BARRATT

DRAINAGE CALCULATIONS

Linglongs Road
Whaley Bridge

October 2017

Designed By: Barratt Manchester
4 Brindley Road
City Park
Manchester
M16 9HQ

CONTENTS

Existing Greenfield Runoff Rates

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	4.421	Urban	0.000
SAAR (mm)	973	Region Number	Region 10

Results l/s

QBAR Rural	28.6
QBAR Urban	28.6
Q100 years	59.4
Q1 year	24.8
Q30 years	48.4
Q100 years	59.4

Existing Greenfield Runoff Volumes

Greenfield Runoff Volume

FSR Data

Return Period (years)	1
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.400
Ratio R	0.300
Areal Reduction Factor	1.00
Area (ha)	4.421
SAAR (mm)	1057
CWI	123.493
Urban	0.000
SPR	30.000

Results

Percentage Runoff (%)	29.62
Greenfield Runoff Volume (m^3)	320.054

Greenfield Runoff Volume

FSR Data

Return Period (years)	30
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.400
Ratio R	0.300
Areal Reduction Factor	1.00
Area (ha)	4.421
SAAR (mm)	1057
CWI	123.493
Urban	0.000
SPR	30.000

Results

Percentage Runoff (%)	32.31
Greenfield Runoff Volume (m^3)	754.764

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.400
Ratio R	0.300
Areal Reduction Factor	1.00
Area (ha)	4.421
SAAR (mm)	1057
CWI	123.493
Urban	0.000
SPR	30.000

Results

Percentage Runoff (%)	34.27
Greenfield Runoff Volume (m^3)	1032.209

Storm Sewer Design

Storm Drainage Design (1 in 2 yr)

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)	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)	400
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	0.140	5.00	0.0	0.600	o	225
1.001	13.642	0.058	235.2	0.039	0.00	0.0	0.600	o	300
1.002	8.631	0.037	233.3	0.011	0.00	0.0	0.600	o	300
1.003	17.054	0.073	233.6	0.003	0.00	0.0	0.600	o	300
2.000	26.292	1.878	14.0	0.015	5.00	0.0	0.600	o	150
2.001	38.092	7.618	5.0	0.030	0.00	0.0	0.600	o	150
1.004	35.086	0.149	235.5	0.031	0.00	0.0	0.600	o	300
1.005	19.070	0.502	38.0	0.015	0.00	0.0	0.600	o	300
1.006	31.428	5.238	6.0	0.015	0.00	0.0	0.600	o	300
3.000	39.819	0.100	400.0	0.111	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	50.00	5.61	202.560	0.140	0.0	0.0	1.9	1.01	40.3	20.9
1.001	50.00	5.83	202.260	0.179	0.0	0.0	2.4	1.02	72.2	26.7
1.002	50.00	5.97	202.202	0.190	0.0	0.0	2.6	1.03	72.5	28.3
1.003	50.00	6.25	202.165	0.193	0.0	0.0	2.6	1.02	72.4	28.7
2.000	50.00	5.16	212.343	0.015	0.0	0.0	0.2	2.71	47.8	2.2
2.001	50.00	5.30	210.465	0.045	0.0	0.0	0.6	4.54	80.2	6.7
1.004	50.00	6.82	202.092	0.269	0.0	0.0	3.6	1.02	72.1	40.1
1.005	50.00	6.95	201.943	0.284	0.0	0.0	3.8	2.56	180.9	42.3
1.006	50.00	7.03	201.441	0.299	0.0	0.0	4.0	6.46	456.5	44.5
3.000	50.00	5.31	195.039	0.111	0.0	0.0	1.5	2.14	3779.1	16.5

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)
3.001	36.736	0.092	400.0	0.077	0.00	0.0	0.600	o	1500
3.002	47.663	0.119	400.0	0.138	0.00	0.0	0.600	o	1500
1.007	56.920	4.536	12.5	0.049	0.00	0.0	0.600	o	375
1.008	21.751	0.054	400.0	0.019	0.00	0.0	0.600	o	1500
1.009	14.828	0.037	400.7	0.000	0.00	0.0	0.600	o	1500
4.000	33.592	0.084	400.0	0.059	5.00	0.0	0.600	o	1500
4.001	18.528	0.046	400.0	0.008	0.00	0.0	0.600	o	1500
4.002	18.788	0.047	399.7	0.097	0.00	0.0	0.600	o	1500
4.003	23.403	0.059	400.0	0.015	0.00	0.0	0.600	o	1500
4.004	21.549	0.054	400.0	0.060	0.00	0.0	0.600	o	1500
1.010	18.876	0.047	400.0	0.091	0.00	0.0	0.600	o	1500
1.011	17.417	1.340	13.0	0.000	0.00	0.0	0.600	o	300
1.012	4.313	0.014	308.1	0.000	0.00	0.0	0.600	o	450

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.001	50.00	5.60	194.939	0.188	0.0	0.0	2.5	2.14	3779.1	28.0
3.002	50.00	5.97	194.848	0.326	0.0	0.0	4.4	2.14	3779.1	48.6
1.007	50.00	7.21	194.728	0.674	0.0	0.0	9.1	5.14	567.5	100.4
1.008	50.00	7.38	189.067	0.693	0.0	0.0	9.4	2.14	3779.1	103.2
1.009	49.68	7.50	189.013	0.693	0.0	0.0	9.4	2.14	3775.6	103.2
4.000	50.00	5.26	189.266	0.059	0.0	0.0	0.8	2.14	3779.1	8.8
4.001	50.00	5.41	189.182	0.067	0.0	0.0	0.9	2.14	3779.1	10.0
4.002	50.00	5.55	189.136	0.164	0.0	0.0	2.2	2.14	3780.3	24.4
4.003	50.00	5.73	189.089	0.179	0.0	0.0	2.4	2.14	3779.1	26.7
4.004	50.00	5.90	189.030	0.239	0.0	0.0	3.2	2.14	3779.1	35.6
1.010	49.25	7.65	188.976	1.023	0.0	0.0	13.6	2.14	3779.1	150.1
1.011	49.06	7.71	188.929	1.023	0.0	0.0	13.6	4.38	309.9	150.1
1.012	48.88	7.78	187.439	1.023	0.0	0.0	13.6	1.15	183.4	150.1

