0	0.3	2.71	47.8	3.4
2.001	44.88	5.30	210.460	0.057	0.0	0.0	0.7	4.54	80.2	7.6
1.004	40.32	6.82	202.092	0.330	0.0	0.0	3.6	1.02	72.1	39.6
1.005	40.06	6.92	201.868	0.347	0.0	0.0	3.8	3.16	349.5	41.4
1.006	39.88	6.99	201.290	0.381	0.0	0.0	4.1	7.77	858.1	45.3
3.000	44.85	5.31	194.651	0.144	0.0	0.0	1.7	2.14	3779.1	19.2

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<u>Manhole Schedules for Surface Network 1</u>											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	203.985	1.425	Open Manhole	1350	1.000	202.560	225				
S2	205.756	3.496	Open Manhole	1350	1.001	202.260	300	1.000	202.335	225	
S3	206.673	4.471	Open Manhole	1350	1.002	202.202	300	1.001	202.202	300	
S4	207.267	5.102	Open Manhole	1350	1.003	202.165	300	1.002	202.165	300	
S5	213.693	1.355	Open Manhole	1200	2.000	212.338	150				
S6	211.927	1.467	Open Manhole	1200	2.001	210.460	150	2.000	210.460	150	
S7	208.226	6.134	Open Manhole	1350	1.004	202.092	300	1.003	202.092	300	
								2.001	202.842	150	600
S8	204.752	2.884	Open Manhole	1500	1.005	201.868	375	1.004	201.943	300	
S9	202.872	1.582	Open Manhole	1500	1.006	201.290	375	1.005	201.290	375	
S10	197.739	3.088	Open Manhole	3000	3.000	194.651	1500				
S11	198.727	4.176	Open Manhole	3000	3.001	194.551	1500	3.000	194.551	1500	
S12	200.289	5.840	Open Manhole	3000	3.002	194.449	1500	3.001	194.449	1500	
S13	199.728	5.388	Open Manhole	3000	1.007	194.340	375	1.006	195.574	375	1234
								3.002	194.340	1500	
S14	193.999	5.836	Open Manhole	3000	1.008	188.163	1500	1.007	189.663	375	375
S15	192.171	4.062	Open Manhole	3000	1.009	188.109	1500	1.008	188.109	1500	
S16	196.445	8.080	Open Manhole	3000	4.000	188.365	1500				
S17	194.021	5.740	Open Manhole	3000	4.001	188.281	1500	4.000	188.281	1500	
S18	192.676	4.441	Open Manhole	3000	4.002	188.235	1500	4.001	188.235	1500	
S19	192.392	4.204	Open Manhole	3000	4.003	188.188	1500	4.002	188.188	1500	
S20	192.089	3.960	Open Manhole	3000	4.004	188.129	1500	4.003	188.129	1500	
S21	191.843	3.771	Open Manhole	3000	1.010	188.072	1500	1.009	188.072	1500	
								4.004	188.075	1500	3
S22	191.629	3.604	Open Manhole	3000	1.011	188.025	375	1.010	188.025	1500	
S23A	189.019	1.499	Open Manhole	1350	1.012	187.520	450	1.011	187.595	375	
S24	188.035	0.534	Open Manhole	0		OUTFALL		1.012	187.501	450	
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Online Controls for Surface Network 1

Crown Vortex Valve® Manhole: S13, DS/PN: 1.007, Volume (m³): 112.8

Design Head (m) 2.337 Vortex Valve® Type R1 SW Only Invert Level (m) 194.340
Design Flow (l/s) 46.0 Diameter (mm) 226

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.1	1.200	33.1	3.000	52.3	7.000	79.9
0.200	10.9	1.400	35.7	3.500	56.5	7.500	82.7
0.300	17.5	1.600	38.2	4.000	60.4	8.000	85.4
0.400	22.0	1.800	40.5	4.500	64.1	8.500	88.1
0.500	23.0	2.000	42.7	5.000	67.5	9.000	90.6
0.600	23.4	2.200	44.8	5.500	70.8	9.500	93.1
0.800	27.0	2.400	46.8	6.000	74.0		
1.000	30.2	2.600	48.7	6.500	77.0		

Crown Vortex Valve® Manhole: S22, DS/PN: 1.011, Volume (m³): 53.5

Design Head (m) 3.600 Vortex Valve® Type R1 SW Only Invert Level (m) 188.025
Design Flow (l/s) 35.0 Diameter (mm) 177

