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Date 25/06/2020 File 200625 Site SW network rev b.MDX	Designed by SDL Checked by	
Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	23.738	0.158	150.2	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	16.267	0.108	150.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	2.121	0.014	151.5	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	9.967	0.066	151.0	0.030	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	29.454	0.131	224.8	0.081	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.37	8.766	0.000	0.0	0.0	0.0	1.06	42.3	0.0
1.001	50.00	5.63	8.608	0.000	0.0	0.0	0.0	1.06	42.3	0.0
2.000	50.00	5.04	8.650	0.000	0.0	0.0	0.0	0.81	14.4	0.0
2.001	50.00	5.25	8.636	0.030	0.0	0.0	0.0	0.82	14.4	4.1
1.002	50.00	6.10	8.500	0.111	0.0	0.0	0.0	1.04	73.8	15.0

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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
1.003	18.012	0.042	428.9	0.036	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.000	2.077	0.045	46.2	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	8.745	0.078	112.1	0.096	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	18.084	0.045	401.9	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	1.493	0.025	59.7	0.000	5.00	0.0	0.600	o	150	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)
1.003	50.00	6.40	8.369	0.147	0.0	0.0	0.0	0.98	155.1	19.9
3.000	50.00	5.02	8.800	0.000	0.0	0.0	0.0	1.48	26.2	0.0
3.001	50.00	5.18	8.755	0.096	0.0	0.0	0.0	0.95	16.8	13.0
1.004	50.00	6.70	8.327	0.243	0.0	0.0	0.0	1.01	160.3	32.9
4.000	50.00	5.02	8.435	0.000	0.0	0.0	0.0	1.30	23.0	0.0

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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
4.001	5.547	0.193	28.7	0.156	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	18.849	0.047	401.0	0.018	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	48.674	0.123	395.7	0.108	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.000	73.295	0.430	170.5	0.075	5.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	39.940	0.534	74.8	0.043	5.00	0.0	0.600	o	150	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)
4.001	50.00	5.07	8.410	0.156	0.0	0.0	0.0	1.89	33.3	21.1
1.005	50.00	7.01	8.282	0.417	0.0	0.0	0.0	1.01	160.5	56.5
1.006	50.00	7.81	8.235	0.525	0.0	0.0	0.0	1.02	161.6	71.1
5.000	50.00	6.22	8.616	0.075	0.0	0.0	0.0	1.00	39.7	10.2
6.000	50.00	5.57	9.007	0.043	0.0	0.0	0.0	1.16	20.6	5.8

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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
6.001	9.264	0.062	149.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	7.127	0.019	375.1	0.037	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	78.290	0.047	1665.7	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
7.000	2.919	0.100	29.2	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	12.041	0.113	106.6	0.096	0.00	0.0	0.600	o	150	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)
6.001	50.00	5.76	8.473	0.043	0.0	0.0	0.0	0.82	14.5	5.8
1.007	50.00	7.93	8.111	0.680	0.0	0.0	0.0	1.04	166.0	92.1
1.008	43.87	10.59	8.092	0.680	0.0	0.0	0.0	0.49	77.8	92.1
7.000	50.00	5.03	9.300	0.000	0.0	0.0	0.0	1.87	33.1	0.0
7.001	50.00	5.23	8.820	0.096	0.0	0.0	0.0	0.97	17.2	13.0

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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
8.000	3.756	0.033	113.8	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
8.001	8.059	0.066	122.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.002	11.174	0.065	171.9	0.025	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.003	9.461	0.075	126.1	0.012	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.004	10.474	0.071	147.5	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.002	73.310	0.179	409.6	0.178	0.00	0.0	0.600	o	450	Pipe/Conduit	
7.003	20.593	0.228	90.3	0.086	0.00	0.0	0.600	o	450	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)
8.000	50.00	5.07	8.750	0.000	0.0	0.0	0.0	0.94	16.6	0.0
8.001	50.00	5.21	8.717	0.000	0.0	0.0	0.0	0.91	16.0	0.0
8.002	50.00	5.46	8.684	0.025	0.0	0.0	0.0	0.76	13.5	3.4
8.003	50.00	5.63	8.619	0.037	0.0	0.0	0.0	0.89	15.8	5.0
8.004	50.00	5.85	8.544	0.043	0.0	0.0	0.0	0.83	14.6	5.8
7.002	50.00	7.07	8.407	0.317	0.0	0.0	0.0	1.00	158.8	42.9
7.003	50.00	7.23	8.228	0.403	0.0	0.0	0.0	2.14	340.3	54.6