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)	400
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	11.656	0.278	41.9	0.049	5.00	0.0	0.600	o	150
1.001	27.082	2.257	12.0	0.008	0.00	0.0	0.600	o	150
1.002	15.231	1.523	10.0	0.008	0.00	0.0	0.600	o	150
1.003	63.156	7.216	8.8	0.048	0.00	0.0	0.600	o	150
2.000	26.867	2.442	11.0	0.015	5.00	0.0	0.600	o	150
2.001	18.839	4.410	4.3	0.006	0.00	0.0	0.600	o	150
1.004	70.451	0.176	400.0	0.120	0.00	0.0	0.600	o	1500
3.000	15.489	0.039	397.2	0.103	5.00	0.0	0.600	o	1500
1.005	18.744	1.874	10.0	0.010	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	5.12	194.645	0.049	0.0	0.0	0.7	1.56	27.5	7.3
1.001	50.00	5.28	194.367	0.057	0.0	0.0	0.8	2.92	51.7	8.5
1.002	50.00	5.36	192.110	0.065	0.0	0.0	0.9	3.20	56.6	9.7
1.003	50.00	5.67	190.587	0.113	0.0	0.0	1.5	3.43	60.6	16.8
2.000	50.00	5.15	190.224	0.015	0.0	0.0	0.2	3.06	54.0	2.2
2.001	50.00	5.21	187.782	0.021	0.0	0.0	0.3	4.91	86.8	3.1
1.004	50.00	6.21	182.022	0.254	0.0	0.0	3.4	2.14	3779.1	37.8
3.000	50.00	5.12	181.884	0.103	0.0	0.0	1.4	2.15	3792.7	15.3
1.005	50.00	6.29	181.845	0.367	0.0	0.0	5.0	4.16	165.5	54.7

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	300

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	6.47	179.896	0.367	0.0	0.0	5.0	1.02	72.2	54.7S

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)	400
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	1.364	33.0	0.043	5.00	0.0	0.600	o	150
2.000	14.927	0.740	20.2	0.009	5.00	0.0	0.600	o	150
1.001	49.683	2.615	19.0	0.032	0.00	0.0	0.600	o	150
1.002	22.237	1.631	13.6	0.009	0.00	0.0	0.600	o	150
3.000	32.207	1.464	22.0	0.014	5.00	0.0	0.600	o	150
1.003	18.754	3.126	6.0	0.058	0.00	0.0	0.600	o	150
1.004	16.908	0.042	402.6	0.008	0.00	0.0	0.600	o	1050
1.005	44.545	0.111	401.3	0.030	0.00	0.0	0.600	o	1500
1.006	19.918	0.050	400.0	0.072	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	5.43	193.032	0.043	0.0	0.0	0.6	1.76	31.1	6.4
2.000	50.00	5.11	192.408	0.009	0.0	0.0	0.1	2.25	39.8	1.3
1.001	50.00	5.78	191.668	0.084	0.0	0.0	1.1	2.32	41.0	12.5
1.002	50.00	5.92	189.053	0.093	0.0	0.0	1.3	2.74	48.5	13.9
3.000	50.00	5.25	188.886	0.014	0.0	0.0	0.2	2.16	38.1	2.1
1.003	50.00	5.99	187.422	0.165	0.0	0.0	2.2	4.14	73.2	24.6
1.004	50.00	6.16	182.960	0.173	0.0	0.0	2.3	1.71	1481.8	25.8
1.005	50.00	6.51	182.468	0.203	0.0	0.0	2.7	2.14	3772.9	30.2
1.006	50.00	6.66	182.357	0.275	0.0	0.0	3.7	2.14	3779.1	41.0

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)
1.007	17.969	0.045	399.3	0.025	0.00	0.0	0.600	o	1500
1.008	18.286	0.046	400.0	0.039	0.00	0.0	0.600	o	1500
1.009	11.721	0.029	400.0	0.000	0.00	0.0	0.600	o	1500
4.000	16.769	1.048	16.0	0.011	5.00	0.0	0.600	o	150
4.001	13.451	0.791	17.0	0.016	0.00	0.0	0.600	o	150
4.002	12.937	0.681	19.0	0.000	0.00	0.0	0.600	o	150
4.003	39.686	6.168	6.4	0.111	0.00	0.0	0.600	o	150
5.000	26.871	1.581	17.0	0.050	5.00	0.0	0.600	o	150
5.001	32.847	4.399	7.5	0.093	0.00	0.0	0.600	o	150
4.004	31.590	0.079	399.9	0.038	0.00	0.0	0.600	o	1500
1.010	11.540	0.037	311.9	0.033	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)
1.007	50.00	6.80	182.307	0.300	0.0	0.0	4.1	2.14	3782.4	44.7
1.008	50.00	6.94	182.262	0.339	0.0	0.0	4.6	2.14	3779.1	50.5
1.009	50.00	7.04	182.216	0.339	0.0	0.0	4.6	2.14	3779.1	50.5
4.000	50.00	5.11	192.454	0.011	0.0	0.0	0.1	2.53	44.7	1.6
4.001	50.00	5.20	191.406	0.027	0.0	0.0	0.4	2.46	43.4	4.0
4.002	50.00	5.29	190.615	0.027	0.0	0.0	0.4	2.32	41.0	4.0
4.003	50.00	5.46	189.934	0.138	0.0	0.0	1.9	4.00	70.7	20.6
5.000	50.00	5.18	189.746	0.050	0.0	0.0	0.7	2.46	43.4	7.4
5.001	50.00	5.33	188.165	0.143	0.0	0.0	1.9	3.71	65.6	21.3
4.004	50.00	5.71	182.266	0.319	0.0	0.0	4.3	2.14	3779.7	47.5
1.010	50.00	7.22	182.187	0.691	0.0	0.0	9.4	1.02	112.7	102.9