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.2	1.200	20.3	3.000	32.1	7.000	49.0
0.200	8.0	1.400	21.9	3.500	34.7	7.500	50.7
0.300	11.7	1.600	23.4	4.000	37.1	8.000	52.4
0.400	12.4	1.800	24.9	4.500	39.3	8.500	54.0
0.500	13.1	2.000	26.2	5.000	41.4	9.000	55.6
0.600	14.4	2.200	27.5	5.500	43.5	9.500	57.1
0.800	16.6	2.400	28.7	6.000	45.4		
1.000	18.5	2.600	29.9	6.500	47.2		

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 2

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	10
M5-60 (mm)	19.400	Minimum Backdrop Height (m)	0.000
Ratio R	0.300	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for Surface Network 2

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	14.177	0.315	45.0	0.033	5.00	0.0	0.600	o	150
1.001	27.082	2.257	12.0	0.070	0.00	0.0	0.600	o	150
1.002	15.231	1.523	10.0	0.038	0.00	0.0	0.600	o	225
1.003	63.156	5.589	11.3	0.056	0.00	0.0	0.600	o	225
2.000	26.867	5.373	5.0	0.036	5.00	0.0	0.600	o	150
2.001	18.839	0.195	96.6	0.013	0.00	0.0	0.600	o	1200
1.004	70.451	0.176	400.0	0.128	0.00	0.0	0.600	o	1500
3.000	15.489	0.039	400.0	0.103	5.00	0.0	0.600	o	1500
1.005	18.744	1.988	9.4	0.024	0.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.16	194.686	0.033	0.0	0.0	0.4	1.50	26.6	4.9
1.001	50.00	5.31	194.371	0.103	0.0	0.0	1.4	2.92	51.7	15.3
1.002	50.00	5.37	192.039	0.141	0.0	0.0	1.9	4.16	165.5	21.0
1.003	50.00	5.64	190.516	0.197	0.0	0.0	2.7	3.91	155.7	29.3
2.000	50.00	5.10	190.137	0.036	0.0	0.0	0.5	4.54	80.2	5.4
2.001	50.00	5.18	182.905	0.049	0.0	0.0	0.7	3.81	4305.5	7.3
1.004	50.00	6.19	182.410	0.374	0.0	0.0	5.1	2.14	3779.1	55.7
3.000	50.00	5.12	182.273	0.103	0.0	0.0	1.4	2.14	3779.1	15.3
1.005	50.00	6.26	182.234	0.501	0.0	0.0	6.8	4.29	170.4	74.6

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Network Design Table for Surface Network 2

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.006	10.889	0.046	235.0	0.000	0.00	0.0	0.600	o	375

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.006	50.00	6.42	180.096	0.501	0.0	0.0	6.8	1.18	130.1	74.6

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Online Controls for Surface Network 2

Crown Vortex Valve® Manhole: S33, DS/PN: 1.005, Volume (m³): 158.4

Design Head (m) 2.066 Vortex Valve® Type R1 SW Only Invert Level (m) 182.234
Design Flow (l/s) 17.8 Diameter (mm) 145

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.6	1.200	13.6	3.000	21.5	7.000	32.9
0.200	6.0	1.400	14.7	3.500	23.3	7.500	34.1
0.300	7.6	1.600	15.7	4.000	24.9	8.000	35.2
0.400	7.9	1.800	16.7	4.500	26.4	8.500	36.3
0.500	8.8	2.000	17.6	5.000	27.8	9.000	37.3
0.600	9.6	2.200	18.4	5.500	29.2	9.500	38.3
0.800	11.1	2.400	19.3	6.000	30.5		
1.000	12.4	2.600	20.0	6.500	31.7		

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 3

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	10
M5-60 (mm)	19.400	Minimum Backdrop Height (m)	0.000
Ratio R	0.300	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for Surface Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	45.020	2.486	18.1	0.043	5.00	0.0	0.600	o	150
2.000	14.927	0.589	25.3	0.013	5.00	0.0	0.600	o	150
1.001	49.683	2.046	24.3	0.028	0.00	0.0	0.600	o	150
1.002	22.237	4.550	4.9	0.015	0.00	0.0	0.600	o	150
3.000	32.207	4.864	6.6	0.017	5.00	0.0	0.600	o	150
1.003	18.754	0.047	400.0	0.019	0.00	0.0	0.600	o	1500
1.004	16.908	0.042	400.0	0.013	0.00	0.0	0.600	o	1500
1.005	44.545	0.111	400.0	0.038	0.00	0.0	0.600	o	1500
1.006	19.918	0.050	400.0	0.067	0.00	0.0	0.600	o	1500

