

Woods Hardwick		Page 1
15-17 Goldington Road	SWS Net 1	
Bedford	17748 Yapton Road	
MK40 3NH	Barnham	
Date 06/08/2020 17:03	Designed by C.Smith	
File SWS BARNHAM 160720 test.MDX	Checked by	
Micro Drainage	Network 2018.1.1	

<p align="center"><u>STORM SEWER DESIGN by the Modified Rational Method</u></p> <p align="center"><u>Design Criteria for Storm</u></p> <p align="center">Pipe Sizes Network Manhole Sizes Standard</p> <p align="center">FEH Rainfall Model</p> <div> <div>Return Period (years)</div> <div>2</div> </div> <div> <div>FEH Rainfall Version</div> <div>1999</div> </div> <div> <div>Site Location GB 495800 104050 SU 95800 04050</div> <div> <div>C (1km)</div> <div>-0.025</div> </div> <div> <div>D1 (1km)</div> <div>0.403</div> </div> <div> <div>D2 (1km)</div> <div>0.246</div> </div> <div> <div>D3 (1km)</div> <div>0.396</div> </div> <div> <div>E (1km)</div> <div>0.308</div> </div> <div> <div>F (1km)</div> <div>2.327</div> </div> </div> <div> <div>Maximum Rainfall (mm/hr)</div> <div>50</div> </div> <div> <div>Maximum Time of Concentration (mins)</div> <div>30</div> </div> <div> <div>Foul Sewage (l/s/ha)</div> <div>0.000</div> </div> <div> <div>Volumetric Runoff Coeff.</div> <div>0.750</div> </div> <div> <div>PIMP (%)</div> <div>100</div> </div> <div> <div>Add Flow / Climate Change (%)</div> <div>0</div> </div> <div> <div>Minimum Backdrop Height (m)</div> <div>0.200</div> </div> <div> <div>Maximum Backdrop Height (m)</div> <div>1.500</div> </div> <div> <div>Min Design Depth for Optimisation (m)</div> <div>1.200</div> </div> <div> <div>Min Vel for Auto Design only (m/s)</div> <div>1.00</div> </div> <div> <div>Min Slope for Optimisation (1:X)</div> <div>500</div> </div>
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Designed with Level Soffits

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	0.075	96.7	0.027	6.00	0.0	0.600	o	150	Pipe/Conduit		
1.001	4.810	0.048	100.0	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	0.122	100.0	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	5.000	0.100	50.0	0.052	6.00	0.0	0.600	o	150	Pipe/Conduit		
3.001	6.000	0.254	23.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		

Network Results Table											
PN	Rain (mm/hr)	T.C. (mins)	US/IL E (m)	I.Area (ha)	E 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	8.053	0.027	0.0	0.0	0.0	1.02	18.1	3.7	
1.001	50.00	6.20	7.978	0.027	0.0	0.0	0.0	1.00	17.8	3.7	
2.000	50.00	6.15	8.140	0.038	0.0	0.0	0.0	1.00	17.7	5.1	
2.001	50.00	6.35	8.052	0.038	0.0	0.0	0.0	1.00	17.8	5.1	
1.002	47.03	7.11	7.780	0.082	0.0	0.0	0.0	1.00	70.4	10.4	
3.000	50.00	6.06	8.100	0.052	0.0	0.0	0.0	1.43	25.2	7.0	
3.001	50.00	6.10	7.925	0.052	0.0	0.0	0.0	2.70	107.5	7.0	