Storm Sewer Design

Storm Manhole Schedules

Manhole Schedules for Surface Network 1

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	203.985	1.425	Open Manhole	1200	1.000	202.560	225				
S2	205.756	3.496	Open Manhole	1200	1.001	202.260	300	1.000	202.335	225	
S3	206.673	4.471	Open Manhole	1200	1.002	202.202	300	1.001	202.202	300	
S4	207.267	5.102	Open Manhole	1200	1.003	202.165	300	1.002	202.165	300	
S5	213.693	1.350	Open Manhole	1200	2.000	212.343	150				
S6	211.927	1.462	Open Manhole	1200	2.001	210.465	150	2.000	210.465	150	
S7	208.226	6.134	Open Manhole	1200	1.004	202.092	300	1.003	202.092	300	
								2.001	202.847	150	605
S8	204.752	2.809	Open Manhole	1200	1.005	201.943	300	1.004	201.943	300	
S9	202.872	1.431	Open Manhole	1200	1.006	201.441	300	1.005	201.441	300	
S10	197.739	2.700	Open Manhole	3000	3.000	195.039	1500				
S11	198.727	3.788	Open Manhole	3000	3.001	194.939	1500	3.000	194.939	1500	
S12	200.352	5.505	Open Manhole	3000	3.002	194.848	1500	3.001	194.848	1500	
S13	199.728	5.000	Open Manhole	3000	1.007	194.728	375	1.006	196.203	300	1400
								3.002	194.728	1500	
S14	193.999	4.931	Open Manhole	3000	1.008	189.067	1500	1.007	190.192	375	
S15	192.171	3.158	Open Manhole	3000	1.009	189.013	1500	1.008	189.013	1500	
S16	196.445	7.179	Open Manhole	3000	4.000	189.266	1500				
S17	194.021	4.839	Open Manhole	3000	4.001	189.182	1500	4.000	189.182	1500	
S18	192.676	3.540	Open Manhole	3000	4.002	189.136	1500	4.001	189.136	1500	
S19	192.392	3.304	Open Manhole	3000	4.003	189.089	1500	4.002	189.089	1500	
S20	192.089	3.059	Open Manhole	3000	4.004	189.030	1500	4.003	189.030	1500	
S21	191.843	2.867	Open Manhole	3000	1.010	188.976	1500	1.009	188.976	1500	
								4.004	188.976	1500	
S22	191.629	2.700	Open Manhole	3000	1.011	188.929	300	1.010	188.929	1500	
S23A	189.019	1.580	Open Manhole	1500	1.012	187.439	450	1.011	187.589	300	
S24	188.035	0.610	Open Manhole	0		OUTFALL		1.012	187.425	450	

Manhole Schedules for Surface Network 2

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)
S25	195.995	1.350	Open Manhole	1200	1.000	194.645	150				
S26	195.723	1.356	Open Manhole	1200	1.001	194.367	150	1.000	194.367	150	
S27	193.473	1.363	Open Manhole	1350	1.002	192.110	150	1.001	192.110	150	
S28	192.011	1.424	Open Manhole	1350	1.003	190.587	150	1.002	190.587	150	
S29	191.574	1.350	Open Manhole	1200	2.000	190.224	150				
S30	189.178	1.396	Open Manhole	1200	2.001	187.782	150	2.000	187.782	150	
S31	188.884	6.863	Open Manhole	3000	1.004	182.022	1500	1.003	183.371	150	
								2.001	183.372	150	
S32	185.400	3.516	Open Manhole	3000	3.000	181.884	1500				
S33	184.657	2.812	Open Manhole	3000	1.005	181.845	225	1.004	181.845	1500	
								3.000	181.845	1500	
S34	183.341	3.445	Open Manhole	1350	1.006	179.896	300	1.005	179.971	225	
S35	181.891	2.041	Open Manhole	0		OUTFALL		1.006	179.850	300	

Manhole Schedules for Surface Network 3

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)
S36	194.382	1.350	Open Manhole	1200	1.000	193.032	150				
S37	193.758	1.350	Open Manhole	1200	2.000	192.408	150				
S38	193.026	1.358	Open Manhole	1200	1.001	191.668	150	1.000	191.668	150	
								2.000	191.668	150	
S39	190.481	1.429	Open Manhole	1200	1.002	189.053	150	1.001	189.053	150	
S40	190.236	1.350	Open Manhole	1200	3.000	188.886	150				
S41	189.402	1.981	Open Manhole	1200	1.003	187.422	150	1.002	187.422	150	
								3.000	187.422	150	
S42	188.472	5.512	Open Manhole	2700	1.004	182.960	1050	1.003	184.296	150	436
S43	187.618	5.150	Open Manhole	3000	1.005	182.468	1500	1.004	182.918	1050	
S44	185.459	3.102	Open Manhole	3000	1.006	182.357	1500	1.005	182.357	1500	
S45	184.911	2.604	Open Manhole	3000	1.007	182.307	1500	1.006	182.307	1500	
S46	185.029	2.767	Open Manhole	3000	1.008	182.262	1500	1.007	182.262	1500	
S47	185.825	3.608	Open Manhole	3000	1.009	182.216	1500	1.008	182.216	1500	
S48	193.804	1.350	Open Manhole	1200	4.000	192.454	150				
S49	192.801	1.395	Open Manhole	1200	4.001	191.406	150	4.000	191.406	150	
S50	192.006	1.391	Open Manhole	1200	4.002	190.615	150	4.001	190.615	150	
S51	191.526	1.592	Open Manhole	1200	4.003	189.934	150	4.002	189.934	150	
S52	191.096	1.350	Open Manhole	1200	5.000	189.746	150				
S53	190.083	1.918	Open Manhole	1200	5.001	188.165	150	5.000	188.165	150	
S54	188.915	6.649	Open Manhole	3000	4.004	182.266	1500	4.003	183.766	150	150
								5.001	183.766	150	150
S55	186.575	4.388	Open Manhole	3000	1.010	182.187	375	1.009	182.187	1500	
								4.004	182.187	1500	
S56	184.176	2.026	Open Manhole	0		OUTFALL		1.010	182.150	375	