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.32	193.032	0.043	0.0	0.0	0.6	2.38	42.0	6.4
2.000	50.00	5.12	191.135	0.013	0.0	0.0	0.2	2.01	35.5	1.9
1.001	50.00	5.72	190.546	0.084	0.0	0.0	1.1	2.05	36.3	12.5
1.002	50.00	5.80	188.500	0.099	0.0	0.0	1.3	4.59	81.1	14.7
3.000	50.00	5.14	188.814	0.017	0.0	0.0	0.2	3.94	69.7	2.5
1.003	50.00	5.95	182.600	0.135	0.0	0.0	1.8	2.14	3779.1	20.1
1.004	50.00	6.08	182.553	0.148	0.0	0.0	2.0	2.14	3779.1	22.0
1.005	50.00	6.42	182.511	0.186	0.0	0.0	2.5	2.14	3779.1	27.7
1.006	50.00	6.58	182.399	0.253	0.0	0.0	3.4	2.14	3779.1	37.7

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Manhole Schedules for Surface Network 3

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S36	194.382	1.350	Open Manhole	1200	1.000	193.032	150				
S37	193.758	2.623	Open Manhole	1200	2.000	191.135	150				
S38	193.026	2.480	Open Manhole	1200	1.001	190.546	150	1.000	190.546	150	
								2.000	190.546	150	
S39	190.481	1.981	Open Manhole	1200	1.002	188.500	150	1.001	188.500	150	
S40	190.236	1.422	Open Manhole	1200	3.000	188.814	150				
S41	189.402	6.802	Open Manhole	3000	1.003	182.600	1500	1.002	183.950	150	
								3.000	183.950	150	
S42	188.472	5.919	Open Manhole	3000	1.004	182.553	1500	1.003	182.553	1500	
S43	187.618	5.107	Open Manhole	3000	1.005	182.511	1500	1.004	182.511	1500	
S44	185.459	3.060	Open Manhole	3000	1.006	182.399	1500	1.005	182.399	1500	
S45	184.750	2.400	Open Manhole	3000	1.007	182.350	1500	1.006	182.350	1500	
S46	185.029	2.724	Open Manhole	2400	1.008	182.305	1500	1.007	182.305	1500	
S47	185.825	3.566	Open Manhole	2400	1.009	182.259	1500	1.008	182.259	1500	
S48	193.804	2.601	Open Manhole	1200	4.000	191.203	150				
S49	192.801	2.070	Open Manhole	1200	4.001	190.731	150	4.000	190.731	150	
S50	192.006	1.350	Open Manhole	1200	4.002	190.656	150	4.001	190.656	150	
S51	191.526	2.275	Open Manhole	1200	4.003	189.251	150	4.002	189.251	150	
S52	191.096	2.321	Open Manhole	1200	5.000	188.775	150				
S53	190.083	7.674	Open Manhole	3000	5.001	182.409	1500	5.000	186.305	150	2546
S54	188.915	6.588	Open Manhole	3000	4.004	182.327	1500	4.003	185.504	150	1827
								5.001	182.327	1500	
S55	186.575	4.345	Open Manhole	2400	1.010	182.230	300	1.009	182.230	1500	
								4.004	182.248	1500	1218
S56	184.176	2.026	Open Manhole	0		OUTFALL		1.010	182.150	300	

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Online Controls for Surface Network 3

Crown Vortex Valve® Manhole: S55, DS/PN: 1.010, Volume (m³): 87.2

Design Head (m) 2.579 Vortex Valve® Type R1 SW Only Invert Level (m) 182.230
Design Flow (l/s) 9.4 Diameter (mm) 99