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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
4.000	3.000	0.025	120.0	0.066	6.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	7.000	0.104	67.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	41.039	0.171	240.0	0.036	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	10.000	0.215	46.5	0.047	6.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	6.700	0.350	19.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.000	5.000	0.335	14.9	0.027	6.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	3.000	0.165	18.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	32.806	0.134	244.8	0.049	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.000	6.272	0.175	35.8	0.024	6.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	4.928	0.110	44.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.002	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	
8.000	5.288	0.053	99.8	0.051	6.00	0.0	0.600	o	150	Pipe/Conduit	
8.001	7.275	0.072	101.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.002	28.500	0.117	243.6	0.027	0.00	0.0	0.600	o	300	Pipe/Conduit	
9.000	3.000	0.082	36.6	0.027	6.00	0.0	0.600	o	150	Pipe/Conduit	
9.001	3.000	0.085	35.3	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	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	50.00	6.05	7.875	0.066	0.0	0.0	0.0	0.92	16.2	8.9
4.001	50.00	6.13	7.775	0.066	0.0	0.0	0.0	1.60	63.5	8.9
1.003	44.48	7.79	7.596	0.236	0.0	0.0	0.0	1.01	71.4	28.4
5.000	50.00	6.11	8.140	0.047	0.0	0.0	0.0	1.48	26.1	6.4
5.001	50.00	6.16	7.925	0.047	0.0	0.0	0.0	2.31	40.9	6.4
6.000	50.00	6.03	8.075	0.027	0.0	0.0	0.0	2.62	46.3	3.7
6.001	50.00	6.05	7.740	0.027	0.0	0.0	0.0	2.37	41.9	3.7
1.004	42.66	8.33	7.425	0.359	0.0	0.0	0.0	1.00	70.7	41.5
7.000	50.00	6.06	7.800	0.024	0.0	0.0	0.0	1.69	29.8	3.2
7.001	50.00	6.10	7.550	0.024	0.0	0.0	0.0	1.96	77.9	3.2
7.002	50.00	6.30	7.440	0.035	0.0	0.0	0.0	1.02	40.7	4.7
1.005	42.13	8.50	7.216	0.394	0.0	0.0	0.0	1.01	111.8	45.0
8.000	50.00	6.09	7.650	0.051	0.0	0.0	0.0	1.01	17.8	6.9
8.001	50.00	6.18	7.522	0.051	0.0	0.0	0.0	1.30	51.7	6.9
8.002	48.98	6.65	7.375	0.078	0.0	0.0	0.0	1.00	70.9	10.3
9.000	50.00	6.03	7.575	0.027	0.0	0.0	0.0	1.67	29.5	3.7
9.001	50.00	6.06	7.493	0.027	0.0	0.0	0.0	1.70	30.0	3.7
1.006	40.65	9.01	7.108	0.515	0.0	0.0	0.0	1.00	159.3	56.7

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
10.000	20.088	0.057	352.4	0.024	6.00	0.0	0.600	o	450	Pipe/Conduit	
11.000	11.000	0.115	95.7	0.000	6.00	0.0	0.600	o	150	Pipe/Conduit	
11.001	3.600	0.052	69.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	3.548	0.033	107.5	0.034	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)
10.000	50.00	6.31	7.090	0.024	0.0	0.0	0.0	1.08	171.3	3.2
11.000	50.00	6.18	7.500	0.000	0.0	0.0	0.0	1.03	18.2	0.0
11.001	50.00	6.23	7.385	0.000	0.0	0.0	0.0	1.21	21.4	0.0
1.007	50.00	6.06	7.033	0.000	5.0	0.0	0.0	0.97	17.1	5.0

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 Online Controls	10	Number of Time/Area Diagrams	0
		Number of Storage Structures	10
		Number of Real Time Controls	0

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		

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Online Controls for Storm

Orifice Manhole: 3B, DS/PN: 1.001, Volume (m³): 0.3

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.978

Orifice Manhole: 3D, DS/PN: 2.001, Volume (m³): 0.3

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 8.052

Orifice Manhole: 4B, DS/PN: 3.001, Volume (m³): 0.4

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.925

Orifice Manhole: 4D, DS/PN: 4.001, Volume (m³): 1.4

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.775

Orifice Manhole: 10B, DS/PN: 5.001, Volume (m³): 1.2

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.925

Orifice Manhole: 10D, DS/PN: 6.001, Volume (m³): 1.2

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.740

Orifice Manhole: 32B, DS/PN: 7.001, Volume (m³): 0.4

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.550

Orifice Manhole: 42B, DS/PN: 8.001, Volume (m³): 0.4

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.522

Orifice Manhole: 7B, DS/PN: 9.001, Volume (m³): 0.3

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 7.493

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

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

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

Complex Manhole: 3B, DS/PN: 1.001

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	15.0
Max Percolation (l/s)	20.8	Slope (1:X)	70.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.053	Cap Volume Depth (m)	0.400

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	11.0
Max Percolation (l/s)	9.2	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.250	Cap Volume Depth (m)	0.420