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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
1.009	7.866	0.044	178.8	0.131	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	5.422	0.030	180.7	0.000	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)
1.009	43.69	10.68	8.000	1.214	0.0	0.0	0.0	1.52	241.3	143.6
1.010	43.56	10.74	7.956	1.214	0.0	0.0	0.0	1.51	240.0	143.6

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<u>Online Controls for Surface Network 1</u> <u>Orifice Manhole: 4, DS/PN: 2.001, Volume (m³): 0.2</u> Diameter (m) 0.030 Discharge Coefficient 0.600 Invert Level (m) 8.636 <u>Orifice Manhole: 6, DS/PN: 3.001, Volume (m³): 0.2</u> Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 8.755 <u>Orifice Manhole: 7, DS/PN: 4.001, Volume (m³): 1.4</u> Diameter (m) 0.030 Discharge Coefficient 0.600 Invert Level (m) 8.410 <u>Orifice Manhole: 16, DS/PN: 7.001, Volume (m³): 0.2</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 9.200 <u>Orifice Manhole: 20, DS/PN: 8.001, Volume (m³): 1.1</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 8.717 <u>Hydro-Brake® Optimum Manhole: 20, DS/PN: 1.010, Volume (m³): 3.0</u> Unit Reference MD-SHE-0123-7300-1200-7300 Design Flow (l/s) 7.3 Design Head (m) 1.200 Flush-Flo™ Calculated		
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<u>Hydro-Brake® Optimum Manhole: 20, DS/PN: 1.010, Volume (m³): 3.0</u> <table><tr><td>Objective</td><td>Minimise upstream storage</td><td>Invert Level (m)</td><td>7.956</td></tr><tr><td>Application</td><td>Surface</td><td>Minimum Outlet Pipe Diameter (mm)</td><td>150</td></tr><tr><td>Sump Available</td><td>Yes</td><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr><tr><td>Diameter (mm)</td><td>123</td><td></td><td></td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>1.200</td><td>7.3</td><td>Kick-Flo®</td><td>0.759</td><td>5.9</td></tr><tr><td>Flush-Flo™</td><td>0.354</td><td>7.3</td><td>Mean Flow over Head Range</td><td>-</td><td>6.3</td></tr></table> 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 <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>4.4</td><td>0.600</td><td>6.9</td><td>1.600</td><td>8.4</td><td>2.600</td><td>10.5</td><td>5.000</td><td>14.3</td><td>7.500</td><td>17.4</td></tr><tr><td>0.200</td><td>6.9</td><td>0.800</td><td>6.0</td><td>1.800</td><td>8.8</td><td>3.000</td><td>11.2</td><td>5.500</td><td>15.0</td><td>8.000</td><td>17.9</td></tr><tr><td>0.300</td><td>7.3</td><td>1.000</td><td>6.7</td><td>2.000</td><td>9.3</td><td>3.500</td><td>12.1</td><td>6.000</td><td>15.6</td><td>8.500</td><td>18.5</td></tr><tr><td>0.400</td><td>7.3</td><td>1.200</td><td>7.3</td><td>2.200</td><td>9.7</td><td>4.000</td><td>12.9</td><td>6.500</td><td>16.2</td><td>9.000</td><td>19.0</td></tr><tr><td>0.500</td><td>7.1</td><td>1.400</td><td>7.8</td><td>2.400</td><td>10.1</td><td>4.500</td><td>13.6</td><td>7.000</td><td>16.8</td><td>9.500</td><td>19.5</td></tr></table>			Objective	Minimise upstream storage	Invert Level (m)	7.956	Application	Surface	Minimum Outlet Pipe Diameter (mm)	150	Sump Available	Yes	Suggested Manhole Diameter (mm)	1200	Diameter (mm)	123			Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.200	7.3	Kick-Flo®	0.759	5.9	Flush-Flo™	0.354	7.3	Mean Flow over Head Range	-	6.3	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)	Depth (m)	Flow (l/s)	0.100	4.4	0.600	6.9	1.600	8.4	2.600	10.5	5.000	14.3	7.500	17.4	0.200	6.9	0.800	6.0	1.800	8.8	3.000	11.2	5.500	15.0	8.000	17.9	0.300	7.3	1.000	6.7	2.000	9.3	3.500	12.1	6.000	15.6	8.500	18.5	0.400	7.3	1.200	7.3	2.200	9.7	4.000	12.9	6.500	16.2	9.000	19.0	0.500	7.1	1.400	7.8	2.400	10.1	4.500	13.6	7.000	16.8	9.500	19.5
Objective	Minimise upstream storage	Invert Level (m)	7.956																																																																																																									
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<u>Storage Structures for Surface Network 1</u>			
<u>Porous Car Park Manhole: 3, DS/PN: 2.000</u>			
Infiltration Coefficient Base (m/hr)	0.00000	Porosity 0.30	Slope (1:X) 0.0
Membrane Percolation (mm/hr)	1000	Invert Level (m) 8.650	Depression Storage (mm) 5
Max Percolation (l/s)	202.7	Width (m) 4.8	Evaporation (mm/day) 3
Safety Factor	2.0	Length (m) 152.0	Membrane Depth (mm) 0
<u>Complex Manhole: S2, DS/PN: 1.003</u>			
<u>Porous Car Park</u>			
Infiltration Coefficient Base (m/hr)	0.00000	Porosity 0.30	Slope (1:X) 0.0
Membrane Percolation (mm/hr)	1000	Invert Level (m) 8.800	Depression Storage (mm) 5