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	1.200	6.3	3.000	10.0	7.000	15.3
0.200	2.9	1.400	6.9	3.500	10.8	7.500	15.9
0.300	3.2	1.600	7.3	4.000	11.6	8.000	16.4
0.400	3.7	1.800	7.8	4.500	12.3	8.500	16.9
0.500	4.1	2.000	8.2	5.000	13.0	9.000	17.4
0.600	4.5	2.200	8.6	5.500	13.6	9.500	17.9
0.800	5.2	2.400	9.0	6.000	14.2		
1.000	5.8	2.600	9.3	6.500	14.8		

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region England and Wales	Cv (Summer)		0.750
M5-60 (mm)	19.400	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Climate Period Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0% 30/15 Summer				
1.001	15 Winter	30	0% 30/15 Summer				
1.002	15 Winter	30	0% 30/15 Summer				
1.003	15 Winter	30	0% 30/15 Summer				
2.000	15 Winter	30	0%				
2.001	15 Winter	30	0%				
1.004	15 Winter	30	0% 30/15 Summer				
1.005	15 Winter	30	0%				
1.006	15 Winter	30	0%				
3.000	60 Winter	30	0%				
3.001	60 Winter	30	0%				
3.002	60 Winter	30	0%				
1.007	60 Winter	30	0% 30/15 Summer				
1.008	360 Winter	30	0%				
1.009	360 Winter	30	0%				
4.000	360 Winter	30	0%				
4.001	360 Winter	30	0%				
4.002	360 Winter	30	0%				
4.003	360 Winter	30	0%				
4.004	360 Winter	30	0%				
1.010	360 Winter	30	0%				
1.011	360 Winter	30	0% 30/15 Summer				

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.012	360 Winter	30	0%					
PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m³)	Flow / Cap.	O'flow (l/s)	Flow (l/s)	
1.000	S1	203.000	0.215	0.000	1.33	0.0	50.6	SURCHARGED
1.001	S2	202.607	0.047	0.000	0.92	0.0	54.9	SURCHARGED
1.002	S3	202.559	0.057	0.000	1.06	0.0	58.2	SURCHARGED
1.003	S4	202.520	0.055	0.000	1.01	0.0	62.6	SURCHARGED
2.000	S5	212.379	-0.109	0.000	0.16	0.0	7.5	OK
2.001	S6	210.509	-0.101	0.000	0.23	0.0	17.7	OK
1.004	S7	202.449	0.057	0.000	1.19	0.0	78.7	SURCHARGED
1.005	S8	202.004	-0.239	0.000	0.28	0.0	81.9	OK
1.006	S9	201.375	-0.290	0.000	0.12	0.0	88.7	OK
3.000	S10	195.338	-0.813	0.000	0.01	0.0	19.7	OK
3.001	S11	195.338	-0.713	0.000	0.01	0.0	12.9	OK
3.002	S12	195.338	-0.611	0.000	0.01	0.0	18.6	OK
1.007	S13	195.338	0.623	0.000	0.06	0.0	30.2	SURCHARGED
1.008	S14	189.275	-0.388	0.000	0.01	0.0	26.4	OK
1.009	S15	189.275	-0.334	0.000	0.02	0.0	24.8	OK
4.000	S16	189.274	-0.591	0.000	0.00	0.0	2.8	OK
4.001	S17	189.274	-0.507	0.000	0.00	0.0	5.4	OK
4.002	S18	189.274	-0.461	0.000	0.00	0.0	7.4	OK
4.003	S19	189.274	-0.414	0.000	0.00	0.0	9.2	OK
4.004	S20	189.274	-0.355	0.000	0.01	0.0	11.6	OK
1.010	S21	189.274	-0.298	0.000	0.01	0.0	21.8	OK
1.011	S22	189.274	0.874	0.000	0.08	0.0	20.7	SURCHARGED
1.012	S23A	187.646	-0.324	0.000	0.18	0.0	20.7	OK

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region England and Wales	Cv (Summer)		0.750
M5-60 (mm)	19.400 Cv (Winter)		0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0%					
1.001	15 Winter	30	0%					
1.002	15 Winter	30	0%					
1.003	15 Winter	30	0%					
2.000	15 Winter	30	0%					
2.001	120 Winter	30	0%					
1.004	120 Winter	30	0%					
3.000	120 Winter	30	0%					
1.005	120 Winter	30	0%	30/15 Summer				
1.006	120 Winter	30	0%					

PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m ³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	
1.000	S25	194.753	-0.083	0.000	0.40	0.0	9.9	OK
1.001	S26	194.460	-0.061	0.000	0.65	0.0	32.3	OK
1.002	S27	192.124	-0.140	0.000	0.30	0.0	44.4	OK
1.003	S28	190.617	-0.124	0.000	0.41	0.0	62.3	OK
2.000	S29	190.175	-0.112	0.000	0.14	0.0	10.8	OK
2.001	S30	183.175	-0.930	0.000	0.00	0.0	5.3	OK
1.004	S31	183.175	-0.735	0.000	0.01	0.0	36.8	OK

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2

PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m³)	Flow / Cap.	O'flow (l/s)	Flow (l/s)	
3.000	S32	183.175	-0.598	0.000	0.01	0.0	8.9	OK
1.005	S33	183.175	0.716	0.000	0.08	0.0	12.1	SURCHARGED
1.006	S34	180.183	-0.288	0.000	0.12	0.0	12.1	OK

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region England and Wales	Cv (Summer)	0.750	
M5-60 (mm)	19.400 Cv (Winter)	0.840	

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0%					
2.000	15 Winter	30	0%					
1.001	15 Winter	30	0%					
1.002	15 Winter	30	0%					
3.000	15 Winter	30	0%					
1.003	360 Winter	30	0%					
1.004	360 Winter	30	0%					
1.005	360 Winter	30	0%					
1.006	360 Winter	30	0%					
1.007	360 Winter	30	0%					
1.008	360 Winter	30	0%					
1.009	360 Winter	30	0%					
4.000	15 Winter	30	0%					
4.001	15 Winter	30	0%	30/15 Summer				
4.002	15 Winter	30	0%					
4.003	15 Winter	30	0%					
5.000	15 Winter	30	0%					
5.001	360 Winter	30	0%					
4.004	360 Winter	30	0%					
1.010	360 Winter	30	0%	30/15 Summer				

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Water	Surch'd Depth (m)	Flooded	Flow / Cap.	O'flow (l/s)	Pipe	Status
		Level (m)		Volume (m³)			Flow (l/s)	
1.000	S36	193.090	-0.092	0.000	0.31	0.0	12.7	OK
2.000	S37	191.169	-0.116	0.000	0.12	0.0	3.9	OK
1.001	S38	190.642	-0.054	0.000	0.71	0.0	25.0	OK
1.002	S39	188.566	-0.084	0.000	0.38	0.0	29.5	OK
3.000	S40	188.841	-0.123	0.000	0.08	0.0	5.1	OK
1.003	S41	183.084	-1.016	0.000	0.00	0.0	6.4	OK
1.004	S42	183.084	-0.969	0.000	0.00	0.0	5.6	OK
1.005	S43	183.084	-0.927	0.000	0.00	0.0	5.9	OK
1.006	S44	183.084	-0.815	0.000	0.00	0.0	5.5	OK
1.007	S45	183.084	-0.766	0.000	0.00	0.0	6.6	OK
1.008	S46	183.084	-0.720	0.000	0.00	0.0	7.3	OK
1.009	S47	183.084	-0.675	0.000	0.00	0.0	6.0	OK
4.000	S48	191.341	-0.012	0.000	0.79	0.0	22.0	OK
4.001	S49	191.045	0.164	0.000	1.80	0.0	21.7	SURCHARGED
4.002	S50	190.723	-0.084	0.000	0.41	0.0	21.8	OK
4.003	S51	189.330	-0.071	0.000	0.53	0.0	28.3	OK
5.000	S52	188.824	-0.101	0.000	0.23	0.0	12.0	OK
5.001	S53	183.084	-0.825	0.000	0.00	0.0	6.5	OK
4.004	S54	183.084	-0.742	0.000	0.00	0.0	9.2	OK
1.010	S55	183.085	0.555	0.000	0.08	0.0	5.4	SURCHARGED