Storm Sewer Design

Flow Control Details

Online Controls for Surface Network 1

Crown Vortex Valve® Manhole: S13, DS/PN: 1.007, Volume (m³): 116.3

Design Head (m) 1.900 Vortex Valve® Type R1 SW Only Invert Level (m) 194.728
Design Flow (l/s) 39.0 Diameter (mm) 219

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.0	1.200	31.1	3.000	49.1	7.000	75.0
0.200	10.5	1.400	33.6	3.500	53.1	7.500	77.7
0.300	16.7	1.600	35.9	4.000	56.7	8.000	80.2
0.400	20.7	1.800	38.1	4.500	60.2	8.500	82.7
0.500	21.1	2.000	40.1	5.000	63.4	9.000	85.1
0.600	22.0	2.200	42.1	5.500	66.5	9.500	87.4
0.800	25.4	2.400	43.9	6.000	69.5		
1.000	28.4	2.600	45.7	6.500	72.3		

Crown Vortex Valve® Manhole: S22, DS/PN: 1.011, Volume (m³): 47.1

Design Head (m) 2.600 Vortex Valve® Type R1 SW Only Invert Level (m) 188.929
Design Flow (l/s) 28.1 Diameter (mm) 172

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.1	1.200	19.2	3.000	30.3	7.000	46.3
0.200	7.7	1.400	20.7	3.500	32.7	7.500	47.9
0.300	11.0	1.600	22.1	4.000	35.0	8.000	49.5
0.400	11.4	1.800	23.5	4.500	37.1	8.500	51.0
0.500	12.4	2.000	24.7	5.000	39.1	9.000	52.5
0.600	13.6	2.200	26.0	5.500	41.0	9.500	53.9
0.800	15.6	2.400	27.1	6.000	42.9		
1.000	17.5	2.600	28.2	6.500	44.6		

Online Controls for Surface Network 2

Crown Vortex Valve® Manhole: S33, DS/PN: 1.005, Volume (m³): 161.1

Design Head (m) 2.260 Vortex Valve® Type R1 SW Only Invert Level (m) 181.845
Design Flow (l/s) 11.5 Diameter (mm) 114

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	8.4	3.000	13.3	7.000	20.3
0.200	4.0	1.400	9.1	3.500	14.4	7.500	21.0
0.300	4.2	1.600	9.7	4.000	15.4	8.000	21.7
0.400	4.9	1.800	10.3	4.500	16.3	8.500	22.4
0.500	5.4	2.000	10.9	5.000	17.2	9.000	23.1
0.600	6.0	2.200	11.4	5.500	18.0	9.500	23.7
0.800	6.9	2.400	11.9	6.000	18.8		
1.000	7.7	2.600	12.4	6.500	19.6		

Online Controls for Surface Network 3

Crown Vortex Valve® Manhole: S55, DS/PN: 1.010, Volume (m³): 96.9

Design Head (m) 2.600 Vortex Valve® Type R1 SW Only Invert Level (m) 182.187
Design Flow (l/s) 19.6 Diameter (mm) 143

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	13.2	3.000	20.9	7.000	32.0
0.200	5.9	1.400	14.3	3.500	22.6	7.500	33.1
0.300	7.4	1.600	15.3	4.000	24.2	8.000	34.2
0.400	7.6	1.800	16.2	4.500	25.7	8.500	35.3
0.500	8.6	2.000	17.1	5.000	27.0	9.000	36.3
0.600	9.4	2.200	17.9	5.500	28.4	9.500	37.3
0.800	10.8	2.400	18.7	6.000	29.6		
1.000	12.1	2.600	19.5	6.500	30.8		

1 in 1 yr Rainfall Simulation

Critical Storm results for summer & winter profile, 15-360 min.

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S1	202.615	0.14	20.9	22.344	OK
1.001	S2	202.326	0.11	26.7	28.559	OK
1.002	S3	202.273	0.13	28.3	30.304	OK
1.003	S4	202.233	0.12	28.7	30.775	OK
2.000	S5	212.352	0.01	2.2	2.394	OK
2.001	S6	210.480	0.02	6.7	7.182	OK
1.004	S7	202.169	0.15	40.1	42.900	OK
1.005	S8	201.993	0.07	42.3	45.299	OK
1.006	S9	201.474	0.03	44.5	47.696	OK
3.000	S10	195.099	0.00	16.5	17.709	OK
3.001	S11	195.096	0.00	28.0	30.002	OK
3.002	S12	195.095	0.00	48.6	52.034	OK
1.007	S13	195.094	0.04	100.4	107.573	OK
1.008	S14	189.520	0.01	103.2	110.645	OK
1.009	S15	189.520	0.01	103.2	110.622	OK
4.000	S16	189.520	0.00	8.8	9.423	OK
4.001	S17	189.520	0.00	10.0	10.713	OK
4.002	S18	189.520	0.00	24.4	26.209	OK
4.003	S19	189.520	0.00	26.7	28.613	OK
4.004	S20	189.520	0.00	35.6	38.176	OK
1.010	S21	189.520	0.01	150.1	163.263	OK
1.011	S22	189.520	0.05	150.1	162.864	SURCHARGED
1.012	S23A	187.540	0.11	150.1	162.806	OK

