

Woods Hardwick		Page 1
15-17 Goldington Road Bedford MK40 3NH	SWS Net 1 17748 Yapton Road Barnham	
Date 03/04/2020 09:54 File SWS BARNHAM 31072019 test.MDX	Designed by c.smith Checked by	
Micro Drainage	Network 2018.1.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	7.249	0.072	100.7	0.027	6.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	4.810	0.054	89.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	8.832	0.088	100.4	0.038	6.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	12.200	0.128	95.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	45.400	0.184	246.7	0.017	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	8.814	0.088	100.2	0.116	6.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	7.104	0.071	100.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	41.039	0.171	240.0	0.036	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	6.964	0.070	99.5	0.080	6.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	6.700	0.155	43.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	32.806	0.134	244.8	0.042	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	6.272	0.063	99.6	0.025	6.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	4.928	0.095	51.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.002	12.000	0.074	162.2	0.011	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	10.462	0.033	317.0	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)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.12	8.056	0.027	0.0	0.0	0.0	1.00	17.7	3.7
1.001	50.00	6.20	7.984	0.027	0.0	0.0	0.0	1.07	18.8	3.7
2.000	50.00	6.15	8.146	0.038	0.0	0.0	0.0	1.00	17.7	5.1
2.001	50.00	6.34	8.058	0.038	0.0	0.0	0.0	1.03	18.2	5.1
1.002	47.05	7.10	7.780	0.082	0.0	0.0	0.0	1.00	70.4	10.4
3.000	50.00	6.15	7.905	0.116	0.0	0.0	0.0	1.00	17.7	15.7
3.001	50.00	6.26	7.817	0.116	0.0	0.0	0.0	1.00	17.8	15.7
1.003	44.50	7.78	7.596	0.234	0.0	0.0	0.0	1.01	71.4	28.2
4.000	50.00	6.12	7.800	0.080	0.0	0.0	0.0	1.01	17.8	10.8
4.001	50.00	6.19	7.730	0.080	0.0	0.0	0.0	1.53	27.1	10.8
1.004	42.68	8.33	7.425	0.356	0.0	0.0	0.0	1.00	70.7	41.1
5.000	50.00	6.10	7.673	0.025	0.0	0.0	0.0	1.01	17.8	3.4
5.001	50.00	6.16	7.610	0.025	0.0	0.0	0.0	1.40	24.7	3.4
5.002	50.00	6.36	7.440	0.036	0.0	0.0	0.0	1.02	40.7	4.9
1.005	42.14	8.50	7.216	0.392	0.0	0.0	0.0	1.01	111.8	44.7

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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
6.000	5.288	0.053	99.8	0.054	6.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	7.275	0.072	101.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.002	28.500	0.117	243.6	0.021	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.000	8.164	0.082	99.6	0.027	6.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	6.467	0.065	99.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	30.532	0.075	407.1	0.016	0.00	0.0	0.600	o	450	Pipe/Conduit	
8.000	20.088	0.057	352.4	0.000	6.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	3.548	0.033	107.0	0.032	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)
6.000	50.00	6.09	7.650	0.054	0.0	0.0	0.0	1.01	17.8	7.3
6.001	50.00	6.21	7.597	0.054	0.0	0.0	0.0	1.00	17.7	7.3
6.002	48.85	6.68	7.375	0.075	0.0	0.0	0.0	1.00	70.9	9.9
7.000	50.00	6.14	7.555	0.027	0.0	0.0	0.0	1.01	17.8	3.7
7.001	50.00	6.24	7.473	0.027	0.0	0.0	0.0	1.01	17.8	3.7
1.006	40.67	9.01	7.108	0.510	0.0	0.0	0.0	1.00	159.3	56.2
8.000	50.00	6.31	7.090	0.000	0.0	0.0	0.0	1.08	171.3	0.0
1.007	50.00	6.06	7.033	0.000	5.0	0.0	0.0	0.97	17.2	5.0