Max Percolation (l/s)	54.7	Width (m) 4.8	Evaporation (mm/day) 3
Safety Factor	2.0	Length (m) 41.0	Membrane Depth (mm) 0
<u>Porous Car Park</u>			
Infiltration Coefficient Base (m/hr)	0.00000	Porosity 0.30	Slope (1:X) 0.0
Membrane Percolation (mm/hr)	1000	Invert Level (m) 8.800	Depression Storage (mm) 5
Max Percolation (l/s)	75.0	Width (m) 10.0	Evaporation (mm/day) 3
Safety Factor	2.0	Length (m) 27.0	Membrane Depth (mm) 0
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<u>Porous Car Park Manhole: 5, DS/PN: 3.000</u>																										
<table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Invert Level (m)</td><td>8.800</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Max Percolation (l/s)</td><td>147.2</td><td>Width (m)</td><td>5.0</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Length (m)</td><td>106.0</td><td>Membrane Depth (mm)</td><td>0</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0	Membrane Percolation (mm/hr)	1000	Invert Level (m)	8.800	Depression Storage (mm)	5	Max Percolation (l/s)	147.2	Width (m)	5.0	Evaporation (mm/day)	3	Safety Factor	2.0	Length (m)	106.0	Membrane Depth (mm)	0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0																					
Membrane Percolation (mm/hr)	1000	Invert Level (m)	8.800	Depression Storage (mm)	5																					
Max Percolation (l/s)	147.2	Width (m)	5.0	Evaporation (mm/day)	3																					
Safety Factor	2.0	Length (m)	106.0	Membrane Depth (mm)	0																					
<u>Porous Car Park Manhole: 6, DS/PN: 4.000</u>																										
<table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Invert Level (m)</td><td>8.700</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Max Percolation (l/s)</td><td>322.0</td><td>Width (m)</td><td>4.2</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Length (m)</td><td>276.0</td><td>Membrane Depth (mm)</td><td>0</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0	Membrane Percolation (mm/hr)	1000	Invert Level (m)	8.700	Depression Storage (mm)	5	Max Percolation (l/s)	322.0	Width (m)	4.2	Evaporation (mm/day)	3	Safety Factor	2.0	Length (m)	276.0	Membrane Depth (mm)	0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0																					
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Safety Factor	2.0	Length (m)	276.0	Membrane Depth (mm)	0																					
<u>Porous Car Park Manhole: 15, DS/PN: 7.000</u>																										
<table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Invert Level (m)</td><td>9.300</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Max Percolation (l/s)</td><td>150.0</td><td>Width (m)</td><td>5.0</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Length (m)</td><td>108.0</td><td>Membrane Depth (mm)</td><td>0</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0	Membrane Percolation (mm/hr)	1000	Invert Level (m)	9.300	Depression Storage (mm)	5	Max Percolation (l/s)	150.0	Width (m)	5.0	Evaporation (mm/day)	3	Safety Factor	2.0	Length (m)	108.0	Membrane Depth (mm)	0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0																					
Membrane Percolation (mm/hr)	1000	Invert Level (m)	9.300	Depression Storage (mm)	5																					
Max Percolation (l/s)	150.0	Width (m)	5.0	Evaporation (mm/day)	3																					
Safety Factor	2.0	Length (m)	108.0	Membrane Depth (mm)	0																					
<u>Porous Car Park Manhole: 19, DS/PN: 8.000</u>																										
<table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Invert Level (m)</td><td>8.750</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Max Percolation (l/s)</td><td>156.0</td><td>Width (m)</td><td>15.6</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Length (m)</td><td>36.0</td><td>Membrane Depth (mm)</td><td>0</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0	Membrane Percolation (mm/hr)	1000	Invert Level (m)	8.750	Depression Storage (mm)	5	Max Percolation (l/s)	156.0	Width (m)	15.6	Evaporation (mm/day)	3	Safety Factor	2.0	Length (m)	36.0	Membrane Depth (mm)	0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0																					
Membrane Percolation (mm/hr)	1000	Invert Level (m)	8.750	Depression Storage (mm)	5																					
Max Percolation (l/s)	156.0	Width (m)	15.6	Evaporation (mm/day)	3																					
Safety Factor	2.0	Length (m)	36.0	Membrane Depth (mm)	0																					
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Time Area Diagram for Green Roof at Pipe Number 3.000 (Surface Network 1)