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S25	194.676	0.09	7.3	6.686	OK
1.001	S26	194.389	0.05	8.5	7.778	OK
1.002	S27	192.133	0.06	9.7	8.869	OK
1.003	S28	190.617	0.09	16.8	15.419	OK
2.000	S29	190.234	0.01	2.2	2.047	OK
2.001	S30	187.790	0.01	3.1	2.865	OK
1.004	S31	182.281	0.00	37.8	34.680	OK
3.000	S32	182.280	0.00	15.3	14.060	OK
1.005	S33	182.280	0.03	54.7	49.877	SURCHARGED
1.006	S34	179.956	0.09	54.7	49.908	OK

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S36	193.057	0.07	6.4	5.867	OK
2.000	S37	192.416	0.01	1.3	1.228	OK
1.001	S38	191.699	0.10	12.5	11.462	OK
1.002	S39	189.084	0.09	13.9	12.690	OK
3.000	S40	188.899	0.02	2.1	1.910	OK
1.003	S41	187.455	0.11	24.6	22.515	OK
1.004	S42	183.010	0.01	25.8	23.606	OK
1.005	S43	182.716	0.00	30.2	27.706	OK
1.006	S44	182.716	0.00	41.0	37.539	OK
1.007	S45	182.716	0.00	44.7	40.969	OK
1.008	S46	182.716	0.00	50.5	46.211	OK
1.009	S47	182.716	0.00	50.5	45.833	OK
4.000	S48	192.463	0.01	1.6	1.501	OK
4.001	S49	191.423	0.03	4.0	3.684	OK
4.002	S50	190.633	0.03	4.0	3.684	OK
4.003	S51	189.965	0.09	20.6	18.830	OK
5.000	S52	189.769	0.06	7.4	6.823	OK
5.001	S53	188.198	0.11	21.3	19.512	OK
4.004	S54	182.716	0.01	47.5	43.493	OK
1.010	S55	182.716	0.10	102.9	92.963	SURCHARGED

1 in 30yr Rainfall Simulation

Critical Storm results for summer & winter profile, 15-10080 min.

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of 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, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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%	30/15 Winter				
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	15 Winter	30	0%					
1.004	15 Winter	30	0%	30/15 Winter				
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	240 Winter	30	0%					
1.009	240 Winter	30	0%					
4.000	240 Winter	30	0%					
4.001	240 Winter	30	0%					
4.002	240 Winter	30	0%					
4.003	240 Winter	30	0%					
4.004	240 Winter	30	0%					

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.
1.010	240 Winter	30	0%					
1.011	240 Winter	30	0%	30/15 Summer				
1.012	240 Winter	30	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S1	202.812	0.027	0.000	1.05	0.0	40.2	SURCHARGED
1.001	S2	202.518	-0.042	0.000	0.81	0.0	48.4	OK
1.002	S3	202.475	-0.027	0.000	0.93	0.0	50.9	OK
1.003	S4	202.442	-0.023	0.000	0.83	0.0	51.5	OK
2.000	S5	212.375	-0.118	0.000	0.10	0.0	4.5	OK
2.001	S6	210.508	-0.107	0.000	0.18	0.0	14.1	OK
1.004	S7	202.392	0.000	0.000	1.02	0.0	67.8	SURCHARGED
1.005	S8	202.084	-0.159	0.000	0.45	0.0	70.8	OK
1.006	S9	201.526	-0.215	0.000	0.18	0.0	73.9	OK
3.000	S10	195.607	-0.932	0.000	0.01	0.0	14.8	OK
3.001	S11	195.607	-0.832	0.000	0.00	0.0	9.0	OK
3.002	S12	195.607	-0.740	0.000	0.01	0.0	15.5	OK
1.007	S13	195.607	0.504	0.000	0.05	0.0	26.6	SURCHARGED
1.008	S14	189.994	-0.573	0.000	0.01	0.0	24.7	OK
1.009	S15	189.994	-0.520	0.000	0.01	0.0	22.5	OK
4.000	S16	189.993	-0.773	0.000	0.00	0.0	3.2	OK
4.001	S17	189.993	-0.689	0.000	0.00	0.0	4.0	OK
4.002	S18	189.993	-0.643	0.000	0.00	0.0	5.9	OK
4.003	S19	189.993	-0.596	0.000	0.00	0.0	7.7	OK
4.004	S20	189.993	-0.537	0.000	0.00	0.0	9.9	OK
1.010	S21	189.993	-0.483	0.000	0.01	0.0	18.8	OK
1.011	S22	189.993	0.764	0.000	0.07	0.0	18.0	SURCHARGED
1.012	S23A	187.556	-0.333	0.000	0.15	0.0	18.0	OK

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S1	202.636	0.25	20.9	55.122	OK
1.001	S2	202.352	0.21	26.7	70.474	OK
1.002	S3	202.301	0.24	28.3	74.808	OK
1.003	S4	202.259	0.21	28.7	75.983	OK
2.000	S5	212.358	0.02	2.2	5.907	OK
2.001	S6	210.484	0.04	6.7	17.720	OK
1.004	S7	202.199	0.28	40.1	105.894	OK
1.005	S8	202.013	0.12	42.3	111.805	OK
1.006	S9	201.484	0.05	44.5	117.716	OK
3.000	S10	195.477	0.00	16.5	43.723	OK
3.001	S11	195.477	0.00	28.0	74.057	OK
3.002	S12	195.477	0.00	48.6	128.392	OK
1.007	S13	195.477	0.05	100.4	265.371	SURCHARGED
1.008	S14	189.993	0.01	103.2	272.337	OK
1.009	S15	189.993	0.01	103.2	271.106	OK
4.000	S16	189.992	0.00	8.8	23.249	OK
4.001	S17	189.992	0.00	10.0	26.411	OK
4.002	S18	189.992	0.00	24.4	64.511	OK
4.003	S19	189.992	0.00	26.7	69.939	OK
4.004	S20	189.992	0.00	35.6	92.472	OK
1.010	S21	189.992	0.01	150.1	397.194	OK
1.011	S22	189.992	0.07	150.1	394.890	SURCHARGED
1.012	S23A	187.556	0.15	150.1	394.050	OK