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN	Invert Level (m)	Diameter (mm)	Pipes In PN	Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	8.900	0.844	Open Manhole	600	1.000	8.056	150				
2	8.900	0.916	Open Manhole	600	1.001	7.984	150	1.000	7.984	150	
10	8.750	0.604	Open Manhole	600	2.000	8.146	150				
11	8.750	0.692	Open Manhole	600	2.001	8.058	150	2.000	8.058	150	
3	9.088	1.308	Open Manhole	1200	1.002	7.780	300	1.001	7.930	150	
								2.001	7.930	150	
20	8.900	0.995	Open Manhole	600	3.000	7.905	150				
21	8.900	1.083	Open Manhole	600	3.001	7.817	150	3.000	7.817	150	
4	8.898	1.302	Open Manhole	1500	1.003	7.596	300	1.002	7.596	300	
								3.001	7.746	150	
9	8.850	1.050	Open Manhole	1200	4.000	7.800	150				
10	8.850	1.120	Open Manhole	1200	4.001	7.730	150	4.000	7.730	150	
5	8.736	1.311	Open Manhole	1500	1.004	7.425	300	1.003	7.425	300	
								4.001	7.575	150	
30	8.400	0.727	Open Manhole	600	5.000	7.673	150				
31	8.400	0.790	Open Manhole	600	5.001	7.610	150	5.000	7.610	150	
32	8.612	1.172	Open Manhole	1200	5.002	7.440	225	5.001	7.515	150	
6	8.790	1.574	Open Manhole	1500	1.005	7.216	375	1.004	7.291	300	
								5.002	7.366	225	
40	8.600	0.950	Open Manhole	600	6.000	7.650	150				
41	8.600	1.003	Open Manhole	600	6.001	7.597	150	6.000	7.597	150	
42	8.577	1.202	Open Manhole	1500	6.002	7.375	300	6.001	7.525	150	
50	8.400	0.845	Open Manhole	600	7.000	7.555	150				
51	8.400	0.927	Open Manhole	600	7.001	7.473	150	7.000	7.473	150	
7	8.641	1.533	Open Manhole	1800	1.006	7.108	450	1.005	7.183	375	
								6.002	7.258	300	
								7.001	7.408	150	
8A	8.250	1.160	Open Manhole	1500	8.000	7.090	450				
8	8.250	1.217	Open Manhole	1800	1.007	7.033	150	1.006	7.033	450	
								8.000	7.033	450	
	7.820	0.820	Open Manhole	0		OUTFALL		1.007	7.000	150	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
1.000	o	150	1	8.900	8.056	0.694	Open Manhole		600
1.001	o	150	2	8.900	7.984	0.766	Open Manhole		600
2.000	o	150	10	8.750	8.146	0.454	Open Manhole		600
2.001	o	150	11	8.750	8.058	0.542	Open Manhole		600
1.002	o	300	3	9.088	7.780	1.008	Open Manhole		1200
3.000	o	150	20	8.900	7.905	0.845	Open Manhole		600
3.001	o	150	21	8.900	7.817	0.933	Open Manhole		600
1.003	o	300	4	8.898	7.596	1.002	Open Manhole		1500
4.000	o	150	9	8.850	7.800	0.900	Open Manhole		1200
4.001	o	150	10	8.850	7.730	0.970	Open Manhole		1200
1.004	o	300	5	8.736	7.425	1.011	Open Manhole		1500
5.000	o	150	30	8.400	7.673	0.577	Open Manhole		600
5.001	o	150	31	8.400	7.610	0.640	Open Manhole		600
5.002	o	225	32	8.612	7.440	0.947	Open Manhole		1200
1.005	o	375	6	8.790	7.216	1.199	Open Manhole		1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
1.000	7.249	100.7	2	8.900	7.984	0.766	Open Manhole		600
1.001	4.810	89.1	3	9.088	7.930	1.008	Open Manhole		1200
2.000	8.832	100.4	11	8.750	8.058	0.542	Open Manhole		600
2.001	12.200	95.3	3	9.088	7.930	1.008	Open Manhole		1200
1.002	45.400	246.7	4	8.898	7.596	1.002	Open Manhole		1500
3.000	8.814	100.2	21	8.900	7.817	0.933	Open Manhole		600
3.001	7.104	100.1	4	8.898	7.746	1.002	Open Manhole		1500
1.003	41.039	240.0	5	8.736	7.425	1.011	Open Manhole		1500
4.000	6.964	99.5	10	8.850	7.730	0.970	Open Manhole		1200
4.001	6.700	43.2	5	8.736	7.575	1.011	Open Manhole		1500
1.004	32.806	244.8	6	8.790	7.291	1.199	Open Manhole		1500
5.000	6.272	99.6	31	8.400	7.610	0.640	Open Manhole		600
5.001	4.928	51.9	32	8.612	7.515	0.947	Open Manhole		1200
5.002	12.000	162.2	6	8.790	7.366	1.199	Open Manhole		1500
1.005	10.462	317.0	7	8.641	7.183	1.083	Open Manhole		1800