Area (m³) 530 Depression Storage (mm) 5 Evaporation (mm/day) 3 Decay Coefficient 0.050

Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)
0 4	0.009631	20 24	0.003543	40 44	0.001303	60 64	0.000480	80 84	0.000176	100 104	0.000065
4 8	0.007885	24 28	0.002901	44 48	0.001067	64 68	0.000393	84 88	0.000144	104 108	0.000053
8 12	0.006456	28 32	0.002375	48 52	0.000874	68 72	0.000321	88 92	0.000118	108 112	0.000043
12 16	0.005286	32 36	0.001944	52 56	0.000715	72 76	0.000263	92 96	0.000097	112 116	0.000036
16 20	0.004328	36 40	0.001592	56 60	0.000586	76 80	0.000215	96 100	0.000079	116 120	0.000029

Time Area Diagram for Green Roof at Pipe Number 4.000 (Surface Network 1)

Area (m³) 1130 Depression Storage (mm) 5 Evaporation (mm/day) 3 Decay Coefficient 0.050

Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)
0 4	0.020534	20 24	0.007554	40 44	0.002779	60 64	0.001022	80 84	0.000376	100 104	0.000138
4 8	0.016812	24 28	0.006185	44 48	0.002275	64 68	0.000837	84 88	0.000308	104 108	0.000113
8 12	0.013765	28 32	0.005064	48 52	0.001863	68 72	0.000685	88 92	0.000252	108 112	0.000093
12 16	0.011269	32 36	0.004146	52 56	0.001525	72 76	0.000561	92 96	0.000206	112 116	0.000076
16 20	0.009227	36 40	0.003394	56 60	0.001249	76 80	0.000459	96 100	0.000169	116 120	0.000062

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Time Area Diagram for Green Roof at Pipe Number 7.000 (Surface Network 1)

Area (m³) 800 Depression Storage (mm) 5 Evaporation (mm/day) 3 Decay Coefficient 0.050

Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)
0 4	0.014538	20 24	0.005348	40 44	0.001967	60 64	0.000724	80 84	0.000266	100 104	0.000098
4 8	0.011902	24 28	0.004379	44 48	0.001611	64 68	0.000593	84 88	0.000218	104 108	0.000080
8 12	0.009745	28 32	0.003585	48 52	0.001319	68 72	0.000485	88 92	0.000178	108 112	0.000066
12 16	0.007978	32 36	0.002935	52 56	0.001080	72 76	0.000397	92 96	0.000146	112 116	0.000054
16 20	0.006532	36 40	0.002403	56 60	0.000884	76 80	0.000325	96 100	0.000120	116 120	0.000044

Time Area Diagram for Green Roof at Pipe Number 8.000 (Surface Network 1)

Area (m³) 560 Depression Storage (mm) 5 Evaporation (mm/day) 3 Decay Coefficient 0.050

Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)	Time (mins) From: To:	Area (ha)
0 4	0.010176	20 24	0.003744	40 44	0.001377	60 64	0.000507	80 84	0.000186	100 104	0.000069
4 8	0.008332	24 28	0.003065	44 48	0.001128	64 68	0.000415	84 88	0.000153	104 108	0.000056
8 12	0.006821	28 32	0.002509	48 52	0.000923	68 72	0.000340	88 92	0.000125	108 112	0.000046
12 16	0.005585	32 36	0.002055	52 56	0.000756	72 76	0.000278	92 96	0.000102	112 116	0.000038
16 20	0.004573	36 40	0.001682	56 60	0.000619	76 80	0.000228	96 100	0.000084	116 120	0.000031

Time Area Diagram at Pipe Number 8.000 for Surface Network 1

Total Area (ha) 0.043

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Micro Drainage	Network 2018.1										
<u>Time Area Diagram at Pipe Number 8.000 for Surface Network 1</u> <table><thead><tr><th colspan="2">Time (mins)</th><th>Area</th></tr><tr><th>From:</th><th>To:</th><th>(ha)</th></tr></thead><tbody><tr><td>0</td><td>4</td><td>0.043</td></tr></tbody></table>			Time (mins)		Area	From:	To:	(ha)	0	4	0.043
Time (mins)		Area									
From:	To:	(ha)									
0	4	0.043									
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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 6
Number of Online Controls 6 Number of Storage Structures 8 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
FEH Rainfall Version 2013 Cv (Summer) 1.000
Site Location GB 496649 103835 SU 96649 03835 Cv (Winter) 1.000

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

Profile(s) Summer and Winter
Duration(s) (mins) 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

		Water Surcharged Flooded			Pipe		
US/MH	US/CL	Level	Depth	Volume	Flow / Overflow	Maximum	Flow
PN Name Event	(m)	(m)	(m)	(m³)	Cap. (l/s)	Vol (m³)	(l/s) Status