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region England and Wales	Cv (Summer)		0.750
M5-60 (mm)	19.400 Cv (Winter)		0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Climate Period Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0% 30/15 Summer				
1.001	15 Winter	30	0% 30/15 Summer				
1.002	15 Winter	30	0% 30/15 Summer				
1.003	15 Winter	30	0% 30/15 Summer				
2.000	15 Winter	30	0%				
2.001	15 Winter	30	0%				
1.004	15 Winter	30	0% 30/15 Summer				
1.005	15 Winter	30	0%				
1.006	15 Winter	30	0%				
3.000	60 Winter	30	0%				
3.001	60 Winter	30	0%				
3.002	60 Winter	30	0%				
1.007	60 Winter	30	0% 30/15 Summer				
1.008	360 Winter	30	0%				
1.009	360 Winter	30	0%				
4.000	360 Winter	30	0%				
4.001	360 Winter	30	0%				
4.002	360 Winter	30	0%				
4.003	360 Winter	30	0%				
4.004	360 Winter	30	0%				
1.010	360 Winter	30	0%				
1.011	360 Winter	30	0% 30/15 Summer				

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.012	360 Winter	30	0%					
PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m³)	Flow / Cap.	O'flow (l/s)	Flow (l/s)	
1.000	S1	203.000	0.215	0.000	1.33	0.0	50.6	SURCHARGED
1.001	S2	202.607	0.047	0.000	0.92	0.0	54.9	SURCHARGED
1.002	S3	202.559	0.057	0.000	1.06	0.0	58.2	SURCHARGED
1.003	S4	202.520	0.055	0.000	1.01	0.0	62.6	SURCHARGED
2.000	S5	212.379	-0.109	0.000	0.16	0.0	7.5	OK
2.001	S6	210.509	-0.101	0.000	0.23	0.0	17.7	OK
1.004	S7	202.449	0.057	0.000	1.19	0.0	78.7	SURCHARGED
1.005	S8	202.004	-0.239	0.000	0.28	0.0	81.9	OK
1.006	S9	201.375	-0.290	0.000	0.12	0.0	88.7	OK
3.000	S10	195.338	-0.813	0.000	0.01	0.0	19.7	OK
3.001	S11	195.338	-0.713	0.000	0.01	0.0	12.9	OK
3.002	S12	195.338	-0.611	0.000	0.01	0.0	18.6	OK
1.007	S13	195.338	0.623	0.000	0.06	0.0	30.2	SURCHARGED
1.008	S14	189.275	-0.388	0.000	0.01	0.0	26.4	OK
1.009	S15	189.275	-0.334	0.000	0.02	0.0	24.8	OK
4.000	S16	189.274	-0.591	0.000	0.00	0.0	2.8	OK
4.001	S17	189.274	-0.507	0.000	0.00	0.0	5.4	OK
4.002	S18	189.274	-0.461	0.000	0.00	0.0	7.4	OK
4.003	S19	189.274	-0.414	0.000	0.00	0.0	9.2	OK
4.004	S20	189.274	-0.355	0.000	0.01	0.0	11.6	OK
1.010	S21	189.274	-0.298	0.000	0.01	0.0	21.8	OK
1.011	S22	189.274	0.874	0.000	0.08	0.0	20.7	SURCHARGED
1.012	S23A	187.646	-0.324	0.000	0.18	0.0	20.7	OK

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region England and Wales	Cv (Summer)		0.750
M5-60 (mm)	19.400 Cv (Winter)		0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360
Return Period(s) (years)	30
Climate Change (%)	0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0%					
1.001	15 Winter	30	0%					
1.002	15 Winter	30	0%					
1.003	15 Winter	30	0%					
2.000	15 Winter	30	0%					
2.001	120 Winter	30	0%					
1.004	120 Winter	30	0%					
3.000	120 Winter	30	0%					
1.005	120 Winter	30	0%	30/15 Summer				
1.006	120 Winter	30	0%					

PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m ³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	
1.000	S25	194.753	-0.083	0.000	0.40	0.0	9.9	OK
1.001	S26	194.460	-0.061	0.000	0.65	0.0	32.3	OK
1.002	S27	192.124	-0.140	0.000	0.30	0.0	44.4	OK
1.003	S28	190.617	-0.124	0.000	0.41	0.0	62.3	OK
2.000	S29	190.175	-0.112	0.000	0.14	0.0	10.8	OK
2.001	S30	183.175	-0.930	0.000	0.00	0.0	5.3	OK
1.004	S31	183.175	-0.735	0.000	0.01	0.0	36.8	OK

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 2

PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m³)	Flow / Cap.	O'flow (l/s)	Flow (l/s)	
3.000	S32	183.175	-0.598	0.000	0.01	0.0	8.9	OK
1.005	S33	183.175	0.716	0.000	0.08	0.0	12.1	SURCHARGED
1.006	S34	180.183	-0.288	0.000	0.12	0.0	12.1	OK