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.000	o	150	40	8.600	7.650	0.800	Open Manhole	600
6.001	o	150	41	8.600	7.597	0.853	Open Manhole	600
6.002	o	300	42	8.577	7.375	0.902	Open Manhole	1500
7.000	o	150	50	8.400	7.555	0.695	Open Manhole	600
7.001	o	150	51	8.400	7.473	0.777	Open Manhole	600
1.006	o	450	7	8.641	7.108	1.083	Open Manhole	1800
8.000	o	450	8A	8.250	7.090	0.710	Open Manhole	1500
1.007	o	150	8	8.250	7.033	1.067	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.000	5.288	99.8	41	8.600	7.597	0.853	Open Manhole	600
6.001	7.275	101.0	42	8.577	7.525	0.902	Open Manhole	1500
6.002	28.500	243.6	7	8.641	7.258	1.083	Open Manhole	1800
7.000	8.164	99.6	51	8.400	7.473	0.777	Open Manhole	600
7.001	6.467	99.5	7	8.641	7.408	1.083	Open Manhole	1800
1.006	30.532	407.1	8	8.250	7.033	0.767	Open Manhole	1800
8.000	20.088	352.4	8	8.250	7.033	0.767	Open Manhole	1800
1.007	3.548	107.0		7.820	7.000	0.670	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
1.007		7.820	7.000	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	1.000
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 7 Number of Storage Structures 8 Number of Real Time Controls 0

Synthetic Rainfall Details

Synthetic Rainfall Details

Rainfall Model	FEH	E (1km)	0.308
Return Period (years)	2	F (1km)	2.327
FEH Rainfall Version	1999	Summer Storms	Yes
Site Location	GB 495800 104050 SU 95800 04050	Winter Storms	No
C (1km)	-0.025	Cv (Summer)	0.750
D1 (1km)	0.403	Cv (Winter)	0.840
D2 (1km)	0.246	Storm Duration (mins)	30
D3 (1km)	0.396		

Online Controls for Storm

Orifice Manhole: 2, DS/PN: 1.001, Volume (m³): 0.4

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.984

Orifice Manhole: 11, DS/PN: 2.001, Volume (m³): 0.3

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 8.058

Orifice Manhole: 10, DS/PN: 4.001, Volume (m³): 1.4

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 7.730

Orifice Manhole: 31, DS/PN: 5.001, Volume (m³): 0.3

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.610

Orifice Manhole: 41, DS/PN: 6.001, Volume (m³): 0.4

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.597

Orifice Manhole: 51, DS/PN: 7.001, Volume (m³): 0.4

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.473

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.007, Volume (m³): 10.6

Unit Reference	MD-SHE-0103-5000-1200-5000
Design Head (m)	1.200
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	103
Invert Level (m)	7.033
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	5.0	Kick-Flo®	0.745	4.0
Flush-Flo™	0.354	5.0	Mean Flow over Head Range	-	4.4

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.4	0.800	4.1	2.000	6.3	4.000	8.8	7.000	11.5
0.200	4.7	1.000	4.6	2.200	6.6	4.500	9.3	7.500	11.8
0.300	5.0	1.200	5.0	2.400	6.9	5.000	9.8	8.000	12.2
0.400	5.0	1.400	5.4	2.600	7.2	5.500	10.2	8.500	12.6
0.500	4.9	1.600	5.7	3.000	7.7	6.000	10.7	9.000	12.9
0.600	4.7	1.800	6.0	3.500	8.3	6.500	11.1	9.500	13.3

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Storage Structures for Storm

Porous Car Park Manhole: 2, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	12.5
Max Percolation (l/s)	34.7	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.984	Cap Volume Depth (m)	0.430

Porous Car Park Manhole: 11, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	25.0
Membrane Percolation (mm/hr)	1000	Length (m)	8.0
Max Percolation (l/s)	55.6	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.058	Cap Volume Depth (m)	0.450

Porous Car Park Manhole: 21, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	111.1	Slope (1:X)	250.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.925	Cap Volume Depth (m)	0.540