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000	S1	240 minute 2 year Winter I+0%	9.926	8.766	-0.225	0.000	0.00		0.000	0.0	OK
1.001	S16	240 minute 2 year Winter I+0%	9.588	8.608	-0.225	0.000	0.00		0.000	0.0	OK
2.000	3	720 minute 2 year Summer I+0%	9.700	8.721	-0.079	0.000	0.05		15.532	0.5	OK*
2.001	4	60 minute 2 year Summer I+0%	9.700	8.771	-0.015	0.000	0.05		0.044	0.6	OK
1.002	S15	60 minute 2 year Summer I+0%	9.681	8.584	-0.216	0.000	0.17		0.172	11.6	OK
1.003	S2	480 minute 2 year Summer I+0%	9.769	8.506	-0.313	0.000	0.05		0.593	5.6	OK
3.000	5	600 minute 2 year Winter I+0%	9.700	9.005	0.055	0.000	0.04		32.831	0.6	SURCHARGED*
3.001	6	600 minute 2 year Winter I+0%	9.700	9.005	0.100	0.000	0.03		0.072	0.4	SURCHARGED
1.004	S3	480 minute 2 year Summer I+0%	9.801	8.506	-0.271	0.000	0.05		0.902	5.9	OK
4.000	6	360 minute 2 year Winter I+0%	10.000	8.831	0.246	0.000	0.11		45.927	1.1	SURCHARGED
4.001	7	360 minute 2 year Winter I+0%	10.000	8.831	0.271	0.000	0.04		0.368	1.2	SURCHARGED
1.005	S4	480 minute 2 year Summer I+0%	9.933	8.506	-0.226	0.000	0.06		1.434	7.7	OK
1.006	S5	480 minute 2 year Summer I+0%	10.112	8.505	-0.180	0.000	0.08		1.731	12.2	OK
5.000	14	60 minute 2 year Summer I+0%	9.903	8.698	-0.143	0.000	0.28		0.066	10.7	OK
6.000	18	60 minute 2 year Summer I+0%	9.750	9.065	-0.092	0.000	0.31		0.046	6.3	OK
6.001	19	60 minute 2 year Summer I+0%	9.950	8.547	-0.076	0.000	0.49		0.088	6.2	OK
1.007	S6	480 minute 2 year Summer I+0%	9.702	8.503	-0.058	0.000	0.18		7.705	17.6	OK
1.008	S7	480 minute 2 year Summer I+0%	9.232	8.502	-0.040	0.000	0.18	0.0	1.362	17.2	OK
7.000	15	360 minute 2 year Summer I+0%	10.014	9.404	-0.046	0.000	0.10		16.885	1.9	OK*
7.001	16	60 minute 2 year Summer I+0%	10.014	9.475	0.505	0.000	0.17		0.151	2.6	SURCHARGED
8.000	19	480 minute 2 year Summer I+0%	9.840	8.842	-0.058	0.000	0.11		15.454	1.3	OK
8.001	20	600 minute 2 year Summer I+0%	9.900	8.846	-0.021	0.000	0.09		0.144	1.2	OK
8.002	20	60 minute 2 year Summer I+0%	9.650	8.738	-0.096	0.000	0.28		0.059	3.4	OK
8.003	21	60 minute 2 year Summer I+0%	9.500	8.681	-0.088	0.000	0.36		0.057	5.0	OK

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m ³)	Pipe Flow (l/s)	Status
8.004	22	60 minute 2 year Summer I+0%	9.400	8.615	-0.079	0.000	0.45		0.052	5.8	OK
7.002	S10	60 minute 2 year Summer I+0%	10.033	8.550	-0.307	0.000	0.21		0.244	31.6	OK
7.003	S11	480 minute 2 year Summer I+0%	9.865	8.501	-0.177	0.000	0.06		4.690	15.7	OK
1.009	S13	480 minute 2 year Winter I+0%	9.300	8.499	0.049	0.000	0.06		188.868	9.8	SURCHARGED
1.010	20	600 minute 2 year Summer I+0%	9.300	8.531	0.125	0.000	0.05		1.850	7.3	SURCHARGED

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

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
8.004	22	600 minute 30 year Winter I+0%	9.400	8.834	0.140	0.000	0.23		0.204	3.0	SURCHARGED
7.002	S10	600 minute 30 year Winter I+0%	10.033	8.831	-0.026	0.000	0.08		6.107	12.1	OK
7.003	S11	600 minute 30 year Winter I+0%	9.865	8.823	0.145	0.000	0.05		12.192	13.8	SURCHARGED
1.009	S13	600 minute 30 year Winter I+0%	9.300	8.822	0.372	0.000	0.05		368.090	8.5	SURCHARGED
1.010	20	720 minute 30 year Winter I+0%	9.300	8.857	0.451	0.000	0.05		2.318	7.3	SURCHARGED

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

PN	US/MH Name	Event	US/CL (m)	Water			Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
				Level (m)	Depth (m)	Flooded						
8.004	22	960 minute 100 year Winter I+40%	9.400	9.151	0.457	0.000	0.28			0.255	3.6	FLOOD RISK
7.002	S10	960 minute 100 year Winter I+40%	10.033	9.149	0.292	0.000	0.10			61.255	14.5	SURCHARGED
7.003	S11	960 minute 100 year Winter I+40%	9.865	9.147	0.469	0.000	0.07			12.753	18.4	SURCHARGED
1.009	S13	960 minute 100 year Winter I+40%	9.300	9.145	0.695	0.000	0.06			609.147	10.1	FLOOD RISK
1.010	20	60 minute 100 year Winter I+40%	9.300	9.192	0.786	0.000	0.05			2.799	7.3	FLOOD RISK