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of 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, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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	15 Winter	30	0%					
1.004	180 Winter	30	0%					
3.000	180 Winter	30	0%					
1.005	180 Winter	30	0%	30/15 Summer				
1.006	180 Winter	30	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S25	194.729	-0.066	0.000	0.59	0.0	14.7	OK
1.001	S26	194.429	-0.088	0.000	0.35	0.0	17.1	OK
1.002	S27	192.174	-0.086	0.000	0.37	0.0	19.5	OK
1.003	S28	190.671	-0.066	0.000	0.58	0.0	34.5	OK
2.000	S29	190.254	-0.120	0.000	0.09	0.0	4.5	OK

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

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
2.001	S30	187.810	-0.122	0.000	0.08	0.0	6.4	OK
1.004	S31	182.694	-0.827	0.000	0.01	0.0	20.0	OK
3.000	S32	182.694	-0.690	0.000	0.00	0.0	7.2	OK
1.005	S33	182.694	0.624	0.000	0.05	0.0	7.1	SURCHARGED
1.006	S34	179.966	-0.230	0.000	0.12	0.0	7.1	OK

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S25	194.686	0.17	7.3	17.721	OK
1.001	S26	194.398	0.10	8.5	20.614	OK
1.002	S27	192.142	0.10	9.7	23.508	OK
1.003	S28	190.627	0.16	16.8	40.862	OK
2.000	S29	190.240	0.02	2.2	5.425	OK
2.001	S30	187.797	0.02	3.1	7.595	OK
1.004	S31	182.694	0.01	37.8	90.829	OK
3.000	S32	182.694	0.00	15.3	35.107	OK
1.005	S33	182.694	0.05	54.7	117.943	SURCHARGED
1.006	S34	179.966	0.12	54.7	117.634	OK

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of 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, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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	15 Winter	30	0%					
1.004	180 Winter	30	0%					
1.005	180 Winter	30	0%					
1.006	180 Winter	30	0%					
1.007	180 Winter	30	0%					
1.008	180 Winter	30	0%					
1.009	180 Winter	30	0%					
4.000	15 Winter	30	0%					
4.001	15 Winter	30	0%					
4.002	15 Winter	30	0%					
4.003	15 Winter	30	0%					
5.000	15 Winter	30	0%					
5.001	15 Winter	30	0%					
4.004	180 Winter	30	0%					
1.010	180 Winter	30	0%	30/15 Summer				

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

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S36	193.101	-0.081	0.000	0.42	0.0	12.6	OK
2.000	S37	192.435	-0.123	0.000	0.07	0.0	2.7	OK
1.001	S38	191.756	-0.062	0.000	0.63	0.0	25.0	OK
1.002	S39	189.139	-0.064	0.000	0.60	0.0	27.6	OK
3.000	S40	188.920	-0.116	0.000	0.11	0.0	4.2	OK
1.003	S41	187.519	-0.053	0.000	0.73	0.0	50.0	OK
1.004	S42	183.180	-0.830	0.000	0.02	0.0	14.6	OK
1.005	S43	183.180	-0.788	0.000	0.01	0.0	15.5	OK
1.006	S44	183.180	-0.677	0.000	0.00	0.0	8.5	OK
1.007	S45	183.180	-0.627	0.000	0.00	0.0	6.3	OK
1.008	S46	183.181	-0.582	0.000	0.00	0.0	7.4	OK
1.009	S47	183.181	-0.536	0.000	0.01	0.0	8.8	OK
4.000	S48	192.482	-0.122	0.000	0.08	0.0	3.3	OK
4.001	S49	191.453	-0.103	0.000	0.21	0.0	8.4	OK
4.002	S50	190.663	-0.102	0.000	0.22	0.0	8.4	OK
4.003	S51	190.022	-0.062	0.000	0.64	0.0	44.0	OK
5.000	S52	189.809	-0.087	0.000	0.36	0.0	15.0	OK
5.001	S53	188.259	-0.056	0.000	0.71	0.0	44.7	OK
4.004	S54	183.181	-0.585	0.000	0.01	0.0	25.4	OK
1.010	S55	183.181	0.619	0.000	0.14	0.0	12.0	SURCHARGED

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S36	193.066	0.12	6.4	15.550	OK
2.000	S37	192.423	0.02	1.3	3.255	OK
1.001	S38	191.710	0.18	12.5	30.377	OK
1.002	S39	189.094	0.17	13.9	33.632	OK
3.000	S40	188.903	0.03	2.1	5.063	OK
1.003	S41	187.467	0.20	24.6	59.670	OK
1.004	S42	183.179	0.02	25.8	62.558	OK
1.005	S43	183.179	0.01	30.2	72.011	OK
1.006	S44	183.179	0.00	41.0	91.314	OK
1.007	S45	183.179	0.00	44.7	95.083	OK
1.008	S46	183.179	0.00	50.5	103.183	OK
1.009	S47	183.179	0.01	50.5	96.075	OK
4.000	S48	192.469	0.02	1.6	3.978	OK
4.001	S49	191.429	0.06	4.0	9.764	OK
4.002	S50	190.639	0.06	4.0	9.764	OK
4.003	S51	189.975	0.17	20.6	49.906	OK
5.000	S52	189.778	0.10	7.4	18.082	OK
5.001	S53	188.210	0.19	21.3	51.714	OK
4.004	S54	183.179	0.01	47.5	112.507	OK
1.010	S55	183.179	0.14	102.9	206.149	SURCHARGED

1 in 100 yr Rainfall Simulation

Critical Storm results for summer & winter profile, 15-360 min.