Porous Car Park Manhole: 10, DS/PN: 4.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	24.0
Max Percolation (l/s)	40.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.730	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: 31, DS/PN: 5.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.5
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	52.8	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.610	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: 41, DS/PN: 6.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	50.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.596	Cap Volume Depth (m)	0.600

Porous Car Park Manhole: 51, DS/PN: 7.001 Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.0 Membrane Percolation (mm/hr) 1000 Length (m) 20.0 Max Percolation (l/s) 27.8 Slope (1:X) 100.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 7.473 Cap Volume Depth (m) 0.400																	
Complex Manhole: 8, DS/PN: 1.007																	
Porous Car Park Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 3.0 Membrane Percolation (mm/hr) 1000 Length (m) 12.0 Max Percolation (l/s) 10.0 Slope (1:X) 200.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 7.033 Cap Volume Depth (m) 0.450																	
Tank or Pond Invert Level (m) 7.120 <table> <tr> <th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr> <tr> <td>0.000</td><td>95.0</td><td>1.130</td><td>248.2</td><td>1.132</td><td>248.6</td></tr> </table>						Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	95.0	1.130	248.2	1.132	248.6
Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)												
0.000	95.0	1.130	248.2	1.132	248.6												

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 1.000
 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 7 Number of Storage Structures 8 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.396
 FEH Rainfall Version 1999 E (1km) 0.308
 Site Location GB 495800 104050 SU 95800 04050 F (1km) 2.327
 C (1km) -0.025 Cv (Summer) 0.750
 D1 (1km) 0.403 Cv (Winter) 0.840
 D2 (1km) 0.246

Margin for Flood Risk Warning (mm) 450.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

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

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m ³)
1.000	1	15 Winter	1	+0%	100/15 Summer				8.098	-0.108	0.000
1.001	2	30 Winter	1	+0%	100/15 Summer				8.056	-0.078	0.000
2.000	10	15 Winter	1	+0%	100/15 Summer				8.195	-0.101	0.000
2.001	11	60 Winter	1	+0%	100/15 Summer				8.123	-0.085	0.000
1.002	3	30 Winter	1	+0%	100/120 Winter				7.821	-0.259	0.000
3.000	20	15 Winter	1	+0%	30/15 Summer	100/15 Summer			8.000	-0.055	0.000
3.001	21	15 Winter	1	+0%	30/15 Summer				7.914	-0.053	0.000
1.003	4	15 Winter	1	+0%	100/15 Winter				7.699	-0.197	0.000
4.000	9	15 Winter	1	+0%	30/15 Summer				7.876	-0.074	0.000
4.001	10	15 Winter	1	+0%	30/15 Summer				7.853	-0.027	0.000
1.004	5	15 Winter	1	+0%	30/120 Winter				7.553	-0.172	0.000
5.000	30	15 Winter	1	+0%	100/15 Summer				7.713	-0.110	0.000
5.001	31	30 Winter	1	+0%	30/240 Winter				7.679	-0.081	0.000
5.002	32	15 Winter	1	+0%	30/60 Winter				7.473	-0.192	0.000
1.005	6	15 Winter	1	+0%	30/30 Winter				7.362	-0.229	0.000
6.000	40	30 Winter	1	+0%	30/15 Summer				7.716	-0.084	0.000
6.001	41	30 Winter	1	+0%	30/15 Summer				7.712	-0.035	0.000
6.002	42	15 Winter	1	+0%	30/60 Winter				7.417	-0.258	0.000
7.000	50	15 Winter	1	+0%	30/120 Winter				7.596	-0.109	0.000
7.001	51	15 Winter	1	+0%	30/15 Summer				7.561	-0.062	0.000
1.006	7	240 Winter	1	+0%	30/30 Winter				7.345	-0.213	0.000
8.000	8A	240 Winter	1	+0%	30/30 Winter				7.343	-0.197	0.000
1.007	8	240 Winter	1	+0%	1/15 Summer				7.343	0.160	0.000