Complex Manhole: 3D, DS/PN: 2.001

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.8
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	32.2	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.140	Cap Volume Depth (m)	0.365

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.8
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	16.1	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.250	Cap Volume Depth (m)	0.390

Complex Manhole: 4B, DS/PN: 3.001

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	12.5
Max Percolation (l/s)	20.8	Slope (1:X)	48.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.100	Cap Volume Depth (m)	0.315

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Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	12.5
Max Percolation (l/s)	20.8	Slope (1:X)	90.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.125	Cap Volume Depth (m)	0.390

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	13.5
Max Percolation (l/s)	11.3	Slope (1:X)	250.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.300	Cap Volume Depth (m)	0.315

Complex Manhole: 4D, DS/PN: 4.001

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.5
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	25.0	Slope (1:X)	250.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.875	Cap Volume Depth (m)	0.790

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	11.0
Max Percolation (l/s)	9.2	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.875	Cap Volume Depth (m)	0.790

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	16.7	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.950	Cap Volume Depth (m)	0.715

Complex Manhole: 10B, DS/PN: 5.001

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	12.0
Max Percolation (l/s)	20.0	Slope (1:X)	140.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.980	Cap Volume Depth (m)	0.490

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Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.0
Membrane Percolation (mm/hr)	1000	Length (m)	12.0
Max Percolation (l/s)	20.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.140	Cap Volume Depth (m)	0.325

Complex Manhole: 10D, DS/PN: 6.001

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)	120.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.075	Cap Volume Depth (m)	0.390

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.5
Membrane Percolation (mm/hr)	1000	Length (m)	9.0
Max Percolation (l/s)	16.3	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.075	Cap Volume Depth (m)	0.365

Complex Manhole: 32B, DS/PN: 7.001

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.3
Membrane Percolation (mm/hr)	1000	Length (m)	8.0
Max Percolation (l/s)	9.6	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.635	Cap Volume Depth (m)	0.690

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	4.3
Max Percolation (l/s)	5.7	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.800	Cap Volume Depth (m)	0.565

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	14.0
Max Percolation (l/s)	11.7	Slope (1:X)	280.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.800	Cap Volume Depth (m)	0.590

Complex Manhole: 42B, DS/PN: 8.001

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.0
Membrane Percolation (mm/hr)	1000	Length (m)	14.0
Max Percolation (l/s)	35.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.650	Cap Volume Depth (m)	0.540

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	13.9	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.650	Cap Volume Depth (m)	0.640

Porous Car Park Manhole: 7B, DS/PN: 9.001

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)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	7.575	Cap Volume Depth (m)	0.450

Complex Manhole: 8, DS/PN: 1.007

Tank or Pond

Invert Level (m) 7.033

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	95.0	1.130	248.2	1.132	248.6

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)	7.500	Cap Volume Depth (m)	0.580

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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 Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	10	Number of Time/Area Diagrams	0
		Number of Storage Structures	10
		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	