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S1	202.635	0.24	20.9	80.111	OK
1.001	S2	202.351	0.20	26.7	102.428	OK
1.002	S3	202.299	0.23	28.3	108.722	OK
1.003	S4	202.257	0.21	28.7	110.438	OK
2.000	S5	212.358	0.02	2.2	8.583	OK
2.001	S6	210.484	0.04	6.7	25.750	OK
1.004	S7	202.198	0.27	40.1	153.927	OK
1.005	S8	202.012	0.12	42.3	162.510	OK
1.006	S9	201.483	0.05	44.5	171.093	OK
3.000	S10	195.580	0.00	16.5	63.527	OK
3.001	S11	195.580	0.00	28.0	107.557	OK
3.002	S12	195.580	0.01	48.6	186.534	OK
1.007	S13	195.580	0.05	100.4	385.659	SURCHARGED
1.008	S14	190.266	0.01	103.2	396.099	OK
1.009	S15	190.265	0.02	103.2	394.937	OK
4.000	S16	190.265	0.00	8.8	33.339	OK
4.001	S17	190.265	0.00	10.0	35.383	OK
4.002	S18	190.265	0.00	24.4	95.210	OK
4.003	S19	190.265	0.00	26.7	104.654	OK
4.004	S20	190.265	0.01	35.6	138.088	OK
1.010	S21	190.265	0.01	150.1	585.170	OK
1.011	S22	190.265	0.08	150.1	585.121	SURCHARGED
1.012	S23A	187.563	0.17	150.1	585.075	OK

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S25	194.692	0.22	7.3	23.149	OK
1.001	S26	194.402	0.13	8.5	26.929	OK
1.002	S27	192.147	0.14	9.7	30.708	OK
1.003	S28	190.633	0.21	16.8	53.385	OK
2.000	S29	190.241	0.03	2.2	7.086	OK
2.001	S30	187.798	0.03	3.1	9.921	OK
1.004	S31	182.928	0.01	37.8	117.414	OK
3.000	S32	182.927	0.01	15.3	44.898	OK
1.005	S33	182.928	0.05	54.7	135.655	SURCHARGED
1.006	S34	179.970	0.14	54.7	135.357	OK

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

PN	USMH	Water Level (m)	Flow/Capacity	Flow (l/s)	Discharge Volume (m³)	Status
1.000	S36	193.071	0.16	6.4	20.315	OK
2.000	S37	192.424	0.03	1.3	4.252	OK
1.001	S38	191.716	0.23	12.5	39.684	OK
1.002	S39	189.101	0.22	13.9	43.936	OK
3.000	S40	188.906	0.04	2.1	6.614	OK
1.003	S41	187.474	0.26	24.6	77.952	OK
1.004	S42	183.432	0.02	25.8	81.732	OK
1.005	S43	183.432	0.01	30.2	92.821	OK
1.006	S44	183.432	0.00	41.0	107.381	OK
1.007	S45	183.432	0.00	44.7	107.508	OK
1.008	S46	183.432	0.00	50.5	113.762	OK
1.009	S47	183.432	0.01	50.5	100.323	OK
4.000	S48	192.471	0.03	1.6	5.197	OK
4.001	S49	191.433	0.07	4.0	12.756	OK
4.002	S50	190.643	0.08	4.0	12.756	OK
4.003	S51	189.982	0.22	20.6	65.196	OK
5.000	S52	189.782	0.13	7.4	23.622	OK
5.001	S53	188.216	0.25	21.3	67.558	OK
4.004	S54	183.432	0.01	47.5	146.165	OK
1.010	S55	183.432	0.16	102.9	234.071	SURCHARGED

1 in 100 yr + 40% Rainfall Simulation

Critical Storm results for summer & winter profile, 15-10080 min.

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of 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, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+40%	100/15 Summer				
1.001	15 Winter	100	+40%	100/15 Summer				
1.002	15 Winter	100	+40%	100/15 Summer				
1.003	15 Winter	100	+40%	100/15 Summer				
2.000	15 Winter	100	+40%					
2.001	15 Winter	100	+40%					
1.004	15 Winter	100	+40%	100/15 Summer				
1.005	15 Winter	100	+40%					
1.006	15 Winter	100	+40%					
3.000	120 Winter	100	+40%					
3.001	120 Winter	100	+40%					
3.002	120 Winter	100	+40%					
1.007	120 Winter	100	+40%	100/15 Summer				
1.008	360 Winter	100	+40%	100/180 Winter				
1.009	360 Winter	100	+40%	100/180 Winter				
4.000	360 Winter	100	+40%	100/240 Winter				
4.001	360 Winter	100	+40%	100/240 Winter				
4.002	360 Winter	100	+40%	100/180 Winter				
4.003	360 Winter	100	+40%	100/180 Winter				
4.004	360 Winter	100	+40%	100/180 Winter				