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<u>Simulation Criteria</u> Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coefficient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000 Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Ratio R 0.300 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 19.400 Cv (Winter) 0.840 Margin for Flood Risk Warning (mm) 300.0 Analysis Timestep 2.5 Second Increment (Extended) DTS Status ON DVD Status OFF Inertia Status OFF Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360 Return Period(s) (years) 30 Climate Change (%) 0 <table border="1"> <thead> <tr> <th>PN</th> <th>Storm</th> <th>Return Climate Period Change</th> <th>First X Surcharge</th> <th>First Y Flood</th> <th>First Z Overflow</th> <th>O/F Act.</th> <th>Lvl Exc.</th> </tr> </thead> <tbody> <tr><td>1.000</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>2.000</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.001</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.002</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>3.000</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.003</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.004</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.005</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.006</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.007</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.008</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.009</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.000</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.001</td><td>15 Winter</td><td>30</td><td>0%</td><td>30/15 Summer</td><td></td><td></td><td></td></tr> <tr><td>4.002</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.003</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>5.000</td><td>15 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>5.001</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>4.004</td><td>360 Winter</td><td>30</td><td>0%</td><td></td><td></td><td></td><td></td></tr> <tr><td>1.010</td><td>360 Winter</td><td>30</td><td>0%</td><td>30/15 Summer</td><td></td><td></td><td></td></tr> </tbody> </table>			PN	Storm	Return Climate Period Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.	1.000	15 Winter	30	0%					2.000	15 Winter	30	0%					1.001	15 Winter	30	0%					1.002	15 Winter	30	0%					3.000	15 Winter	30	0%					1.003	360 Winter	30	0%					1.004	360 Winter	30	0%					1.005	360 Winter	30	0%					1.006	360 Winter	30	0%					1.007	360 Winter	30	0%					1.008	360 Winter	30	0%					1.009	360 Winter	30	0%					4.000	15 Winter	30	0%					4.001	15 Winter	30	0%	30/15 Summer				4.002	15 Winter	30	0%					4.003	15 Winter	30	0%					5.000	15 Winter	30	0%					5.001	360 Winter	30	0%					4.004	360 Winter	30	0%					1.010	360 Winter	30	0%	30/15 Summer			
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Micro Drainage	Network 2013.1.1	

Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Water	Surch'd Depth (m)	Flooded	Flow / Cap.	O'flow (l/s)	Pipe	Status
		Level (m)		Volume (m³)			Flow (l/s)	
1.000	S36	193.090	-0.092	0.000	0.31	0.0	12.7	OK
2.000	S37	191.169	-0.116	0.000	0.12	0.0	3.9	OK
1.001	S38	190.642	-0.054	0.000	0.71	0.0	25.0	OK
1.002	S39	188.566	-0.084	0.000	0.38	0.0	29.5	OK
3.000	S40	188.841	-0.123	0.000	0.08	0.0	5.1	OK
1.003	S41	183.084	-1.016	0.000	0.00	0.0	6.4	OK
1.004	S42	183.084	-0.969	0.000	0.00	0.0	5.6	OK
1.005	S43	183.084	-0.927	0.000	0.00	0.0	5.9	OK
1.006	S44	183.084	-0.815	0.000	0.00	0.0	5.5	OK
1.007	S45	183.084	-0.766	0.000	0.00	0.0	6.6	OK
1.008	S46	183.084	-0.720	0.000	0.00	0.0	7.3	OK
1.009	S47	183.084	-0.675	0.000	0.00	0.0	6.0	OK
4.000	S48	191.341	-0.012	0.000	0.79	0.0	22.0	OK
4.001	S49	191.045	0.164	0.000	1.80	0.0	21.7	SURCHARGED
4.002	S50	190.723	-0.084	0.000	0.41	0.0	21.8	OK
4.003	S51	189.330	-0.071	0.000	0.53	0.0	28.3	OK
5.000	S52	188.824	-0.101	0.000	0.23	0.0	12.0	OK
5.001	S53	183.084	-0.825	0.000	0.00	0.0	6.5	OK
4.004	S54	183.084	-0.742	0.000	0.00	0.0	9.2	OK
1.010	S55	183.085	0.555	0.000	0.08	0.0	5.4	SURCHARGED