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

				Pipe		
US/MH Flow / Overflow				Flow	Level	
PN	Name	Cap.	(l/s)	(l/s)	Status	Exceeded
1.000	1	0.17		2.6	OK	
1.001	2	0.08		1.1	OK	
2.000	10	0.24		3.7	OK	
2.001	11	0.06		1.0	OK	
1.002	3	0.05		3.0	OK	
3.000	20	0.73		11.3	OK	2
3.001	21	0.75		11.3	OK	
1.003	4	0.25		16.8	OK	
4.000	9	0.51		7.8	OK	
4.001	10	0.22		5.1	OK	
1.004	5	0.38		24.3	OK	
5.000	30	0.16		2.4	OK	
5.001	31	0.06		1.1	OK	
5.002	32	0.05		1.8	OK	
1.005	6	0.32		25.9	OK	
6.000	40	0.30		4.4	OK	
6.001	41	0.10		1.6	OK	
6.002	42	0.05		3.1	OK	
7.000	50	0.17		2.6	OK	
7.001	51	0.09		1.3	OK	
1.006	7	0.09		12.5	OK	
8.000	8A	0.00		0.2	OK	
1.007	8	0.44		5.0	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 1.000
 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 7 Number of Storage Structures 8 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.396
 FEH Rainfall Version 1999 E (1km) 0.308
 Site Location GB 495800 104050 SU 95800 04050 F (1km) 2.327
 C (1km) -0.025 Cv (Summer) 0.750
 D1 (1km) 0.403 Cv (Winter) 0.840
 D2 (1km) 0.246

Margin for Flood Risk Warning (mm) 450.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

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

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	1	30 Winter	30	+0%	100/15 Summer				8.136	-0.070	0.000
1.001	2	30 Winter	30	+0%	100/15 Summer				8.130	-0.004	0.000
2.000	10	15 Winter	30	+0%	100/15 Summer				8.244	-0.052	0.000
2.001	11	60 Winter	30	+0%	100/15 Summer				8.192	-0.016	0.000
1.002	3	15 Winter	30	+0%	100/120 Winter				7.852	-0.228	0.000
3.000	20	15 Winter	30	+0%	30/15 Summer	100/15 Summer			8.447	0.392	0.000
3.001	21	15 Winter	30	+0%	30/15 Summer				8.010	0.043	0.000
1.003	4	360 Winter	30	+0%	100/15 Winter				7.825	-0.071	0.000
4.000	9	15 Winter	30	+0%	30/15 Summer				8.122	0.172	0.000
4.001	10	15 Winter	30	+0%	30/15 Summer				7.995	0.115	0.000
1.004	5	360 Winter	30	+0%	30/120 Winter				7.822	0.097	0.000
5.000	30	360 Winter	30	+0%	100/15 Summer				7.818	-0.005	0.000
5.001	31	360 Winter	30	+0%	30/240 Winter				7.818	0.058	0.000
5.002	32	360 Winter	30	+0%	30/60 Winter				7.818	0.153	0.000
1.005	6	360 Winter	30	+0%	30/30 Winter				7.818	0.227	0.000
6.000	40	15 Winter	30	+0%	30/15 Summer				7.845	0.045	0.000
6.001	41	360 Winter	30	+0%	30/15 Summer				7.838	0.091	0.000
6.002	42	360 Winter	30	+0%	30/60 Winter				7.817	0.142	0.000
7.000	50	360 Winter	30	+0%	30/120 Winter				7.826	0.121	0.000
7.001	51	360 Winter	30	+0%	30/15 Summer				7.826	0.203	0.000
1.006	7	360 Winter	30	+0%	30/30 Winter				7.817	0.259	0.000
8.000	8A	360 Winter	30	+0%	30/30 Winter				7.815	0.275	0.000
1.007	8	360 Winter	30	+0%	1/15 Summer				7.815	0.632	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.43		6.6	OK	
1.001	2	0.12		1.8	OK	
2.000	10	0.76		11.8	OK	
2.001	11	0.10		1.7	OK	
1.002	3	0.12		8.2	OK	
3.000	20	2.24		34.9	SURCHARGED	2
3.001	21	1.31		19.8	SURCHARGED	
1.003	4	0.17		11.0	OK	
4.000	9	1.57		23.8	SURCHARGED	
4.001	10	0.42		9.7	SURCHARGED	
1.004	5	0.26		17.1	SURCHARGED	
5.000	30	0.08		1.3	OK	
5.001	31	0.06		1.2	SURCHARGED	
5.002	32	0.05		1.7	SURCHARGED	
1.005	6	0.23		18.8	SURCHARGED	
6.000	40	1.14		16.4	SURCHARGED	
6.001	41	0.13		1.9	SURCHARGED	
6.002	42	0.05		2.9	SURCHARGED	
7.000	50	0.09		1.3	SURCHARGED	
7.001	51	0.08		1.2	SURCHARGED	
1.006	7	0.16		22.6	SURCHARGED	
8.000	8A	0.00		0.1	FLOOD RISK	
1.007	8	0.44		5.0	FLOOD RISK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 1.000
 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 7 Number of Storage Structures 8 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.396
 FEH Rainfall Version 1999 E (1km) 0.308
 Site Location GB 495800 104050 SU 95800 04050 F (1km) 2.327
 C (1km) -0.025 Cv (Summer) 0.750
 D1 (1km) 0.403 Cv (Winter) 0.840
 D2 (1km) 0.246