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
1.000	3A	15 Winter	1	+0%	30/15 Summer				8.120	-0.083	0.000
1.001	3B	15 Winter	1	+0%	30/15 Summer				8.114	-0.014	0.000
2.000	3C	15 Winter	1	+0%	100/15 Summer				8.193	-0.097	0.000
2.001	3D	15 Winter	1	+0%	30/15 Summer				8.178	-0.024	0.000
1.002	3	15 Winter	1	+0%	100/120 Winter				7.832	-0.248	0.000
3.000	4A	15 Winter	1	+0%	30/15 Summer				8.195	-0.055	0.000
3.001	4B	15 Winter	1	+0%	1/15 Summer				8.188	0.038	0.000
4.000	4C	15 Winter	1	+0%	30/15 Summer				7.958	-0.067	0.000
4.001	4D	30 Winter	1	+0%	30/15 Summer				7.955	-0.045	0.000
1.003	4	15 Winter	1	+0%	100/60 Summer				7.682	-0.214	0.000
5.000	10A	15 Winter	1	+0%	100/15 Summer				8.185	-0.105	0.000
5.001	10B	15 Winter	1	+0%	30/15 Summer				8.067	-0.008	0.000
6.000	10C	15 Winter	1	+0%	100/15 Summer				8.101	-0.124	0.000
6.001	10D	15 Winter	1	+0%	1/15 Summer				7.948	0.058	0.000
1.004	5	15 Winter	1	+0%	30/120 Winter				7.537	-0.188	0.000
7.000	32A	15 Winter	1	+0%	100/60 Winter				7.831	-0.119	0.000
7.001	32B	15 Winter	1	+0%	30/15 Summer				7.684	-0.091	0.000
7.002	32	15 Winter	1	+0%	30/60 Winter				7.480	-0.185	0.000
1.005	6	240 Winter	1	+0%	30/60 Summer				7.363	-0.228	0.000
8.000	42A	15 Winter	1	+0%	30/15 Summer				7.721	-0.079	0.000
8.001	42B	15 Winter	1	+0%	30/15 Summer				7.715	-0.032	0.000
8.002	42	15 Winter	1	+0%	30/60 Winter				7.426	-0.249	0.000
9.000	7A	15 Winter	1	+0%	30/120 Winter				7.620	-0.105	0.000
9.001	7B	15 Winter	1	+0%	30/15 Summer				7.617	-0.026	0.000
1.006	7	240 Winter	1	+0%	30/30 Winter				7.362	-0.196	0.000
10.000	8A	240 Winter	1	+0%	30/30 Winter				7.360	-0.180	0.000
11.000	8B	60 Winter	1	+0%	30/60 Winter				7.500	-0.150	0.000
11.001	8C	60 Winter	1	+0%	30/30 Winter				7.385	-0.150	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	3A	0.16		2.5		OK
1.001	3B	0.13		1.7		OK
2.000	3C	0.24		3.7		OK
2.001	3D	0.10		1.7		OK
1.002	3	0.07		4.6		OK
3.000	4A	0.24		4.8		OK
3.001	4B	0.04		2.5	SURCHARGED	
4.000	4C	0.59		6.4		OK
4.001	4D	0.05		2.1		OK
1.003	4	0.18		11.9		OK
5.000	10A	0.20		4.6		OK
5.001	10B	0.05		1.8		OK
6.000	10C	0.07		2.6		OK
6.001	10D	0.09		2.2	SURCHARGED	
1.004	5	0.30		19.4		OK
7.000	32A	0.09		2.3		OK
7.001	32B	0.04		1.7		OK
7.002	32	0.07		2.6		OK
1.005	6	0.13		10.2		OK
8.000	42A	0.34		4.9		OK
8.001	42B	0.06		2.1		OK
8.002	42	0.07		4.4		OK
9.000	7A	0.14		2.6		OK
9.001	7B	0.09		1.6		OK
1.006	7	0.10		13.1		OK
10.000	8A	0.00		0.5		OK
11.000	8B	0.00		0.0		OK
11.001	8C	0.00		0.0		OK

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

US/MH		Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume	Flow /
PN	Name								(m)	(m)	(m³)	Cap.
1.007	8 240 Winter		1	+0%	1/15 Summer				7.360	0.177	0.000	0.44

US/MH		Pipe		Status	Level Exceeded
PN	Name	Overflow (l/s)	Flow (l/s)		
1.007	8		5.0	SURCHARGED	

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 Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	10	Number of Storage Structures	10
		Number of Time/Area Diagrams	0
		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