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.
1.010	360 Winter	100	+40%	100/180 Winter				
1.011	360 Winter	100	+40%	100/15 Summer				
1.012	360 Winter	100	+40%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S1	203.718	0.933	0.000	1.68	0.0	64.0	FLOOD RISK
1.001	S2	203.063	0.503	0.000	1.33	0.0	79.4	SURCHARGED
1.002	S3	202.956	0.454	0.000	1.53	0.0	84.1	SURCHARGED
1.003	S4	202.844	0.379	0.000	1.38	0.0	85.2	SURCHARGED
2.000	S5	212.386	-0.107	0.000	0.18	0.0	8.1	OK
2.001	S6	210.524	-0.091	0.000	0.33	0.0	25.5	OK
1.004	S7	202.711	0.319	0.000	1.75	0.0	115.9	SURCHARGED
1.005	S8	202.143	-0.100	0.000	0.78	0.0	121.4	OK
1.006	S9	201.555	-0.186	0.000	0.30	0.0	126.7	OK
3.000	S10	196.299	-0.240	0.000	0.01	0.0	18.2	OK
3.001	S11	196.299	-0.140	0.000	0.01	0.0	12.9	OK
3.002	S12	196.299	-0.049	0.000	0.01	0.0	22.4	OK
1.007	S13	196.294	1.191	0.000	0.07	0.0	35.5	SURCHARGED
1.008	S14	191.029	0.461	0.000	0.02	0.0	31.9	SURCHARGED
1.009	S15	191.028	0.515	0.000	0.02	0.0	31.8	SURCHARGED
4.000	S16	191.027	0.261	0.000	0.00	0.0	4.5	SURCHARGED
4.001	S17	191.027	0.345	0.000	0.00	0.0	7.9	SURCHARGED
4.002	S18	191.027	0.391	0.000	0.01	0.0	11.3	SURCHARGED
4.003	S19	191.027	0.439	0.000	0.01	0.0	14.2	SURCHARGED
4.004	S20	191.027	0.497	0.000	0.01	0.0	15.9	SURCHARGED
1.010	S21	191.027	0.551	0.000	0.01	0.0	27.9	SURCHARGED
1.011	S22	191.027	1.798	0.000	0.10	0.0	25.3	SURCHARGED
1.012	S23A	187.580	-0.309	0.000	0.22	0.0	25.3	OK

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of 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, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+40%	100/15 Winter				
1.001	15 Winter	100	+40%					
1.002	15 Winter	100	+40%					
1.003	15 Winter	100	+40%	100/15 Summer				
2.000	15 Winter	100	+40%					
2.001	15 Winter	100	+40%					
1.004	240 Winter	100	+40%					
3.000	240 Winter	100	+40%	100/120 Winter				
1.005	240 Winter	100	+40%	100/15 Summer				
1.006	240 Winter	100	+40%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S25	194.823	0.028	0.000	1.05	0.0	26.1	SURCHARGED
1.001	S26	194.453	-0.064	0.000	0.61	0.0	30.2	OK
1.002	S27	192.200	-0.060	0.000	0.66	0.0	34.4	OK
1.003	S28	190.789	0.052	0.000	1.00	0.0	59.5	SURCHARGED
2.000	S29	190.264	-0.110	0.000	0.16	0.0	8.1	OK

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

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
2.001	S30	187.819	-0.112	0.000	0.14	0.0	11.5	OK
1.004	S31	183.439	-0.082	0.000	0.01	0.0	29.8	OK
3.000	S32	183.439	0.055	0.000	0.01	0.0	10.8	SURCHARGED
1.005	S33	183.439	1.369	0.000	0.07	0.0	9.7	SURCHARGED
1.006	S34	179.978	-0.218	0.000	0.17	0.0	9.7	OK

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 * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of 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, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	100	+40%					
2.000	15 Winter	100	+40%					
1.001	15 Winter	100	+40%	100/15 Summer				
1.002	15 Winter	100	+40%	100/15 Summer				
3.000	15 Winter	100	+40%					
1.003	15 Winter	100	+40%	100/15 Summer				
1.004	240 Winter	100	+40%	100/180 Winter				
1.005	240 Winter	100	+40%	100/120 Winter				
1.006	240 Winter	100	+40%	100/120 Winter				
1.007	240 Winter	100	+40%	100/120 Winter				
1.008	240 Winter	100	+40%	100/120 Winter				
1.009	240 Winter	100	+40%	100/120 Winter				
4.000	15 Winter	100	+40%					
4.001	15 Winter	100	+40%					
4.002	15 Winter	100	+40%					
4.003	15 Winter	100	+40%	100/15 Summer				
5.000	15 Winter	100	+40%					
5.001	15 Winter	100	+40%	100/15 Summer				
4.004	240 Winter	100	+40%	100/120 Winter				
1.010	240 Winter	100	+40%	100/15 Summer				

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

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S36	193.132	-0.050	0.000	0.76	0.0	22.9	OK
2.000	S37	192.444	-0.114	0.000	0.13	0.0	4.9	OK
1.001	S38	192.086	0.268	0.000	1.00	0.0	40.1	SURCHARGED
1.002	S39	189.527	0.324	0.000	0.96	0.0	44.1	SURCHARGED
3.000	S40	188.932	-0.104	0.000	0.21	0.0	7.6	OK
1.003	S41	188.177	0.605	0.000	1.09	0.0	74.5	SURCHARGED
1.004	S42	184.128	0.118	0.000	0.02	0.0	20.0	SURCHARGED
1.005	S43	184.128	0.160	0.000	0.01	0.0	18.3	SURCHARGED
1.006	S44	184.128	0.271	0.000	0.00	0.0	8.8	SURCHARGED
1.007	S45	184.128	0.321	0.000	0.01	0.0	10.9	SURCHARGED
1.008	S46	184.128	0.366	0.000	0.01	0.0	12.5	SURCHARGED
1.009	S47	184.128	0.412	0.000	0.01	0.0	13.4	SURCHARGED
4.000	S48	192.492	-0.112	0.000	0.14	0.0	6.0	OK
4.001	S49	191.470	-0.085	0.000	0.38	0.0	15.2	OK
4.002	S50	190.682	-0.083	0.000	0.40	0.0	15.1	OK
4.003	S51	190.421	0.337	0.000	1.03	0.0	70.3	SURCHARGED
5.000	S52	189.835	-0.061	0.000	0.66	0.0	27.1	OK
5.001	S53	189.130	0.815	0.000	1.08	0.0	68.2	SURCHARGED
4.004	S54	184.128	0.362	0.000	0.02	0.0	37.9	SURCHARGED
1.010	S55	184.128	1.566	0.000	0.20	0.0	16.8	SURCHARGED