Margin for Flood Risk Warning (mm) 450.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

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

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	1	15 Winter	100	+30%	100/15 Summer				8.247	0.041	0.000
1.001	2	60 Winter	100	+30%	100/15 Summer				8.233	0.099	0.000
2.000	10	15 Winter	100	+30%	100/15 Summer				8.400	0.104	0.000
2.001	11	60 Winter	100	+30%	100/15 Summer				8.294	0.086	0.000
1.002	3	480 Winter	100	+30%	100/120 Winter				8.196	0.116	0.000
3.000	20	15 Winter	100	+30%	30/15 Summer	100/15 Summer			8.904	0.849	4.235
3.001	21	480 Winter	100	+30%	30/15 Summer				8.197	0.230	0.000
1.003	4	480 Winter	100	+30%	100/15 Winter				8.194	0.298	0.000
4.000	9	15 Winter	100	+30%	30/15 Summer				8.722	0.772	0.000
4.001	10	15 Winter	100	+30%	30/15 Summer				8.216	0.336	0.000
1.004	5	480 Winter	100	+30%	30/120 Winter				8.191	0.466	0.000
5.000	30	480 Winter	100	+30%	100/15 Summer				8.206	0.383	0.000
5.001	31	480 Winter	100	+30%	30/240 Winter				8.207	0.447	0.000
5.002	32	480 Winter	100	+30%	30/60 Winter				8.188	0.523	0.000
1.005	6	480 Winter	100	+30%	30/30 Winter				8.187	0.596	0.000
6.000	40	480 Winter	100	+30%	30/15 Summer				8.215	0.415	0.000
6.001	41	480 Winter	100	+30%	30/15 Summer				8.214	0.467	0.000
6.002	42	480 Winter	100	+30%	30/60 Winter				8.186	0.511	0.000
7.000	50	480 Winter	100	+30%	30/120 Winter				8.206	0.501	0.000
7.001	51	480 Winter	100	+30%	30/15 Summer				8.204	0.581	0.000
1.006	7	480 Winter	100	+30%	30/30 Winter				8.186	0.628	0.000
8.000	8A	480 Winter	100	+30%	30/30 Winter				8.183	0.643	0.000
1.007	8	480 Winter	100	+30%	1/15 Summer				8.183	1.000	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	1.07		16.3	SURCHARGED	
1.001	2	0.17		2.4	SURCHARGED	
2.000	10	1.50		23.3	FLOOD RISK	
2.001	11	0.15		2.4	SURCHARGED	
1.002	3	0.07		4.5	SURCHARGED	
3.000	20	3.18		49.6	FLOOD	2
3.001	21	0.56		8.5	SURCHARGED	
1.003	4	0.23		15.1	SURCHARGED	
4.000	9	3.01		45.7	FLOOD RISK	
4.001	10	0.60		13.8	SURCHARGED	
1.004	5	0.32		20.6	SURCHARGED	
5.000	30	0.12		1.8	FLOOD RISK	
5.001	31	0.06		1.2	FLOOD RISK	
5.002	32	0.05		1.8	FLOOD RISK	
1.005	6	0.26		20.9	SURCHARGED	
6.000	40	0.27		3.9	FLOOD RISK	
6.001	41	0.12		1.9	FLOOD RISK	
6.002	42	0.05		3.0	FLOOD RISK	
7.000	50	0.12		1.9	FLOOD RISK	
7.001	51	0.10		1.4	FLOOD RISK	
1.006	7	0.17		24.0	SURCHARGED	
8.000	8A	0.00		0.1	FLOOD RISK	
1.007	8	0.44		5.0	FLOOD RISK	