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
1.000	3A	15 Winter	30	+0%	30/15 Summer				8.262	0.059	0.000
1.001	3B	15 Winter	30	+0%	30/15 Summer				8.251	0.123	0.000
2.000	3C	15 Winter	30	+0%	100/15 Summer				8.285	-0.005	0.000
2.001	3D	30 Winter	30	+0%	30/15 Summer				8.267	0.065	0.000
1.002	3	15 Winter	30	+0%	100/120 Winter				7.858	-0.222	0.000
3.000	4A	15 Winter	30	+0%	30/15 Summer				8.346	0.096	0.000
3.001	4B	30 Winter	30	+0%	1/15 Summer				8.326	0.176	0.000
4.000	4C	15 Winter	30	+0%	30/15 Summer				8.118	0.093	0.000
4.001	4D	60 Winter	30	+0%	30/15 Summer				8.087	0.087	0.000
1.003	4	360 Winter	30	+0%	100/60 Summer				7.853	-0.043	0.000
5.000	10A	15 Winter	30	+0%	100/15 Summer				8.244	-0.046	0.000
5.001	10B	30 Winter	30	+0%	30/15 Summer				8.227	0.152	0.000
6.000	10C	15 Winter	30	+0%	100/15 Summer				8.165	-0.060	0.000
6.001	10D	15 Winter	30	+0%	1/15 Summer				8.156	0.266	0.000
1.004	5	360 Winter	30	+0%	30/120 Winter				7.850	0.125	0.000
7.000	32A	15 Winter	30	+0%	100/60 Winter				7.856	-0.094	0.000
7.001	32B	360 Winter	30	+0%	30/15 Summer				7.855	0.080	0.000
7.002	32	360 Winter	30	+0%	30/60 Winter				7.846	0.181	0.000
1.005	6	360 Winter	30	+0%	30/60 Summer				7.846	0.255	0.000
8.000	42A	480 Winter	30	+0%	30/15 Summer				7.862	0.062	0.000
8.001	42B	480 Winter	30	+0%	30/15 Summer				7.861	0.114	0.000
8.002	42	360 Winter	30	+0%	30/60 Winter				7.845	0.170	0.000
9.000	7A	480 Winter	30	+0%	30/120 Winter				7.852	0.127	0.000
9.001	7B	480 Winter	30	+0%	30/15 Summer				7.852	0.209	0.000
1.006	7	360 Winter	30	+0%	30/30 Winter				7.845	0.287	0.000
10.000	8A	360 Winter	30	+0%	30/30 Winter				7.843	0.303	0.000
11.000	8B	360 Winter	30	+0%	30/60 Winter				7.843	0.193	0.000
11.001	8C	360 Winter	30	+0%	30/30 Winter				7.843	0.308	0.000

30 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	3A	0.52		8.0	FLOOD RISK	
1.001	3B	0.19		2.6	FLOOD RISK	
2.000	3C	0.74		11.5	OK	
2.001	3D	0.14		2.3	SURCHARGED	
1.002	3	0.15		9.8	OK	
3.000	4A	0.79		15.7	SURCHARGED	
3.001	4B	0.05		3.2	SURCHARGED	
4.000	4C	1.85		20.1	SURCHARGED	
4.001	4D	0.06		2.8	SURCHARGED	
1.003	4	0.15		10.3	OK	
5.000	10A	0.62		14.4	OK	
5.001	10B	0.08		2.7	SURCHARGED	
6.000	10C	0.22		8.0	OK	
6.001	10D	0.13		3.3	SURCHARGED	
1.004	5	0.25		15.9	SURCHARGED	
7.000	32A	0.30		7.4	OK	
7.001	32B	0.02		1.2	SURCHARGED	
7.002	32	0.05		1.6	SURCHARGED	
1.005	6	0.22		17.5	SURCHARGED	
8.000	42A	0.15		2.1	SURCHARGED	
8.001	42B	0.05		1.9	SURCHARGED	
8.002	42	0.05		3.3	SURCHARGED	
9.000	7A	0.06		1.1	SURCHARGED	
9.001	7B	0.07		1.2	SURCHARGED	
1.006	7	0.17		22.8	SURCHARGED	
10.000	8A	0.01		1.0	FLOOD RISK	
11.000	8B	0.00		0.0	SURCHARGED	
11.001	8C	0.01		0.1	FLOOD RISK	

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

		US/MH	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	Surcharged	Flooded		
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	
1.007	8 360	Winter	30	+0%	1/15	Summer			7.843	0.660	0.000	0.44	
		US/MH	Overflow	Pipe	Flow				Level				
PN	Name	(1/s)	(1/s)	Status	Exceeded								
1.007	8		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 Coeffiecient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 10 Number of Storage Structures 10 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

								Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Level (m)	Depth (m)	Volume (m³)
1.000	3A	15 Winter	100	+30%	30/15 Summer			8.387	0.184	0.000
1.001	3B	30 Winter	100	+30%	30/15 Summer			8.363	0.235	0.000
2.000	3C	15 Winter	100	+30%	100/15 Summer			8.485	0.195	0.000
2.001	3D	30 Winter	100	+30%	30/15 Summer			8.379	0.177	0.000
1.002	3	480 Winter	100	+30%	100/120 Winter			8.255	0.175	0.000
3.000	4A	15 Winter	100	+30%	30/15 Summer			8.613	0.363	0.000
3.001	4B	30 Winter	100	+30%	1/15 Summer			8.472	0.322	0.000
4.000	4C	15 Winter	100	+30%	30/15 Summer			8.499	0.474	0.000
4.001	4D	480 Winter	100	+30%	30/15 Summer			8.300	0.300	0.000
1.003	4	480 Winter	100	+30%	100/60 Summer			8.254	0.358	0.000
5.000	10A	15 Winter	100	+30%	100/15 Summer			8.557	0.267	0.000
5.001	10B	60 Winter	100	+30%	30/15 Summer			8.390	0.315	0.000
6.000	10C	15 Winter	100	+30%	100/15 Summer			8.282	0.057	0.000
6.001	10D	15 Winter	100	+30%	1/15 Summer			8.268	0.378	0.000
1.004	5	480 Winter	100	+30%	30/120 Winter			8.251	0.526	0.000
7.000	32A	480 Winter	100	+30%	100/60 Winter			8.258	0.308	0.000
7.001	32B	480 Winter	100	+30%	30/15 Summer			8.258	0.483	0.000
7.002	32	480 Winter	100	+30%	30/60 Winter			8.247	0.582	0.000
1.005	6	480 Winter	100	+30%	30/60 Summer			8.246	0.655	0.000
8.000	42A	480 Winter	100	+30%	30/15 Summer			8.275	0.475	0.000
8.001	42B	480 Winter	100	+30%	30/15 Summer			8.274	0.527	0.000
8.002	42	480 Winter	100	+30%	30/60 Winter			8.246	0.571	0.000
9.000	7A	480 Winter	100	+30%	30/120 Winter			8.269	0.544	0.000
9.001	7B	480 Winter	100	+30%	30/15 Summer			8.272	0.629	0.000
1.006	7	480 Winter	100	+30%	30/30 Winter			8.245	0.687	0.000
10.000	8A	480 Winter	100	+30%	30/30 Winter			8.243	0.703	0.000
11.000	8B	480 Winter	100	+30%	30/60 Winter			8.243	0.593	0.000
11.001	8C	480 Winter	100	+30%	30/30 Winter			8.243	0.708	0.000

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100 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	3A	1.04		16.2	FLOOD RISK	
1.001	3B	0.23		3.1	FLOOD RISK	
2.000	3C	1.47		22.9	FLOOD RISK	
2.001	3D	0.18		2.9	FLOOD RISK	
1.002	3	0.08		5.1	SURCHARGED	
3.000	4A	1.58		31.2	FLOOD RISK	
3.001	4B	0.05		3.8	FLOOD RISK	
4.000	4C	3.57		38.8	SURCHARGED	
4.001	4D	0.05		2.5	SURCHARGED	
1.003	4	0.18		12.2	SURCHARGED	
5.000	10A	1.16		27.0	FLOOD RISK	
5.001	10B	0.10		3.5	SURCHARGED	
6.000	10C	0.44		15.9	SURCHARGED	
6.001	10D	0.15		3.7	SURCHARGED	
1.004	5	0.30		19.6	SURCHARGED	
7.000	32A	0.07		1.7	FLOOD RISK	
7.001	32B	0.02		1.1	FLOOD RISK	
7.002	32	0.05		1.7	FLOOD RISK	
1.005	6	0.25		20.1	SURCHARGED	
8.000	42A	0.26		3.7	FLOOD RISK	
8.001	42B	0.05		1.9	FLOOD RISK	
8.002	42	0.05		3.3	FLOOD RISK	
9.000	7A	0.11		1.9	FLOOD RISK	
9.001	7B	0.07		1.4	FLOOD RISK	
1.006	7	0.17		23.0	FLOOD RISK	
10.000	8A	0.01		1.6	FLOOD RISK	
11.000	8B	0.00		0.0	FLOOD RISK	
11.001	8C	0.00		0.0	FLOOD RISK	



Micro
Drainage

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.
									Level (m)	Depth (m)	Volume (m³)	
1.007	8 480	Winter	100	+30%	1/15	Summer			8.243	1.060	0.000	0.44

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	8		5.0	FLOOD RISK	